Translation of the original operation manual

PHR (Phoenix Robotics & Compact) Lifting Column

Lifting Column for Industrial Applications

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1 GENERAL INFORMATION

1.1 About This Operating Manual

This operating manual provides important information and instructions that will help you use your Columbus McKinnon PHR (Phoenix Robotics) lifting column (hereafter simply referred to as the "lifting column") as intended.

This operating manual is intended for operators, maintenance and setup personnel, and electricians.

This operating manual must always be kept at the lifting column's location of use and must be read, understood, and followed by every single individual tasked with work on or with the lifting column.

This operating manual should enable you to safely operate the lifting column and make full use of all its capabilities and applications.

Both the operating manual and all rules and regulations that apply at the location of use must be observed (with examples including accident prevention regulations).

1.2 Declaration of Conformity

Following is the Declaration of Conformity declaring the product's conformity with Directive 2006/42/EC.

This Declaration of Conformity complies with Directive 2006/42/EC on machinery, Annex II A. It hereby declares that the product conforms to the requirements in Directive 2006/42/EC and the additional listed standards and Directives in terms of its design and of the specific implementation that has been placed on the market by its manufacturer. Any alterations made without first consulting the manufacturer will void this declaration.

Standards and Directives applied:
- EC Machinery Directive 2006/42/EC
- Regulation (EU) 2023/1230
- Directive 2011/65/EU
- Directive 2014/30/EU
- Directive 2014/35/EU
- DIN EN ISO 12100:2010
- EN 60204-1:2018
- EN ISO 13854:2019
- EN ISO 13857:2019

1.3   What the Symbols in This Manual Mean

The following symbols are used throughout this operating manual:

Symbol	What it means
⚠️	Generic warning symbol. Risk of injury if disregarded.
⚡	Electrical shock hazard. Risk of very serious injury if disregarded.
🚶	Trip hazard. Risk of very serious injury if disregarded.
✋	Crush hazard. Risk of very serious injury if disregarded.
i	General helpful information.

2 SAFETY

2.1 Intended Use

PHR lifting columns are a modular, vertically moving lifting device that consists of a three-stage telescopic column system. These lifting columns deliver linear motion that can be used in order to vertically move mounted components or loads in industrial applications, with the preferred use case consisting of cobots.

Do not, under any circumstance, operate these lifting columns in operating conditions outside of those specified in this operating manual, in the technical specification sheet, and in the corresponding order confirmation!

Likewise, operating these lifting columns outside of their respective performance limits / specified ambient conditions is strictly prohibited.

Please note that alterations to PHR lifting columns, as well as the installation of additional devices, are only permissible with express written approval from us.

Observe all technical specifications and functional descriptions!

Any other use – particularly using the lifting column to move people or other living animals – will be considered to be an unintended use.

2.2 General Safety Instructions

- The lifting column must be operated, installed, and maintained exclusively by qualified personnel tasked with doing so. The operator in charge must be tasked with this responsibility in writing.
- It is strictly prohibited to carry or otherwise move people, as well as to remain in the corresponding danger zone, when using devices not intended and set up for this purpose.
- PHR lifting columns are not suitable for use in hazardous locations.
- Do not, under any circumstance, reach into areas within range of moving parts!
- Do not remove or disable protective devices or guards.
- Operating switches and safety limit switches must ensure that the lifting column's stroke will be reliably stopped at the respective end positions. It is strictly prohibited to run the lifting column all the way into mechanical limit stops with the motor, as this may ruin the lifting column.

2.3 How Precautionary Statements Are Used in This Manual and What They Look Like

2.3.1 General precautionary statements

General precautionary statements are found at the beginning of a section or subsection, apply to the entire section or subsection respectively, and feature the following elements:

⚠ SIGNAL WORD
Type and source of hazard Potential consequences if disregarded ▶ Measures that can be used to avoid or minimize the hazard

2.3.2 Specific Precautionary Statements

Specific precautionary statements apply to one or more instructions and feature the following elements:

⚠ SIGNALWORT　　Type and source of hazard; potential consequences if disregarded.

▶ Type and source of hazard; potential consequences if disregarded.

2.3.3 Signal words

The following signal words are used in precautionary statements throughout this manual:

Signal word	What it means
⚠ DANGER	Indicates a high-risk hazardous situation that, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a moderate-risk hazardous situation that, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a low-risk hazardous situation that, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates potential property damage or harm to the environment.

2.4 Description of Target Audiences

2.4.1 General Requirements

Individuals who work on the product or come into contact with it must:

- be 18 years old.
- be tasked with operating the product by the company operating it.
- have read and understood this operating manual before operating the product.

2.4.2 Operating Personnel

Operating personnel must additionally meet the following requirements in order to work with the product:

- Operating personnel must have received in-depth training on how to handle and operate the product.

2.4.3 Electricians

Electricians must have completed their apprenticeship and certification and be authorized to carry out work on electrical systems and components.

- Electricians must have received in-depth training on how to handle and operate the product.
- Electricians must be tasked with work on the product by the company operating it.

2.4.4 Maintenance personnel

Personnel in charge of maintaining the product must meet at least the following requirements in order to be able to maintain the product with the required care:

- Mechanical apprenticeship with advanced electrical training.
- Electrician with significant mechanical expertise and skills.
- Familiar with the product's components and configuration and how the product works.
- Tasked with maintenance by the company operating the product.
- Familiar with the various maintenance tasks and intervals from the maintenance section.

2.4.5 Setup personnel

Setup personnel must consist of qualified individuals who are familiar with the product's components and configuration and how the product works.

Setup personnel must meet the following requirements:

- In-depth training or years of experience working with machines or systems of this kind.
- Mechanical apprenticeship with advanced electrical training or electrician with significant mechanical expertise and skills.

3   TECHNICAL SPECIFICATIONS

3.1   Motor and Encoder

Parameter	Value
Voltage	48 VDC

3.2   Performance Characteristics

Parameter	Value
Speed	125 mm/s (with payload of 130 kg) 170 mm/s (with payload of 70 kg)
Stroke	800 mm
On time	< 40% / 10 min
Accuracy	± 1 mm (Repeatability ≤ 0.5 mm)

3.3   Dimensions and Weight

	PHR70-800	PHR130-800
Weight	Approx. 50 kg	
Base plate dimensions	200 x 200 mm	
Stroke	800 mm	
Height when fully retracted	859 mm	
Height when fully extended	1659 mm	
Adapter plate for cobot	(Depends on specific cobot)	

3.4   Ambient conditions

Parameter	Value
Ambient temperature	5 − 45 °C
Rel. humidity	75% 95% for an operating duration of less than one (1) month

3.5 Permissible Loads on Lifting Column
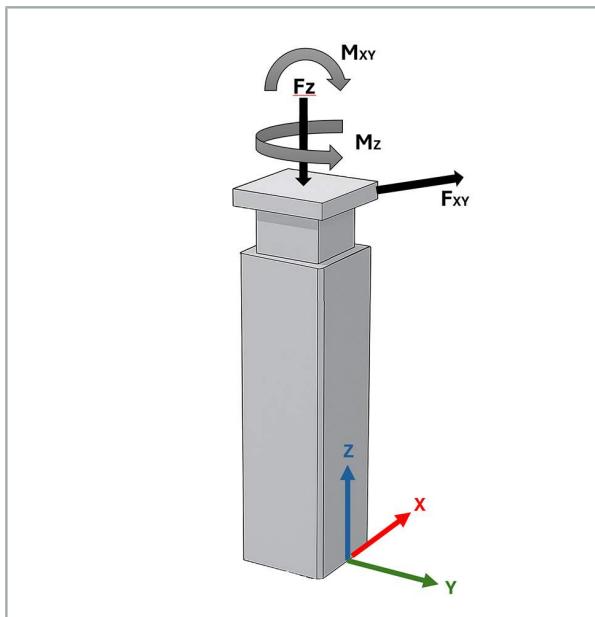
If a cobot is mounted on the lifting column, various forces and torques will act on the column in addition to the maximum permissible vertical load. These forces and torques must also be taken into account when designing the system.

Maximum limits (for a full stroke length of 800 mm):

Vertical force (Fz)	1,300 N
Torque (Txy)	750 Nm
Horizontal force (Fxy)	1,500 N
Torque (Tz)	1,300 Nm

The values specified above cover a large number of popular cobots.

The following limits apply to cobots with a higher Txy:

Vertical force (Fz)	1,300 N
Torque (Txy)	890 Nm
Horizontal force (Fxy)	1,200 N
Torque (Tz)	890 Nm

Notes:

All values are for the maximum stroke length of 800 mm.

The permissible limits are higher for shorter stroke lengths and smaller vertical loads (Fz).

4 DESCRIPTION

4.1 Rating Plate
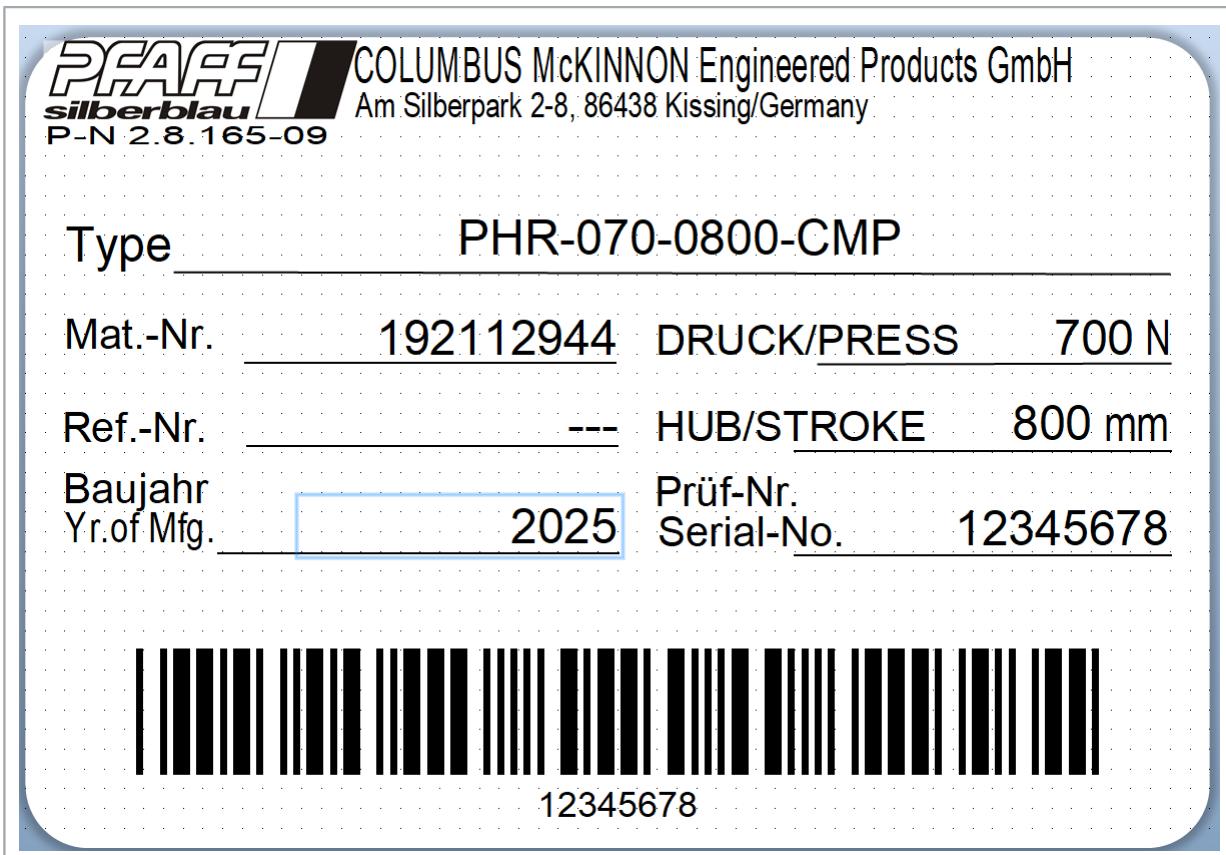
The specifications on the rating plate include, but are not limited to, the following product specifications:

Type	The model number
Mat.-Nr.	The individual internal number assigned to the PHR model
Ref.-Nr.	Order number and number in the order (batch).
Baujahr/Yr. of Mfg.	Year of manufacture
DRUCK/PRESS	Maximum permissible axial force in N
HUB/STROKE	The lifting column's maximum length of travel
Prüf-Nr./Serial-No.	Individual number assigned to the individual PHR

4.1.1 Model code

	1			2			3			4		5
P	H	R	-	0	7	0	-	0	8	0	0	-	A	B	B	-	X

1	Product code	PHR − Phoenix Robotics & Compact
2	Maximum payload	in kg (e.g., 070 ≙ 70 kg)
3	Maximum stroke	in mm (e.g., 0800 ≙ 800 mm)
4	Use	CMP = Compact ABB = Asea Brown Boveri FAN = Fuji Automatic Numerical Control (FANUC) UNR = Universal Robots RBT = Robotics XXX = Other
5	Custom	X = Special model that cannot be identified with the code alone

4.1.2 Existing models

Part number	Model	Compatible robots
192112944	PHR-070-0800-CMP	none
192112946	PHR-130-0800-CMP	none
192115165	PHR-070-0800-ABB	GoFa5 / 10 / 12
192115166	PHR-070-0800-UNR	UR3e / UR15
192115167	PHR-070-0800-UNR	UR7e / 12e / 16e
192115169	PHR-130-0800-UNR	UR20 / 30
192115170	PHR-070-0800-FAN	CRX-5 / 10 / 20

4.2   Function

How It Works – PHR (Phoenix Robotics) Lifting Column

The PHR lifting column is a modular, vertically moving lifting device that consists of a three-stage telescopic column system. These lifting columns deliver linear motion that can be used in order to vertically move mounted components or loads in industrial applications, with the preferred use case consisting of cobots.

