



EWELLIX linear axis for cobots

LIFTKIT-OS

User Manual

We pioneer motion

SCHAEFFLER

Contents

1	About the manual.....	5
1.1	Symbols	5
1.2	Information in this user manual.....	6
1.3	LIFTKIT designation.....	6
1.4	Applicable documents	6
1.5	User information	6
2	General safety regulations.....	7
2.1	Intended use	7
2.2	Improper use	7
2.3	Safety elements	7
2.4	Safety mechanisms	7
2.5	Application information.....	8
2.6	Potential risks.....	8
2.7	Setting up and behavior of the emergency stop switch.....	8
2.8	Safety of the EWELLIX SCU control unit.....	8
2.8.1	Intended use	9
2.8.2	Improper use	10
2.8.3	Fundamental benefits.....	11
2.8.4	Responsibility of the owner and user	11
2.8.5	Personnel requirements	12
2.8.6	Specific dangers	13
2.8.7	Safety equipment.....	15
2.8.8	Safeguard against restart	15
2.8.9	Modifying and information about the device.....	16
2.8.10	Manufacturer's declaration of EMC compliance	19
3	Product description.....	21
4	Scope of delivery.....	22
4.1	LIFTKIT-OS scope of delivery.....	22
5	Assembly.....	24
5.1	Preparation for assembly	24
5.1.1	Tools.....	24
5.2	Mechanical installation of the LIFTKIT-OS.....	24
5.3	Electrical installation of EWELLIX SBOX for LIFTKIT-OS	25
5.3.1	Connection EWELLIX SBOX	25
5.3.2	Safety connection.....	25
5.3.3	Establishing a connection to LIFTKIT-OS.....	26
6	Commissioning	27
6.1	Initialization of the LIFTKIT and cobot installation.....	27
6.2	Software instructions for the LIFTKIT component	28
6.2.1	Introduction	28
6.2.2	Notifications.....	28
6.2.3	Commands.....	29
6.2.4	Software update SBOX	32

- 6.2.5 Setting the IP address on the EWELLIX SBOX..... 35
- 7 Technical data 38
 - 7.1 Dimensional drawing of a LIFTKIT-OS 39

1 About the manual

1.1 Symbols

Safety instructions

Safety precautions are identified by symbols and signal words as shown. 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.

This user manual describes the setup and operation of the LIFTKIT, a vertical lifting axis for collaborative robots.

Warning

1 Warning



001C05E6

This box contains hazardous voltage. Disconnect power before opening.

2 Hazardous voltage



001C0465

The internal wiring must not be touched or changed unless explicitly mentioned in this manual.

The warning and hazard symbols are defined in accordance with ANSI Z535.6-2011.

⚠ DANGER	In case of non-compliance, death or serious injury will occur.
⚠ WARNING	In case of non-compliance, death or serious injury may occur.
⚠ CAUTION	In case of non-compliance, minor or moderate injury may occur.
NOTICE	In case of non-compliance, damage or malfunctions in the product or the adjacent construction may occur.

1.2 Information in this user manual

This manual contains important information for the safe and efficient use of the actuator, also referred to as the device or drive.

The manual is an integral part of the device and must always be kept in the immediate vicinity of the device. All persons working with the device must have read and understood this manual before starting work. Strict compliance with all safety instructions and directions is a basic requirement for workplace safety.

In addition, the accident prevention regulations and general safety provisions applicable at the place of use must be observed.

For better illustration of the operating conditions, the figures used are not necessarily to scale and may differ from the actual design of the device.

1.3 LIFTKIT designation

The LIFTKIT includes a lifting column, a control system and additional accessories that allow for simple integration with a collaborative robot. Depending on the type of LIFTKIT selected, different configurations of the included products are possible.

1.4 Applicable documents

This user manual does not replace the user manuals of the supplied products, but provides additional instructions for the setup and operation of the LIFTKIT system for collaborative robots. General information and safety information can be found in the following documents.

EWELLIX lifting column THG-TLG-TLT user manuals



A current version of this manual is available at:
<https://www.schaeffler.de/std/223E>

EWELLIX SCU control unit user manuals



A current version of this manual is available at:
<https://www.schaeffler.de/std/222B>

1.5 User information

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

Qualified personnel are individuals who, due to their technical training, knowledge, and experience, as well as sound knowledge of the applicable regulations, are capable of performing the tasks assigned to them and independently recognizing and avoiding potential hazards.

2 General safety regulations

This section contains safety information as a supplement to the safety aspects described in the corresponding user manuals for the supplied devices. Failure to follow these guidelines or the safety instructions contained in this manual may result in serious injury, death or damage to property.

The safety aspects listed must be checked and taken into account in the final risk assessment of the system before using the LIFTKIT.

2.1 Intended use

The intended use of the LIFTKIT is described in the lifting column operating manual. The LIFTKIT has been developed and produced for this application.

The additional purpose is defined as follows:

Lifting a cobot in the pressure direction to expand its working range

2.2 Improper use

Any use that goes beyond the intended use or uses other than those outlined above is considered misuse.

Any kind of claims for damages resulting from misuse are excluded.

2.3 Safety elements

The LIFTKIT is equipped with a number of integrated safety elements that enable its integration into a robot application. These include safety relays certified according to DIN EN ISO 13849-1, which allow safe torque off (STO) up to Performance Level e, Category 4.

2.4 Safety mechanisms

To reduce the risk of injury and damage, the following measures have been integrated into the LIFTKIT:

- The individual components are designed and certified in accordance with the UL standard IEC 60601-1 – Safety of medical electrical equipment).
- The EWELLIX SBOX was designed in accordance with EN ISO 13849.
- The lifting column is equipped with an integrated mechanical brake that prevents the column from retracting in the event of a power failure or motor fault.
- A safety nut is installed to prevent unintentional retraction or collapse of the column in the event of failure or wear of the main nut.
- The risk of pinching between the column's tubular sections and the mounting plate is kept to a minimum. When retracted, the minimum clearance is 40 mm
- The EWELLIX SCU control unit of the LIFTKIT and the EWELLIX SBOX must be connected to the safety I/O port of the cobot control system for operation. Activation of the emergency stop switch of the cobot control system triggers the EWELLIX SCU control unit of the LIFTKIT and the EWELLIX SBOX to stop.
- If the cobot control system stops or fails, it triggers a stop signal to the LIFTKIT control system.

