Cobot Lift

Lfting to Empower

Cobot Lift User Manual

Compact heavy lifting solutions with true Plug & Play functionality

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Content

Introduction

Congratulations with your Cobot Lift!

The information contained in this manual is the property of Cobot Lift ApS. The information herein is subject to change without notice. This manual is periodically reviewed and revised. Cobot Lift ApS assumes no responsibility for any errors or omissions in this document.

IMPORTANT

The Cobot Lift system is delivered as a finished and complete machine, partly programmed (URCap) and designed for safe operation. Thus, it should be mentioned that in case of major changes in the programming of the robot the whole systems risk assessment must ALWAYS be re-assessed. A risk assessment must include (but not be limited to) all the safety instructions in this manual.

This manual contains important safety information, which must be read and understood by the integrator of Universal Robots/Cobot Lift before the system/robot is powered on for the first time. It is essential to observe and follow all assembly instructions and guidance provided in other chapters and parts of this manual.

The information in this manual does not cover a complete robot application, nor does it cover all peripheral equipment that can influence the safety of the complete system. The complete system must be designed and installed in accordance with the safety requirements set forth in the standards and regulations of the country where the robot is installed.

The integrators of Universal Robot/Cobot Lift are responsible for ensuring that the applicable safety laws and regulations in the country concerned are observed and that any significant hazards in the complete robot application are eliminated.

- Performing a risk assessment for the complete robot system (UR robot, end-effector, Cobot Lift tool, vacuum tube lift). This is initially done by Cobot Lift, but has to be verified during installation by the integrator of the complete system
- Interfacing other machines and additional safety devices if defined by the risk assessment
- Setting up the appropriate safety settings in the software
- Ensuring that the user will not modify any safety measures
- Validating that the total robot system (UR robot, end-effector, Cobot Lift tool, vacuum tube lift) is designed and installed correctly
- Specifying instructions for use
- Marking the robot installation with relevant signs and contact information of the integrator
- Collecting all documentation in a technical file; including the risk assessment and this manual

Any safety information provided in this manual must not be construed as a warranty, by Cobot Lift, that the system will not cause injury or damage, even if it complies with all safety instructions.

UR robots are equipped with special safety-related features, which are purposely designed to enable collaborative operation, where the robot system operates without fences and/or together with a human. Collaborative operation is only intended for non-hazardous applications, where the complete application, including tool/end effector, work piece, obstacles and other machines, is without any significant hazards according to the risk assessment of the specific application. This also applies when used in combination with a Cobot Lift.

General Description of the Cobot Lift

The Cobot Lift is a hybrid of several existing technologies, taking the best from each innovation. The collaborate robot technology comes from an UR Robot and the lifting force comes from a conventionalvacuum lift. The result is a collaborate application that can lift items up to 45kg while still being able to run without shielding.

In other words, we let the Cobot solve the automation task, while the vacuum lifter does all the lifting. In order to get these two technologies to work together, we have developed a unique and patented interlocking tool – the Cobot Lift. This tool enables the Cobot to move the vacuum lifter horizontally without being affected by the weight of the load vertically.

Installation of the Cobot Lift

A complete installation with the Cobot Lift tool consists of minimum 4 parts:

1. A Cobot Lift tool with slider, control box, rubber dampers and possibly extra order-specific accessories (like indicatorlamps, pillar for robot, external control screen etc.).
2. An end-effector (e,g, a suction pad for the vacuum lifter).
3. A vacuum tube lifter including pillar, swing arm, vacuum pump with filter and suction hose and frequency converter.
4. A UR10 from Universal Robots.

The vacuum lifter is mounted according to the supplier's instructions (please note requirements for the floor, to ensure secure mounting). The Cobot is mounted approx. 50cm from the pillar (on a separate pillar or possibly mounted on the vacuum lifter column with an arm). The Cobot Lift tool is connected to the vacuum hose and mounted on the Cobot. The control box and extra accessories are connected according to the instructions, and the system is ready for start-up.

Before Use

Before using the Cobot Lift, some important adjustments must be made (See detailed instructions below). In the main, the movements of the Cobot must be limited, ie. since the load can only be lifted vertically, the robot's TCP (tool center point) must be told not to deviate more than 20 degrees on the vertical axis to prevent overloading.

In addition, in the robot's safety settings, rotation must be limited in relation to the coupling tool, to protect fingers and hands from pinching/crushing hazards.

Now load the small USB via the robot's teach pendant and select URCap (a program called Cobot Lift). By clicking the small icon, a program for controlling the robot is loaded. This program broadly constitutes the backbone of the final programming and will help you create programs to fit the current task. This is done to ensure easy and quick programming.

Innitial Start-up Procedure

Before applying power, verify that:
The robot has been properly mechanically mounted and is table
The electrical connections are correct and the power (i.e. voltage, frequency, interfrence levels) is within the specified limits
The proper electrical earth (equalizing potential) is provided
The safety-related parts of the control system are properly installed
The other utilities (i.e. water, air, gas) are properly connected and within specified limits
The peripheral equipement including interlocks is properly connected
The limiting devices that establish the restricted space when utilized are installed
The appropriate safeguarding means are applied
The physical environment is as specified (i.e. lighting and noise levels, temperature, humidity, atmospheric contaminants)
The proper version of all programmes - normal control and safety-related - have been validated and are the versions that are installed (engineering change management)

After applying power, verify that:
The start, stop and mode selection (including the key lock switches) control devices function as intended
Each axis moves and is restricted as intended
Emergency stop and protective stop (where included) circuits and devices are functional
It is possible to disconnect and isolate the external power sources
The teach and playback capabilities function correctly
The environmental conditions are considered for compatibility [e.g explosion, corrosiveness, humidity, dust, temperature, electromagnetic interference (EMI), radio frequency interference (RFI) and electrostatic discharge (ESD)]
All safeguards, protective devices, and interlocks function as intended
All other safeguarding is in place (e.g. barriers, warning devices)
In manual mode, the robot operated properly and can handle the product or workpiece
In automatic (normal) operation, the robot operates properly and can perform the intended task at the rated speed and load
The movements of the Cobot must be limited, ie. since the load can only be lifted vertically, the robot's TCP (tool center point) must be told not to deviate more than 20 degrees on the vertical axis to prevent overloading.
Rotation must be limited in relation to the coupling tool, to protect fingers and hands from pinching/crushing hazards.

The commissioning test or initial start-up procedures should also be performed after completion of any maintenance task or system modification that could affect the integrity of the robot system(s) as designed and installed.

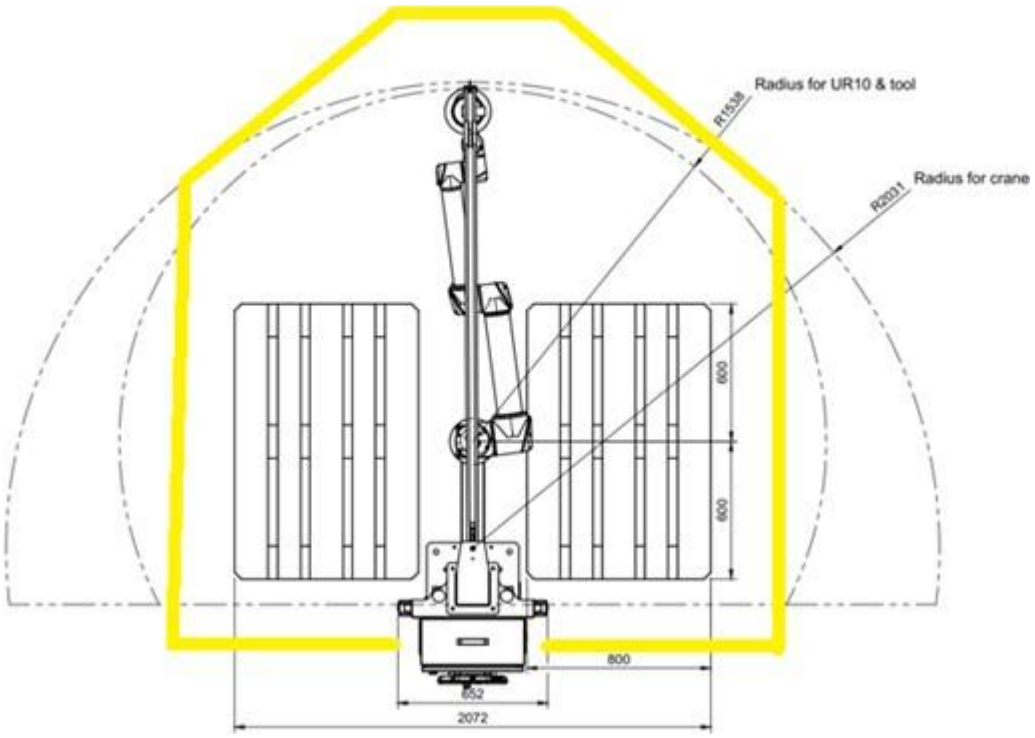
NOTE
Before using the equipment, a comprehensive risk assessment of the entire solution must be carried out according to the Machinery Directive, and a final CE marking of the system must be made. Should the risk assessment show that extra emergency stops/safety scanners or similar are required in the current situation, these can be connected to the robot's emergency stop circuit (see the robot manual for correct connection to the emergency stop circuit).

General Safety Precautions

WARNING, incorrect operation or maintenance can be dangerous and in worst case lead to death!

General
The machine may only be used when all movements and functions are faultless and the safety system is switched on

Intended Use
“Cobot Lift - sack solution” is intended for palletizing or depalletizing sacks. That is, there will be a pickup point or set down point relatively uniform (may differ slightly with the camera) and which is limited within the robot’s working area. In addition, there will be one or two pallets in the immediate vicinity of the robot for palletizing / stacking or depalletizing / unstacking products.
See layout sketch below.
The working area can be limited in the robot’s safety settings if the full working area of the robot is not desired to be used, eg if only one pallet space is used. In connection with defining the robot’s working area, you must be aware that the product in most cases will mean that the area will be larger than without the product and you should therefore expect about 500mm more.
Also make sure there is no other sharp or pointy edges in the immediate area (conveyor or similar) as this might create a possible danger in case the operator is squeezed or pinched between the product and the edge.



The process in general is:

1. Robot with tool move above pickup position.
2. Once sack is detected, move vertically down and turn on vacuum gripper.
3. Once vacuum is achieved perform a vertical lift that is high enough to prevent crushing hazards when moving away from the pickup position.
4. Transport the sack to a pre-position above the set down point. This is to ensure transport path is always the same. Maintain clearance to any fixed components to prevent crushing between fixed components and robot or sack.
5. Move above specific setdown position.
6. Move vertical downwards to place the sack.
7. Release vacuum.
8. Repeat from 1.

Unintended Use
Cobot Lift Sack solution is not intended to handle hazardous products (sacks) such as toxic chemicals. It is not designed to stand in ATEX areas. It is not designed to lift people or animals. It is not designed for direct food production and direct contact with food.

Selection and Qualification of Staff

Operator
Operators must have read and understood instructions for use, instructions, workplace instructions, etc. and must, by reviewing the operating instructions, and workplace instructions and by peer training, have knowledge of the machine's function and safety conditions and be able to make general adjustments and be trained/ instructed in the machine's use, handling, etc. Before starting up or servicing the machine, the operating personnel must be informed of all installed safety features.

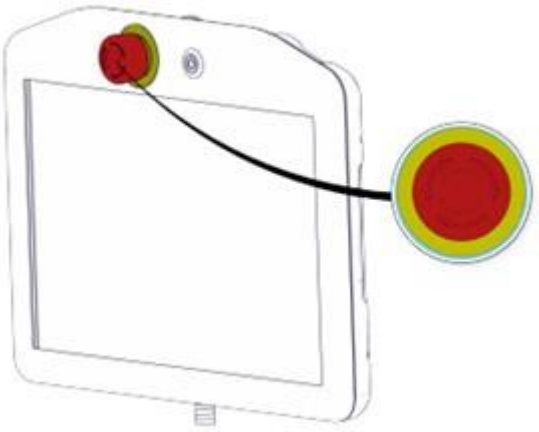
Maintenance personel
Maintenance personnel must be qualified either in a professional education such as, but not limited to, a blacksmith, electrician, or in a training that equates them with this. The person in question must have knowledge of the machine's function and safety conditions as well as have knowledge of the location of safe access routes and emergency stops at and on the machine. Maintenance personnel must have read and understood instructions for use, instructions, workplace instructions, etc. Before starting work, repairers and maintenance personnel must be instructed in safety conditions around the machine. Cobot Lift manual. New maintenance personnel must be trained by an experienced colleague before the maintenance work is carried out.

Personel Protective Equipment

It is recommended that safety shoes be used during operation and transport.

Safety Instructions

- Never use the machine if it is damaged.
- If a dangerous fault occurs, the emergency stop must be activated immediately. Write down the circumstances that led to the error and contact the supplier.
- Never make changes to safety-related equipment or software.
- Emergency stop is placed on the teach pendant of the robot and should be placed close to the operator, so activating can be done immediately in case of emergency.



- There will be residual risk involved in running the Cobot Lift as it is not fenced, however it is using a collaborative robot and will stop in case of collision and is not dangerous.
- The robot should however be stopped before entering the robots working area to avoid collision when possible.
- There should be markings on the floor (tape, paint, or other) so it is clearly shown where the working area of the robot is.

Maintenance and repair
WARNING! Danger of shock! There is a risk of shock if you open the electrical panel.

All sources of supply must be interrupted before such an action. The operation may only be performed by qualified Personnel. A special key must be used to open the locker. This is delivered with the machine

Safety Instructions

In the event that it is desired to use the machine for other than its intended use, a new risk assessment and CE approval must be performed for the machine for its new use.

Risk assessment
Even if the machine is CE marked, the validity of this marking will lapse in the event that their constructive changes are made or the machine is integrated in a plant. One of the most important tasks for an integrator is the risk assessment, as the safety of the machine depends on how the machine is integrated (for example with tools, obstacles and other machines). The integrator is advised to use the guidelines in ISO 12100 to prepare the risk assessment.

Emergency Measures

Fire fighting
In the event of a fire in the machine, the emergency stop must be used immediately! After this, the nearest fire extinguishing device must be used to prevent the fire from spreading.

Possible emissions
In case of smoke development from the machine, the emergency stop must be used immediately! The nearest fire extinguishing device must then be prepared for use in the event of a fire. Adequate ventilation must be provided to remove the smoke from the room.

First aid measures
In the event of personal injury, the injury must be stopped appropriately; use the emergency stop if the damage can develop, otherwise the machine must be shut down via the control system. For mechanical release of the UR robot's link, refer to the UR manual section 1.9 - Movement with and without travel current.

Scope of Supply

Below you will find a few examples of how the Cobot Lift can be used as well as a description of the most common accessories.

Pos.	Description, Stationary Cobot Lift	Pcs.
1	Cobot Lift patended connection and controlling tool (robot/ vacuumtubelifter).	1
2	Release valve, electrically controlled from robot.	1
3	Mounting arm for robot, incl. flanges for robot and column. Can also be mounted on separate column if desired. Optional.	1
4	Status indicator with button and light, 2pcs.	1
5	Controlbox with electrical components, incl. frequency converter for vacuumpump.	1
	Preprogrammed software to simplify required installation programming (URCap). Documentation incl. parts lists, user manual and installation guidance.	1

Pos.	Description, Mobile Cobot Lift	Pcs.
1	Cobot Lift patended connection and controlling tool (robot/ vacuumtubelifter).	1
2	Release valve, electrically controlled from robot.	1
3	Steel cabinet painted in light grey and with solid bottom plate for maximum stability. With electrical components, incl. frequency converter for vacuum pump and robot controller.	1
4	Status indicator with button and light on backside of cabinet, 2pcs.	1
5	Controlbox with electrical components, incl. frequency converter for vacuum pump.	1
	Preprogrammed software to simplify required installation programming (URCap). Documentation incl. parts lists, user manual and installation guidance.	1

NOTE

(UR) Universal Robot with controller can be bought locally. Tube lifter and customer specific suction cup has to specified when ordering the Cobot Lift.