Drive mechanism and motion

The lifting column is driven by an integrated electric servomotor that drives a stationary screw in conjunction with a gear unit. When this screw is driven, the first lifting column section moves upwards. At the same time, a second, mechanically coupled, moving screw unit is driven synchronously, causing the third section to be extended. This arrangement allows for multi-stage telescopic motion.

Safety mechanism

Since the system's design does not allow for self-locking, the servomotor features a holding brake. This brake prevents the lifting column from dropping in an uncontrolled manner when de-energized or in the event of system failure.

Position monitoring

The upper and lower end positions for the lifting column's motion are detected with limit switches and sensors, ensuring that the column's travel is safely limited. The corresponding movement is controlled with a rotary encoder (absolute encoder) that makes it possible to always determine the exact position of the screws and the resulting lifting column height.

Power supply

A separate control box for powering the lifting column is included. This control box can be connected to a standard outlet (230 V).

Connectors

The system features the following external connectors:
- Ethernet interface, RJ45 / CAT6
- Power connector, SAIE-M23-L-HW
- Update / IP address, USB-C
- I/O connector / external control section, M12 8-pin

These connectors make it possible to flexibly integrate the lifting column into existing control systems or manual operation approaches.

4.3 Configuration and Components
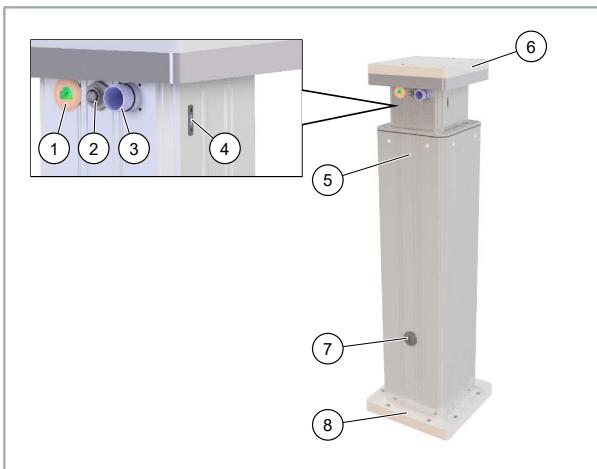
1	Ethernet port
2	Controller connector (input for I/O signals and emergency stop signal)
3	48 VDC power connector
4	USB port
5	Rating plate location
6	Adapter plate for cobot (model-specific)
7	Lubricating hole plug
8	Mounting plate

4.3.1 Power supply control box

The control box is used to power the lifting column. It features a permanently attached 3 m power cable (230 V, CEE 7/4 [type F] plug) and a connector for powering the lifting column. The control box measures 600 x 400 x 200 mm and is designed for wall mounting. In addition, the control box has a protection rating of IP66 and features lockable doors.

4.3.2 Cables

Ethernet cable

The Ethernet cable is used to connect the lifting column to an external controller through the corresponding Ethernet port.

Connectors: Cat 6 RJ45 male-to-male

Length: 5 m

Power / DC cable

Powers the lifting column. The cable connects the enclosed control box to the lifting column.

Connector: Female connector, 4-pin + GND

Length: 5 m

I/O cable

Used to control the lifting column externally. The cable connects the lifting column to an external controller (e.g., manual control panel or intelligent controller).

Connector: 8-pin, M12 A keying

Length: 5 m

Interposing relays

The enclosed interposing relays feature positively guided contacts and are used to connect the enclosed I/O cable to the controller provided by the customer.

The relay outputs are connected to two separate connecting cables that need to be connected to the controller being used by the customer.

Pinout information (*see "Setup and Electrical Installation", page 21*).

i	The interposing relays are only needed if the system is being connected to an ABB or Universal Robots controller!

5 SCOPE OF SUPPLY, TRANSPORTATION, STORAGE

5.1 Condition Upon Delivery

The PHR lifting column is not fully retracted when delivered. This is in order to make it possible to determine the motor's correct direction of rotation during setup (*see "Requirements for a Successful Setup", page 22*).

5.2 Scope of Supply

- Immediately after receipt, check to make sure that all the items included match the corresponding shipping documents.
- Please note that we will be unable to honor defect claims that are not filed in a timely manner.
- Immediately file a claim for any defects and/or missing items with CMCO Engineered Products.
- If you notice any transit damage, file a claim immediately with the shipping company.

Standard scope of supply:
- PHR (Phoenix Robotics & Compact) lifting column
- Control box for power supply (incl. internals, approx. 18 kg)
- Power cable, 5 m

Additional scope of supply for Compact version:
- Pendant station for manual operation (incl. emergency stop button)

Additional scope of supply for Robotics version:
- Adapter plate for cobot (model-specific)
- Ethernet cable, 5 m
- I/O cable, 5 m
- Two (2) interposing relays (only with version for ABB or UR)

5.3 Transportation

Safety instructions for transportation

- The lifting column must be transported exclusively by trained personnel.
- Keep all transportation routes and loading and unloading areas clear of unauthorized personnel.
- Lift / transport the lifting column with suitable slinging gear.
- Do not, under any circumstance, use damaged slinging gear!
- When transporting the lifting column with a crane, make sure that no one is standing underneath the suspended load.

A female thread for slinging gear (e.g., an eye bolt) can be found at the center of the top of the lifting column.

5.4 Storage

Storage periods shorter than three years

- Check the corrosion protection coatings on the components and restore them / touch them up as needed.
- Check the lubrication of moving parts and regrease as needed.

Storage periods longer than three years

- Check the corrosion protection coatings on the components and restore them / touch them up as needed.
- Check the lubrication of moving parts and regrease as needed.

> **ℹ** For storage periods longer than three years but not exceeding five years, we recommend arranging for Columbus McKinnon Engineered Products GmbH service personnel to conduct an inspection and servicing.

6 ASSEMBLY

6.1 Setting Up the Lifting Column

| ⚠ WARNING |
|---|
| **Hazard posed by improper assembly**
▶ The lifting column must be assembled exclusively by qualified personnel tasked with the corresponding work. |

| ℹ	The lifting column must be exclusively installed on the floor.

Requirements for assembly

- Check the lifting column to make sure it is compatible with the applicable technical requirements.
- The mounting structure, bearing structure, and base must be designed to support the maximum forces that will be produced.
  Recommendation: When installing the lifting column, install an additional plate between the lifting column and the installation spot so that the forces that are produced will be transmitted into the floor.

Installation notes
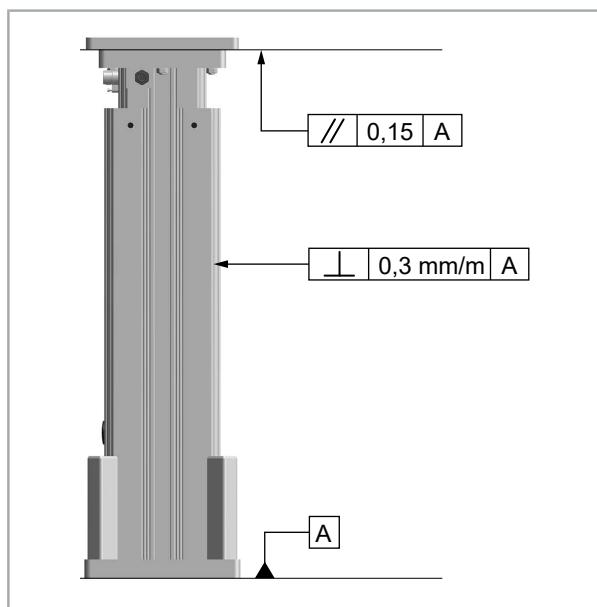
- All parallelism and perpendicularity specifications must be adhered to.
- Misalignments and angle errors must be avoided, as significant errors and misalignments will result in lateral forces. In turn, misalignments and lateral forces will result in a shorter service life and in the device's premature failure!
- Stress and twisting will increase the amount of power required and result in a shorter device service life!

1 Four (4) ISO 4762 socket head cap screws (M12 x 30, property class 8.8) and two (2) ISO 8752 spring pins (12 x 45)

2 Eight (8) ISO 4017 hex cap screws (M12 x 60, property class 8.8)
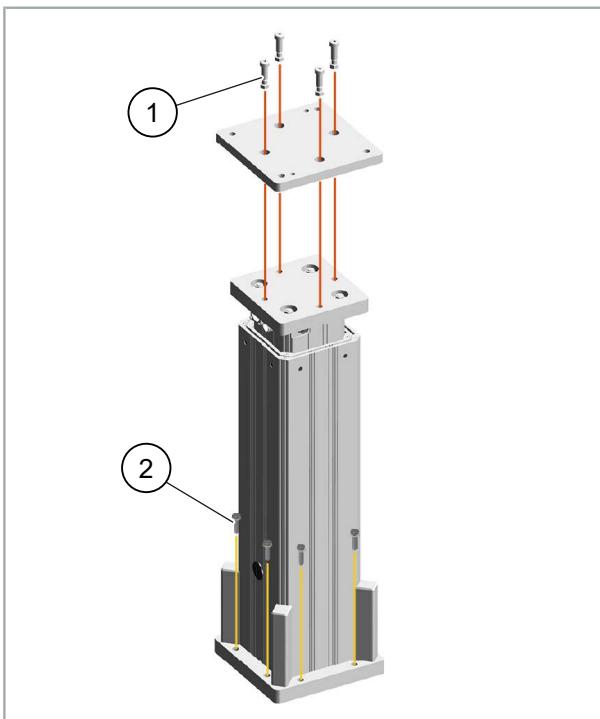
Assembly sequence

1. Tightly fasten the lifting column's mounting plate to the floor with the eight (8) hex cap screws (with a tightening torque of 79 Nm).

2. Tightly fasten the adapter plate for the cobot to the top of the lifting column with the four (4) socket head cap screws and the spring pins (with a tightening torque of 79 Nm).

3. Use a locking device or other thread locking method to secure the screws in such a way as to prevent self-loosening.

You can now install the cobot on the adapter plate.

6.2   Electrical Installation

⚠ WARNING
Electrical shock hazard ▶ Check to make sure that the assembled and installed parts are grounded properly (resistance to ground of less than 10^6 Ω).

⚠ CAUTION
Trip hazard posed by cables! ▶ Route all cables in such a way as to not create any trip hazards (use cable ducts if necessary). ▶ Make sure not to create any abrasion points for the cables.

Safety instructions

- Work on the electrical system must be carried out exclusively by trained electricians with the system de-energized.
- Operating the PHR lifting column without a cobot is only allowed with a connected pendant station in jogging mode.

Power supply

The lifting column is powered with the enclosed control box, which features a power cable for connecting to 230 V and can be connected to the lifting column with the enclosed 48 VDC connection cable.

Robot controller connection

When connecting the robot controller, please consult the manufacturer's manual.

The company operating the system must ensure that the cobot's safety signals are relayed to the PHR lifting column!

7 SETUP AND ELECTRICAL INSTALLATION

7.1 Setup Safety Instructions

> ⚠ **WARNING**
>
> **Crush hazard posed by the motor starting up accidentally.**
> ► De-energize the lifting column before starting work.
> ► Lock and tag out the lifting column.

Make sure that there are no other hazard sources present and that all guards and protective devices are installed properly.

A test in conformity with DIN EN 60204-1, section 18 must be carried out before setup.