2.5 Application information

The following application notes must be observed:

- Integration of an emergency stop switch is required.
- Install emergency stop functions for the column and integrate them into the overall system's safety circuit before commissioning the LIFTKIT.
- The emergency stop function must be installed in such a way that any interruption or reconnection of the power supply (after a power outage) cannot create hazardous situations for persons or objects.
- The emergency stop systems must always remain freely accessible.

To integrate the LIFTKIT into a functional safety system with an STO condition (Safe Torque Off), the EWELLIX SBOX must be connected to the cobot control system safety I/O.

2.6 Potential risks

The following risks must be considered in an application-specific risk assessment when operating the LIFTKIT:

- The column does not automatically detect a shock and does not stop moving in the event of an impact. This may result in the following:
 - Risk of crushing for persons or objects located in the lifting column's stroke area, which can result in serious injury, death or damage to property.
 - Collisions with persons or objects located in the lifting column's stroke area, which can result in serious consequences such as injury, death or damage to property.
- It is possible that the columns do not stop at the required position and the UR control software does not detect the position.
 - Cobot motion may occur at an unintended position, which can lead to serious injury, death, or property damage.
 - For LIFTKIT-FA-630: Misalignment of the 3 lifting columns could cause unexpected movements.

2.7 Setting up and behavior of the emergency stop switch

The LIFTKIT has two emergency stop mechanisms. One is integrated in the EWELLIX SBOX, the other directly in the EWELLIX SCU control unit. The mechanism of the EWELLIX SCU control unit is software-controlled and reacts faster, but only the mechanism of the EWELLIX SBOX guarantees STO up to Performance Level e, Category 4. It is recommended that both mechanisms be integrated into the safety system. The table compares both emergency stop mechanisms.

1 Comparison of safety systems

Emergency stop mechanism	Performance level ISO 13489-1	Travel	Time
EWELLIX SCU	Not classified	18 mm	200 ms
EWELLIX SBOX	Up to PLe, Cat. 4	28 mm	750 ms

2.8 Safety of the EWELLIX SCU control unit

This section provides an overview of the key safety aspects for installing, operating and maintaining the EWELLIX SCU control unit.

Failure to follow this manual and the safety instructions contained therein may result in significant hazards and potentially serious injury, death or damage to the device and the machine.

The EWELLIX SCU control unit has been developed and built in accordance with state-of-the-art technology and recognized regulations.

EU conformity is documented in the technical documentation.

2.8.1 Intended use

The EWELLIX SCU control unit was developed and built in accordance with the state of the art and recognized safety rules. Its intended use is described in this manual.

The intended use of the EWELLIX SCU control unit is:

Control of up to six actuators for push loads or pull loads.

The control unit can only be parameterized for Schaeffler drives. Please contact your Schaeffler representative to find out which drives are approved for use with the EWELLIX SCU control unit.

If the EWELLIX SCU control unit is used for any purpose other than those specified, the manufacturer cannot accept responsibility for any resulting failures or damage.

The EWELLIX-SCU is intended for indoor use only and is used in medical devices as well as in industrial and construction engineering.

2 Permissible ambient conditions of the EWELLIX SCU control unit

Characteristic	Unit	Value
Ambient temperature	°C	5 to 40
Relative humidity	%	5 to 85
Atmospheric pressure	hPa	700 to 1060
Use and operation up to an altitude of	fm (MOPP)	3000
Overvoltage category	–	II
Degree of contamination classification	–	2

Product service life

The EWELLIX SCU control unit is designed for a service life of 10 years or at least 100000 operating cycles per channel.

User groups

The design and implementation of the user manual take into account the different user groups.

To ensure safety, we set requirements for users of the EWELLIX SCU control unit that must be observed under all circumstances. Only persons who meet these requirements are authorized to use the EWELLIX SCU control unit.

We define the user group as all persons who operate, use, commission, further process, or pass on the control unit for further processing. Since the requirements of these user groups vary considerably depending on their role, we distinguish between the following user groups:

- The operator is the contracting partner of the further processor or the reseller. They may impose legal requirements on the operator at the time of purchase of the control system. The operating authority ensures that the user is instructed in the intended use of the device.
- The processor is the contracting partner of the reseller or the manufacturer. The processor assembles the control unit into a complete device. The processor is authorized by the manufacturer of the SCU control unit to use the control unit as intended and has the necessary technical expertise.
- The technician has the technical training required to use the EWELLIX SCU control unit as intended. In addition to the Safety section, the technician is also familiar with the section on Special operating modes. The required technical data can be found in the appendix (see EWELLIX SCU control unit user manual BA140-01).
- The reseller passes the machine on. Any further person who uses the EWELLIX SCU control unit is considered a user. The user must have read the "Safety" section of this manual before commissioning the machine. In addition, the user must be instructed by the operator in the proper operation of the unit.

Types of operation

The EWELLIX SCU control unit is intended exclusively for intermittent operation.

Hazard areas

We distinguish between two hazard areas, which must be observed depending on the user group.

The persons hazard area includes not only the actual users but also third parties (other personnel, visitors, patients, etc.). In the event of damage, liability rests with the operator.

The device hazard area is the responsibility of the processor and technician user group and includes the EWELLIX SCU control unit and all attached elements.

2.8.2 Improper use

Any use other than as intended, modifications to the device without the manufacturer's written consent, or operation beyond the technical limits is considered misuse.

See the technical operating limits in the technical data of the IL-06008 Control Units catalog and on the SCU label.

Any unauthorized use of the device can cause personal injury and property damage. Always follow the directions specified in these instructions.