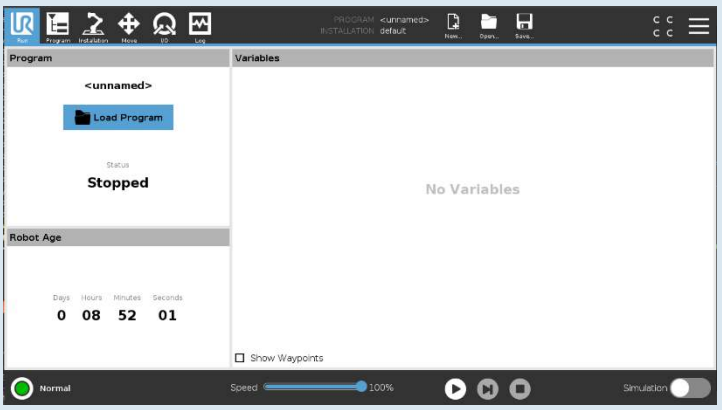
To be priced/sold separately: Touch screen for easy operation customized to the palletizing solution.

Safety Settings

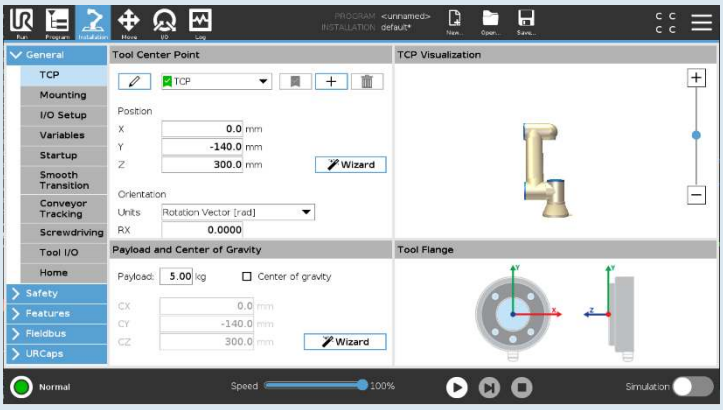
Before starting the production, it is important to make some general safety settings of the robot. First off, the TCP must be set. Secondly, the vertical orientation of the tool must be limited to avoid unnecessary forces to the robot. And to make sure the Cobot Lift tool does not reach an angle where pinching of a finger is possible, you can set the robot tool orientation limits like described.

So please follow this “safety-settings-guide” to the end, before you start running the system.

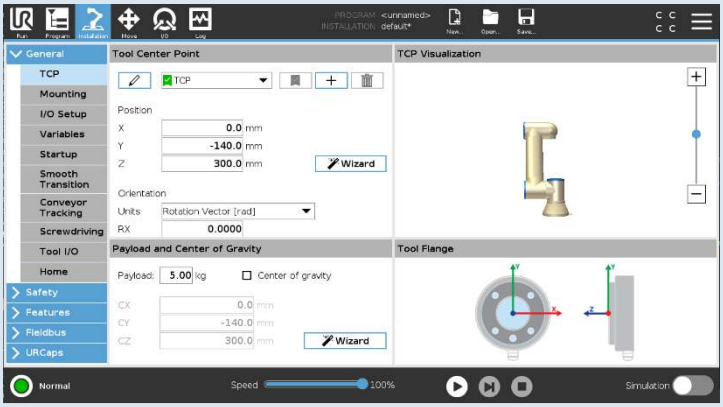
Step 1. Select “Program Robot”



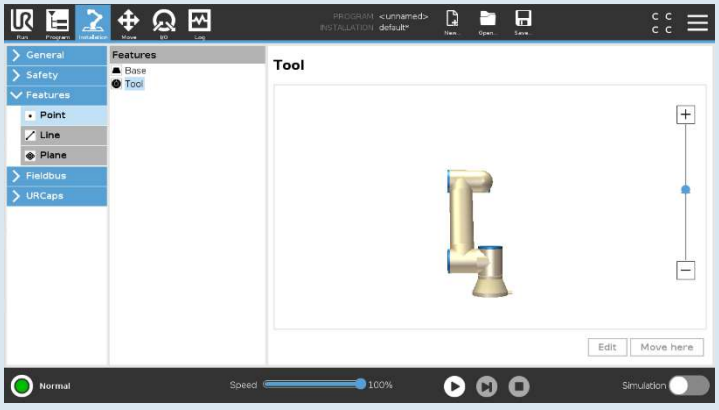
Step 2. Choose ”Installation”



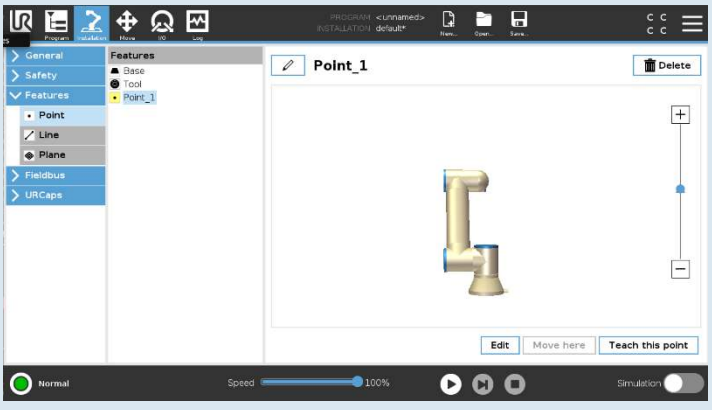
Step 3. Select the “TCP Configuration” tab and enter the Z value at ex. 300.00 mm. Values will vary from one tool/ application. X and Y values are set as usual when setting up the robot. In this case Y is -140mm. Payload is typically set between 4 and 6 kg.



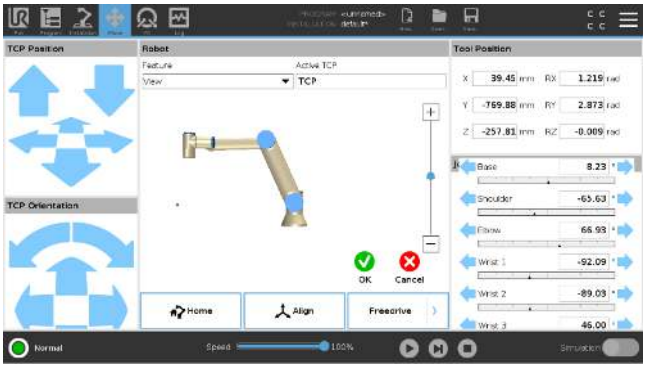
Step 4. Select the “Features” tab and then “Point”



Step 5. Select “Point 1”

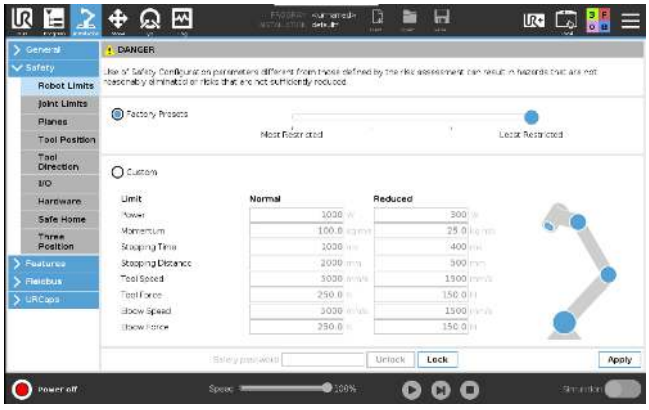


Step 6. Teach this point select "OK"

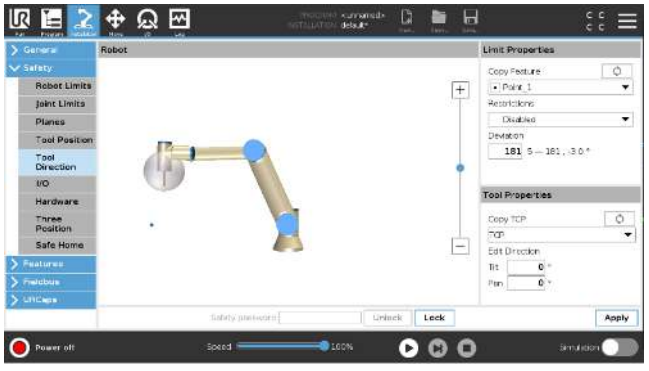


Step 8. Pick "Safety" and select the "Safety password" box

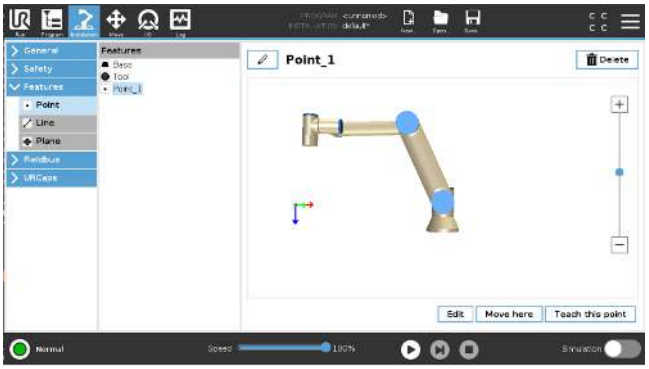
Step 10. "Set slider to least restricted"



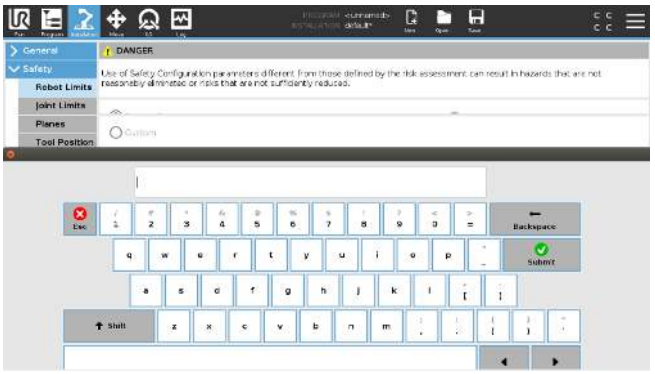
Step 12. In tool directions select Point 1 under copy feature



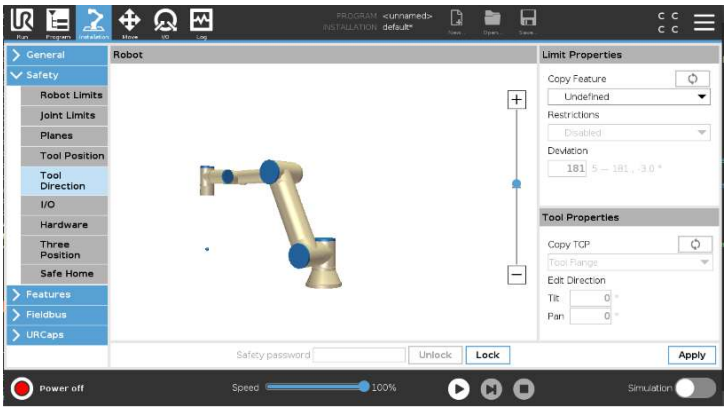
Step 7. You can now see the points you have chosen



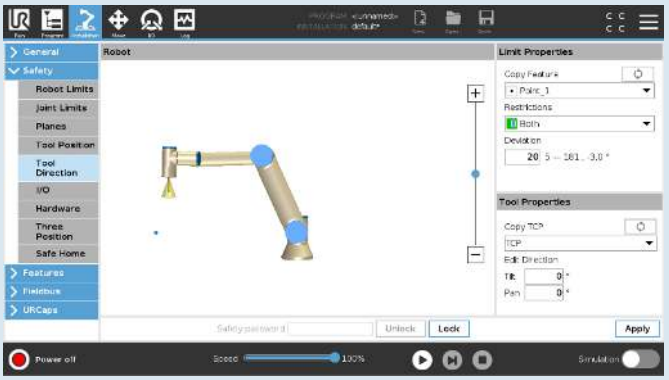
Step 9. Type your safety password



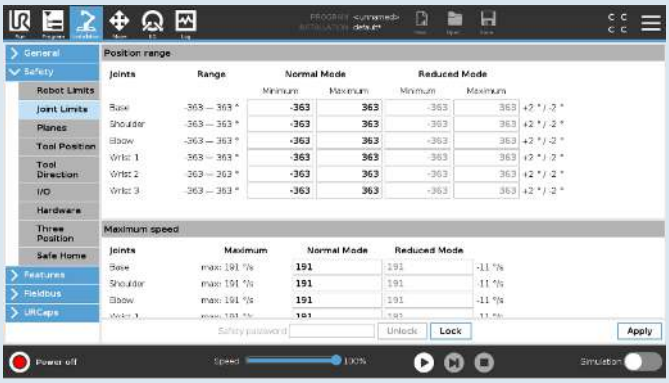
Step 11. "Select tool direction"



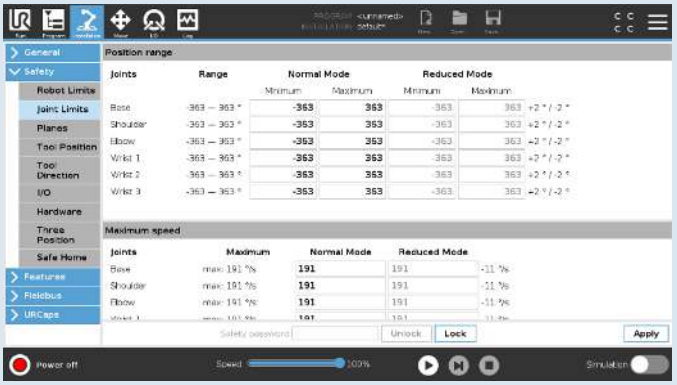
Step 13. In restrictions select “Both” and in “Deviation” type in “20”. Nowthe robot will only be able to make small deviations in the vertical direction. This means the tools orientation will always be close to vertical, to avoid unnecessary forces to the robot



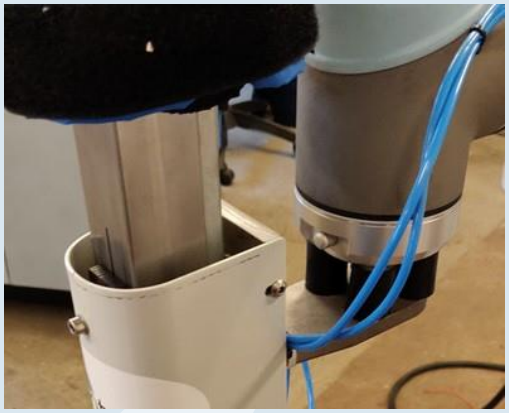
Step 14. Select the “Joint Limits” tab



Step 15. Select “Position range”

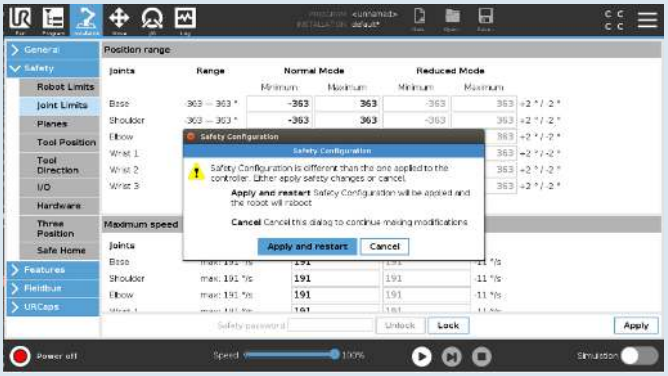


Step 16. If the Cobot Lift is positioned straight forward, like shown on the picture below with the electrical connector facing forward. Set “Wrist 3” to ex. -133 and 93. Value will, however, depend on how the tool is mounted on the robot tool flange and a small test before setting the value would be preferable.



