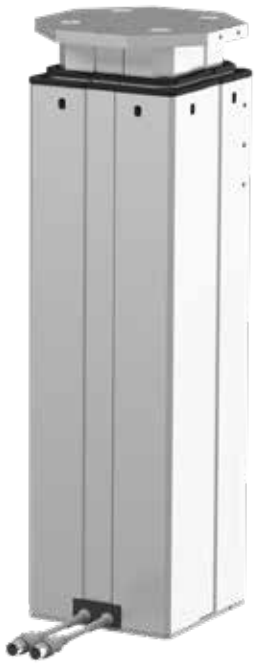
EWELLIX

MAKERS IN MOTION

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

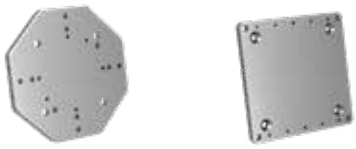
LIFTKIT-UR



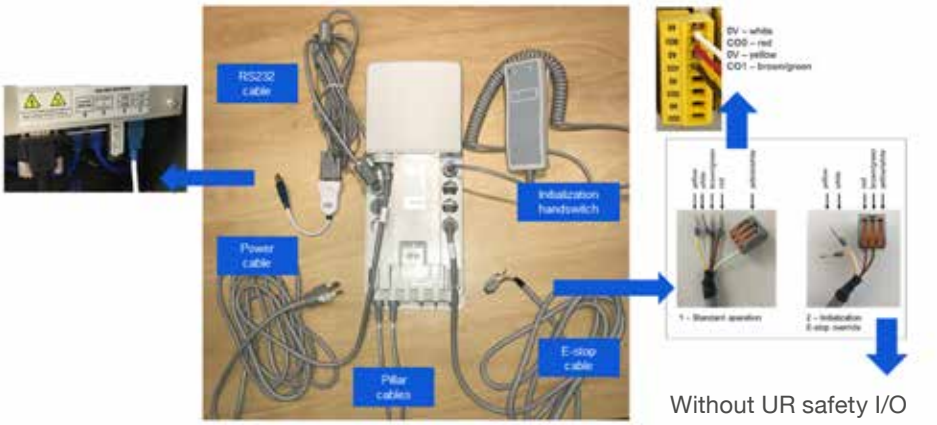
Quick start guide

For more details on each step, read the full instructions

1. Mount interface plates to pillar (top and bottom)



2. Connect all cables



Without UR safety I/O

3. Initialize LIFTKIT (First use only!)

3.1. Press both handswitch buttons at the same time, until controller beeps (5sec)

3.2. Move pillar downwards until end stop (beep)

3.3. Move pillar upwards until end stop (beep)

4. Screw robot to pillar, install URCaps software

Latest URCaps version ↳ **www.ewellix.com**

5.

Setup E-stop in safety I/O settings

Setup communication settings

Contents

⚠ WARNING

Please read this manual before installing, operating or maintaining this telescopic pillar. Failure to follow safety precautions and instructions could cause telescopic pillar failure and result in serious injury, death or property damage. Keep this manual nearby for future reference.

1.0 General information

1.1 Information in this manual

This manual provides important information on how to work with the actuator (also called device or drive) safely and efficiently.

The manual is part of the device, must always be kept in the device's direct proximity and should be available for personnel to read at any time . All personnel working with the device must read and understand this manual before starting any work. Strict compliance with all specified safety notes and instructions is a basic requirement for safety at work.

Moreover, the accident prevention guidelines and general safety regulations applicable at the place of use of the device must also be complied with.

For a better representation of the circumstance of use, the illustrations used are not necessarily to scale and may vary from the actual design of the device.

1.2 Explanation of symbols and signal words

Safety precautions

Safety precautions are identified by symbols and signal words as shown to the right . The signal words indicate the severity of the hazard and the chance it could occur.

Follow these safety precautions and act cautiously in order to avoid accidents, personal injury and damage to property.

These installation instructions describe the setup and operation of LIFTKIT, a vertical lifting axis for collaborative robots.

⚠ DANGER

Indicates a dangerous situation, which will lead to death or serious personal injury, if the precautionary measures are ignored.