7.2 Pinout at I/O connector / external control section

The following is the pinout at the I/O connector:

Pin	Function	Color
1	+24V	white
2	STO 1+	brown
3	STO 2+	green
4	CN3.1	yellow
5	CN3.3	gray
6	[Reserved]	
7	[Reserved]	
8	[Reserved]	

7.3 Requirements for a Successful Setup

- The setup must be carried out only after the lifting column has been properly installed and assembled by qualified personnel tasked with the corresponding work.

- This operating manual must be observed and followed without fail when setting up the lifting column.

- The lifting column must be set up exclusively by qualified personnel tasked with doing so.

- When setting up the lifting column after a storage period longer than three years, it is recommended to check the lifting column and its components for wear and to make sure they are properly lubricated.

- The first time the lifting column is set up, the motor's direction of rotation must be checked.
  To do this, briefly run the motor to determine its direction of rotation and avoid potential stalling.

- During setup, continuously check the temperature on the lifting column sections. The sections should never be more than just lukewarm!

- During the break-in period, look out for unusual linear actuator noises and vibrations. An increased temperature despite observing the on time and the permissible power output is an indicator of impermissible lateral forces!

- Before actual operation, test the lifting column without a load (extend it all the way and then retract it once).

7.4 Settings for Basic Values

The following limits and speeds apply to the various versions of the lifting column. These settings and speeds need to be set in the robot controller accordingly.

Model	Stroke [mm]	Upper limit [mm]	Lower limit [mm]	Max. lifting speed [mm/s]
PHR070-800	800	1,659	859	125
PHR130-800	800	1,659	859	170

During setup, check to make sure that the integrated limit switches are working correctly.

1. Fully extend the lifting column and make sure that the upper end position is detected and the lifting column stops accordingly.

2. Then fully retract the lifting column and make sure that the lower end position is detected and the lifting column stops accordingly.

7.5 Setup for Manual Operation

7.5.1 Connecting the Pendant Station for Manual Operation
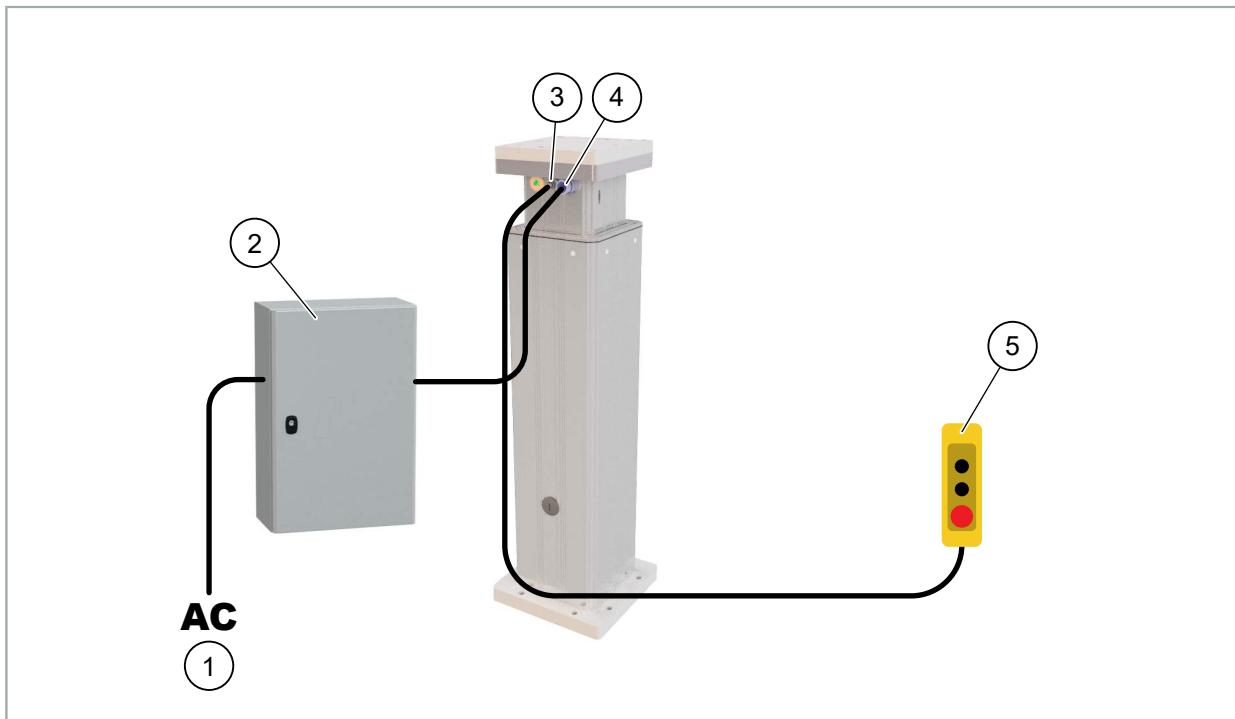
1	230 V power (provided by customer) through CEE 7/4 (type F) plug	**4**	Power supply connection (48 VDC)
2	Power supply control box	**5**	Pendant station
3	I/O & STO interface (M12, 8 pins)		

7.5.2 Homing

For initial setup:

1. Press and hold down the "Up" and "Down" buttons at the same time for five (5) seconds.

Whenever starting up the lifting column afterwards:

1. Press and hold down the "Up" and "Down" buttons at the same time for ten (10) seconds.

The lifting column will move at 1/6 of its maximum speed downwards until it reaches the lower limit switch.

After reaching the lower limit switch, the lifting column will move at 1/6 of its maximum speed upwards until it reaches the upper limit switch.

7.6 Electrical Connection – ABB Controller

> ⚠ **WARNING**
>
> ⚡ **Electrical shock hazard**
> ▶ Check to make sure that the assembled and installed parts are grounded properly (resistance to ground of less than 10^6 Ω).
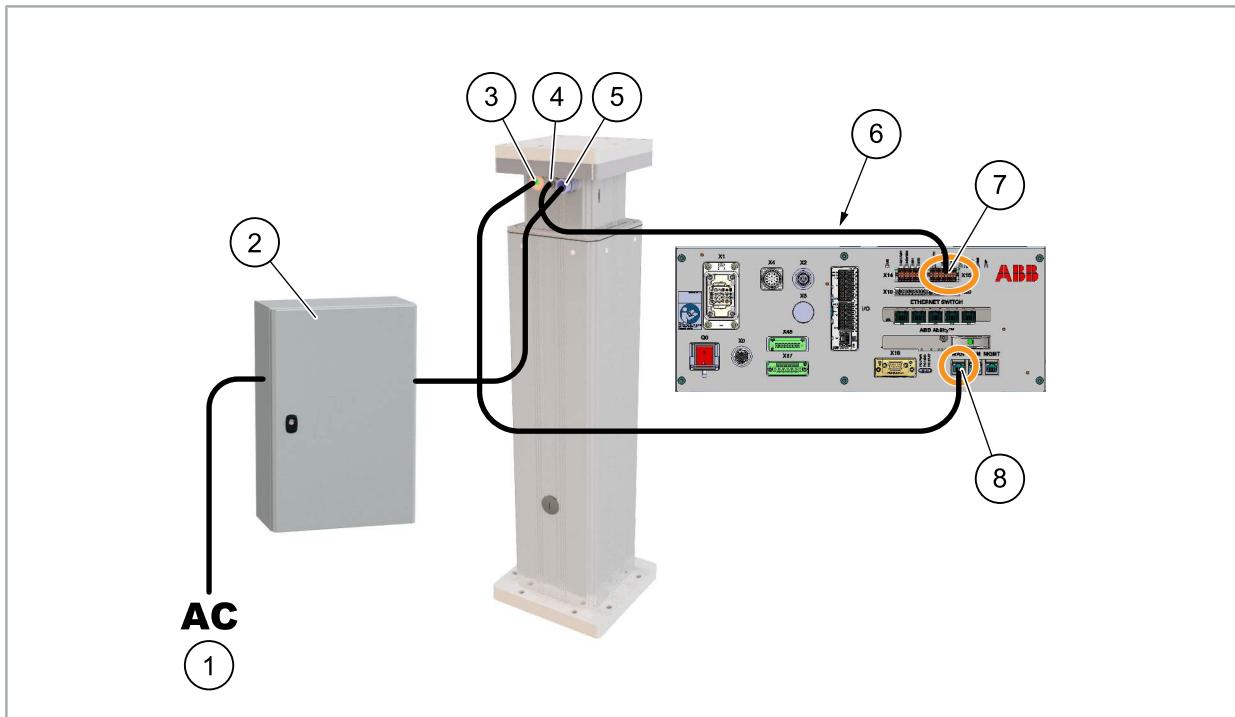
|			
1	230 V power (provided by customer) through CEE 7/4 (type F) plug	**5**	Power supply connection (48 VDC)
2	Power supply control box	**6**	Interposing relays
3	Ethernet interface (RJ45)	**7**	I/O & STO interface (ABB connector: "**X15**")
4	I/O & STO interface (M12, 8 pins)	**8**	Ethernet port (ABB connector: "**WAN**")
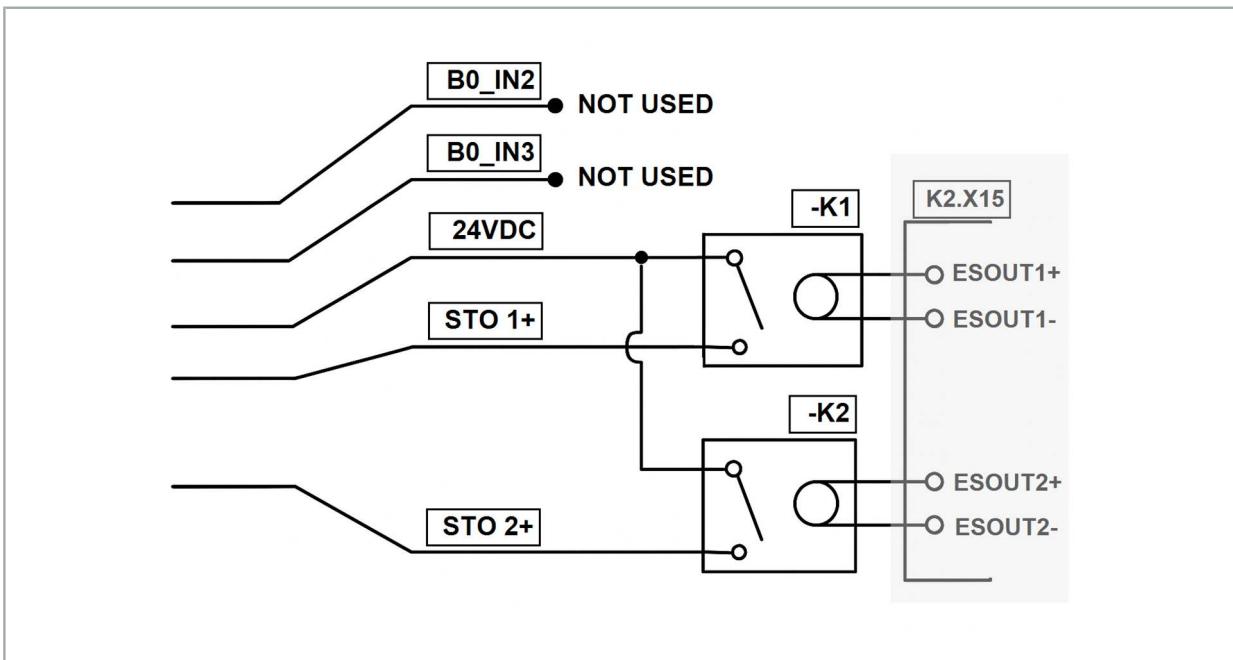
The figure above shows the I/O cable and Safe Torque Off (STO) signal connections between the lifting column and the robot controller.

The lifting columns' signal cables are connected to external safety relays for this purpose. From there, the safe outputs are connected to the controller.

Signals that are not needed are labeled accordingly and are not used.