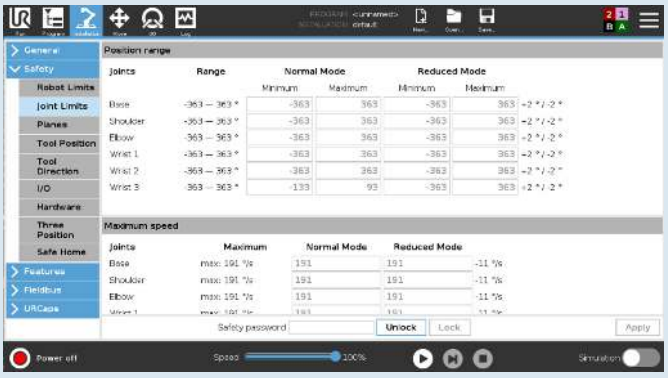
Then click “Apply” in the bottom right corner. The idea is to avoid pinching, but also maintain maximum possible rotation, so please adjust value to match the best compromise.

Step 17. This pop-up will now appear. Select “Apply and restart”.



Step 18. Select “Confirm Safety Configuration”

Step 19. Restart the robot by clicking the red dot in the left corner.

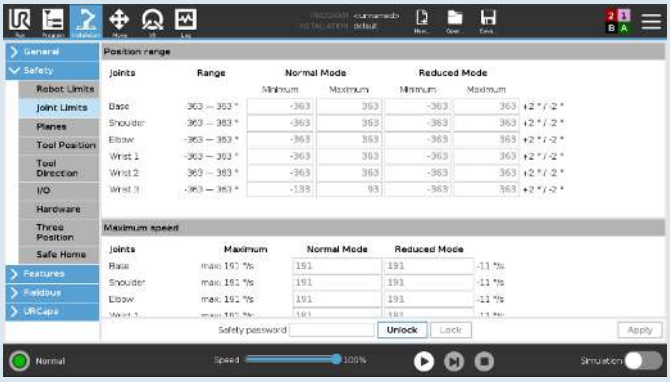


Step 20. Now select “ON”

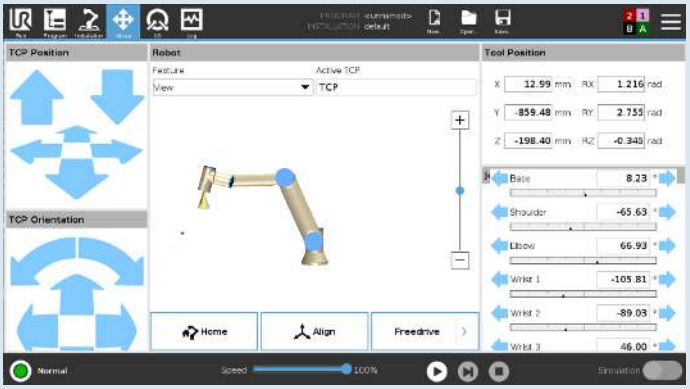
Step 21. Click “START”

Step 22. Click “OK” in the bottom right corner

Step 23. Go to the joint limits page and select the “Move” button in the top bar.

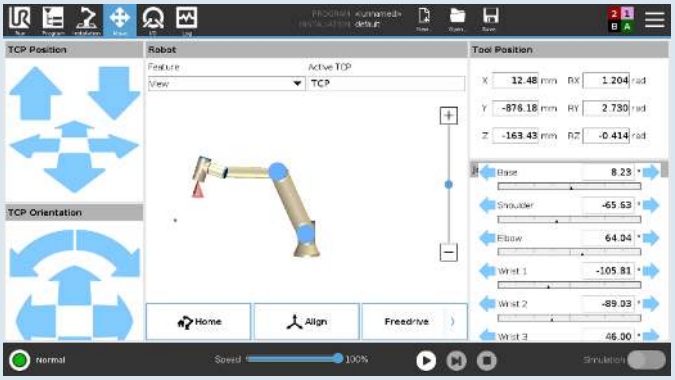


Step 24. Click on one of the arrows by “Wrist 1”. A yellow field will appear when you tip the robot.



Step 25. If you continue to press on one of the arrows, the field will turn red and you will get this pop-up message. Press “Enable Robot”

Step 26. After you have pressed “Enable Robot” you are done.



Well done!

You have now completed the safety installation steps for the Cobot Lift!

Other Safety Related Settings

When using the Cobot Lift there are other safety features to be aware of. The URCap has a demon included which is monitoring the state of the robot. In case the vacuum level is getting low and the force on the robot starts to increase, this will set the robot in a kind of freedrive in the vertical direction.

The reason for this is that in case of power failure on the vacuum system we don't want to risk dropping a heavy load, so a mechanical valve in the top of the vacuum tube closes and trapps the vacuum in the lifting tube. The trapped vacuum will slowly be released and the burden/product will slowly go down to the floor.

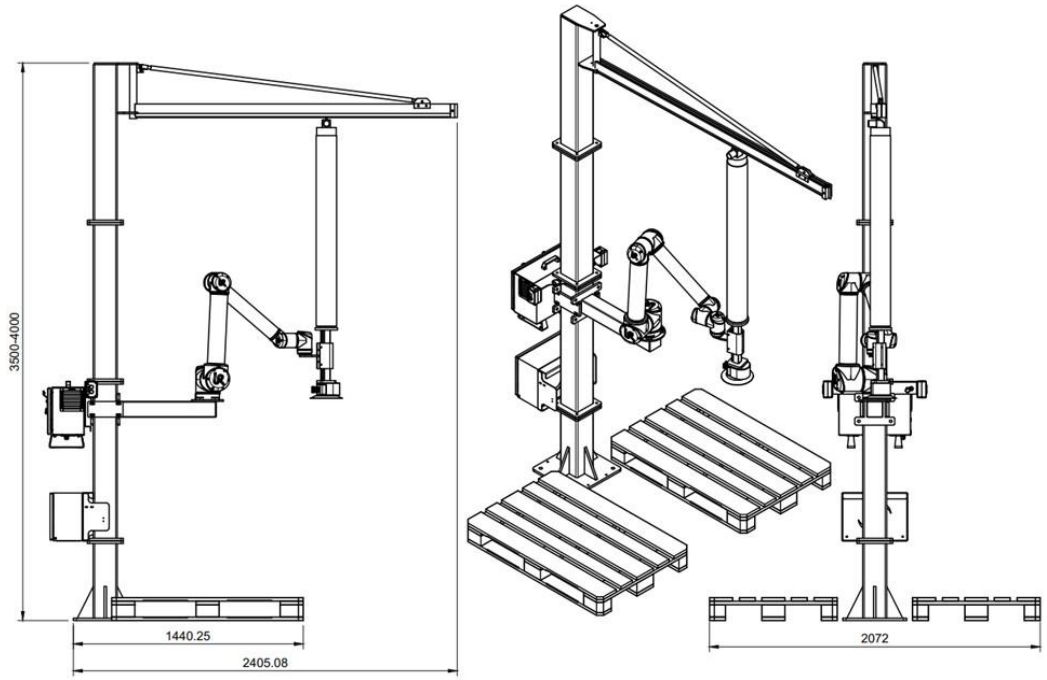
As an extra safety precaution a relay is monitoring the power supply to the vacuum pump and when the power is off, the demon is activated and the burden will be lowered as described above.

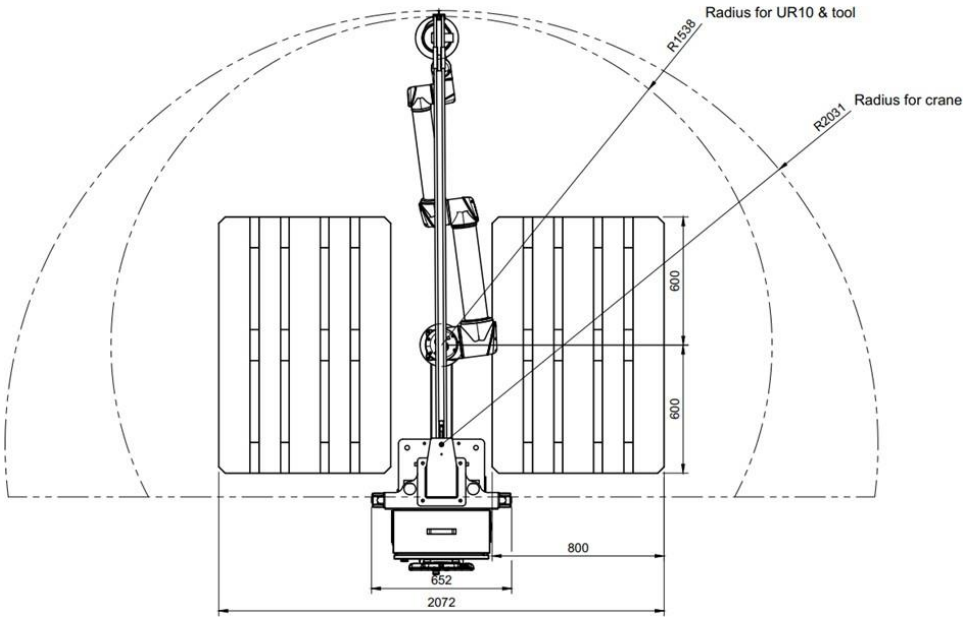
At the same time the relay is setting an alarm and a light to indicate to the operator that a fault and potential danger is occurring and that he/she should "step out of harms way". In most palletizing installations the "risk zones" will be very small if any, but should be marked, so the operator knows if he/she is standing ina potential danger zone.

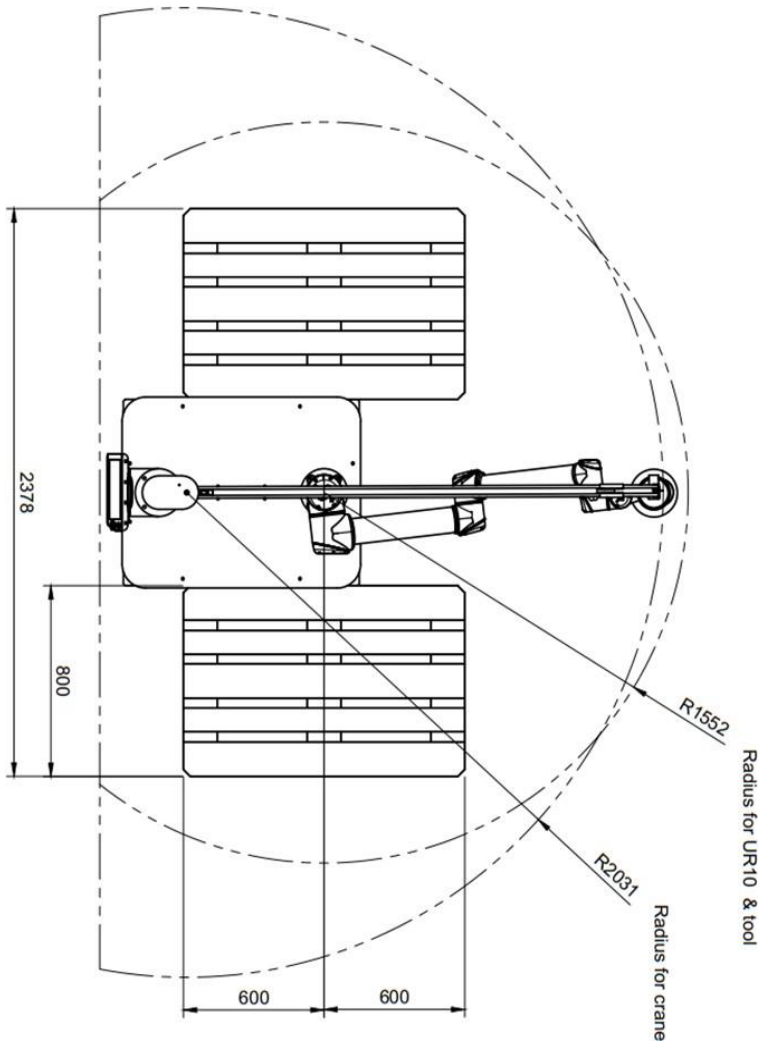
Technical specification

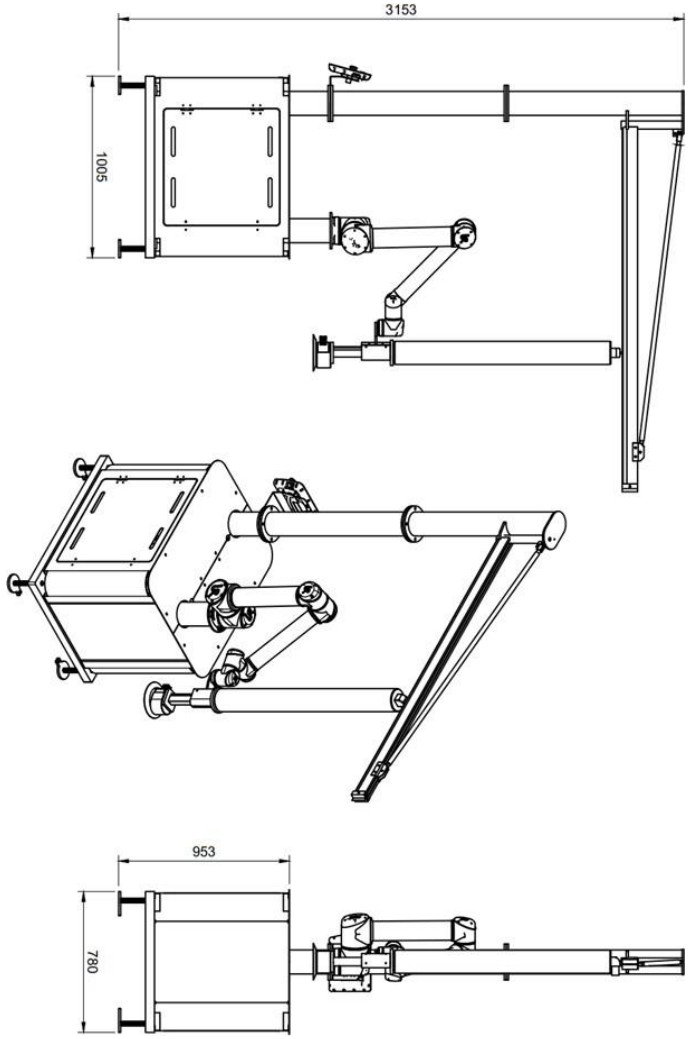
Technical Details	Stationary Cobot Lift	Mobile Cobot Lift
Payload	5-45kg	
Reach	Up to 1400mm, can be extended to 1500mm	
Power supply	3x400v/16Amp	
Air supply	5-8 bar	
Stacking height	Up to 1600mm (depending on product and reach)	Up to 1400mm (depending on product and reach)
Robot Position Height	The arm on which the Cobot Lift is placed can be adjusted from 700-1400mm. Extra crane module of 0.5m length is incl. for more flexibility	Approximately 120cm
Dimensions, complete solution with Cobot Lift, vacuum tube lift, crane and cobot arm	Footprint of crane system 40x40cm, 4m modular crane column. Can be extended to 5m if needed	Footprint 80x120cm and 3.2m height
Certifications and standards	Declaration of conformity Directive 2006/42 EC, Annex 1.A	
Cobot compatibility	UR10 CB3 or E-series	
Programming	Cobot Lift URCap in Polyscope	
Vacuum tube lift	120mm vacuum tube and 3kw sidechannel vacuum pump	
Accessories	• Suction foot for sacks • Suction cup for boxes and buckets • Quick connector for end effector • Cobot Lift rotating head • Silencer box vor vacuum pump • Long stroked vacuum tube • 1m extra column	• Suction foot for sacks • Suction cup for boxes and buckets • Quick connector for end effector • Cobot Lift rotating head • Long stroked vacuum tube • 1 meter extra column
End of arm tool/End effector	Vacuum gripper is standard, but can be equipped with mechanical grippers also.	