⚠ WARNING

Indicates a dangerous situation, which can lead to minor or moderate injury or property damage, if the precautionary measures are ignored.

⚠ CAUTION

Indicates a dangerous situation, which can lead to minor or moderate injury the precautionary measures are ignored.

NOTICE

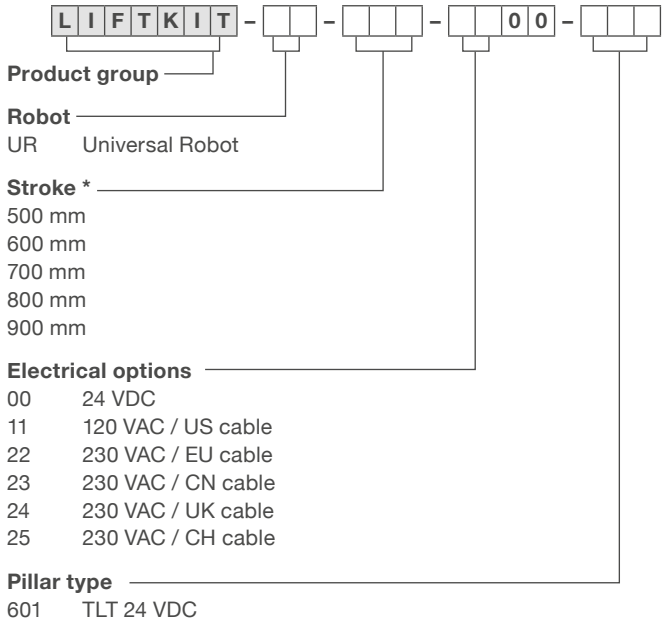
Indicates information considered important, but not hazard-related (e.g. messages relating to property damage).

NOTE

Emphasizes useful hints and recommendations as well as information for efficient and trouble-free operation.

1.3 LIFTKIT designations

LIFTKIT contains a telescopic pillar, a controller and additional accessories enabling easy integration with a collaborative robot. Depending on LIFTKIT typekey chosen, different configurations of these included products are possible.



* Longer stroke up to 1 400 mm available on request

1.4 Related documents

This instruction manual does not replace the operating manuals of the included products, but adds additional instructions relevant to the setup and operation of the LIFTKIT's system related to collaborative robots.

For general information and safety instructions please refer to installation, operation and maintenance manuals available at **www.ewellix.com.**

- TC-08023-EN THG-TLG-TLT operating manual
- TC-08005-EN SCU operating manual

1.5 Target audience

This manual is intended for qualified technical personnel who install and use LIFTKIT in their application. This manual and the corresponding operating manuals should be kept available for reference at all times.

Qualified personnel is able to carry out assigned work and to recognize and prevent possible dangers self-reliantly due to its professional training, knowledge and experience as well as profound knowledge of applicable regulations.

2.0 Safety

This section provides safety aspects supplementary to the safety aspects described in the relevant operating manuals of the included devices. Failure to comply with the guidelines and safety instructions contained in this manual may result in serious hazards that could cause possible serious injury or death, or damage to the device or equipment.

The listed safety aspects must be reviewed and taken into account in the final application risk assessment prior to the use of LIFTKIT.

2.1 Intended use

LIFTKIT has been designed and built for the intended use as described in the operating manual of the pillar, with additional intended use defined as

- Lifting of a robot to extend its operating range.

Any use that extends beyond the intended use or a use different than the one described above is deemed misuse.

Any type of claims resulting from damage caused by misuse are excluded.

2.2 Functional safety

The LIFTKIT system and its components TLT and SCU, are not functional safety systems compliant with EN ISO 13489-1 or IEC 62061. To integrate LIFTKIT into a functional safety chain, external safety devices have to be added to the overall system.