The control unit is suitable for indoor use only and must not be exposed to weather conditions, strong UV radiation, or explosive atmospheric environments. The following specific limitations of application apply:

- flammable anesthetic mixture with air
- flammable anesthetic mixture with oxygen or nitrous oxide
- increased radioactive radiation

⚠ CAUTION**Danger due to misuse.**

Any use of this device beyond its intended use may result in potentially hazardous situations.

- Strictly adhere to all safety precautions and information in this operating manual.
- Do not expose this device to weather conditions, strong UV rays, corrosive or explosive air media as well as other aggressive media.
- Do not make any modifications, conversions or changes to the design or individual drive components.
- Never use the device outside of the technical application and operational limits.

2.8.3 Fundamental benefits

Control of electromechanical actuators/lifting columns on command.

2.8.4 Responsibility of the owner and user

The device is designed for commercial use by its operator or processor. The processor is the contracting partner of the reseller or the manufacturer. The processor integrates the device into a complete system (application).

The operator or processor of the system is therefore subject to the requirements of occupational health and safety legislation.

In addition to the safety instructions in this manual, the operator or processor must also comply with the following with regard to the safety, accident prevention, and environmental protection regulations applicable at the installation site of the system:

- Ensure you are informed about the applicable occupational health and safety regulations. You must also identify any additional hazards that may arise due to the specific working conditions at the location where the device is used. The hazard assessment must be implemented in the form of work instructions for operating the device.
- Ensure that the work instructions created for the system, including the device, comply with current legal requirements and adapt the instructions accordingly.
- Clearly define and assign responsibilities for installation, operation, maintenance, and cleaning.
- Ensure that all personnel handling the device have read and understood this manual.
- Provide personnel with the required protective equipment
- Train personnel regularly and inform them about hazards.

In addition, the operator or processor must ensure that the device is in proper working condition. They must do the following:

- Ensure that the maintenance intervals described in this manual are observed.
- Have all safety devices regularly checked for correct functioning and completeness.

Areas of responsibility

Different areas of responsibility arise in accordance with the various user groups

The operator is responsible for the personnel hazard area and ensures that only authorized and instructed users work with the control unit. The operator is responsible for:

- determining which persons are permitted to use the control unit (authorized persons)
- instructing the users
- compliance with all relevant legal requirements and regulations.

The operating company may only authorize persons to use the control unit who meet the user group requirements.

The processor is responsible for the following:

- preparing a CE-compliant user manual for the device into which the control unit has been integrated
- compliance with the safety regulations in accordance with this user manual

The technician is responsible for the following:

- compliance with the manufacturer's instructions and the safe design of the interfaces to other equipment
- installation and use of the control unit in accordance with its intended use
- installation of optional modules and connection cables

The reseller is responsible for the following:

- passing on this user manual and the control unit to the processor, operator, technician, or user
- passing on a CE-compliant USER manual, and the device into which the control unit has been integrated, to the operator.

The user is responsible for the following:

- ensuring that no one is endangered by the operation of the control unit.
- Operation of the control unit in normal operation
- Immediate and proper response to malfunctions.

2.8.5 Personnel requirements

WARNING



Improper installation, operation and maintenance can result in serious injury, death or property damage.

Use is permitted only by trained personnel who have read, understood, and follow these instructions.

Qualifications

The following qualifications are specified for the different areas of activity described in this manual:

- **An instructed person (operator):**
Is instructed by the employer during an induction about the tasks assigned and the potential hazards arising from improper conduct.
- **Qualified personnel:**
Due to their technical training, knowledge, and experience, as well as familiarity with the applicable standards and regulations, they are capable of performing the tasks assigned to them independently and of recognizing and avoiding potential hazards.
- **Professional electrician:**
Due to their technical training, knowledge, and experience, as well as familiarity with the applicable standards and regulations, the electrically skilled person is capable of performing work on electrical systems independently and of recognizing and avoiding potential hazards. In addition, the electrically skilled person is trained for the specific place of use and is familiar with the applicable standards and regulations.

Only persons who can be expected to reliably perform their tasks are permitted as personnel. Persons whose ability to react is impaired, e.g., by drugs, alcohol, or medication, are not permitted.

2.8.6 Specific dangers

The manufacturer has minimized the effects of existing hazards through design measures and protective measures. Observe the residual risks described, the possible countermeasures, and the warnings in the following sections.

Hazards for persons, objects, and property

When working with the control unit, observe the following residual risks and possible countermeasures.

DANGER



Danger to life caused by electric current.

Touching live parts poses an immediate danger to life. Damage to insulation or individual components can also represent a life-threatening hazard.

- In the event of insulation damage, immediately disconnect the power supply and arrange for the defective parts to be repaired.
- Work on the electrical system may only be carried out by electrically skilled persons.
- Before performing any work on the electrical system, disconnect the machine from the power supply.
- Before maintenance, cleaning, or repair work, disconnect the power supply and secure it against reconnection.
- Do not bypass or disable fuses. When replacing fuses, ensure the correct current rating is used.
- Keep moisture away from live parts. to prevent short circuits.

WARNING



Risk of electric shock

Check that the mains voltage corresponds to the rated values on the product label.

- Ensure that power cables cannot be pinched or damaged
- Warning: risk of electric shock from damaged plugs or damaged power cables. Never touch a damaged power plug or power cord when the control unit is in operation, since the control unit is powered with AC 120 V AC 230 V.
- Ensure that the control unit is disconnected from the power supply before removing a defective plug from the socket.

⚠ WARNING**Unintended, uncontrollable movement.**

A component failure may cause an uncontrollable movement of the connected actuator(s). In the worst case, a RAM or ROM error can result in incorrect or automatic movement. This type of error has a low probability of occurrence but can cause a movement to be triggered. If the button of the hand switch sticks when released and the user does not press the button in the opposite direction, an automatic movement will occur.