7.7 Electrical Connection – FANUC Controller
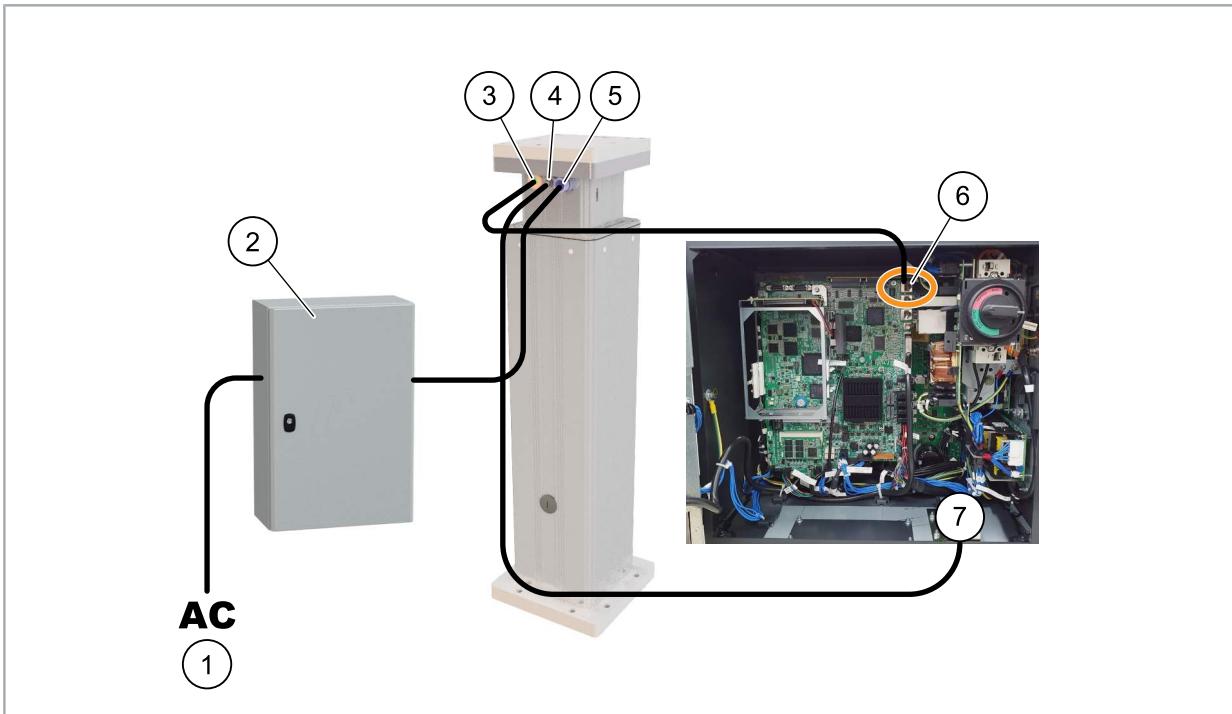
|			
1	230 V power (provided by customer) through CEE 7/4 (type F) plug	**5**	Power supply connection (48 VDC)
2	Power supply control box	**6**	Ethernet port
3	Ethernet interface (RJ45)	**7**	I/O & STO interface (for the pinout, *see "Pinout at I/O connector / external control section", page 21*)
4	I/O & STO interface (M12, 8 pins)		
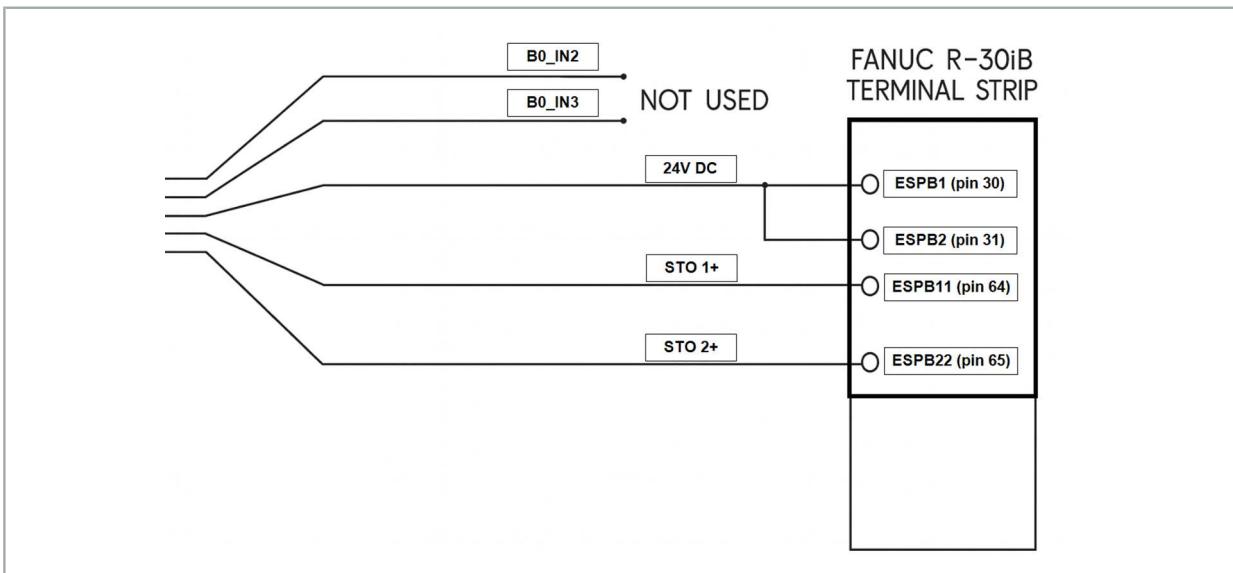
The figure above shows the I/O cable and Safe Torque Off (STO) signal connections between the lifting column and the robot controller. The lifting column's signal cables need to be connected with the enclosed cables for this purpose, and wires that are not needed must be labeled accordingly and not used.

7.8   Electrical Connection – Universal Robots Controller

1	230 V power (provided by customer) through CEE 7/4 (type F) plug	**5**	Power supply connection (48 VDC)
2	Power supply control box	**6**	Interposing relays
3	Ethernet interface (RJ45)	**7**	I/O & STO interface (for the pinout, *see "Pinout at I/O connector / external control section", page 21*)
4	I/O & STO interface (M12, 8 pins)	**8**	Ethernet interface (Ethernet symbol)
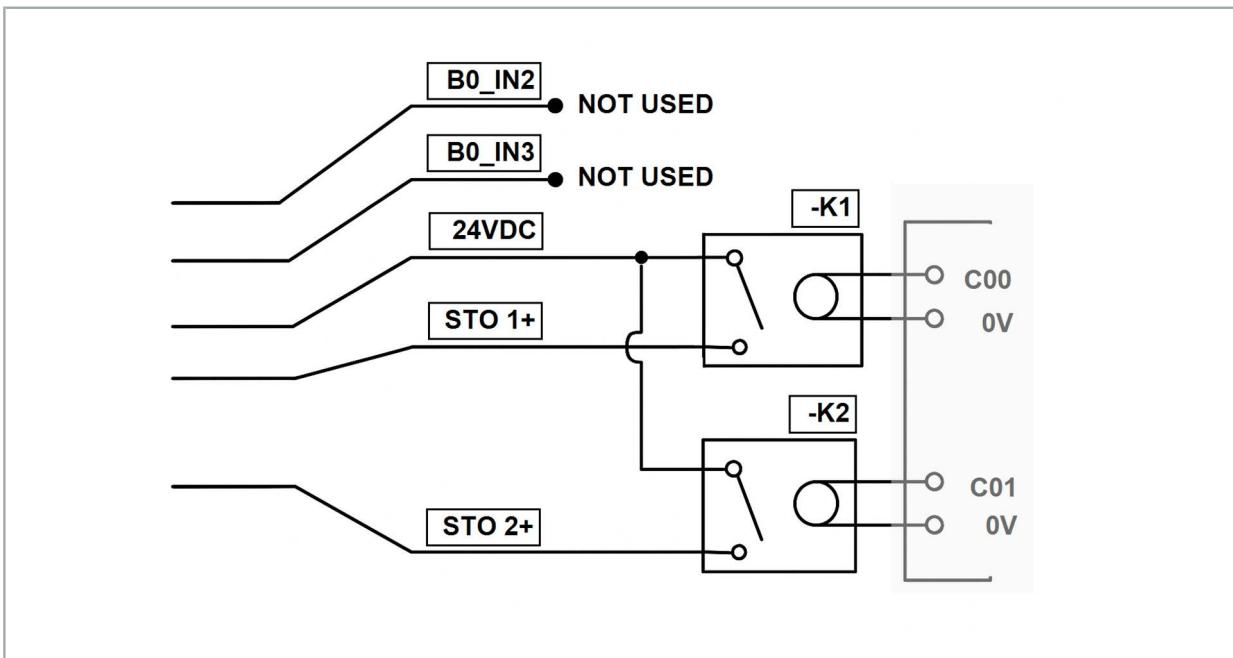
The figure above shows the I/O cable and Safe Torque Off (STO) signal connections between the lifting column and the robot controller.

The lifting columns' signal cables are connected to external safety relays for this purpose. From there, the safe outputs are connected to the controller.

Signals that are not needed are labeled accordingly and are not used.

Instructions for connecting the electrical wiring to Universal Robots controllers

When connecting the lifting column to a Universal Robots controller (UR), please note that the safety outputs from the UR controller must first be activated/configured in the software accordingly.

This configuration is required in order for the lifting column to be able to be safely shut down with the UR controller (e.g., for the STO / emergency stop functionality).

For more information, please refer to the *"Sharing the Emergency Stop with Other Machines"* section in the Universal Robots software installation manual.

7.9 Software Installation

The following sections describe how to install and use the PHR (Phoenix Robotics & Compact) lifting column software. The current software supports cobot controllers from ABB, FANUC, and Universal Robots (UR).

### 7.9.1 Software Installation – ABB

System Requirements

- This software version supports ABB (GoFa 5, 10 & 12) OmniCore C30 Version RW7.18.0 and higher
- Wizard Easy Programming Version 1.7.0 and higher
- Web app mode: "Standard mode" on FlexPendant.

Creating a cobot backup with the FlexPendant

1. Plug an empty USB drive into the FlexPendant.
2. Select "Settings" in the main menu.
3. Select the "Backup" option.
4. Tap "Browse" and select the USB drive.
5. Tap "Backup" to start creating the backup.
   ✓ The backup process should be done in a few seconds.

Installing the lifting column software

1. Format an empty USB drive to NTFS with a conventional PC.
2. Download the installation file (e.g., *CMCO_LiftingColumn_1.4.1.zip*) from the following link:
   https://www.cmco.com/de-de/Software-Downloads/
3. Unzip the ZIP file in a separate folder.
   The ZIP file should contain two files:
   - open.cmco.liftingcolumn_1.4.1.rmf
   - open.cmco.liftingcolumn_1.4.1.rpk
     Both files are password-protected (the password will be provided by Sales).
4. Copy the folder with the two files to the empty USB drive.
   Important: Make absolutely sure to copy the entire folder with the two files.
5. Turn on the cobot.
6. On the FlexPendant, select "Controller Software" and then select "Add-In Installer".
7. Select the "+Add Add-In" option.
8. Plug the USB drive into the cobot.
9. Select the drive and then the add-in from the list.
10. Make sure that the add-in is selected under "Select Features".
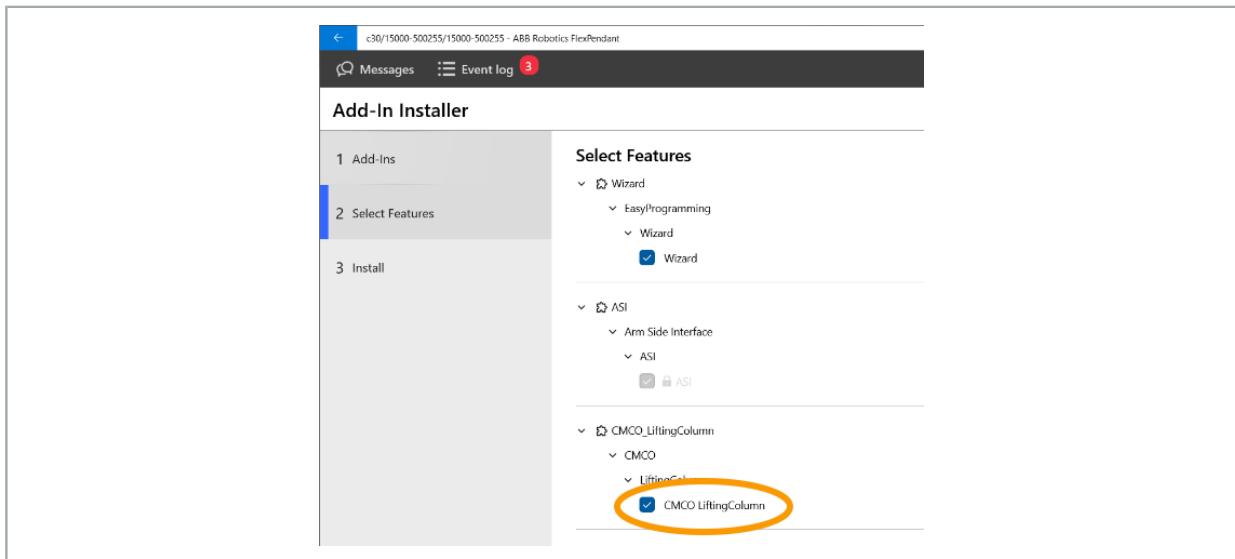
11. Install the add-in.

    ✓ The cobot will restart and install the add-in. This operation can take a few minutes.