2.3 Safety mechanisms

The following measures have been integrated in LIFTKIT to reduce the risk of harm or damage

- The individual components have been designed and UL certified according to IEC 60601-1 – Safety of medical devices.
- The pillar has an integrated mechanical brake that prevents back-driving of the pillar in case of power loss or motor failure.
- A backup nut is installed to prevent a sudden collapse of the pillar in case of failure or wear of the nut.
- Pinching risk between the tube sections of the pillar and the UR attachment plate is minimized. In retracted position, the minimum gap is 40 mm.
- The LIFTKIT's SCU controller has to be connected to the Universal Robot (UR) safety I/O connection to operate. Activation of the UR emergency stop will trigger a stop of the LIFTKIT's SCU controller. If the UR system is turned off, LIFTKIT cannot be operated.
- The LIFTKIT's controller checks the RS232 connection to the UR controller. If this connection is lost, the pillar movement is automatically stopped.
- Stopping or failure of the UR software triggers a stop signal to the LIFTKIT's controller.

2.4 Application notes

- Integration with an emergency-stop is required for its intended use.
- Install emergency stop functions for the pillar and integrate them into the safety chain of the complete system prior to operating LIFTKIT.
- The emergency stop function has to be connected in such a way that a disruption of the power supply or the activation of the power supply after a power disruption cannot cause a hazardous situation for persons and objects.
- The emergency-stop systems must always be freely accessible.
- To integrate LIFTKIT into a functional safety system with a STO (Safe Torque Off) safe condition, an external safety relay has to be connected to the LIFTKIT controller power supply, triggered by a functional safety function, such as the UR safety I/O.

2.5 Potential risks

The following risks during LIFTKIT operation have to be considered in an application specific risk assessment

- The pillar does not detect an impact automatically and does not stop movement upon impact. This can lead to:
  - Crushing of a person or an object in the path of the pillar, causing serious injury or death or property damage.
  - Dynamic impact to a person or an object causing serious injury or death or property damage.
- It is possible that the pillar movement does not stop at the desired position and the UR control software does not recognize this
  - Movement of the robot can occur at a different position than intended, causing significant serious injury or death or property damage.

2.6 Stopping behavior

LIFTKIT stops differently depending on the stop mechanism triggered. The following four stopping behaviors can occur:

Stopping mechanism	Stop distance	Stop time
Power line to SCU controller is cut by safety relay (Category 0, LIFTKIT de-energized, uncontrolled stop)	28 mm	750 ms
Emergency stop button pressed on the Universal Robots system (Category 1, LIFTKIT energized, uncontrolled stop)	18 mm	200 ms
Software triggered stop if the robot stops due to an impact or the serial connection is damaged	tbc	tbc
Software triggered stop in normal operation. LIFTKIT energized, controlled stop using speed ramp down	50 mm	800 ms

Test report LTV180157

3.0 LIFTKIT components

3.1 Scope of delivery

1. 1 Telescopic pillar TLT
2. 1 Control unit SCU16/56/96
3. 1 Mains cable SCU EU/US/CH/CN
4. 1 RS232 interface cable M/0133976
5. 1 Adapter cable RS232 – USB M/0133972
6. 1 Cable for UR safety I/O connection M/0133975
7. 1 EHA31 operating handswitch M/0133980 (UR version)
8. 1 UR attachment plate M/0133933*
9. 1 bottom mounting plate M/0133932
10. 8 M10x40 screws for mounting plates M/0102913
11. 8 screws M6x20 for UR3 robot / bottom plate M/0111860
12. 4 screws M8x25 for UR5/UR10/UR16 robot M/0111907
13. 4 screws M6x30 for UR3e robot M/0112009*
14. 2 pins ⌀ 6x20 mm to align UR3 robot M/0207203
15. 2 pins ⌀ 8x20 to align UR5/UR10/UR16 robot M/0207200*
16. 1 USB stick with URCaps software M/0133981*
17. 1 Quick start guide

3.2 System requirements

- Robot compatibility: UR3, UR5, UR10, UR16 e-Series
- UR controller: minimum CB 3.1 is required for the URCaps plugin
- Polyscope: minimum 3.6
- Power input (max) depending on the SCU power version chosen:
  - 24 VDC / 30 A
  - 120 VAC / 6,5 A
  - 230 VAC / 3,3 A