⚠ WARNING**Special hazards when cleaning the control unit.**

The control units comply with IPX4 degree of protection. Cleaning with water, including chemical additives, must be pH-neutral. Excessively acidic or alkaline liquids can destroy metal and plastic parts in the control unit.

Manually and mechanically operated high-pressure steam cleaners must not be used. Only isopropyl alcohol may be used for manually disinfecting and wiping the control unit. A control unit must never be washed in a washing machine or other equipment. The control unit would be damaged if liquid were allowed to penetrate it. The plastic housing must be checked at regular intervals (every six months) for mechanical damage (e.g., cracks).

⚠ WARNING**Damage to property**

Injuries caused by cracks and associated openings in the actuator housing and/or housing of its accessories: If the housing is damaged by stock, breakage or heavy wear, stop using the device and follow the disassembly instructions.

⚠ CAUTION**Personal injury or property damage**

Pay attention to the risk of personal injury and damage to property caused by incorrect operation. Incorrect operation can endanger persons in the hazardous zone or can endanger objects.

- Before pressing a key on the control device, ensure that you press the correct key.
- Take suitable measures to ensure that the control device cannot be operated incorrectly.

⚠ CAUTION**No function is considered a safe state.****⚠ CAUTION**

The control unit is for indoor use only and must not be exposed to weather conditions, strong UV rays or corrosive or explosive ambient air. The control unit must only be operated when the safety cover is fitted.

⚠ CAUTION

If the controller unit experiences a malfunction due to an interruption of the grid power or an electronic defect, these should not pose a risk to the patient, operator or service personnel.

Ewellix actuators should be operated in accordance with the application specified on the rating plate.

The nominal data pertaining to the actuators and the controller unit must be checked upon installation. The values indicated on the rating plate must not be exceeded. Failure to observe this information will result in irreparable damage to the actuators and the controller unit. There is a risk of personal injury.

⚠ CAUTION

Overload to the control unit triggers a temperature switch in the mains transformer. Once the transformer has cooled down, the thermal circuit breaker is reset so that the control unit is ready to control the actuators again.

⚠ CAUTION**Risk of electric shock.**

Care must be taken not to damage the control unit with water. The control unit is splash-proofed according to IPX4. Prevent the control unit from being sprayed with or coming into contact with water during operation.

Prolonged overloading will result in irreparable damage to the controller unit.

Special hazards of the SCU with batteries

Replacement batteries should only be ordered from Schaeffler, as they are a special type. Used batteries must be disposed of properly. The user's maintenance personnel must be instructed by the end manufacturer in how to open and close the battery compartment cover and how to replace the battery.

⚠ WARNING

If unintended movements can cause serious injury, additional protective means must be installed to stop or avoid such movements.

⚠ WARNING

Interruption of the grid power supply does not prevent the drives from moving in the event of an electrical failure while the batteries are connected.

2

2.8.7 Safety equipment

⚠ WARNING

Hazard due to non-functioning safety equipment.

To ensure safe operation, all safety equipment must be in proper working condition.

- Always check the functionality of the safety equipment in accordance with the maintenance plan
- Never disable safety equipment
- Safety equipment must never be bypassed or modified.

Integration into an emergency stop system is required (for certain applications)

⚠ WARNING

Risk of electric shock.

The EWELLIX SCU control unit has no on/off switch. If it must be switched off, e.g., in an emergency, the control unit must be disconnected from the power supply. Only this measure ensures that the control units are deenergized. For applications in which the control units are installed, an emergency stop switch or an all-pole disconnection from the power supply must be provided. In the case of battery options, additional protective equipment may be required.

The device is intended solely for installation in an application or system. It does not have its own operating elements and has no independent emergency stop function. Install the device so that it is part of an emergency stop system and can be switched off if necessary.

The emergency stop system must be connected in such a way that an interruption of the power supply or restoration of the power supply after an interruption cannot create a hazardous situation for persons or objects.

The emergency shut-off systems must always be freely accessible.

2.8.8 Safeguard against restart

To secure the control unit against unintentional reconnection:

1. Disconnect the control unit's powerline plug from the main power supply.

⚠ DANGER

Life-threatening situation due to unauthorized reconnection.

When working in hazard areas, there is a risk that the power supply may be connected without authorization. This presents a life-threatening situation for people in the hazard zone.

- Observe the information on securing the power supply against reconnection in the user manuals for the control unit.
- Always follow the procedure for securing against reconnection as described below.

Securing the control unit against reconnection:

2. Disconnect the powerline plug from the socket.
3. If the control unit is fitted with a battery, ensure that the battery is disconnected and removed from the control unit.

2.8.9 Modifying and information about the device

⚠ WARNING



To avoid hazardous situations and ensure optimum performance, do not make any changes or modifications to the device that are not expressly approved by .

Warning notices

No special warning notices are attached for control units.

⚠ WARNING



Risk of injury because of illegible symbols.

Over time, stickers and decals may become dirty or illegible for a variety of reasons.

- Always keep all safety, warning and operating stickers in a legible condition.
- Replace damaged stickers or warning signs immediately.

Information labels and indicator lights

Labels

There are two labels on the back of the control unit:

- Product label ►16|📄3
- Software parameter label ►17|📄4

📄3 Location of the rating plate and SCU parameter plate



001C05AB

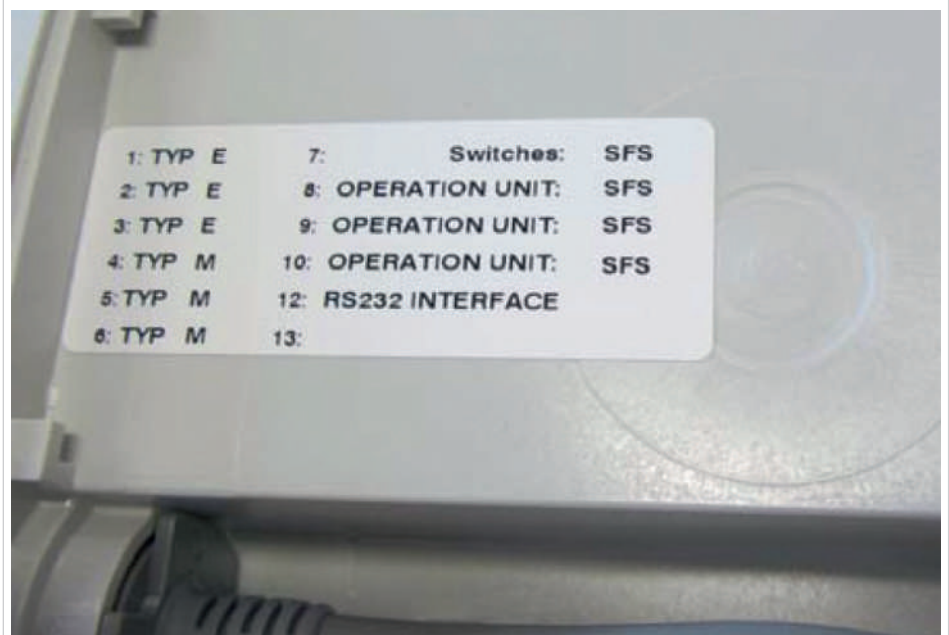
4 Example of Smart Control Parameters (SCP label)



001D1032

An additional label (inside, under the housing cover ▶17 | 5) shows the pin assignment of the inputs/outputs (linear actuators, lifting columns, switches, operating elements, battery, etc.)

5 Example of the pin assignment of the control unit



001D1042

For detailed information about the SCP label ▶17 | 4 and the corresponding label for the pins on the EWELLIX SCU control unit ▶17 | 5, please contact your representative at Schaeffler.

Operating indicator light

The indicator light provides a visual display of the operational readiness of the EWELLIX SCU control unit ▶18 | 6.

The is equipped with a green LED that indicates operational readiness.

6 Operation indicator



001D1052

In addition, an LED on the connected operating element (e.g., hand switch) indicates the status of functionality of the EWELLIX SCU control unit and the connected actuators, and (optionally) provides information on the charge capacity of a battery in use.

CAUTION



Push-to-run operation (recommended)

The connected actuators and pillars move as long as the button on the handswitch is pressed. A green indicator indicates operation. The respective function (up/down) is determined and triggered by pressing the button. If the actuator does not have signals to indicate operation, we recommend installing an operating signal in the application (this depends on the application).

Grounding, metal pin

The EWELLIX control units SCU5 and SCU9 are defined as Class I devices. These models are connected to PE (protective ground) on the mains supply side. This PE is also connected to the metal pin next to the mains supply connection ►19| 6 on the EWELLIX SCU control unit. This pin can also be used to connect the end application to earth (PE) via a protective conductor (green/yellow).

7 Grounding, metal pin



001D1062

This pin may also be used to connect other devices in the application to the earth. This can also be helpful in the event of improvements during EMC measurements.

Please note: The maximum torque for the hexagonal bolt is 0.8 Nm.

2.8.10 Manufacturer's declaration of EMC compliance

This section is only necessary if the devices are approved and intended for use in medical applications or environments in accordance with IEC60601-1-2, ed. 4. This section presents the results and potential with regard to EMC issues.

Professional health care facilities

Doctor's offices, dental practices, clinics, limited-care facilities, free-standing surgical centers, free-standing birthing centers, multi-practitioner facilities, hospitals (emergency rooms, patient rooms, intensive care units, operating theaters, except in the vicinity of HF surgical equipment, an MR system outside an RF-shielded room of an ME system for magnetic resonance imaging).

Essential performance

The essential performance of the EWELLIX control unit is the “supply of electro-mechanical actuators and columns on command.” Risk management identifies the safety functions of these control units. All properties or functions are performed correctly. Risks to patients, users, or others must be identified and assessed in order to prevent or reduce harm. The following points identify and describe the EMC risks of the EWELLIX control unit in accordance with EMC measurements:

Warning against stacking devices

⚠ WARNING**Stacked with other devices**

Use of this device next to or stacked with other devices should be avoided, as this may lead to improper operation. If such use is necessary, this device and the other devices should be observed to ensure that they operate normally.

Cable list, cable lengths, cable accessories

⚠ WARNING**Use of accessories, sensors, and cables.**

The use of accessories, transducers and tables not specified or supplied by the device manufacturer may result in increased electromagnetic emissions or decreased electromagnetic immunity of this device and may result in improper operation.

3 Product description

Expansion of the working range

- vertical lifting of the cobot by up to 1400 mm (longer strokes on request) with a compact retracted length
- robust column design for industrial use, vibration-free movement, and virtually maintenance-free operation

Plug-and-play solution

- hardware compatible with small and medium-sized cobots < 50 kg and expanded version for large cobots 50 kg to 75 kg
- LIFTKIT control via TCP/IP

Cost savings and increased productivity

Cobots working in combination with a LIFTKIT offer a cost-effective solution for modernizing an existing assembly hall with a switch from a manual to a fully automated production line.

4 Scope of delivery

4.1 LIFTKIT-OS scope of delivery

The following parts are included in the scope of delivery:

- 1 EWELLIX lifting column TLT
- 1 EWELLIX control unit SCU 16/56/96
- 1 SBOX mains cable EU/US/CH/CN
- 1 interface cable RS232
- 1 controller I/O cable
- 1 EWELLIX hand switch EHA3
- 1 bottom mounting plate
- 8 screws M10×40
- 4 screws M6×20
- 2 pins, dia. 8×20
- 1 quick guide manual
- 1 EWELLIX SBOX
- 1 SBOX key
- 1 SBOX I/O cable
- 1 power cable EWELLIX SBOX to EWELLIX SCU
- 1 Ethernet cable
- SBOX mounting elements