    ✓ Once the installation is completed successfully, the "CMCO Lifting Column" application will be shown on the FlexPendant start screen.
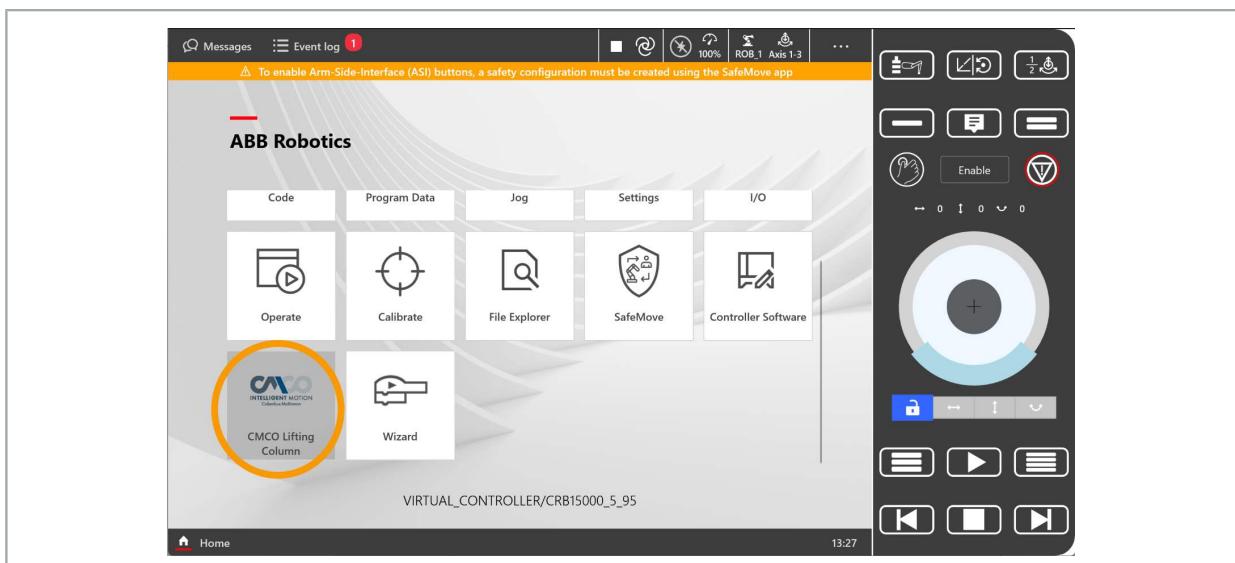
Setting the IP address

- The ABB CRB 15000 (GoFa™) cobot is configured with a static IP address for its management port (MGMT) by default: 192.168.125.1.
- The ABB FlexPendant, also referred to as a "teach pendant," is used to program and operate the cobot. It often has a static IP address as well: 192168125250
- The ABB CRB WAN port must have an IP address of 192.168.10.100. The last three digits ("100") can contain any number other than "51"
- The lifting column has a static IP address of 192.168.10.51 and uses port 3333.
- If you use a PC to open ABB RobotStudio, you will need to connect it to the ABB CRB 15000 MGMT port.

1. In ABB RobotStudio, click on "Controller" > "Properties" > "Network Settings" > "Public Network" and change the IP address to 192.168.10.100.
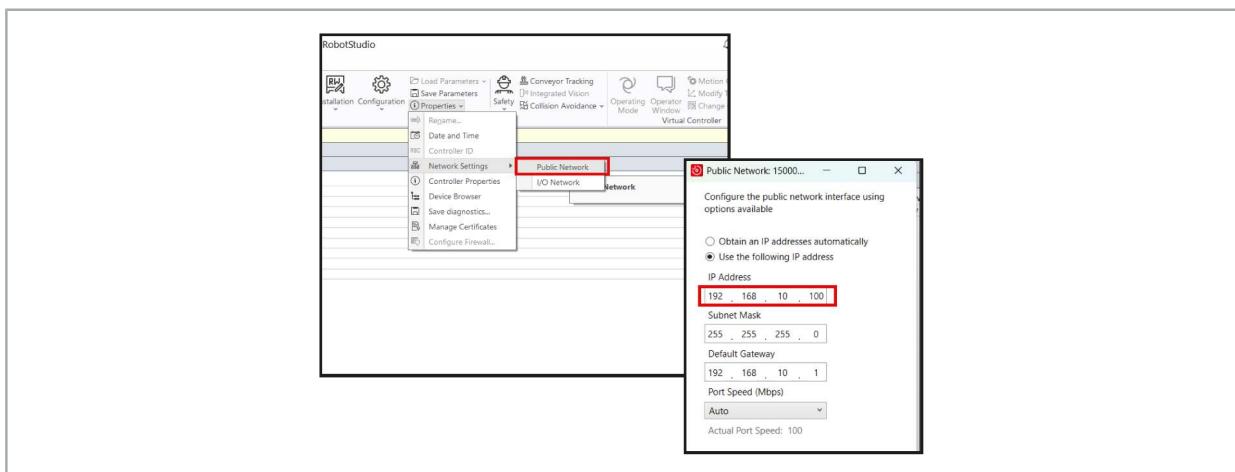
2. Click on "Request Write Access" to enable editing.
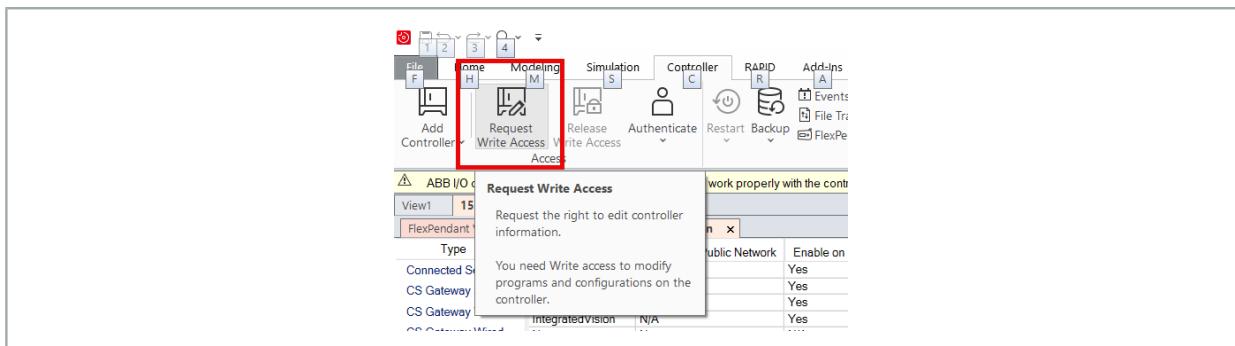
3. For "Firewall Manager", change the values for "RapidSockets" as follows and then confirm with "OK".
   - Enable on Public Network: Yes
   - Enable on Private Network: No
   - Enable on I/O Network: No
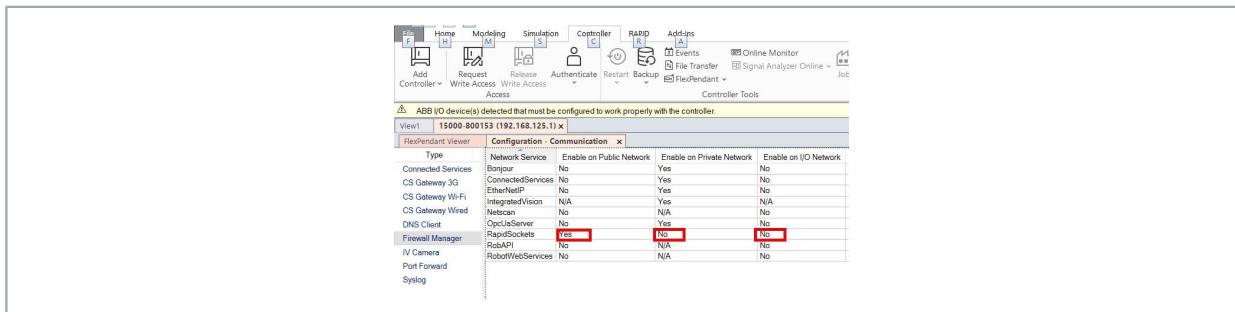
4. Restart the system by clicking on "Restart".

Updating the software

If a new version of the software is available and needs to be installed, you will first need to delete the existing software version.

1. Download the software as instructed previously.
2. Back up the cobot as instructed previously.
3. On the FlexPendant, open the "Add-In Installer" menu.
4. Select the "CMCO LiftingColumn" add-in and uninstall it by tapping "Remove Add-In".
5. Delete the "CMCO_LiftingColumn" folder in "HOME" > "WebApps".
6. Delete the "CMCOLC.cobloc" file in "HOME" > "BlockLibrary".
7. Delete the files in "HOME" > "WebApps" > "CMCO_LiftingColumn" or save them in a different folder. The files in this folder contain user data.
8. Install the new software version as instructed previously.

7.9.1.1 "Settings" Screen
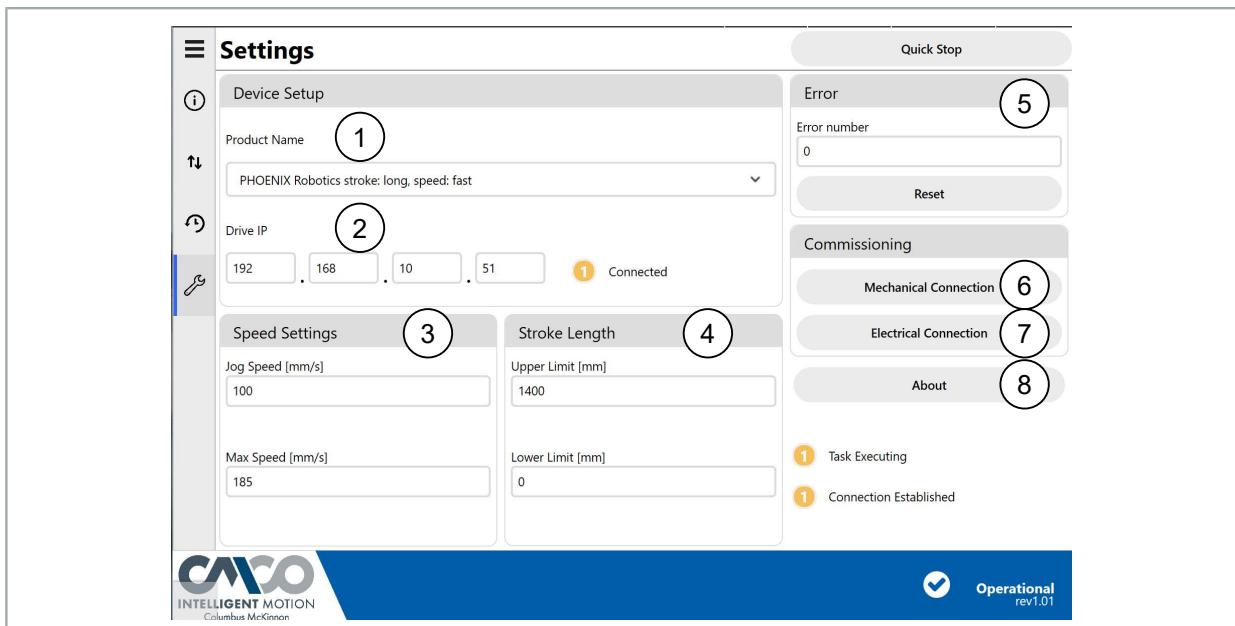
1 – Product Name

- PHOENIX Robotics ABB GoFa 5, 10, 12 - high speed
- PHOENIX Robotics ABB - high payload

2 – Drive IP

- Drive used to control and monitor the lifting column. The default IP address is 192.168.10.51.
- Do not change this drive IP address unless necessary!
- The IP address for the ABB CRB 15000 WAN port must be 192.168.10.100.
- If the WAN port needs to be changed to a different subnet address, the drive IP address will need to be changed with the Delta Line DL_Space software. This software can be downloaded from the following link: *https://www.delta-line.com/a.pag/software-pzk3285kzpsxzk615.html*.
- The bottom right corner of the screen will show whether a connection to the lifting column has been successfully established.

3 – Speed Settings

- "Jog Speed" is used to set the speed for jogging mode in the "Position" screen.
- "Max Speed" is used to set the maximum speed at which the lifting column is allowed to move to predefined positions. This maximum speed will depend on the specific lifting column module being used (*see "Settings for Basic Values", page 22*).

4 – Stroke Length

- Used to set the lifting column's upper and lower limits.
- These limits will depend on the specific lifting column module being used (*see "Settings for Basic Values", page 22*).

5 – Error

- Shows lifting column malfunctions and errors.
- Malfunctions and errors will be shown as a numeric code (*see "Error messages", page 38*).