16. *UR software plugin*

2. *Controller*

1. *Telescopic pillar*

8. *UR attachment plate*

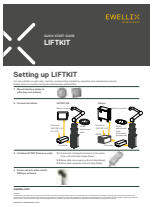
7. *Handswitch*

9. *Bottom fixation plate*

5 3 4 6

12 11/13 10

14/15



17. *Quick start guide*

4.0 Mechanical installation

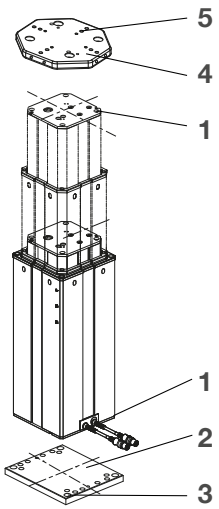
4.1 Tools required

- Hex key size 5 and 6
- Screw driver 2 mm

4.2 Robot installation on the telescopic pillar

Refer to the numbers in 3.1 Scope of delivery, and in the figure below.

1. Take the telescopic pillar out of the box
2. Loosen and remove 4 transport screws at the bottom (**1**)
3. Attach the bottom mounting plate (**2**) using 4 M10x40 screws (screw 10) on the outer guiding tube
   a. Ensure tightening torque 40 Nm on these screws
4. Fix the bottom plate securely to the ground or a frame using at least four attachment holes on the plate (**3**)
   a. Alternatively, if mounting to a SLIDEKIT, attach the bottom plate with 8x M6 screws to the LIFTKIT's attachment plate.
5. Loosen and remove 4 transport screws at the top (**1**)
6. Attach the top UR attachment plate (**4**) using 4 M10x40 screws (screw 10) on the inner guiding tube.
   a. Ensure tightening torque 40 Nm on these screws
7. If required, insert the 2 alignment pins on the top plate and press them in (or use a plastic hammer) (⌀ 6 mm for UR3 (pin 14), ⌀ 8 mm for UR5/10/16 (pin 15))
8. Align the robot with the alignment pins and fix the robot base with the four screws provided (M6x20 (screw 11) for UR3, M6x30 (screw 13) for UR3e, M8x25 (screw 12) for UR5/10/16)



1. Transport screws
2. Bottom mounting plate
3. Ground fixations holes
4. Top mounting plate
5. UR alignment pins

5.0 Electrical connection

5.1 Electrical connection

Refer to **3.1 Scope of delivery**, and in the **figure 1**.

1. Connect the two DIN8 plugs of the motor cables of the telescopic pillar in motor port (**1**) and (**2**) of the SCU controller
2. Connect the mains cable (cable 3) to the SCU controller to port (**11**)
3. Connect the RS232 cable (cable 4) to port (**12**)
4. Connect the EHA31 handswitch (handswitch 7) to port (**10**) (handswitch only needed to initialize the system or when troubleshooting)
5. Connect the UR safety I/O connection cable (cable 6) to port (**7**)
6. Connect the RS232 cable (cable 4) to the USB adapter (cable 5)

NOTE

If connecting LIFTKIT for the first time, LIFTKIT has to be initialized. Perform the initialization routine now, as described in **Chapter 6**, before continuing with the next steps!