8 LIFTKIT-OS scope of delivery



Quick start guide



EWELLIX-Control unit SCU



EWELLIX-SBOX



EWELLIX-Lifting column TLT



Bottom mounting plate



EWELLIX-operating handswitch EHA31



Screws and pins



SBOX Key



SBOX I/O cable



SBOX power cable



SBOX to SCU power cable



SCU I/O cable



RS232 interface cable



Ethernet cable

001D4C2E

5 Assembly

5.1 Preparation for assembly

5.1.1 Tools

These tools are required for installation:

- Allen key 5 mm
- Allen key 6 mm
- Screwdriver 2 mm

5.2 Mechanical installation of the LIFTKIT-OS

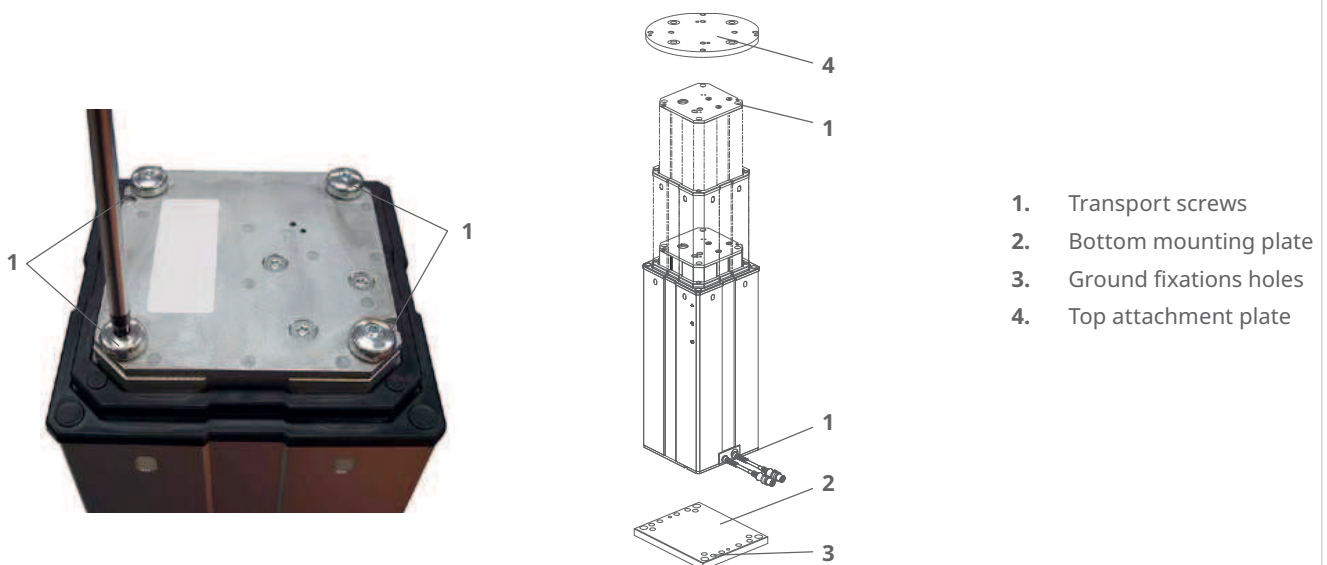
Cobot installation on the lifting column

As part of the preparation for installing the lifting column, please refer to the numbers in the Scope of delivery section and in the illustration.

1. Remove the lifting column from the box.
2. Loosen and remove the 4 transport bolts on the underside (1).
3. Fasten the bottom mounting plate (2) with 4 M10×40 bolts (bolt 10) to the outer guide tube. Observe a tightening torque of 40 Nm for these bolts.
4. Secure the bottom plate to the floor or to a frame, using at least 4 of the mounting holes in the plate (3). We recommend supporting the outer LIFTKIT aluminum profiles to increase its stability.
5. Loosen and remove the 4 transport bolts (1) on the upper end of the lifting column.
6. Secure the upper 4 mounting plate (4) with 4 M10×40 screws (screw 10) on the inner guide tube.

Alternatively, when mounting on a SLIDEKIT, you can remove the cobot mounting plate from the EWELLIX SLIDEKIT and secure the base plate of the EWELLIX LIFTKIT to the mounting plate of the EWELLIX SLIDEKIT using 8 M6 screws.

9 Close-up of the bolts used for transport (left) and the TLT lifting column (right)



001D4C33

5.3 Electrical installation of EWELLIX SBOX for LIFTKIT-OS

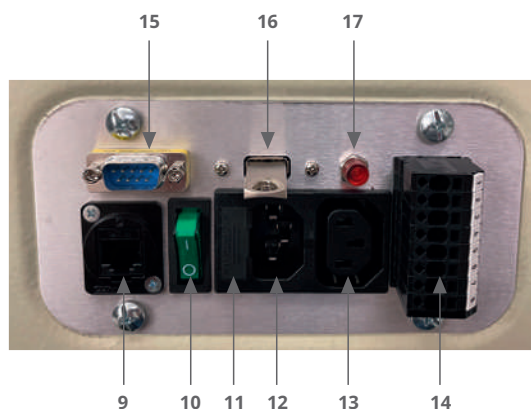
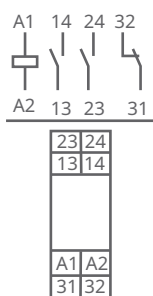
5.3.1 Connection EWELLIX SBOX

The EWELLIX SBOX acts as an interface to the EWELLIX SCU control unit and also to the cobot controller. The figure on the right shows the connections on the front plate of the EWELLIX SBOX; the figure on the left shows a detailed description of the connections for the safety relays.