Stationary Cobot Lift






2378
800
600
600
R1552
Radius for UR10 & tool
R2031
Radius for crane


3153
1005
953
780

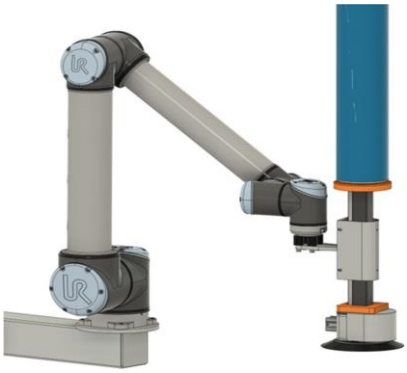
What is in the Box

There are several options when buying the Cobot Lift. Stationary Cobot Lift, Mobile Cobot Lift and Cobot Lift tool kit.

Cobot lift Tool Kit

The Cobot Lift kit is designed to fit directly on any vacuum tube lifter with a 150x150mm squared tube column.

The Cobot Lift kit is delivered in a standard EU pallet, which contains:

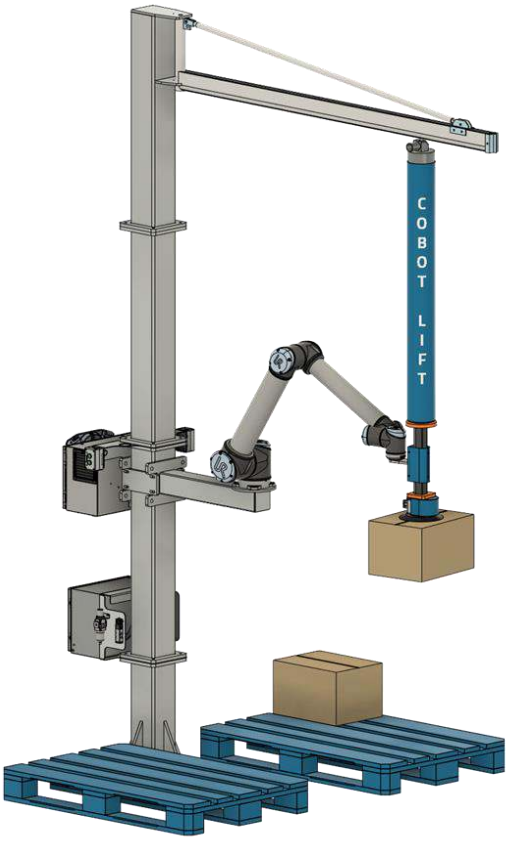


The process in general is:

1. Cobot Lift tool – connector tool between UR10 robot and vacuumlift. Pre-assembled.
2. Rubber vibration dampers for mounting between UR10 robot and Cobot Lift flanges. 4 pcs.
3. Control box containing frequency converter and main switch.
4. Push buttons and cables included.
5. Arm for Robot for a squared 150x150mm column (optional).
6. Pneumatics for release and booster valve.
7. USB stick containing URCap and manual.

Stationary Cobot Lift

The Stationary Cobot Lift is a modular system that can be configured in several heights for different applications. It comes with a modular column in 5 pcs (with a total height of up to 4m above the floor), 2m crane arm, vacuum tube lifter from TAWI (as standard) and mounting brackets for controls, filters, silencers etc. Arm for robot can be mounted from 700mm and up. Typical stacking height is up to 1,6m above the floor on a 80x120cm pallet, but with larger products this can sometimes be extended further.



Mobile Cobot Lift

The Mobile Cobot Lift is delivered as a complete unit, ready for installation. The Mobile system makes it ideal where there is a need for a very flexible production or for fairs. It is delivered with a column in 3 sections (total height of 3,2m from the floor), 2m crane arm, vacuum tube lifter from TAWI (as standard) and mounting brackets for controls, filters, silencers etc mounted inside the cabinet. Robot is mounted in approx. 120cm height. Typical stacking height is up to 1,4m above the floor on a 80x120cm pallet, but can be extended up to 1,55m with fixed legs.

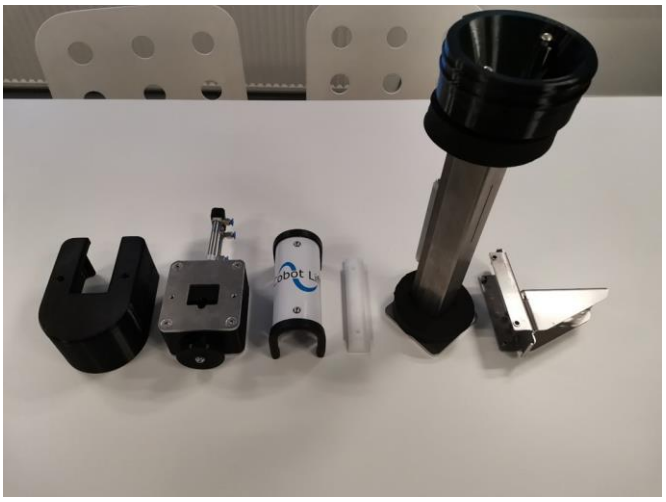
Mounting Instructions

In the following section we will provide a guide as to how to assemble the Cobot Lift tool so it is ready to be installed in the overall installation covering a UR robot arm, vacuum tube lift and end effector.

This is what the tool looks like. A sliding unit with flanges in both ends and a release/booster valve in the bottom. The flanges has to be specified to fit the vacuumtubelifter for the system (ex. Tawi/PIAB, Schmalz, Fezer etc.). As standard the vacuumtube size is prepared for 120mm vacuum tube.

Cobot Lift tool with combination valve ready for mounting of suction foot.

Assembly of the tool. It consist of a sliding member, bracket for mounting on the robot, a combination valve and a valve cover.



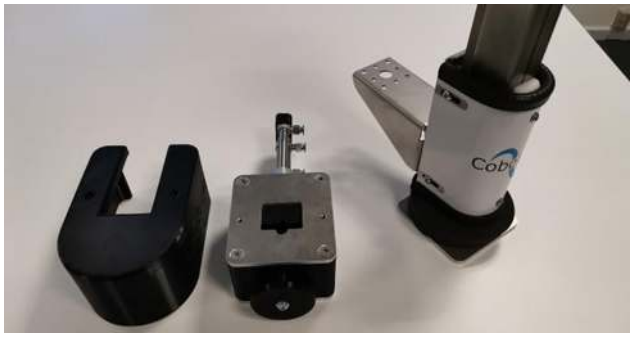
Step 1. Mount the tube connection for the vacuum tube with 2 M6 buttonhead screws and and locknuts. Remember to mount the 4mm O-ring to get a tight seal between the parts.

Step 2. The mounting bracket is fixed by means of 3 x M5 screws on the slider.

Step 3. Mount the slide cover by means of the 4 x M5 buttonhead screws. Make sure the slide block is moving freely when mounted. In case reach is an issue the tool can also be supplied with a longer mounting bracket increasing the reach by 100mm.



Step 4. Mount the combination valve and tighten the 2 M6 special nuts. The tool is ready for mounting of a suction foot.




Alternatively, the suction foot can be mounted with a Cobot Lift quick connector for fast changeover between suction cups. Please be aware that when using some end effectors and the quick connecter, that the release valve is exposed and thereby creating a potential pinching risk. If this is the case, please use ourcover plate to eliminate the risk.



In some suction heads a perforated plate need to be mounted (typically when lifting sacks). Please check directions of this subject with your suction head supplier.

Step 5. Vibration dampers are mounted on the tool flange.

Step 6. The Cobot Lift tool is mounted on the vibration dampers.

Step 7. Connect the airhoses to the vent valve and align them to the robot. Make sure the robot can move freely without stretching the hoses too much or pinching them.

Step 8. The vacuum tube is mounted on the Cobot Lift, by using a hoseclamp on the top plastic flange on the Tool.

Step 9. When the clamp is mounted, a rubber hose delivered with the vacuum tube is mounted to avoid sharp edges of the clamp getting in contact with operators.

Congratulations!

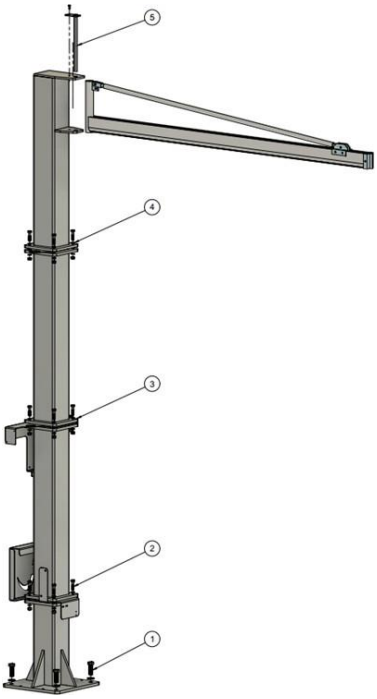
The Cobot Lift tool is now mounted and ready for action.

Mounting Instructions

Stationary Cobot Lift

The Stationary Cobot Lift Column is a modular system that can be configured in several heights for different applications.

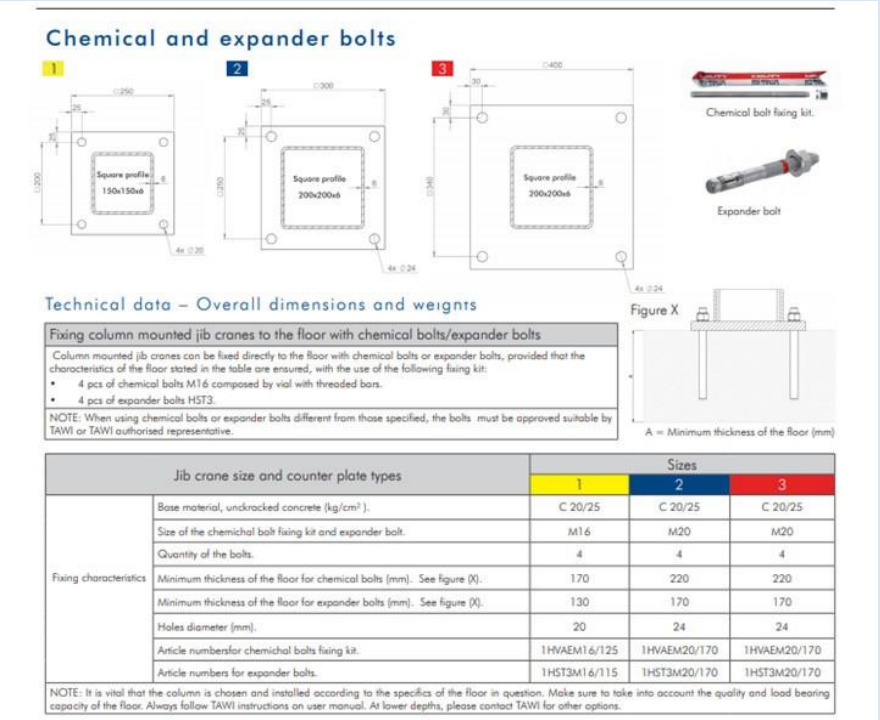
As the Stationary is mounted directly in the floor it is important that the fixation is done according to specifications from the Vacuum tube supplier. In the Cobot Lift we use as standard the system from TAWI/PIAB and their requirements.



Step 1. Components:
- M16 or M20 screw and disc x 4

Mount a screw in each of the 4 holes of the bottom flange in the column lower part, and tighten it down. Lenght of M20 screws depends on the strenght of the the floor/mounting plate. See example from Tawi Lyftman jib cranes Issue: See below.

Hilti anchors like these can be used.



Chemical and expander bolts

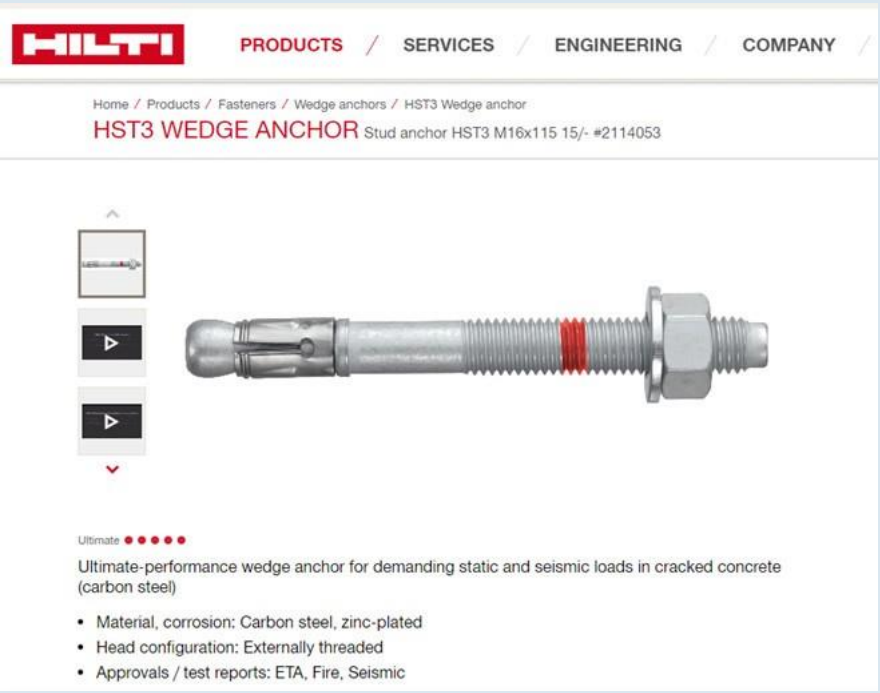
Technical data – Overall dimensions and weights

Fixing column mounted jib cranes to the floor with chemical bolts/expander bolts
Column mounted jib cranes can be fixed directly to the floor with chemical bolts or expander bolts, provided that the characteristics of the floor stated in the table are ensured, with the use of the following fixing kit: • 4 pcs of chemical bolts M16 composed by vial with threaded bars. • 4 pcs of expander bolts HST3.
NOTE: When using chemical bolts or expander bolts different from those specified, the bolts must be approved suitable by TAWI or TAWI authorised representative.

Figure X

Jib crane size and counter plate types		Sizes 1	2	3
Fixing characteristics	Base material, uncracked concrete (kg/cm³).	C 20/25	C 20/25	C 20/25
	Size of the chemichal bolt fixing kit and expander bolt.	M16	M20	M20
	Quantity of the bolts.	4	4	4
	Minimum thickness of the floor for chemical bolts (mm). See figure (X).	170	220	220
	Minimum thickness of the floor for expander bolts (mm). See figure (X).	130	170	170
	Holes diameter (mm).	20	24	24
	Article numbersfor chemichal bolts fixing kit.	1HVAEM16/125	1HVAEM20/170	1HVAEM20/170
	Article numbers for expander bolts.	1HST3M16/115	1HST3M20/170	1HST3M20/170

NOTE: It is vital that the column is chosen and installed according to the specifics of the floor in question. Make sure to take into account the quality and load bearing capacity of the floor. Always follow TAWI instructions on user manual. At lower depths, please contact TAWI for other options.



HILTI PRODUCTS / SERVICES / ENGINEERING / COMPANY

Home / Products / Fasteners / Wedge anchors / HST3 Wedge anchor

HST3 WEDGE ANCHOR Stud anchor HST3 M16x115 15/- #2114053

Ultimate ●●●●●

Ultimate-performance wedge anchor for demanding static and seismic loads in cracked concrete (carbon steel)

- Material, corrosion: Carbon steel, zinc-plated
- Head configuration: Externally threaded
- Approvals / test reports: ETA, Fire, Seismic

As the base plate of the Cobot Lift Stationary is larger than the ones on a Tawi system, the forces on the bolts will also be less.

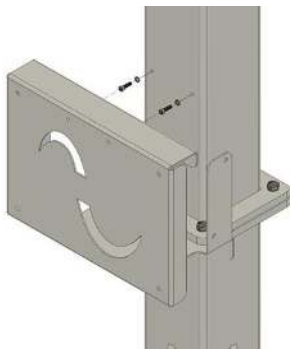
Chemical bolt fixing kit.