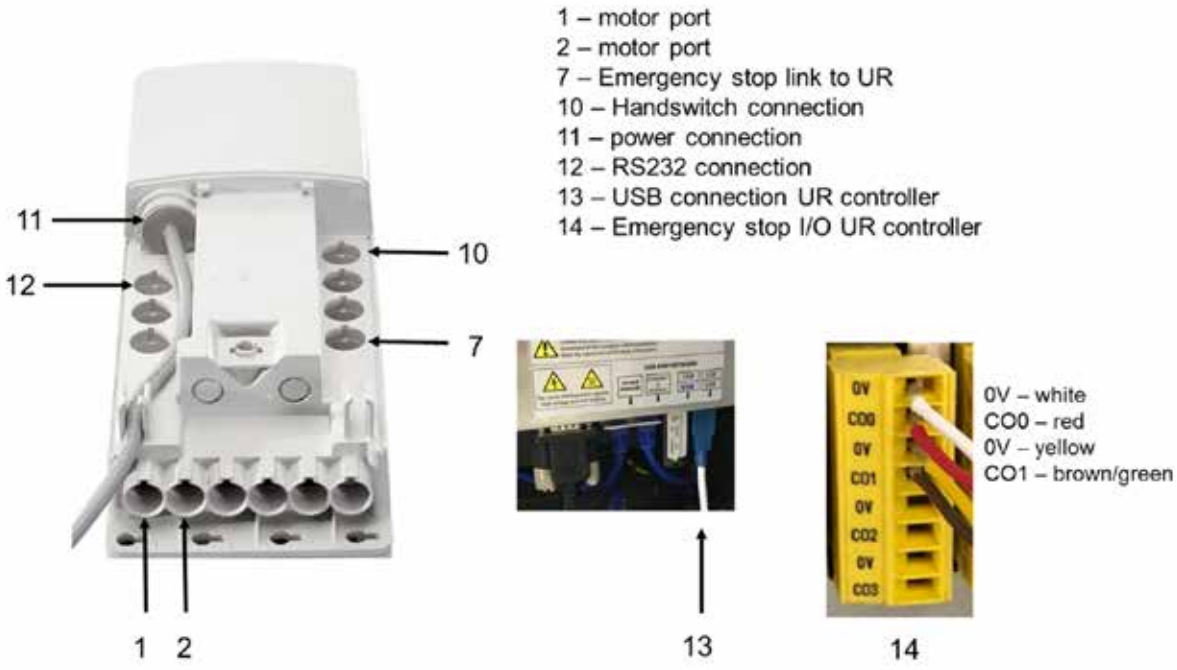
7. Plug in USB adapter cable to UR controller USB port (**13**)
8. Attach the emergency stop cables to a safety I/O on the UR controller (**14**)

NOTE

The safety I/O has to be configured in the Safety menu of the Installation tab.
Follow the instructions in **Chapter 8.**

9. Close SCU with SCU cover

Fig. 1

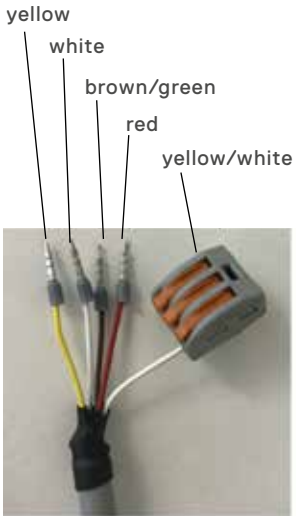


6.0 Initialization of LIFTKIT before connection to robot controller

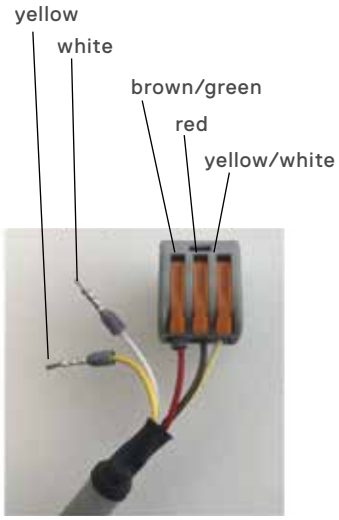
LIFTKIT has to be initialized before its first operation. For this step, the handset included has to be connected to the LIFTKIT's SCU controller. Follow the steps below:

1. Follow the electrical connections steps 1-6 described in **Chapter 5 – Electrical connection**
2. If the SCU is not connected to the UR controller, or the UR controller is switched off, an override of the emergency stop link to UR has to be activated. Short-circuit the three wires with the provided clamp as shown in the **figure 2**.
3. Press both handswitch buttons simultaneously for about 5 seconds, until the SCU rattles and beeps. Now the pillar will run at 50% speed and force.
4. Move the pillar downwards until it hits the end position. The SCU controller beeps.
5. Move the pillar upwards to the top position until it hits the end position. The SCU controller beeps.
6. Now the end positions have been identified and virtual limits have been set to always stop the pillar using soft ramps.
7. The pillar should move without beeping at its full speed. If it does not reach its full stroke, or it continues to beep, repeat the initialization procedure.