10 EWELLIX-SBOX



1. K1.A1 → 24V for safety relay #1
2. K2.A1 → 24V for safety relay #2
3. K1.A2 → 0V for safety relay #1
4. K2.A2 → 0V for safety relay #2
5. K1.31 → read out for relay #1
6. K1.32 → read out for relay #1
7. K2.31 → read out for relay #2
8. K2.32 → read out for relay #2



9. Ethernet connector
10. On/Off switch
11. Fuse
12. Power In
13. Power Out
14. I/O connector
15. RS232 connector
16. USB port
17. Relays status light (if On relays are powered)

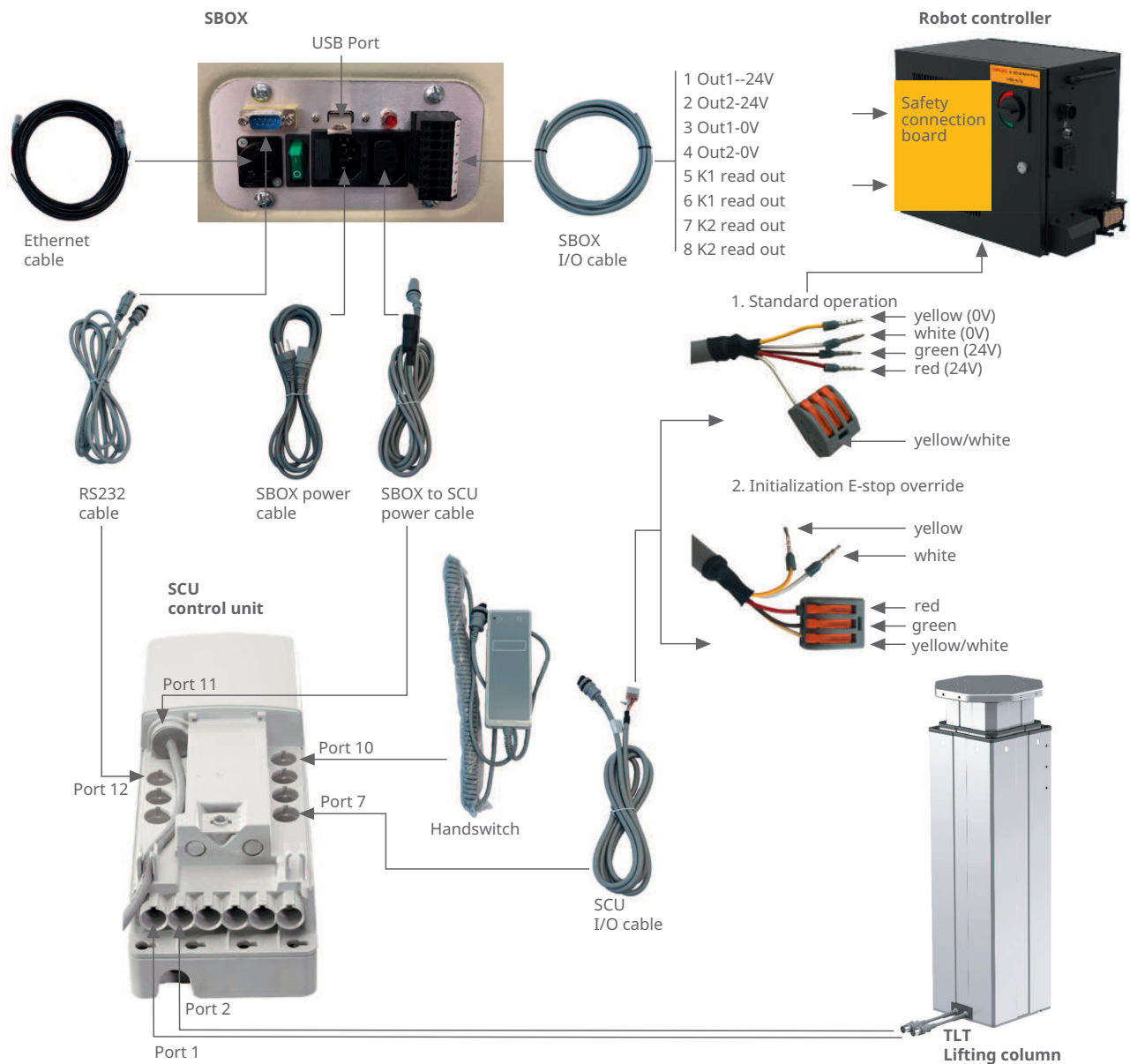
001C1DD3

5.3.2 Safety connection

The EWELLIX SBOX-L-01 has two integrated safety relays with forcibly guided contacts. Its coil and feedback contacts are wired directly to the I/O connector.

5.3.3 Establishing a connection to LIFTKIT-OS

11 Connecting LIFTKIT-OS



001D48BF

6 Commissioning

6.1 Initialization of the LIFTKIT and cobot installation

The LIFTKIT must be initialized before being operated for the first time. This involves completing the following steps:

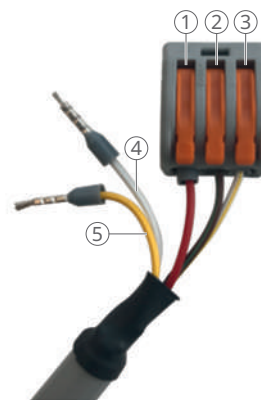
1. Connect the LIFTKIT as shown in Figure ▶28 | 13. It is recommended that initialization be carried out without the cobot mounted on the column. Connect the lifting column to ports 1 and 2 of the EWELLIX SCU control unit.
2. Bypass the emergency stop link. Using the clamp provided, short-circuit the three wires as shown in Figure ▶27 | 12 to bypass the emergency stop link.
3. Press both hand switches simultaneously for about 5 s until the EWELLIX SCU control unit emits an intermittent beep. The column now runs at 50 % speed and power.
4. Move the column downward using the hand switch and buttons until it reaches the end position. The EWELLIX SCU control unit beeps.
5. Move the column upward using the hand switch and buttons until it reaches the end position. The EWELLIX SCU control unit beeps.
6. If necessary, insert the two alignment pins into the upper plate and press them in (or use a plastic hammer).
7. Align the cobot using the alignment pins and fasten the cobot base using the four screws provided.
8. Remove the temporary emergency stop bypass from step 2.

The determined end positions are used as virtual stoppers, which are approached using ramps. After successful initialization, the lifting column moves both at full speed and at full force. Repeat the initialization procedure if the lifting column does not reach its maximum stroke or the control unit beeps while the column is moving.