NOTE: Hilti supply a bolt fixing kit as an alternative to the expander bolt. Both types will work.

Expander bolt

Step 2. Components:
- M12 50 mm screws x 4
- M12 disc x 8
- M12 locknuts x 4

The M12 screws are mounted with the flange for the electrical cabinet and tightened.



Step 2,5. Components:
- M6 20 mm screw x 2
- M6 disc x 2

Mount the two M6 screws and tighten them.

Step 3 Components:
- M12 50 mm screws x 4
- M12 disc x 8
- M12 locknuts x 4

The M12 screws are mounted with the flange for the robot controller and tightened. Mount the two M6 screws and tighten them.

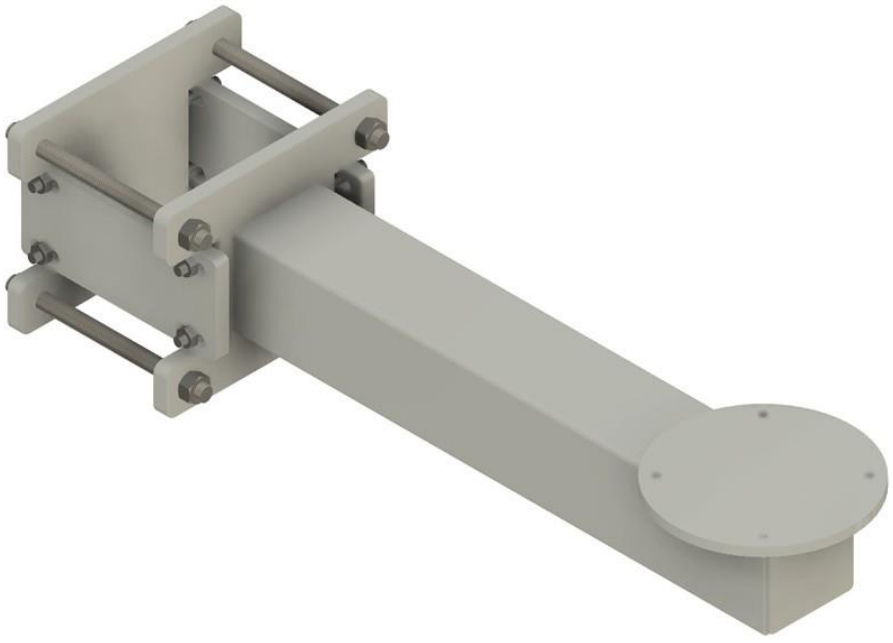
Step 4. Components:
- M12 50 mm screws x 4
- M12 disc x 8
- M12 locknuts x 4

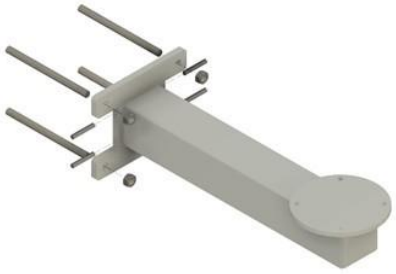
The flange for the tube is mounted between the flanges and two discs are mounted in the two other wholes to make sure it is aligned.

Step 5. Components:
- M6 20 mm screw x 1

The jib arm is mounted with the long pin bolt and the M6 screw.

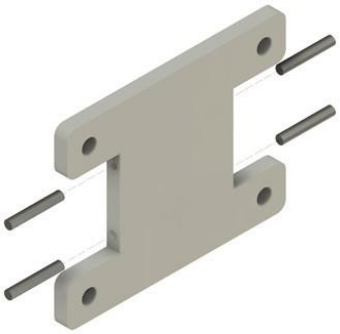
Mounting of arm for Universal Robots on Stationary Cobot Lift 2





Step 1. Components:
- M16, 220 mm threaded rod x 4
- M10, 70 mm threaded rod x 4
- M16, nuts x 4

The 4 M16 threaded rods are mounted loosely.



Step 2. Components:
- M10 threaded rod 70 mm x 4

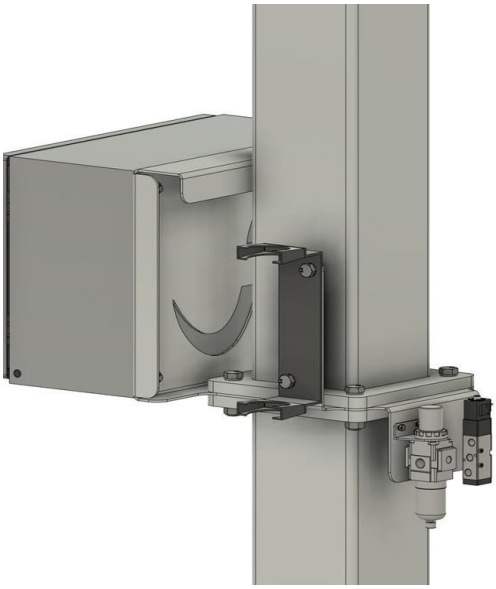
The 4 M10 threaded rods are mounted in the clamp flange.

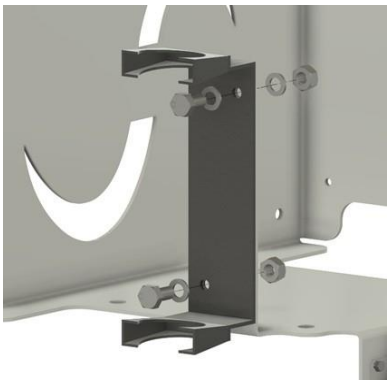
Step 3. Components:
-M16 nuts x 4
- M10 nuts x 8
- Side clamps x 2

Decide which height the robot should be mounted en and fix the arm to the column. The arm has to be aligned in all directions so please pay attention with the tightening of the arm. This may take some time, but has to be done.

Use a spirit leveler to level the arm.

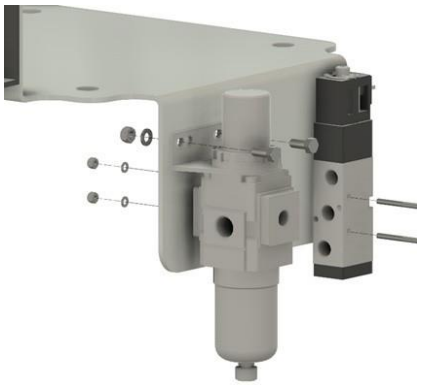
Mounting of components on the flange for the electrical cabinet





Step 1. Components:
- M8 20 mm screws x 2
- M8 disc x 4
- M8 locknut x 2
- Vacuum filter holder

The Vacuum filter holder is mounted withe the two M8 screws and Tightened.



Step 2. Components:
- M5 12 mm screws x 2
- M5 discs x 2
- M5 lock nut x 2
- Regulator
- M3 30 mm screw x 2
- M3 disc x 2
- M3 locknu x 2
- Magnetic valve

Regulator and magnetic valve is mounted on the flange with screws and nuts, and pneumatic fittings for 4mm hose.

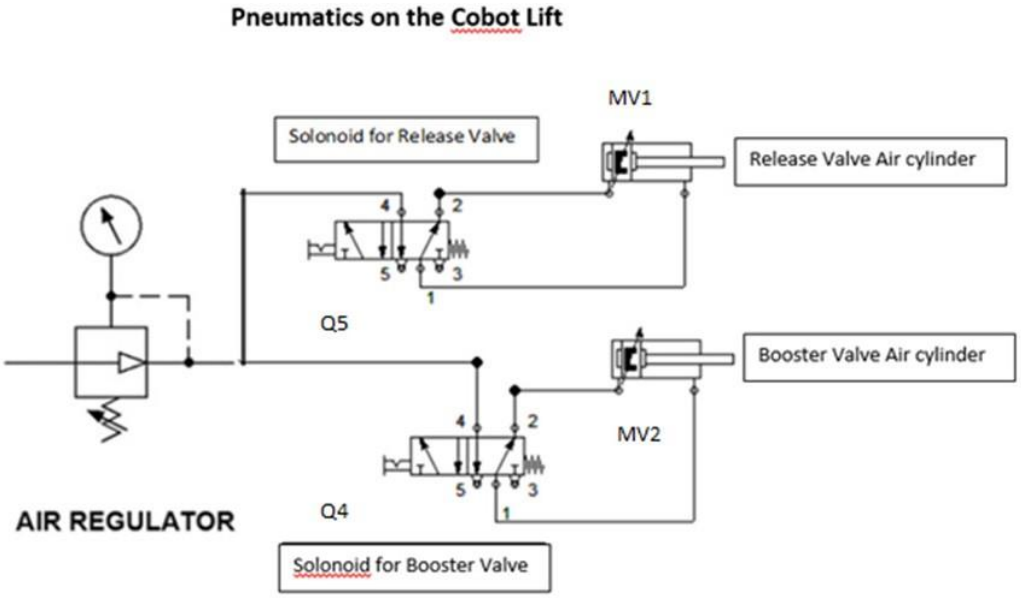
Step 3. Components:
- M4 25 mm screws x 4
- M4 disc x 8
- M4 locknut x 4
- Brake resistor (optional)

Brake resistor is mounted with 4 M4 screws and nuts. Wire on brake resistor should turn downwards

Step 4. Components:
-M8 20 mm screws x 4
- M8 disc x 4
- M8 locknut x 4
- Electrical cabinet

Electrical cabinet is mounted with the 4 M8 screws.

Connection of the pneumatic system is done by means of the 6mm air tube. Internal connection of the 2 5/2 solenoids is done like described below with 4mm air tubes. Air cylinders are connected with 4mm air tubes. Pressure should be adjusted to 5-7 bars pressure.



Mounting of components on the UR controller flange

Step 1. Components:
- 15 mm bumper x 2
- 10-15 mm bumper x2
- M6 20 mm screws x 4
- M6 nut x 4

Mount the bumpers on the flange.

Step 2. Components:
- M4 16 mm screws x 4
- Status buttons x 2

Fix the plastic cabinet with the status buttons. This can optionally be supplied with LED lights in the top as shown on the picture.

Step 3. Components:
- UR controller

Mount the controller on the flange.

Mounting of UR10 and tool on the Stationary Cobot Lift

Step 1. Components:
-M8 16 mm bolt x 4
- UR10(e)

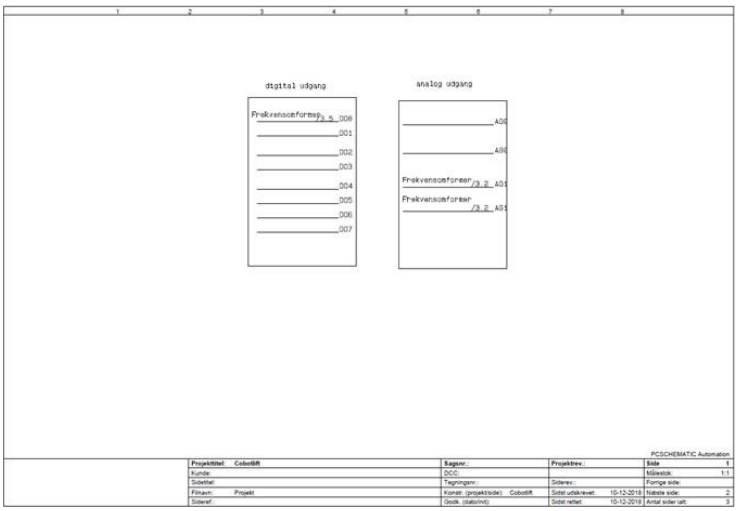
The weight of the robot arm is 28kg, so be aware when mounting it. The electrical connector should be facing towards the column.

Step 2. Components:
-M6 16 mm screws x 4
- M6 25x25 rubber bumpers x 4
- UR10(e)
- Cobot Lift Tool

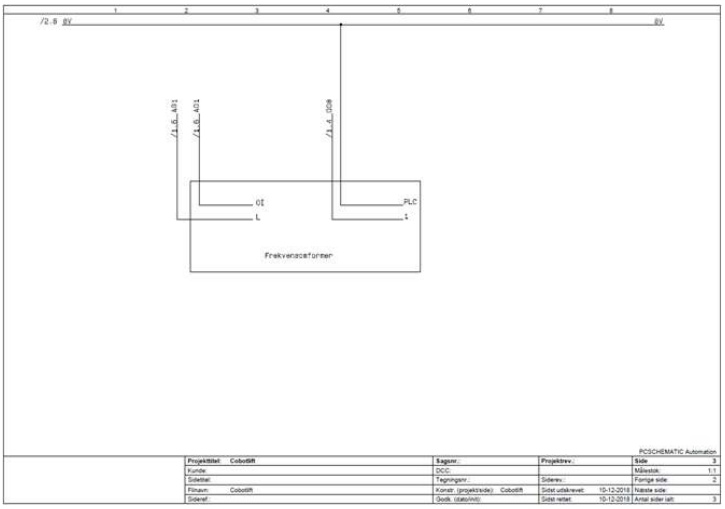
Mount the bumpers between the robot flange and the Cobot Lift Tool and connect the air hoses for the release valve.

How to Connect the Frenquency Converter

There is a need for a frequency converter on the vacuum pump in order to get full control of the vacuum system. This of course has to fit to the vacuum pump and it is mounted like this in the Electrical Diagram:

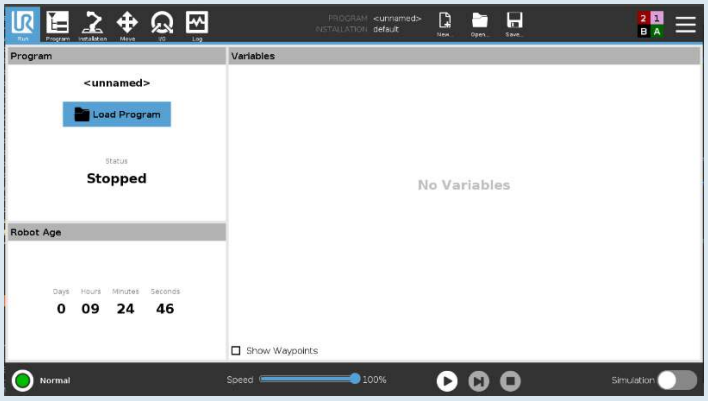


A digital output is used for start and stop of the frequency converter and an analog signal is used for adjusting the level.

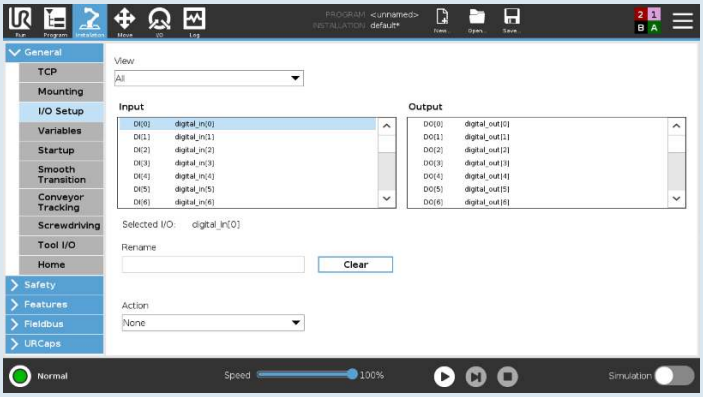


To name the vacuum output please go to the UR teach pendant:

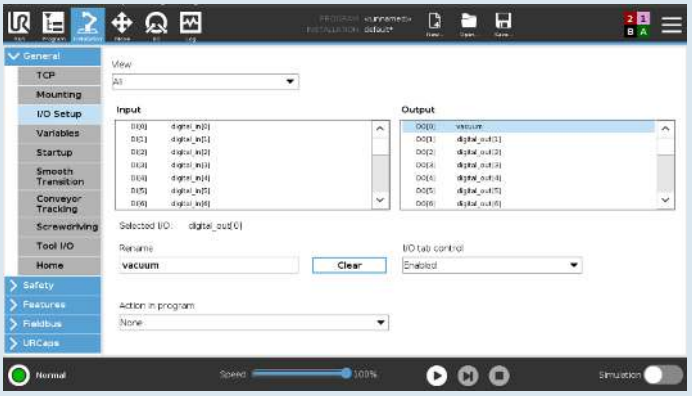
Step 1. Select “program robot”



Step 3. Select “I/O Setup” and then click “digital_out[0]”



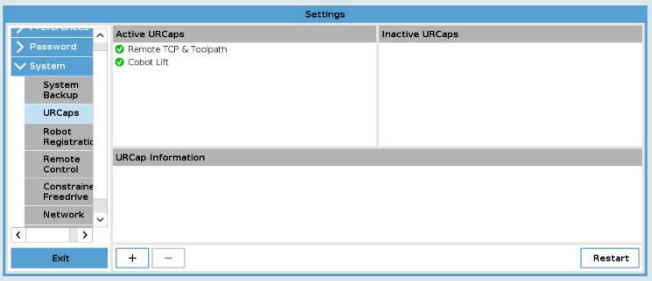
Step 4. Write “Vacuum” in the box called “Rename”. The frequency converter can now be programmed. Remember to set both digital and analog output.