Fig. 2



1 - Standard operation



2- Initialization
E-stop override

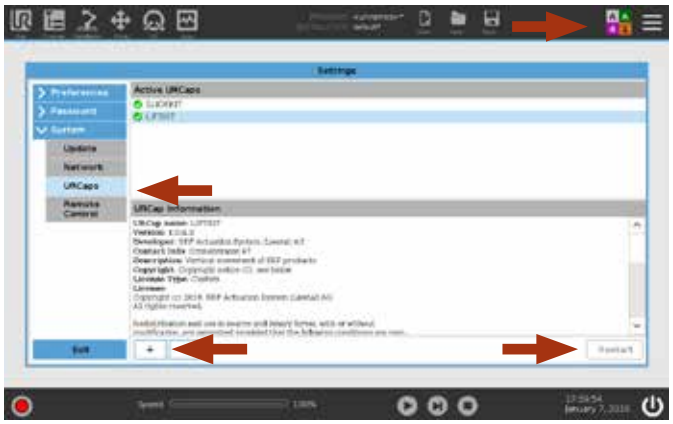
7.0 Software Installation

Make sure the newest URCaps version is used at all times. Download the current version on ewellix.com.

The software screencaps shown use the e-Series design. Functionality on the CB-Series is similar but might have a different appearance.

To install the LIFTKIT's URCaps, follow the described steps.

1. Go to the setup screen by pressing the top right corner hamburger menu
2. Insert the LIFTKIT's USB Drive into the USB port at the teach pendant
3. In the left side menu, choose System - URCaps. Then, press '+', choose the URCaps file from the LIFTKIT's USB drive, then press 'Restart'



8.0 Software operation

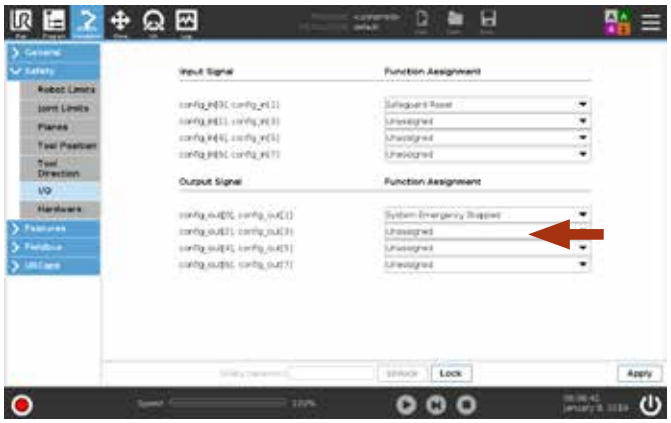
The LIFTKIT's URCaps enables movement of LIFTKIT directly in the UR Polyscope environment. When going into programming mode in Polyscope, the LIFTKIT's setup can be accessed in the installation tab. The movement of LIFTKIT can then be accessed directly in the Program tab.

8.1 LIFTKIT installation

The LIFTKIT's installation screen (shown below) allows to set up three aspects of the LIFTKIT's operation: 1. Communication, 2. Type of LIFTKIT selection, 3. Programming of accessible positions.

8.1.1 Safety I/O setup on UR controller

To activate LIFTKIT, the safety I/O has to be configured correctly in the UR environment. In the Safety section of the installation tab, set the relevant safety output to 'System Emergency Stopped'.



8.1.2 Communication

- **Serial interface**: Select the serial interface on the UR controller that enables the connection. In case other devices are connected, select a free serial port.
- **Daemon port**: Select a daemon port that is not used by another URCaps. If the same port is used for different URCaps, communication problems might occur and LIFTKIT cannot operate normally.

8.1.3 LIFTKIT setup

Pillar version: Select the correct pillar version from the drop-down menu. The important selection criteria are the last three digits, i.e. LIFTKIT-UR-601. By selecting a wrong configuration, a normal operation of LIFTKIT cannot be guaranteed! If the pillar has been initialized correctly, the maximum stroke accessible is displayed.

Check that this value corresponds with the product connected.