6 – Mechanical Connection

- Information on how to assemble the lifting column.

7 – Electrical Connection

- Information on how to connect the lifting column.

8 – "About"

- Information about the application.

"Task Executing" and "Connection Established" respectively indicate that the application is being executed in the cobot's controller and that the application is connected to the lifting column.

7.9.1.2 "Position" Screen
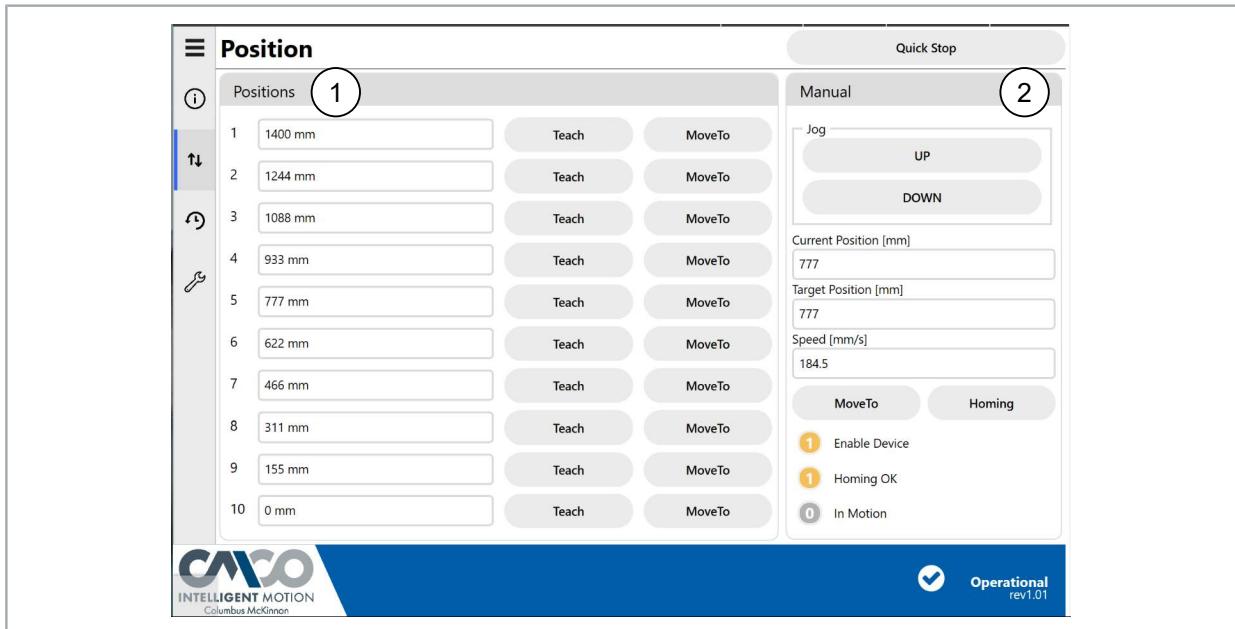
1 – Position definitions

- You can teach lifting column positions under "Positions".
- The positions can have any name that is up to 30 characters long.
- "Teach" will take the current lifting column position and teach it as the position for the corresponding named position.
- "MoveTo" will make the lifting column move to a taught position.

2 – Commands for moving the lifting column manually

- You can use the "UP" and "DOWN" buttons to move the lifting column at the previously defined speed as long as you keep pressing the button.
- The fields below will continuously show the current position, the target position, and the lifting column speed.
- You can use the "MoveTo" button to move the lifting column to a position specified in the "Target Position" field.
- You can use the "Homing" button to move the lifting column to the upper and lower end position sensors in order to determine the software limits.

"Enable device" indicates that the application is accessing the lifting column.

"Homing OK" indicates that the lifting column successfully traveled to the end position sensors.

"In Motion" indicates that the lifting column is moving.

7.9.1.3 "Status" Screen
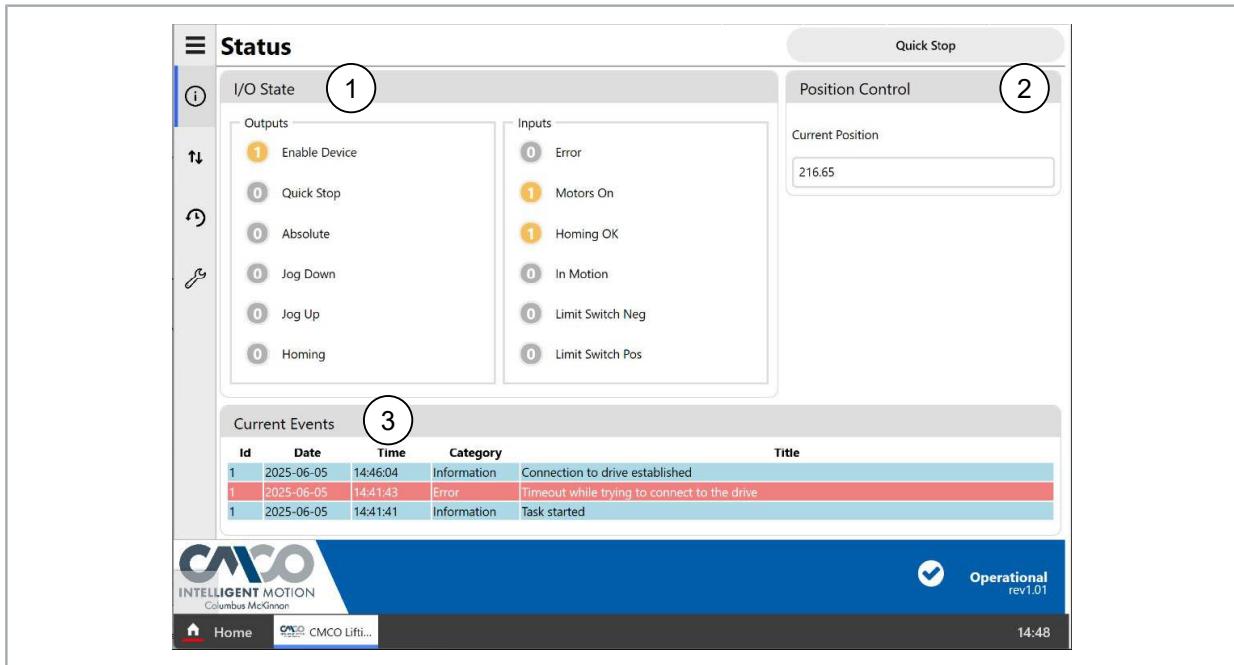
1 Input and output signal states.
0 = OFF (false)
1 = ON (true)

2 Shows the lifting column's current position in mm.

3 Shows current messages.

Outputs

- Enable Device: Indicates that the application is activating the lifting column's drives.
- Quick Stop: Indicates that the application has sent a quick stop signal to the lifting column.
- Absolute: Indicates that the application is carrying out a full movement of the lifting column to a defined position.
- Jog Down / Up: Indicates that the application is moving the lifting column up or down in jogging mode.
- Homing: Indicates that the application is homing the lifting column.

Inputs

- Error: Indicates that the lifting column is signaling an error.
- Motor On: Indicates that the lifting column drive is active.
- Homing OK: Indicates that the homing process was completed successfully.
- In Motion: Indicates that the lifting column is moving.
- Limit Switch Neg: Indicates that the lower end position sensor is active (the lifting column is at its bottommost position).
- Limit Switch Pos: Indicates that the upper end position sensor is active (the lifting column is at its topmost position).

7.9.1.4   Messages Screen – ABB

Detailed information on past messages will be shown under "Event History".

7.9.1.5 Error messages

#	Bit#	Name	Description
1	**1**	STX/ETX not valid	STX or ETX character could not be validated. The character was incorrect or part of the message was lost.
2	**2**	Control Word not valid	Bad command. Only "motor enable" and an additional command are valid. Check the command that was sent.
4	**3**	SEQ Error, msg lost	The received command contained more characters than allowed. The command was lost.
8	**4**	Negative Value	Negative value for position. The program outputs "0" as its lowest value. If the error persists, carry out a homing run in order to set the zero position correctly.
16	**5**	Feedback Error	Feedback error. The encoder cannot be calibrated or is not working properly. Check the encoder.
32	**6**	I2T Protection	Error caused by long-lasting current peaks. The software monitors the current on the lifting column motor and triggers this error if this current rises above a defined value (over 20% of the maximum current).
64	**7**	Thermal Protection	Lifting column motor too hot (75 – 80 °C).
128	**8**	Missing Torque Enable	24 V power for STO is missing. Establish STO power and reset the alarm.
256	**9**	Voltage Protection	Power supply fault. Voltage peak or excessive voltage applied.
512	**10**	Thermal Protection	Power supply fault. Voltage peak or excessive current.
1024	**11**	EE-prom Fail	EEPROM error. A part of the software was not loaded correctly. Download and install the software again.
2048	**12**	Homing Error	The homing run was not ended correctly or was not completed.
4096	**13**	Open Transistor	Open transistor. Normally triggered by another fault or if the motor stalls.
8192	**14**	Open Phase	One of the motor's phases has become disconnected or is connected incorrectly.
16384	**15**	Software Error	The application could not be run correctly. Restart the application or download and install it again if necessary.
32768	**16**	Drive Error	One of the errors listed above is present.

7.9.2 Software Installation – FANUC

Installing the software add-in

1. Turn on the FANUC controller.
2. Download the installation file (e.g., CMCO_LiftingColumn_1.4.1.zip) from the following link: *https://www.cmco.com/de-de/Software-Downloads/*
3. Use a USB drive to install the installation file on the teach pendant.

7.9.2.1 "Setup" Screen

Installing the software add-in

1. Turn on the FANUC controller.
2. Download the installation file (e.g., CMCO_LiftingColumn_1.4.1.zip) from the following link: *https://www.cmco.com/de-de/Software-Downloads/*
3. Use a USB drive to install the installation file on the teach pendant.

Setting basic values

The basic values for the lifting column are defined in the settings.
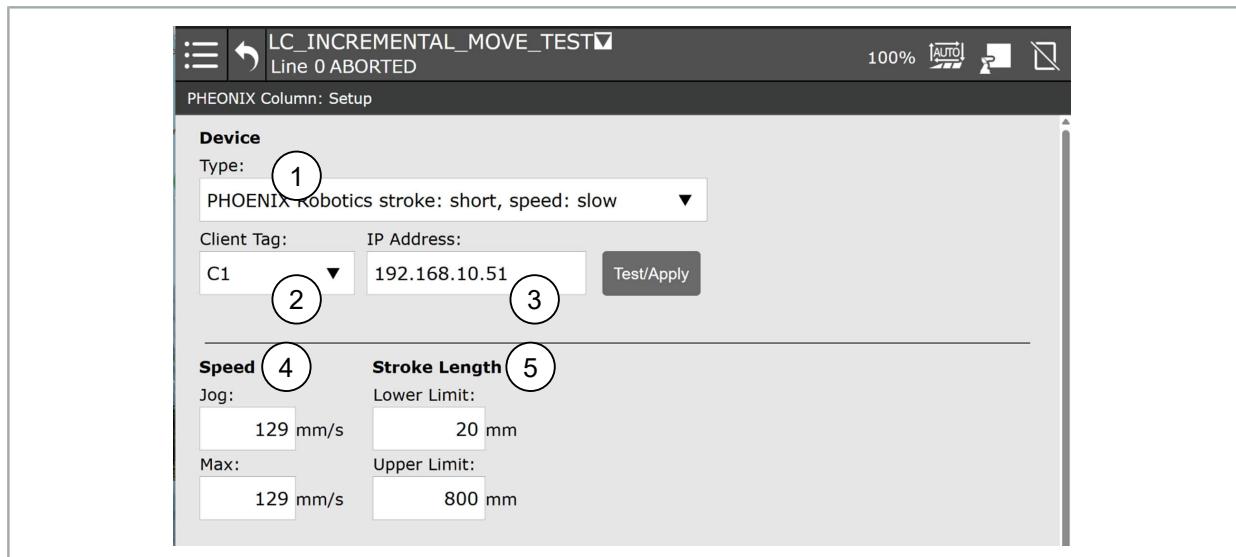
1. Select the lifting column model:
   - PHOENIX Robotics Fanuc (high Speed)
   - PHOENIX Robotics Fanuc CRX25/CRX30 (high payload)
2. Set the client tag for the lifting column.

   Make sure that the client tag is not already being used for a different cobot accessory, since this will result in the IP address being overwritten.
3. Set the IP address (default: 192.168.10.51) and tap "Test/Apply".
   - ✓ A connection to the lifting column will be established.
4. Set the lifting column speeds.

   "Jog" is used to set the speed for jogging mode in the "Position" screen.