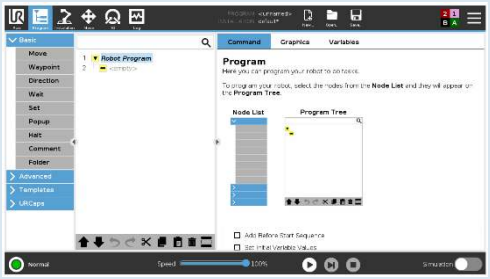
How to Program the Cobot Lift

When the Cobot Lift is installed according to the manual/specifications and all connections are made it is time for the programming of the robot. The Cobot Lift comes with a URCap that can help minimize installation time. The URCap provides the user/integrator with a good starting point for the programming. In the URCap there is also a surveillance function, that is monitoring the status of the robot and vacuum system constantly. So in case you want to run the Cobot Lift without the Cobot Lift URCap, please consult with us, as this will also influence on the safety of the system if it is not done correct

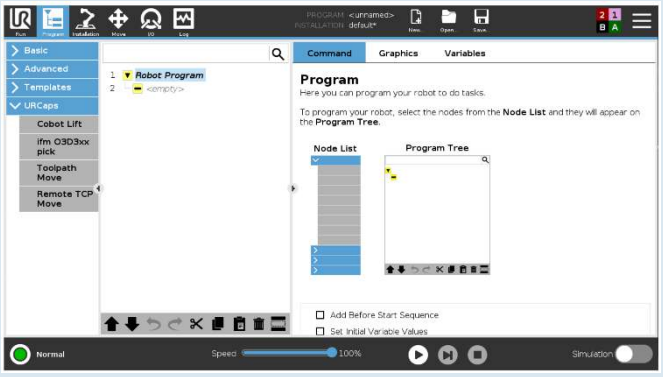
Step 1. Insert the USB stick in the teach pendantand download the URCap “COBOTLIFT” (go to settings – system – URCaps and add the pro- gram by clicking “+”)



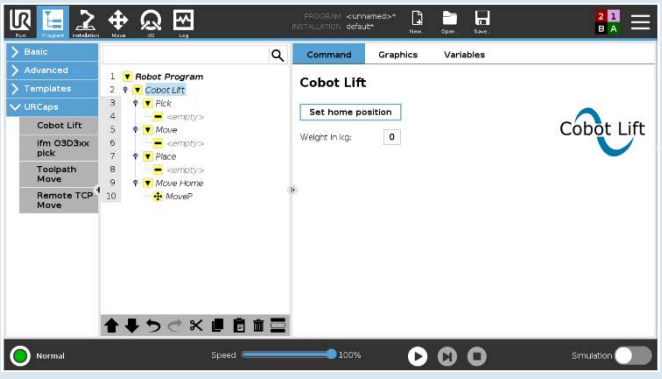
Step 2. Create a new program



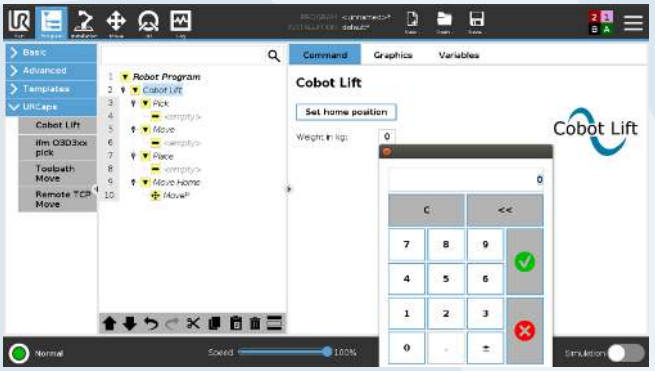
Step 3. Click on “Structure” and select “URCaps” tab



Step 4. The program structure will now ap- pear and you can set the home position



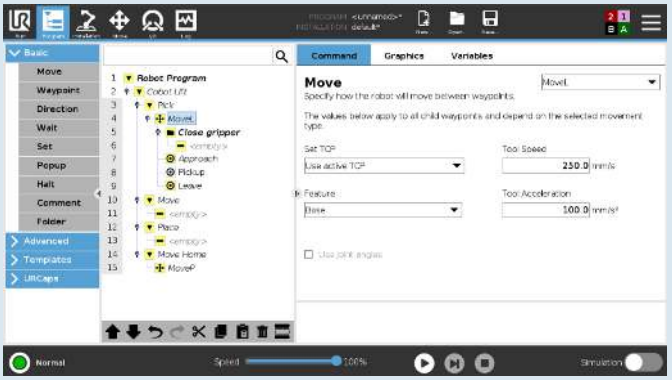
Step 5. Set the weight of the product



Step 6. Now go to the “Pick” line and click the “Set” Button. Set the waypoint.

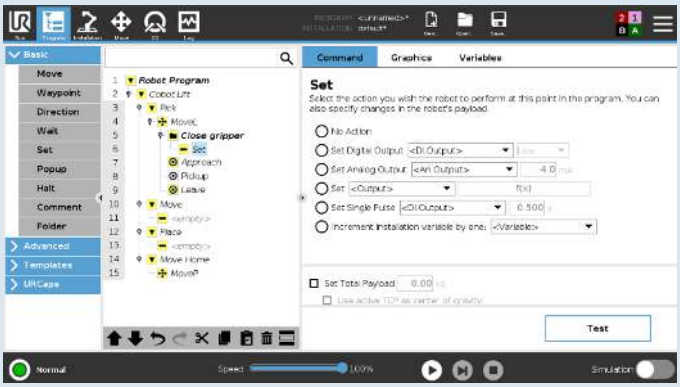
When the waypoint is set, the slider will become active. According to the typed-in weight a value is set, and a speed recommendation is given in text. However, as products can vary a lot, it is recommended to start the programming with a low acceleration for example around 100mm/s2.

Step 7. If you go to the “MOVE” line you will see the value is used for the waypoints that just came up. There is an approach point, a pick point and a leave point which is typical in a pickup situation, but you can add waypoints and functions if this is required for the actual application.

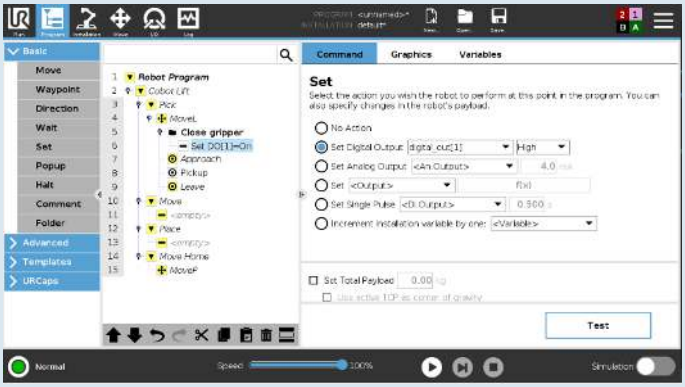


Step 8. There is also an empty folder called “Close gripper”. In most cases this is where you activate the pneumatic cylinder for the release valve, but it could also be other types of grippers. In the example here we will activate the release valve.

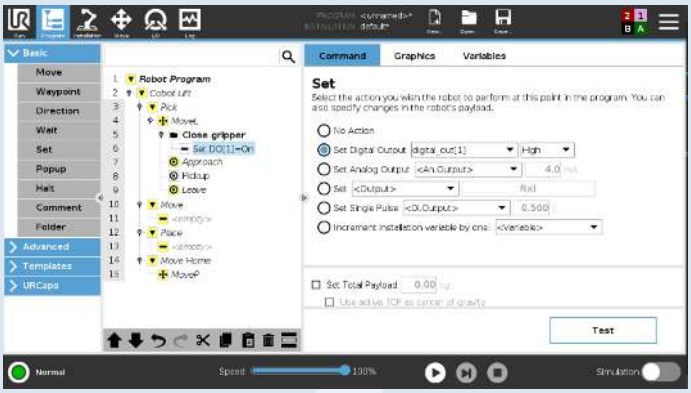
Go to the “BASIC” tab and push “SET”.



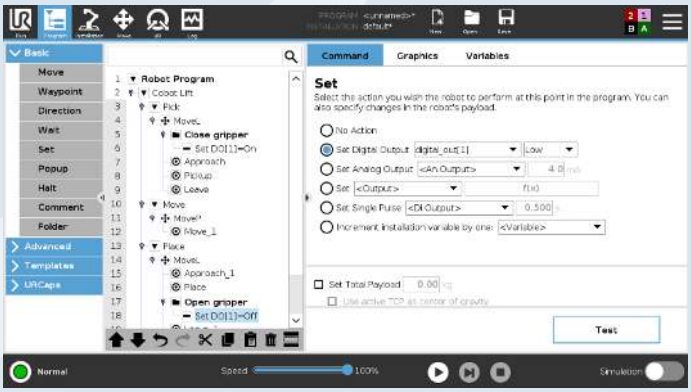
Step 9. You can now set the digital output you have chosen for the “gripper function”



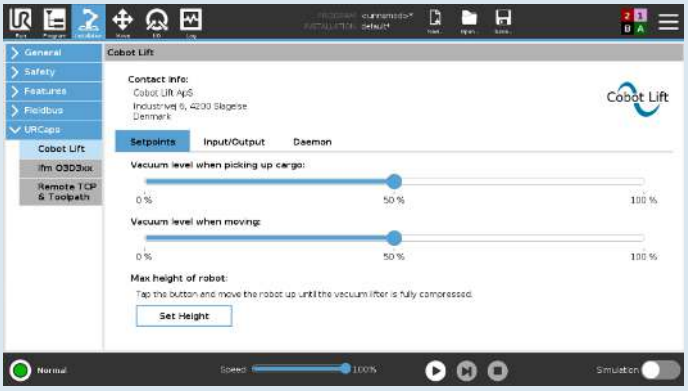
Step 10. Now the pick positions and actions are set. Please do the same in the “MOVE” and “PLACE” lines too. If the application in question is suitable for the UR palletizing wizards, this function is also available in the URCaplines too. If the application in question is suitable for the UR palletizing wizards, this function is also available in the URCap.



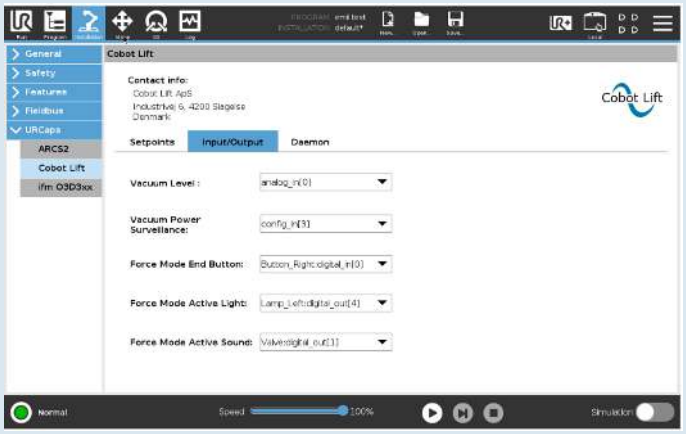
Step 11. When the positions and the gripping actions are set, the program is ready to run.



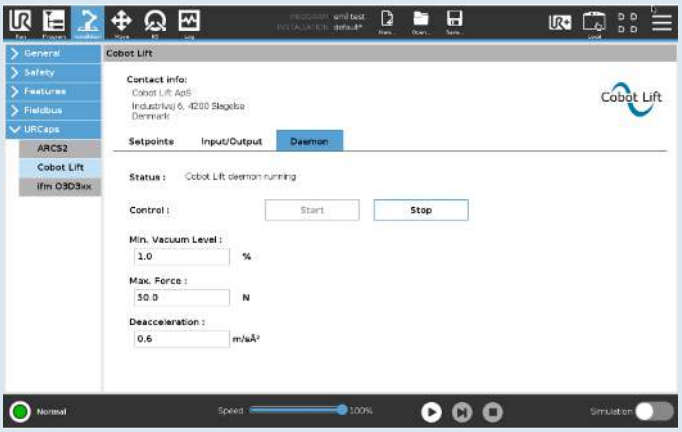
Step 12. However, before you start the program, a value for the vacuum level must be set. This is done in the "INSTALLATION" tab. Here you can set the value on the two sliders. One for picking up the product and one for the other movements. In most cases these two can use the same level.



Step 13. Set Vacuum Level, Force Mode End Button and Force Mode Active Light



Step 14. Set value for "Min. Vacuum Level" and "Max. Force" and press "Start".



Congratulations!

You have completed the programming!

Important Guidelines Before Start Programming

When doing the programming always make sure to follow the guidelines

1. Always use low accelerations and try to get the movements as smooth and slow as possible using large blends when possible.
2. Vacuum level should be adjusted so the tool is "floating" in the middle of the sliding unit when running with and without product. 2 vacuum levels will be optimal..
3. Make sure the machine and tool is aligned in the vertical plane.
4. Use Move L or Move P in the vertical movements and only Move J in the horizontal Plane.
5. When selecting way points please try to use the installation actively. Example could be to make sure the robot is moving as much as possible where no operator is entering (above conveyor belt and pallets for example).
6. If there is movement of the robot in areas where the operator might be entering, try to keep the speed and height of the robot/product as low as possible.
7. In case harm will be done to the operator in case of collision additional safety features must be added to the installation like fencing, light curtain, scanners, etc, what ever makes most sense in the actual installation.
8. Speed settings in a typical palletizing/depalletizing application is of course depending on the type of product, but using general guidelines you can expect:
    - Lighter products, 5-20kg, up to 4 picks per minute.
    - Medium products, 20-30kg, up to 3 picks per minute.
    - Heavy products, 30-45kg, up to 2 picks per minute.

Please only consider these figures as a guide, in case you want more detailed information about speed and impact forces please look in our implementation guide for more info.

Mounting of UR10 and tool on the Stationary Cobot Lift

The Cobot Lift is designed to lift heavy products (up to 45kg) so it is important to consider this when using the machine.

- Never stand or crawl below the product when the Cobot Lift is lifting/running. In case a heavy product is dropped/lost this might cause servere damage to the operator/ person.
- The Cobot Lift is equipped with safety features to avoid harm of personnel, but it is the responsibility of the operator to use the machine according to the descriptions in this manual.
- Due to the inertia in the product speed will naturally be lower when lifting heavy products compared to lighter products. This is due to the extra force the robot will have to handle (when pushing/pulling the product), but also due to the increased impact forces in case of collision.

Risk Assessment

One of the most important things that an integrator needs to do, is to perform a risk assessment of the complete installation. In many countries this is required by law.

The Cobot Lift system is delivered as a finished and complete machine, pre-programmed and designed for safe operation. Thus, it should be mentioned that in case of changes in the programming of the robot the whole systems risk assessment must ALWAYS be re-assessed. A risk assessment must include (but not belimited to) all the safety instructions in this manual.