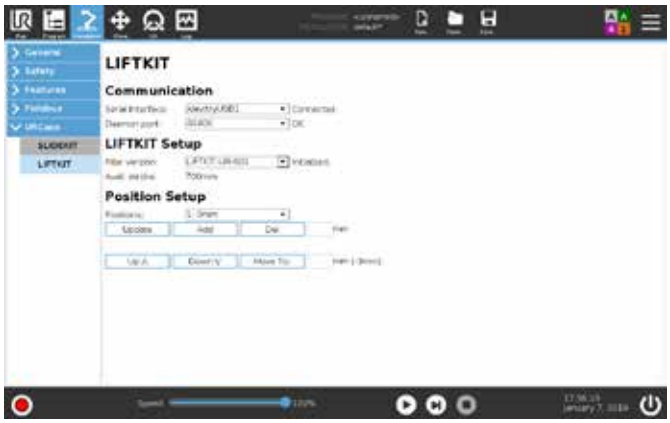
8.1.4 Position setup

Up to ten positions of LIFTKIT can be set up to be accessible in the UR programming mode. To add a position, enter the value of the position in mm and press 'Add'. An additional position is added to the list of positions.

Similarly, positions can be deleted or updated.

The 0 mm position (fully retracted) is the default and cannot be deleted. Note: Save the installation file to keep the selected positions after a restart of the UR system.

Note: If more positions are required, a function call is available to access any position directly (see instructions later in this chapter).



8.2 Accessing LIFTKIT positions

To access the programmed positions in the UR motion program, a URCaps command must be inserted in the program sequence, then the position can be accessed in this ‘LIFT’ command.

8.2.1 Insert a URCaps command

In the Structure tab (e-Series: left menu bar), choose URCaps and select LIFTKIT.

8.2.2 Access a LIFTKIT position

To access a LIFTKIT position, select the LIFT command in the Robot Program and select the Command tab.

From the drop down menu, the set up positions can be selected. After selection, this position is automatically set at this command point.

To move to this position immediately, keep the ‘Move to Position’ button pressed until the position is reached.

8.2.3 Access positions in script

The current position of LIFTKIT can be accessed with a function call to

var := get_liftkit_position()

To set a position of LIFTKIT, use a function call:

var := move_liftkit(x)

where x is the position in mm

9.0 Troubleshooting

Malfunction	Possible cause	What to do
The pillar does not move	Control unit not operational	Check main power to control unit
		Ensure that the RS232 cable is securely connected to the SCU and the UR USB port
		Ensure that the emergency stop link to the UR controller is securely connected to the SCU and the UR safety IO
		Emergency stop must be released.
	Robot not running	Turn on robot
	Obstacle in stroke area of the pillar	Remove all obstacles in the stroke area
	Motor has stopped due to high temperature	Observe duty cycle in technical specification. Wait 20 minutes and try again.
	The communication port of the URCaps daemon (Installation tab) interferes with another URCaps	Change the port to an alternative number and try again
	The serial connection is not connected in the URCaps	Check all cable connections and re-start the robot controller.
The pillar stops before reaching its maximum stroke	Control unit cuts of power	Ensure that the centric and excentric load does not exceed the load limits given in the specification of the pillar.
	Obstacle in the stroke area of the device	Remove all obstacles in the stroke area
The pillar moves at half the speed and the SCU controller beeps	Controller is not initialized	Perform initialization procedure described in this manual

10.0 Specifications

Operating range extension

- Vertical lifting of the cobot by up to 900 mm (1 400 mm on request) with compact retracted height
- Robust pillar design for industrial use, vibration free motion and virtually maintenance free

Plug-and-play solution

- Hardware interface compatible with UR3, UR5, UR10 and UR16 robots
- Universal Robots+ certified product
- Software control integrated with UR controller (URCaps) for easy motion programming
- Basic control option with digital I/O for all cobot manufacturers

Cost savings and higher productivity

Cobots combined with Ewellix LIFTKIT provide a cost-effective solution to upgrade an existing assembly shop, moving from a manual handled to a fully automatized line.