   "Max" is used to set the maximum speed at which the lifting column is allowed to move to predefined positions. This maximum speed will depend on the specific lifting column module being used.

   "Fast": 185 mm/s

   "Slow": 129 mm/s
5. Set the lifting column's upper and lower limits (*see "Settings for Basic Values", page 22*).

7.9.2.2 "Position" Screen
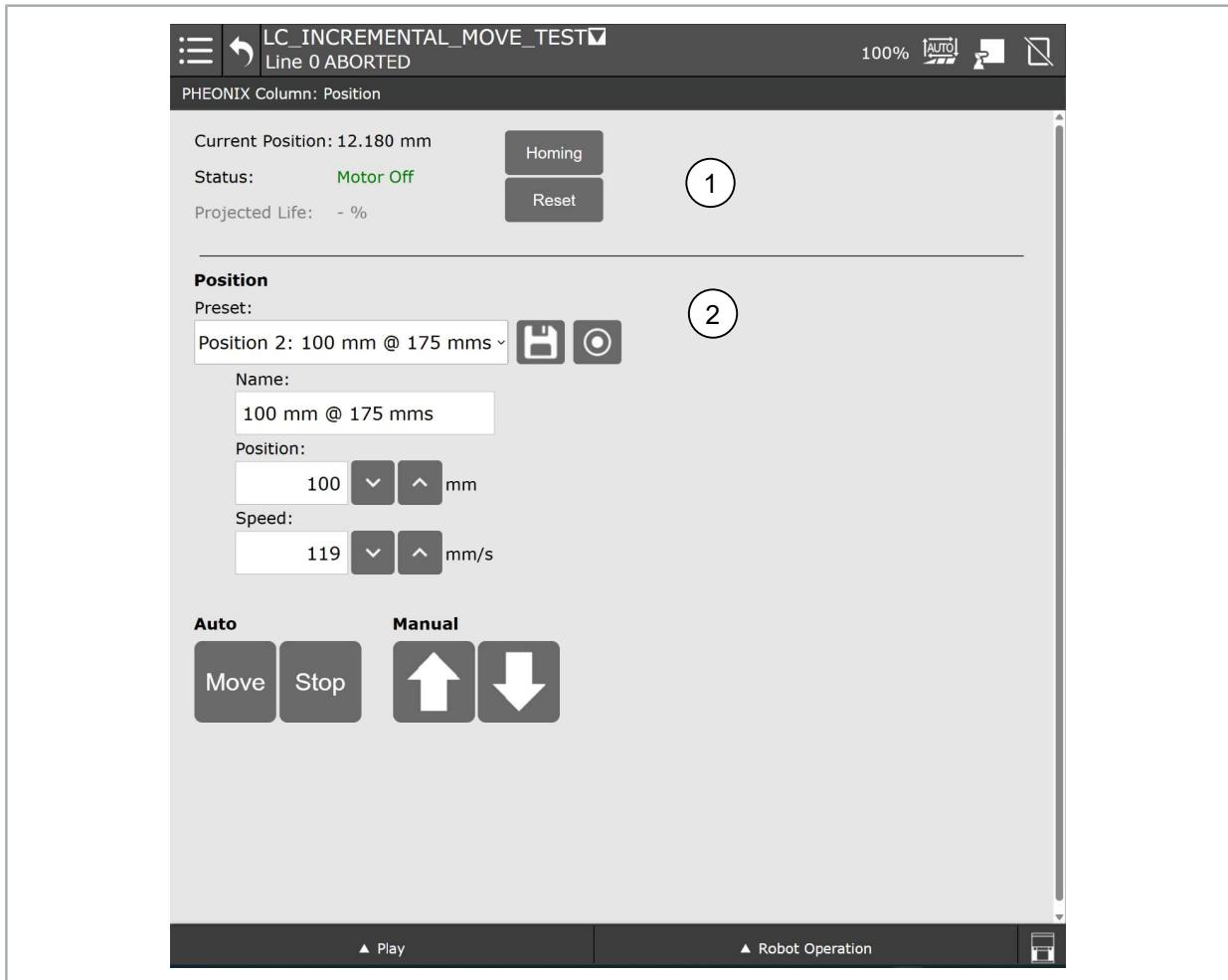
1 – Current information about the lifting column

- ■ "Current Position" shows the lifting column's current position.
- ■ You can use the "Homing" button to move the lifting column to the upper and lower end position sensors in order to determine the software limits.
- ■ You can use the "Reset" button to reset any lifting column drive errors.

2 – Position definitions

- ■ The "Preset" field and buttons can be used to select predefined positions and move to them or save new positions.
- ■ You can enter the name for a new position in the "Name" field. After you do this, the position will be available for selection in the "Preset" field.
- ■ The "Position" and "Speed" fields are used to define the position and travel speed for a position. When you save a position, these values will be applied to the position with the corresponding name.
- ■ You can use the "Move" button to automatically move to the position defined in the "Position" field and to save it if necessary. "Stop" can be used to stop an automatic movement at any time.
- ■ You can use the arrow buttons under "Manual" to move the lifting column at the previously defined speed as long as you keep pressing the button.

7.9.2.3 "Alarm Status" Screen

Detailed information on active and past messages will be shown under "Alarm Status".

7.9.2.4 "Help" Screen
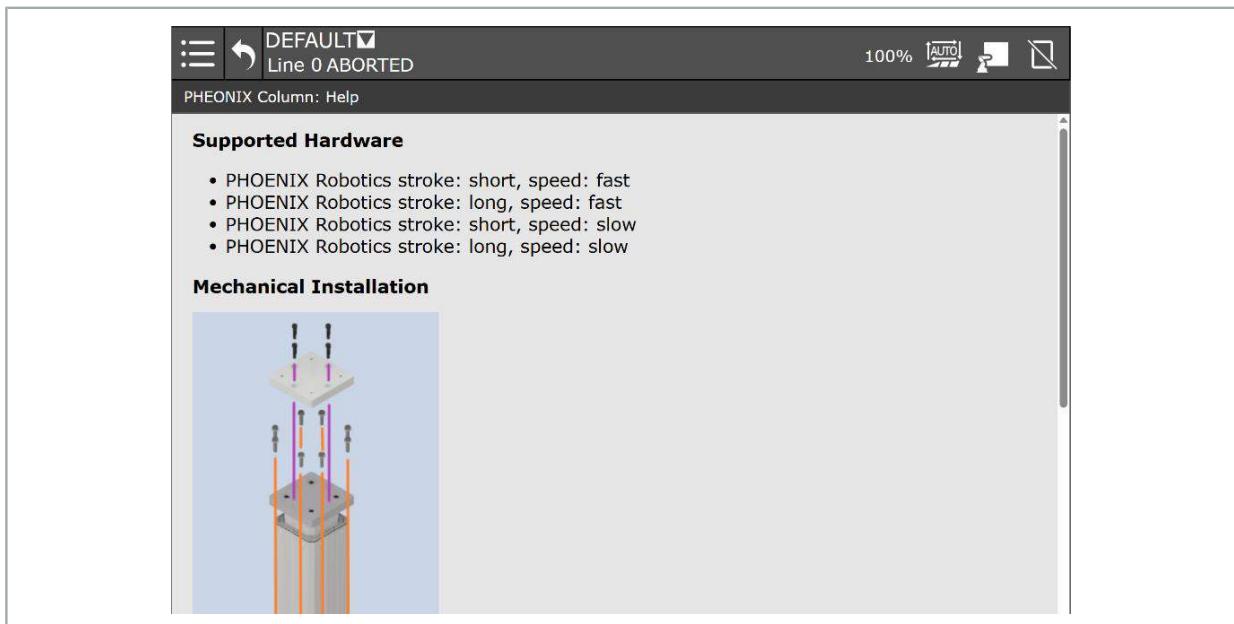
The "Help" screen has available information on how to assemble and connect the lifting column.

7.9.3   Software Installation – UR

Installing the software add-in

1. Turn on the UR controller.
2. Download the installation file (e.g., CMCO_LiftingColumn_1.4.1.zip) from the following link: *https://www.cmco.com/de-de/Software-Downloads/*
3. Use a USB drive to install the installation file on the teach pendant.
4. Select "System Manager".
5. Select "URcaps".
6. Enter the password to open URcaps.
7. Select "+URcap".

7.9.3.1 "Configuration" screen
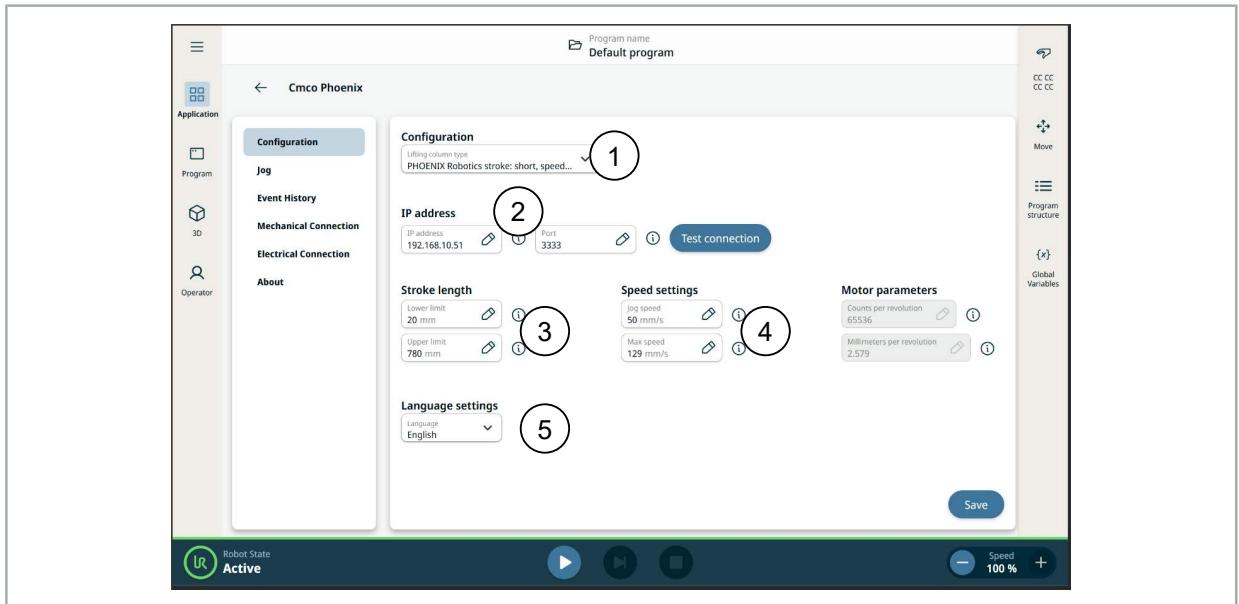
1 – Lifting column configuration

- PHOENIX Robotics high speed
- PHOENIX Robotics - high payload

2 - IP address

- Enter the IP address (default: 192.168.10.51).
- Enter the port number (default: 3333).
- Tap "Test connection" to establish a connection

3 – Stroke length

- Used to set the lifting column's upper and lower limits.
- These limits will depend on the specific lifting column module being used (*see "Settings for Basic Values", page 22*).

4 – Speed settings

- "jog speed" is used to set the speed for jogging mode in the "jog" screen.
- "Max speed" is used to set the maximum speed at which the lifting column is allowed to move to predefined positions. This maximum speed will depend on the specific lifting column module being used (*see "Settings for Basic Values", page 22*).