The safety of the robot installation depends on how the robot is integrated (E.g. tool/end effector, obstacles and other machines). The risk assessment that the integrator conducts shall consider all work tasks throughout the lifetime of the robot application. A risk assessment must be conducted before the robot arm is turned on for the first time.

A part of the risk assessment conducted by the integrator is to identify the proper safety configuration settings, as well as the need for additional emergency stop buttons and/or other protective measures required for the specific robot application. Identifying the correct safety configuration settings is a particularly important part of developing collaborative robot installations.

Some safety-related features are purposely designed for collaborative robot applications. These features are configurable through the safety configuration settings and are particularly relevant when addressing specific risks in the risk assessment conducted by the integrator: Please read the risk assessment part of the Universal Robots manual as these instructions also apply to the Cobot Lift system. Please also ensure to read relevant vacuum tube lift producers manual.

If the robot is installed in a non-collaborative robot application where hazards cannot be reasonably eliminated or risks cannot be sufficiently reduced by use of the built-in safety-related functions, then the risk assessment conducted by the integrator must conclude the need for additional protective measures (e.g. an enabling device to protect the operator during set-up and programming).

The following hazards must be considered by the integrator (Other significant hazards can be present in a specific robot installation).

1. Penetration of skin by sharp edges and sharp points on tool/end effector or tool/ end effector connector.
2. Bruising due to contact with the robot.
3. Sprain or bone fracture due to strokes between a heavy payload and a hard surface.
4. Items falling out of tool/end effector, e.g. due to a poor grip or power interruption. This point is extra important to consider with the Cobot Lift system due to the high payload of the robot.
5. Mistakes due to different emergency stop buttons for different machines.
6. Mistakes due to unauthorized changes to the safety configuration parameters.
7. Which height is the robot/workload working in during production.
8. What kind of damage is the product able to do to the operator (soft bag vs. hard bucket)

Questions and Answers

Payload Related

How should the payload be configured to ensure no damage to the robot?
So far, we have used payloads between 4 and 6 kg. Depending a bit on the tool/suction cup. It is only in case the vacuum pump is not running, otherwise this will take up the load, but we have found it a good compromise to be somewhere in the middle to avoid protective stops.

How is the payload defined?
As usual with the x-y-z tcp offsets (z is a mean value of min. and max., but it does not seem to make much of an influence). We do not take the load of the product into consideration when we define the payload in the robot.

How does it change with and without product?
It doesn't change. The load does not influence the robot, but usually you can just use a higher speed without the extra load. The vacuumlifter is carrying the load and the swivel arm does not need much force to move the weight around sideways.

Motion Related

What is the maximum speed that the robot should be allowed to work at with the upgraded payload?
We do not have a fixed figure. There are many factor that can have an impact on this. We have made trials with water-like products in plastic bags weighing 11kg where we needed to use a slower speed, than running with more compact materials weighing 20kg.

Allowed working conditions – max. speed, acceleration, payload:
Accelerations should generally be kept low, high accelerations with high inertia payloads cause large forces and torques which can lead to protective stops etc. So low acceleration, big blends and in general very smooth movements are the key to be able to run the extra loads. The more weight (or viscosity like water), the lower the speed.

Safety Related

How will the increased payload/momentum affect the risk assessment?
Very general rules has to be used here like with any other installation, but very pointy/hard loads are of course extra critical if they are also heavy. Layouts in the individual installation will also affect this (is it possible to walk in the working zone and so on).

Can the Cobot Lift be used with any safety configuration? For example, force and power to the minimum?
In our opinion it will not make much sense, as the required speed will be very low to avoid protective stops.

The total payload from the robot and the supporting machine may have to be considered for the risk assessment. In this case, the risk reduction by robot safety functions may not be sufficient. Then, how can we reduce the risk from the heavy load? Our experience and testing tells us that the weight typically helps us stop the robot very easily when pushing to the load/robot, both vertically and horizontally. When very little force is applied the load stops the robot.

The safety system of the robot is not designed for payloads beyond the nominal payload of the robot. Therefore it is necessary to clearly inform the integrator/end-user of the system to do a risk assessment and specifically consider the risk of being hit/clamped/crushed by the payload, as well as the risks involved in case a large payload is dropped accidentally. This is made clear in the information for use. If the vacuum pump stops/loose power, you can set the robot in freedrive by means of the Demon functionin the robot (software running in the robot continuously an monitoring the state of the vacuum pump) to protect the robot from overload and to secure a safe and controlled lowering of the product. However some loads (for instance a bag with much leakage or maybe a piece of luggage) might be dropped before the robot hits the ground. In this case extra measures has to be taken to avoid any risks if this is considered as a high risk in the final risk assessment. There might also be instances where the freedrivefunction actually could be hazardous to the operators safety and thereby not relevant. However, this could potentially damage the robot in case of power failure to the vacuumsystem.

Longevity Related

Do you foresee any circumstances in which the device may malfunction and overload the robot?
In case of power failure where both the vacuum pump and the robot is turned off immediately. If this is most likely to happen it will be worth integrating back-up power supply to the installation. If one of the two is still powered on, it should not be an issue. But a backup source of the power supply could prevent this from happening.

How can we guarantee, that the force/weight applied on the robot is within the given limits? (Preventing joint damage over time)
Our first installation has been running 3½ years (3 shift) now with a very low cycle time and without any issues so far. Data logging also tells us that we are running within reasonable limits. In principal the robot is running without any load in the vertical direction and only pushing/pulling the product.

Will the robot breakdown due to pushing 45 kg and over a time period?
The robot does not push 45kg. The vacuumlift set-up is helping us here. With this type of lifter a man can lift hundreds of kilos and still move it around without using a lot of power to move it. The workload is less than 10kg when moving around unless sudden stops or hard accelerations are used. In this case the robot will go into protective stop and will not be able to run.

Does the lift assist mechanism apply a force to the robot in the z-direction when approaching and retracting during pick and place and will that force have an impact on the longevity of the robot?
No. We do not think so. We sometimes use force mode when picking up or placing a product, but we are within the normal limits.

Accuracy Related

What's the position deviation of the joints?
Due to the rubber connection between the robot and the lifter, the accuracy will be poor. However, if the z movement is done slowly when setting down the load (so there is little swing in the system) the accuracy will be pretty good. The Cobot Lift can also be mounted without the dampers, but then speed and acceleration settings must be quite low.

How can the system ensure that the robot's repeatability does not deteriorate?
Repeatability will also be poor compared to the robot itself, but I think this is the price you pay when going up in load Again the way to solve it is as mentioned above.

Trouble shooting guide

Problem / Error	Solution
Vacuum pump is not running.	Check if it receives signal from the robot on the I/O page. Check if analog slider is set to zero.
Robot cannot hold onto items.	Check if the rubber lip on the suction head is damaged. Check if the center distance is correct when the robot picks up the item.Try turning on the Booster Valve.
Robot cannot dispose items properly.	Check if the point of disposal is correctly adjusted in the system. Reduce speed if the objects are swinging too much at the point of disposal.
Robot does not stop when it has run out of items.	Make sure the sensor on the pick-up spot works.
Robot runs slowly.	Check that the speed indicator on the display is at 100%. (Applies only when the program is opened in programming mode).
Robot does not hit its positions.	Zero point is offset. Contact the supplier or correct the waypoints involved.
Robot reports error on the display *	Contact supplier if error repeats.
Robot goes into error in the middle of program. Some features are still running.	Disable the current functions from the I / O page and restart the program when the error is corrected.
Pneumatic cylinders do not work.	Check if the machine has access to compressed air and whether the given cylinders/valve communicates with the robot on the I / O page.
Robot goes into protective stop when running.	Adjust speed and/or acceleration settings to a lower level. Use blends to make the movements as smooth as possible.

*** Additional troubleshooting and maintenance of the UR robot can be found in the Universal Robots service manual for UR on the Support website (http://www.universal-robots.com/support).**

Transport and Storage

Transport

Transport of the mobile device may only be carried out with pallet lifts/forklifts. Lift under the solid steel base plate from any side.

Before Transport

Ensure that all loose parts are either attached or removed during transport to ensure stable transport.

Transporting the Machine

It should only be lifted by bringing the pallet lifter/forklift under the base plate. It's important that it's all the way under before lifting.

Unpacking the Machine

The packaging of the machine shall be disposed of in accordance with the applicable national legislation.

Storage Requirements

The machine must be wrapped so that all visible surfaces are covered.

Preparing the Machine

All energy supply is removed before storage.

Disassembly

General

Before starting de-assembly, the machine's electrical supply separator/main switch must be opened (voltage disconnected) and locked. The machine must be disconnected from pneumatics and vented.

Disposal and Recycling

The machine is dismantled and sorted into categories, as required by applicable environmental requirements.

The product is subject to Directive 2012/19/EU on waste electrical and electronic equipment (WEEE). Do not dispose of the product together with unsorted household waste. Use the local WEEE collection points to dispose of this product and ensure that all relevant regulations are complied with.

Declaration of Conformity

Declaration of Incorporation
Directive 2006/42 EC, Annex II B

Cobot Lift ApS
Industrivej 6
4200 Slagelse
Denmark

Herewith declares that
Machine: Cobot lift CL-XXX-2021

Year: 2019

Declaration of Incorporation
Directive 2006/42 EC, Annex II B

The following parts of national technical standards have been used

EN 12100:2010

Cobot Lift tool is intended to be incorporated into machinery or to be assembled with other machinery to constitute machinery covered by Directive 2006/42/EC

And furthermore declares that it is not allowed to put the machinery into service until the machinery into which it is to be incorporated or of which it is to be a component has been found and declared to be in conformity with the provisions of Directive 2006/42/EC and with national implementing legislation i.e as a whole, including the machinery referred to in this declaration.

Signature
Flemming Bischoff Truelsen

Date

UNIVERSAL ROBOTS

EU Declaration of Incorporation (DOI) *(in accordance with 2006/42/EC Annex II B)* *original EN*

Manufacturer:	**Person in the Community Authorized to Compile the Technical File:**
Universal Robots A/S Energivej 25 DK-5260 Odense S Denmark	**David Brandt** Technology Officer, R&D Universal Robots A/S, Energivej 25, DK-5260 Odense S

Description and Identification of the Partly-Completed Machine(s):

Product and Function:	**Industrial robot** *multi-axis manipulator with control box and with or without teach pendant* Function is determined by the completed machine (with end-effector and intended use).
Model:	**UR3e, UR5e, UR10e, UR16e** (e-Series): Below cited certifications and this declaration include: *Effective October 2020: Teach Pendants with 3-Position Enabling (3PE TP) & standard Teach Pendants (TP).* *Effective May 2021: UR10e specification improvement to 12.5kg maximum payload.*
Serial Number:	**Starting 2020 5 0 00000 and higher** *year* / *e-Series* — *Sequential numbering, restarting at 0 each year* *3 = UR3e, 5 = UR5e, 0 = UR10e, 6 = UR16e*
Incorporation:	**Universal Robots e-Series (UR3e, UR5e, UR10e and UR16e) shall only be put into service upon being integrated into a final complete machine (robot system, cell or application), which conforms with the provisions of the Machinery Directive and other applicable Directives.**

It is declared that the above products, for what is supplied, fulfil the following directives as detailed below:
When this incomplete machine is integrated and becomes a complete machine, the integrator is responsible for determining that completed machine fulfils all applicable Directives and update the harmonized and other standards.

I. Machinery Directive 2006/42/EC	**The following essential requirements have been fulfilled:** 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.4.3, 1.2.5, 1.2.6, 1.3.2, 1.3.4, 1.3.8.1, 1.3.9, 1.5.1, 1.5.2, 1.5.5, 1.5.6, 1.5.10, 1.6.3, 1.7.2, 1.7.4, 4.1.2.3, 4.1.3 It is declared that the relevant technical documentation has been compiled in accordance with Part B of Annex VII of the Machinery Directive.
II. Low-voltage Directive 2014/35/EU	Reference the LVD and the harmonized standards used below.
III. EMC Directive 2014/30/EU	Reference the EMC Directive and the harmonized standards used below.
IV. RoHS Directive 2017/2102/EU	Reference the RoHS Directive.
V. WEEE Directive 2019/2193/EU	Reference the WEEE Directive.

Reference to the harmonized standards used, as referred to in Article 7(2) of the MD & LV Directives and Article 6 of the EMC Directive:

(I) EN ISO 10218-1:2011 *TÜV Nord Certificate # 44 708 14097607*	**(I)** EN ISO 14118:2018	**(III)** EN 61000-3-3: 2013
(I) EN ISO 13732-1:2008	**(I)** EN 60204-1:2018	**(III)** EN 61000-6-1:2019
(I) EN ISO 13849-1:2015 *TÜV Nord Certificate # 44 207 14097610*	**(II)** EN 60320-1:2015+AC:2016	**(III)** EN 61000-6-2:2019
(I) EN ISO 13849-2:2012	**(II)** EN 60529:1991+A1:2000+A2:2013	**(III)** EN 61000-6-3:2007+A1: 2011
(I) EN ISO 13850:2015	**(I)** EN 60947-5-5:1997+A1:2005 +A11:2013+A2:2017	**(III)** EN 61000-6-4:2019
	(III) EN 61000-3-2:2019	**(II)** EN 61131-2:2007
		(II) EN 61140:2016

Reference to other technical standards and technical specifications used:

(I) ISO 9409-1:2004 *[Type 50-4-M6]*	**(III)** EN 60068-2-64:2008+A1:2019	**(III)** EN 61326-3-1: 2017 *[Industrial locations SIL 2]*
(I) ISO/TS 15066 *as applicable*	**(II)** EN 60664-1:2007	ISO 14664-1:2015 *[Cleanroom Class 6 for control assembly with enclosure and Class 5 for UR3e, UR5e UR10e and UR16e manipulators]*
(III) EN 60068-2-1: 2007	**(II)** EN 60664-5:2007	
(III) EN 60068-2-2:2007	**(I)** EN 60947-5-8:2020	
(III) EN 60068-2-27:2008	**(II)** EN 61784-3:2010 *[SIL2]*	

The manufacturer, or his authorised representative, shall transmit relevant information about the partly completed machinery in response to a reasoned request by the national authorities.

Approval of full quality assurance system (ISO 9001), by the notified body Bureau Veritas, certificate #DK013489.

Odense Denmark, 1 May 2021

Roberta Nelson Shea, Global Technical Compliance Officer

Universal Robots A/S, Energivej 25, DK-5260 Odense S, Denmark
CVR-nr. 29 13 80 60

Phone +45 8993 8989
Fax +45 3879 8989

info@universal-robots.com
www.universal-robots.com

INSTALLATION MANUAL JIB CRANES
IMPORTANT! Tightening torques; the following recommended tightening torques for unlubricated bolted joints must be followed:
M8:25Nm M10:45Nm M12: 80Nm M16: 150Nm

Assurance MD 2006/42/EC Annex IIB

DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY

As defined in Machinery Directive 2006/42/EC Annex IIB

Manufacturer: TAWI AB
Box 10205, 434 23 Kungsbacka, Sweden

Authorized Representative:
Name;.....
Company; Cabot Lift ApS
Address; Danmark

It is hereby confirmed that this partly completed machine intended for incorporation (further on referred to as *machine*)

Product Group; TAWI crane systems
Product Type; ERAV 2/50L Alu
Serial Number; [redacted]

is corresponding to basic demands in directive 2006/42/EC. In addition, this *machine* must not be taken into service before the host machine, in which it is to be incorporated, is also corresponding to directive 2006/42/EC.