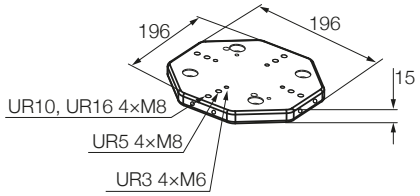
Technical data

	Unit	LIFTKIT-UR-601
Pillar type	-	TLT
Performance Data		
Max. Push load	N	1 500
Max. Pull load	N	0
Max. dynamic moments	Nm	210
Max. static moment	Nm	3 000
Max. linear speed	mm/s	80
Duty cycle	-	10% (20% at 500N)
Mechanical Data		
Screw type	-	Acme screw
Stroke range	mm	500 - 900
Retracted length (software controlled)	mm	Stroke/2 + 275
Weight @ 0 mm stroke	kg	21
Δ weight per 500 mm stroke	kg	1,7
Robots compatibility	-	UR3, UR5, UR10, UR16, e-Series
Cable management	-	Threads on pillar and interface
	-	plate to attach cable management
Electrical		
Input Voltage/Current		120 VAC / 6,5 A 230 VAC / 3,3 A 24 VDC / 10 A
I/O voltage	-	24 VDC
Emergency stop	-	Connection to UR safety I/O
Communication		
Control interface	-	URCaps plugin compatible with CB3.1 / Polyscope 3.6 or higher
Positioning, repeatability	mm	± 1
Accessible positions	-	any
Feedback	-	Position feedback via URCaps
Soft start and stop	-	Implemented for smooth operation
Software control	-	URcap
Environment		
Type of protection		IP40 in operational state
Ambient temperature	°C	+10 to +40
Max. humidity	%	85
Altitude	m	2 000
Vibration	-	Stationary industrial environment

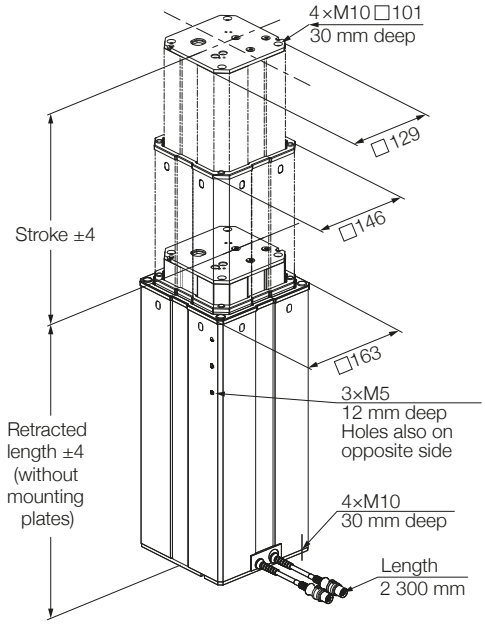
Dimensional drawing

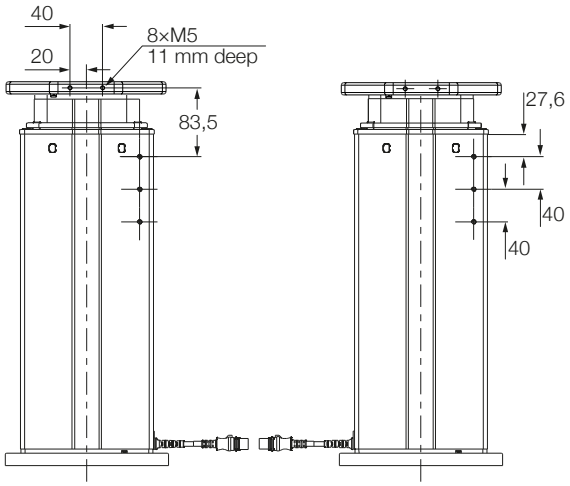
TLT telescopic pillar

Robot attachment plate

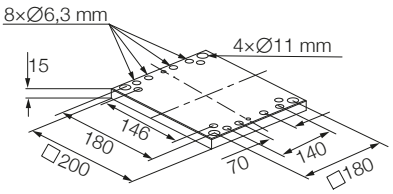


TLT Pillar

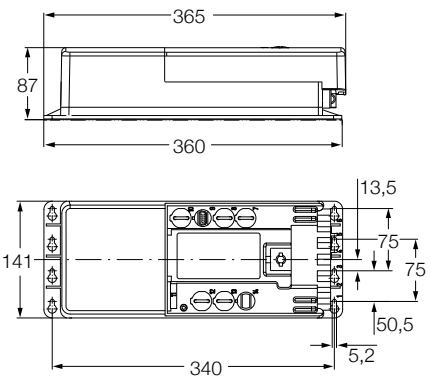




Bottom fixation plate



Controller



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