5 – Language settings

7.9.3.2 "jog" Screen
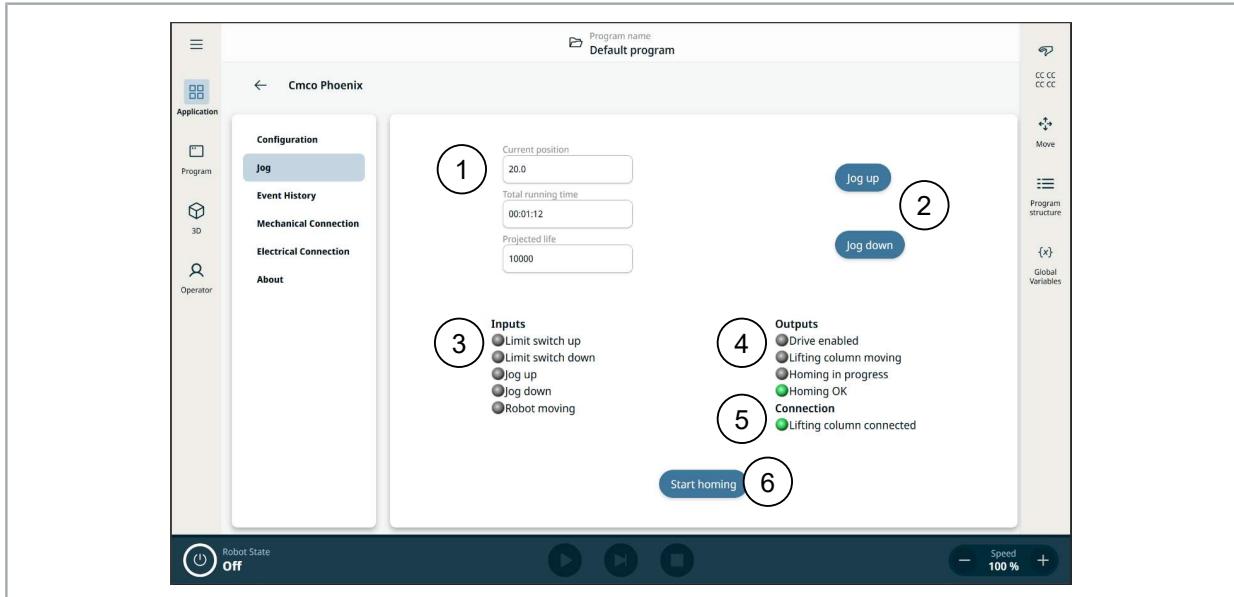
1 – Information about the lifting column

- Current position
- Total running time
- Projected service life

2 – Commands for moving the lifting column manually

- You can use the "Jog up" and "Jog down" buttons to move the lifting column at the previously defined speed as long as you keep pressing the button.

3 – Input signal states

- Limit switch up: Indicates that the upper end position sensor is active (the lifting column is at its topmost position).
- Limit switch down: Indicates that the lower end position sensor is active (the lifting column is at its bottommost position).
- Jog up: Indicates that the lifting column is being manually moved up.
- Jog down: Indicates that the lifting column is being manually moved down.
- Robot moving: -

4 – Output signals

- Drive enabled: Indicates that the application is activating the lifting column's drives.
- Lifting column moving: Indicates that the lifting column is moving.
- Homing in progress: Indicates that the lifting column is in the middle of homing.
- Homing OK: Indicates that the homing process was completed successfully.

5 – Connection status

- Indicates whether there is an active connection to the lifting column.

6 – Homing

- Can be used to start the process of moving the lifting column to the upper and lower end position sensors in order to determine the software limits.

7.9.3.3 "Event History" screen
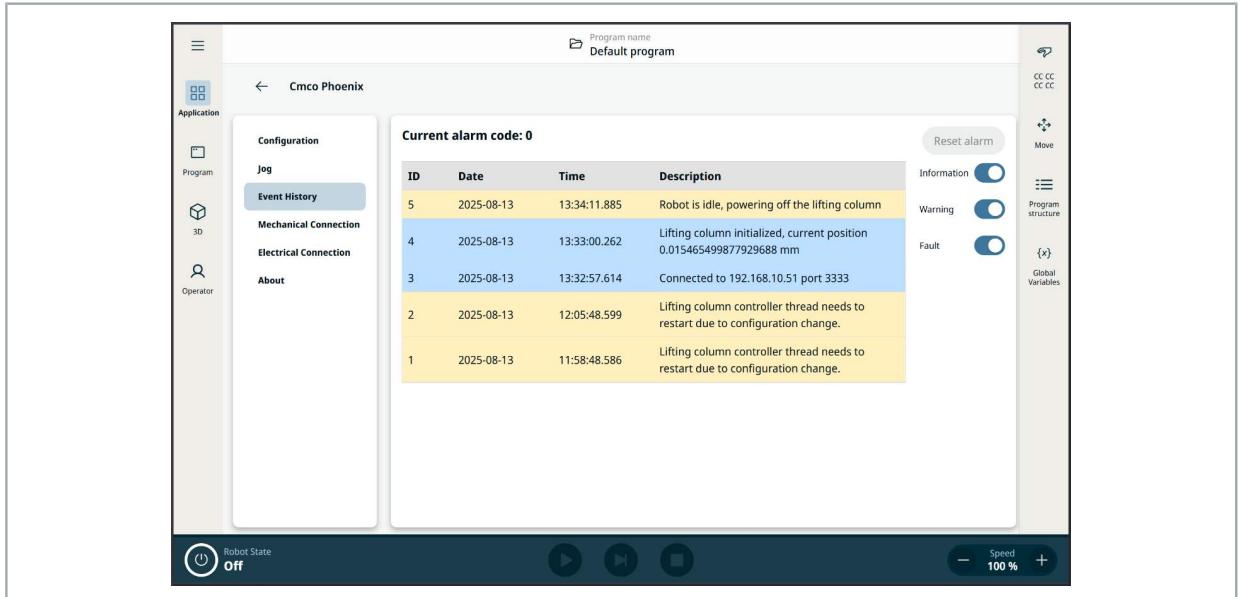
Detailed information on past messages will be shown under "Event History".

7.9.3.4 Close-Up of Main Menu
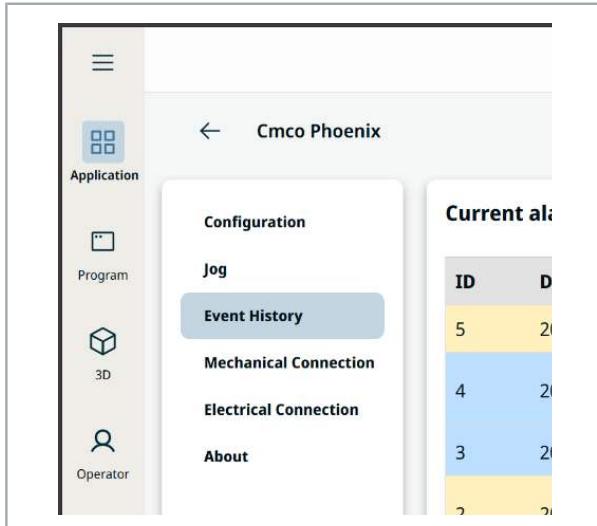
You can tap the "Mechanical Connection" and "Electrical Connection" options to access information on how to assemble and connect the lifting column respectively.

8 SHUTTING DOWN THE LIFTING COLUMN

Shutting down the lifting column once work is done:

1. Complete all active operations first.
2. Move the lifting column to its bottommost position.
3. De-energize the lifting column.

Shutting down the lifting column before disassembly:

1. Complete all active operations first.
2. Move the lifting column to its bottommost position.
3. De-energize the lifting column and make sure it is de-energized.
4. Disconnect all connections from the lifting column.
5. Remove the load on top of the lifting column.

9   MAINTENANCE AND INSPECTION

9.1   Maintenance Safety Instructions

> **⚠ WARNING**
>
> **Electrical shock hazard**
>
> Electrical connections may be live even when the motor is not moving.
>
> ▶ De-energize the lifting column before starting work.
>
> ▶ Work on the 230 V system must be carried out exclusively by qualified personnel.
>
> ▶ Carry out a visual inspection of all live components before starting maintenance or troubleshooting work.

> **⚠ WARNING**
>
> **Crush hazard posed by the motor starting up accidentally**
>
> ▶ De-energize the lifting column before starting work.
>
> ▶ Lock and tag out the motor.

> **⚠ WARNING**
>
> **Crush hazard posed by the lifting column suddenly dropping from its extended position.**
>
> ▶ Remove the payload from the lifting column.
>
> ▶ Before starting work, use suitable means to mechanically secure the lifting column in such a way that it will not drop.

- A qualified person must regularly inspect / maintain (recommendation: at least once a year) the system on behalf of the company operating it.
- All inspections, checks, and changes must be documented (e.g., machine record, inspection log).
- The company operating the system must count or measure and document the system's load cycles and operating hours.
- Repairs to the lifting column must be carried out exclusively by authorized and qualified personnel (e.g., by Columbus McKinnon Engineered Products GmbH service personnel).
- Failure to use genuine spare parts may result in the lifting column not working correctly.
- A function test must be carried out after work is completed.

9.2 Maintenance Schedule

Interval	Task / Description
Regularly; as necessary	Lubricate the screws (*see "Lubricating the Screws", page 49*). The interval will depend on the PHOENIX lifting column's operating conditions and on time. If you have any questions or doubts, please consult with CMCO to determine an appropriate lubricating interval.
semiannually	Static brake test: 1. Completely extend the lifting column. 2. Turn off the power. The lifting column must not retract. If the lifting column retracts, this means that the brake is worn out.
annually	▪ Check to make sure that the limit switches are working correctly (including customer limit switches). ▪ Check the rating plate to make sure it is legible and replace it if necessary. ▪ Arrange for an inspection by an expert (record the result in an inspection log).

We recommend arranging for Columbus McKinnon Engineered Products GmbH service personnel to perform a general overhaul of the PHR lifting column every five years or after 1,000 operating hours. As part of this overhaul, service personnel will inspect the lifting column, replace wear parts, check all safety-relevant components, and completely change all lubricants.

Please note that you will need to send the lifting column to the factory for this overhaul.

9.3 Maintenance Tasks

9.3.1 Operating Fluids / Lubricant Recommendation

Please refer to the safety data sheets for the greases / sprays / oils being used.

Ambient temperature [°C]	Gear unit	Screw
-10 to +80	Klüberplex GE 11-680 *)	

*) Lubricant classification in conformity with DIN 51502

Lubricants from the table above are used at the factory in order to ensure that the lifting column will work properly.

In order to ensure that sufficient lubricant will be applied to the screws' surface when relubricating them, we recommend using spray grease (lubricant spray).

We recommend using the following greases as a spray. These greases are available directly from us:

Ambient temperature [°C]	Screw / Phönix
-10 to +80	Klüberplex GE 11-680

Please note that alternative lubricants must be agreed upon with CMCO! Incompatible lubricants may negatively affect the lifting column's operation!

Used lubricants must be disposed of in compliance with all applicable laws and regulations!

9.3.2 Lubricating the Screws

The grease points can only be accessed when the lifting column is fully extended. When it is, the plugs on the lubrication holes will be visible (these holes can be found on both sides of the outermost section). You can use a slotted screwdriver to completely remove these plugs in order to expose the lubrication holes.

1. Move the lifting column to its extended position.
2. Remove the lubricating hole plugs with a slotted screwdriver.
3. Lubricate the screws with grease.
4. Retract and extend the lifting column multiple times and lubricate the screws.
5. Repeat until the screws are evenly greased.
6. Reinsert the plugs.

10   CUSTOMER SERVICE CONTACT INFORMATION

If you need assistance with troubleshooting or otherwise require service personnel, you can contact Customer Service through any of the following channels:

Phone: +49 8233 2121 0
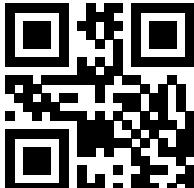
E-mail: service.kissing@cmco.com
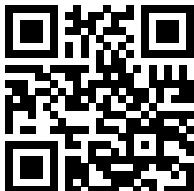
Important information when contacting Customer Service:

Please provide Customer Service with the following information when contacting us. This information can be found on the rating plate or the "Product Specifications (Technical Specifications)" section.

- Machine model (Type)
- Part number (Mat.-No.)
- Reference number (Ref.-No.)
- Baujahr/Yr. of Mfg.

11   DISPOSAL

Disposal is part of the product's lifecycle and must be carried out while taking its environmental impact into account.

After the lifting column is removed from service, its components must be recycled or disposed of in compliance with all locally applicable laws and regulations.

Proper disposal will help protect the environment and contribute to the sustainable use of resources.

11.1   Waste products

The waste products listed below will be produced during the system's disassembly and proper disposal.

Only a general overview of these waste products is provided here. This overview does not claim to be exhaustive.

Scrap metal

The lifting column is predominantly made of aluminum and steel and castings made with these materials. In addition, the gear unit features bronze and/or brass components.

E-waste

The drive's e-waste consists of components from the motor, controller, electromechanical stroke limiter, and reed switches. This e-waste must be separated during disassembly and disposed of separately.

Plastics and rubber

Waste products in the plastic and rubberlike substance category will also have to be disposed of. These products must be separated during disassembly.

Greases

Small amounts of old grease will also have to be disposed of. They must be separated and separately disposed of in compliance with all locally applicable laws and regulations.

CMCO
INTELLIGENT MOTION

COLUMBUS McKINNON FAMILY OF BRANDS

CM
MAGNETEK
DORNER
Yale
Duff-Norton
STAHL
CraneSystems

PFAFF
silberblau
COFFING
HOISTS
BUDGIT
Hoists
Camlok
Lifting Clamps
UNIFIED
CM
ET
GARVEY

Dixie
Industries
CHESTER
HOIST
LITTLE MULE
SHAW-BOX
STEERMAN
LOAD MOVING SYSTEMS
montratec