Further it is confirmed that the *machine* mentioned is in compliance with appropriate directives below:

- *Directive 2006/95/EC* Low Voltage Directive
- *Directive 2004/108/EC* EMC Directive
- *Directive ____ /___ /__* Additional directives, ATEX , Pressure Vessels

The following harmonizing standards also apply;

2006/42/EC	2006/95/EC	2004/108/EC
SS-EN ISO 12100:2010		
SS-EN 14238:2004 + A1:2009		
SS-EN 13001-1:2004 + A1:2009		
SS-EN 13001-2:2004 + A3:2009		
SIS – CEN/TS 13001-3:2004		

Place; KUNGSBACKA, SWEDEN **Date;** 17/12-21

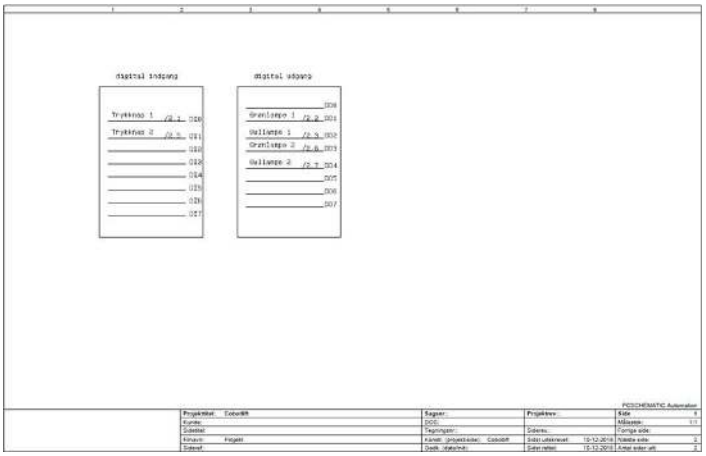
Signature; **Signature;**

Thomas Bräutigam, CEO TAWI AB **Simon Törn, Responsible for the technical dossier**

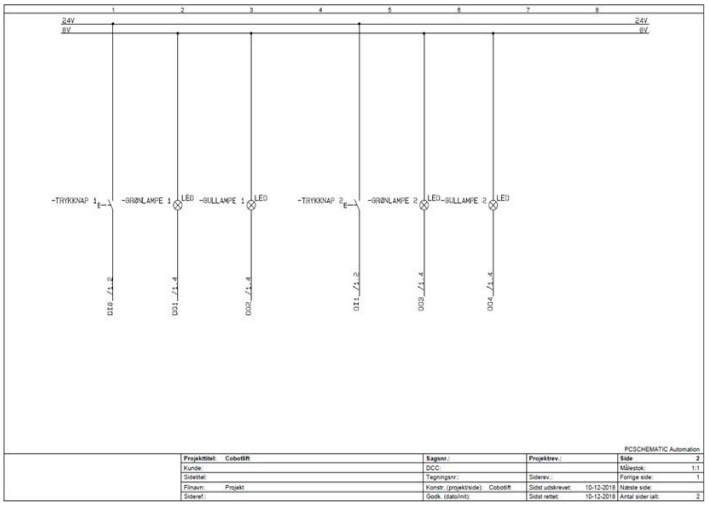
TAWI AB
Box 10205
434 23 KUNGSBACKA, SWEDEN
Tel. +46 300 185 00
info@tawi.se • www.tawi.com

Connection of Status Indication

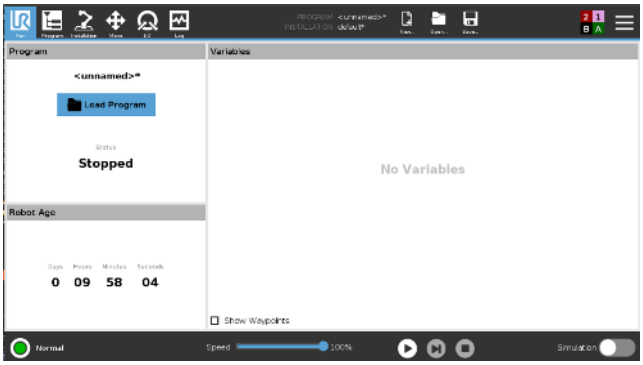
In some cases a status indication can be helpful. In the following section we will describe how to install a status indication lamp. Status indication can be done by means of two small boxes with indication or a light tower.



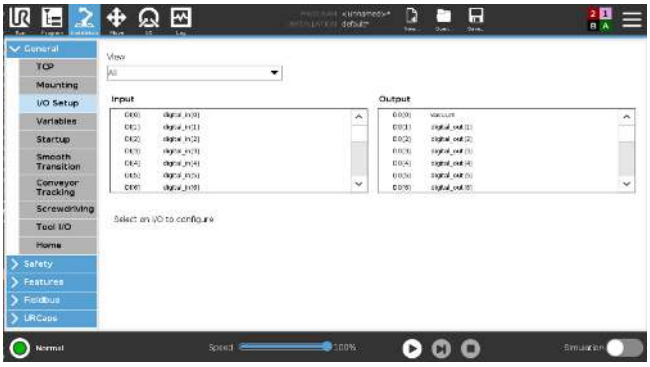
Electrical diagram of the addition.
Wires must be mounted on the robot I/O connections



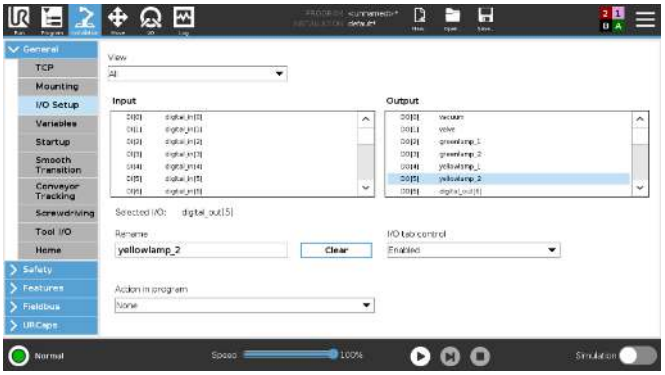
Step 1. Go to the polyscope panel for programming, choose “program robot”



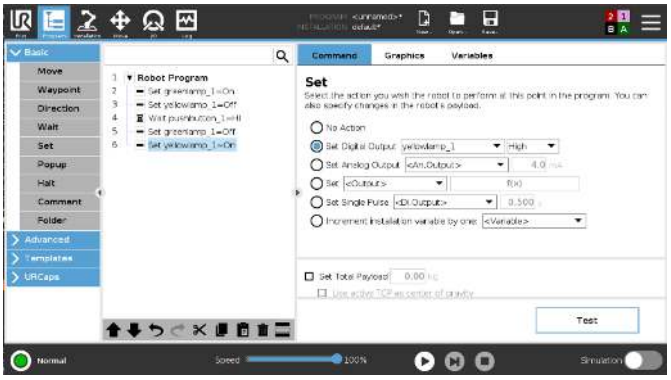
Step 2. Choose ”Installation” and then I/O Setup



Step 3. Select input/output and name it as desired in the ”Rename” box.

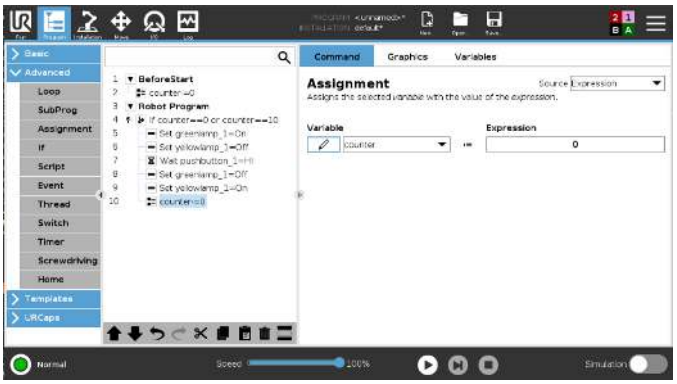


Step 4. Now you can use them in your program.

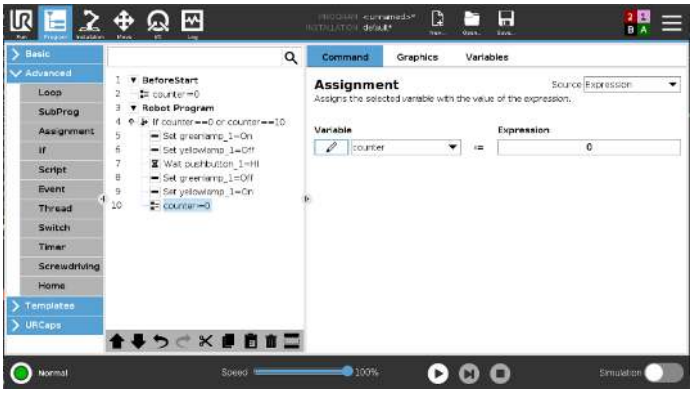


First examples shows how to use the button each time a cycle has to be started.

Step 5. By using a statement and a counter you can decide how many items you need on the pallet.



Step 6. You have now completed your counter



NOTE. There are other ways of implementing a status indication, so please only see the above example as a help to your installation

Service and Maintenance

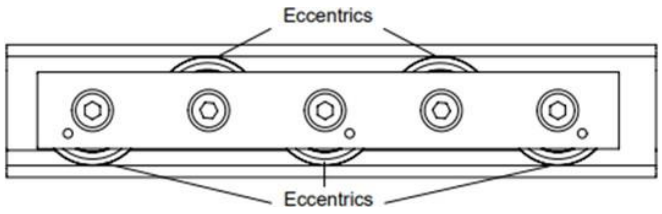
Service and maintenance of the robot and vacuum system is done according to the manual of the supplier of the robot and the vacuum system. However, a quick visual inspection should be done every day before starting production.

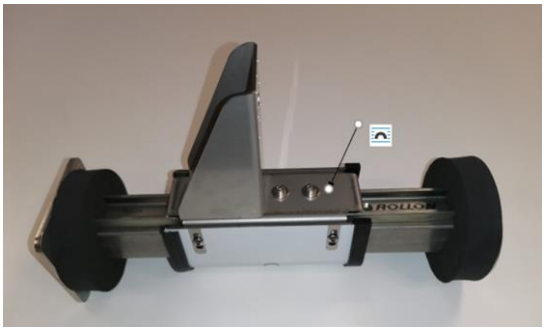
Service and maintenance of the Cobot Lift tool is done by means of a visual inspection to check that all connections are in place (screws, pneumatic connections etc.).

There is a sliding unit on the tool that might wear out over time. This can easily be exchanged by means of a few screws, however, it is our experience that the unit typically works for years before wearing out.

Adjusting the Sliding Unit

There are 5 rollers in the sliding unit. These rollers can be adjusted in tension by means of the fixing screws that are positioned on an eccentric screw/bolt. Use the small and flat steel key that is delivered with the machine and a 4mm hexagon key. Adjust it like in the drawing below. A bit of tension in slide has to be applied to dampen the tool when running.



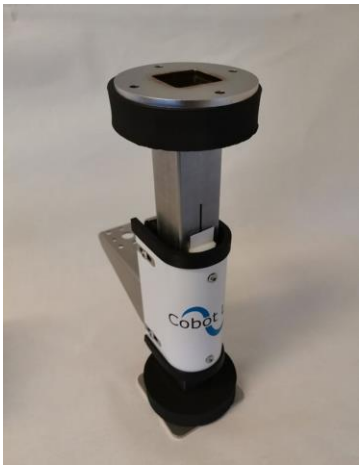


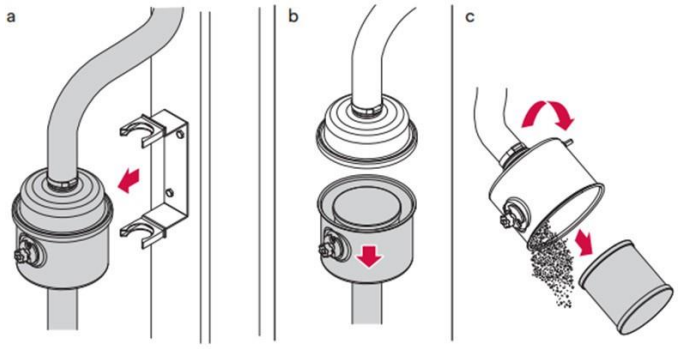
Adjusting the Slide Cover on the Cobot Lift Tool

It is important that the Cobot Lift tool is adjusted correctly before you start running with it. This is adjusted from the factory, but in case you disassemble it please make sure it is adjusted again.

The cover is loosened by means of the 4 M5 allen screws on the side of the cover. A piece of paper is folded one time and put in between the sliding block and the sliding tube like on the pictures below. Press the slide cover so the paper is pressed towards the sliding tube and tighten the 4 screws again. Take out the paper and the tool is adjusted.

The sliding block should be able to move freely just a little bit.





As described in the manual from the vacuum lift manufacturer, an air filter on the machine must be inspected and cleaned regularly. This should be a part that is assessed on a case-by-case basis as the nature of the product can affect how frequently it should happen. However, this should be done at least once a week or if the equipment starts to lose lifting power/suction capacity.

Cleaning of the filters on the robot controller should be done on a regular basis. Amount of dust in the area will influence highly on how often this should be carried out, so please inspect daily in the first period of time to define how often it should be done at the actual installation.

To clean the Control Box filters

There is a filter on either side of the Control Box.

1. Gently remove the outer plastic frame, by pulling where the red arrows are shown in the images below. The frame tilts outward.
2. Remove both filters and use low pressure air to clean them.

   If necessary, replace filters.

Pneumatic system should be reviewed for leaks and the regulator should be inspected and in case of water in the spectacle glass, drained off. In general, only dried compressed air should be used on the machine.

Recommended inspection activities

Inspection Action Type	Timeframe		
	Weekly	Monthly	Annually
Check Emergency stop on Teach Pendant		X	
Check and clean filter on vacuum system (if necessary)	X		
Check vacuum system for leaks	X		
Check safety inputs and outputs (if connected)		X	
Check and clean air filters on Robot Control Box		X	
Check flat rings (sealings in robot joints)		X	
Check Tool mounting bolts		X	
Check mounting bolts in whole system			X
Check pneumatic system for leaks and water in glass		X	
Check functionality of the sliding unit on the tool		X	

Safety

Before Commencement
Before starting repair, maintenance, etc., energy sources must be disconnected.

1. Electrical supply separator/main switch must be opened (voltage disconnected) and Locked.
2. In cases where additional lights are needed, maintenance staff shall bring this with them.
3. When lifting and handling heavy parts/components, approved lifting equipment must be used.
4. In operating situations where repairers are inside the machine, have dismantled parts of the machine or handle spare parts or tools, these persons shall be instructed to exercise particular precaution.
5. After repair, maintenance, etc., the operator must inspect the entire machine before starting for defects

Electrical Work

1. Before starting work on electrical panels, check that the machine is in a voltageless state with a reliable instrument.
2. Upon inspection where it is necessary to work under voltage, staff must have a valid ISO 50110-1:2013 certificate/course certificate.
    - Work on live parts and work near live parts must always be carried out by competent and trained personnel.
    - When working under tension, there must always be another person so close to the workplace that he or she can intervene quickly in the event of an cident.
3. This person, who does not need to be an expert or instructed in the ISO 50110-1:2013 provisions, must be informed before work begins on how best to take action to stop the Accident.
4. After repair, maintenance, etc., the compensatory connections must be reassembled Correctly.

Cleaning and Order

During cleaning, the machine must be switched off (separate from electrical supply) and personal protective equipment must be used according to the data sheets of the cleaning products used.

Do not clean the machine and its equipment with powerful solvents.

During daily operation, where operators do not handle tools or spare parts in the vicinity of the machine, operators shall be instructed to exempt the area around the machine from objects and liquids which may cause falls.

Corrective Maintenance

If the machine has murmurs, unusual vibrations or the like, the fault must be located and remedied. If this is not possible, an authorised fitter must be called.

In general, it should be advised that maintenance and repairs are carried out only by trained and instructed personnel with the necessary professional background.

When replacing parts and components, only parts identical to those originally fitted may be used. In the case of illegible or unclear information and warnings, these must be replaced immediately by new original parts.

Performing Maintenance Tasks

Maintenance tasks may only be performed by qualified maintenance personnel. See section “Selection and qualification of staff”

Cobot Lift

Lifting to Empower

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