Reinitialization may be required if the system connections are changed.

Zoom in on the safety I/O cable to bypass the emergency stop link using the clamp provided.

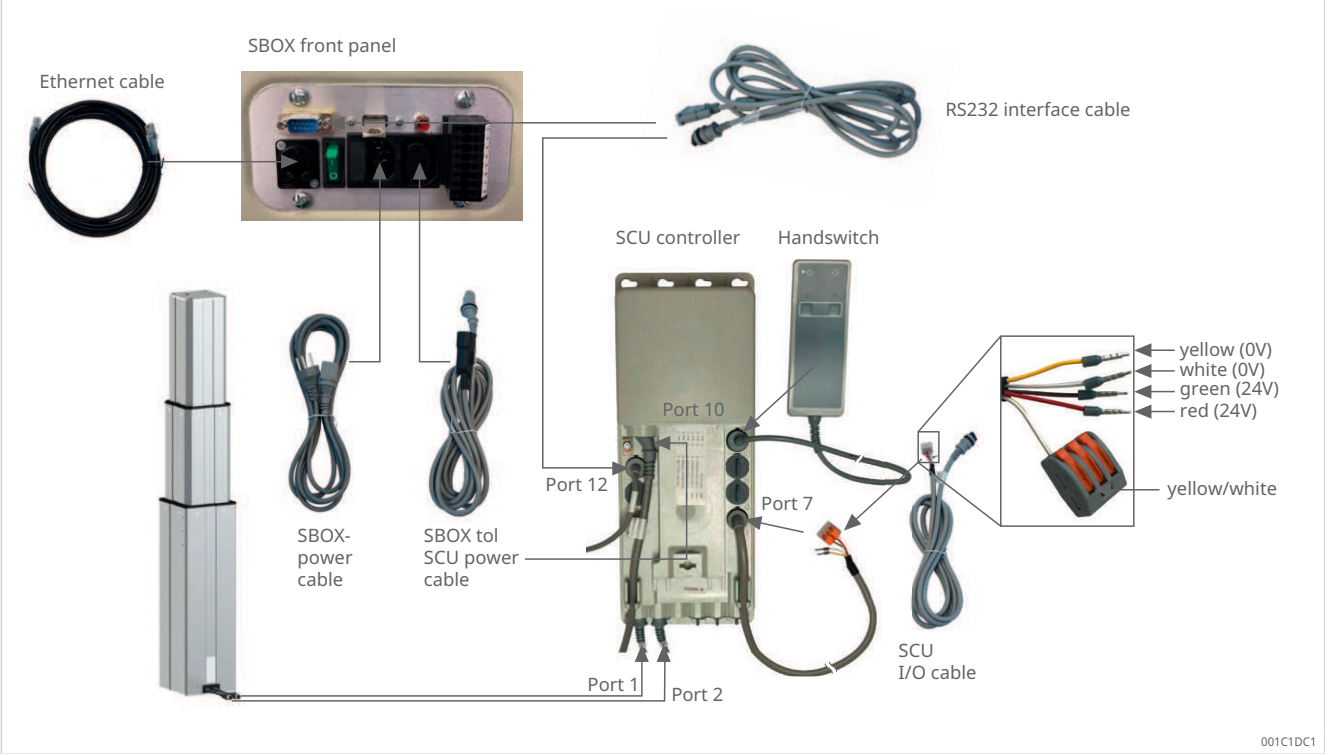
12 Zoom in on the safety I/O cable to bypass the emergency stop function using the clamp provided



001D1082

1	Red	2	Green
3	Yellow/white	4	White
5	Yellow		

13 Digital I/O clamp in the robot controller



6.2 Software instructions for the LIFTKIT component

6.2.1 Introduction

The EWELLIX SBOX-L-01 is controlled by string-based TCP/IP commands. It can be controlled by connecting to a PLC, cobot or PC via Telnet communication with port 50001. The default IP address is 192.168.1.100.

6.2.2 Notifications

Client message

3 Client message

Command	Parameter 1	Parameter 2	Line feed
-	-	-	-

Server message

4 Server message

Received command	Acknowledge	Parameter 1	Parameter 2	Parameter 3	Parameter 3	Line feed
-	-	-	-	-	-	-

Separators and characters for the end of the line

A comma is used as the separator. At the end of a message, a line feed (\n) is used as the character for the end of the line.

Parameter

Parameters are defined for each command. They must be in the correct order.

Number of places after decimal comma

All float values are sent with one decimal place. Other decimal places are truncated.

Confirmations

5 Confirmations

Command	Acknowledge	Parameter 1	Parameter 2	Parameter 3	Description
Command ok	OK				Everything OK
Command not found	NF				Command invalid
Command not allowed	NA	*see status	*see status	*see status	Command is OK, but not permitted in the current mode
Wrong nbr of parameters	WNP	Nbr of min needed parameters	Nbr of max possible parameters		Incorrect number of parameters
Out of range	OOR	Index of parameter	Min	Max	At least one parameter is out of range
Value Error	VE	Index of parameter	Data type		Incorrect data type for parameters
Execution error	EF	Error reason			The command and parameters are valid, but the execution is incorrect

* Conditional restart, virtual limits must be reset.

6.2.3 Commands

Various commands can be used to communicate with the SBOX-L-01. Note that they only function in the permitted state.

6 Commands

Command	Permitted state
moveTo_absolutePosition	Ready
stop_moving	Moving
get_position	Connected, Ready, Moving, Error
get_stroke	Connected, Ready, Moving, Error
get_status	Initialized, Connected, Ready, Moving, Error
set_virtualLimits	Connected, Ready
get_virtualLimits	Connected, Ready, Moving, Error
set_type*	Initialized, Connected, Ready, Error
get_type	Initialized, Connected, Ready, Moving, Error
get_typesAvailable	Initialized, Connected, Ready, Moving, Error

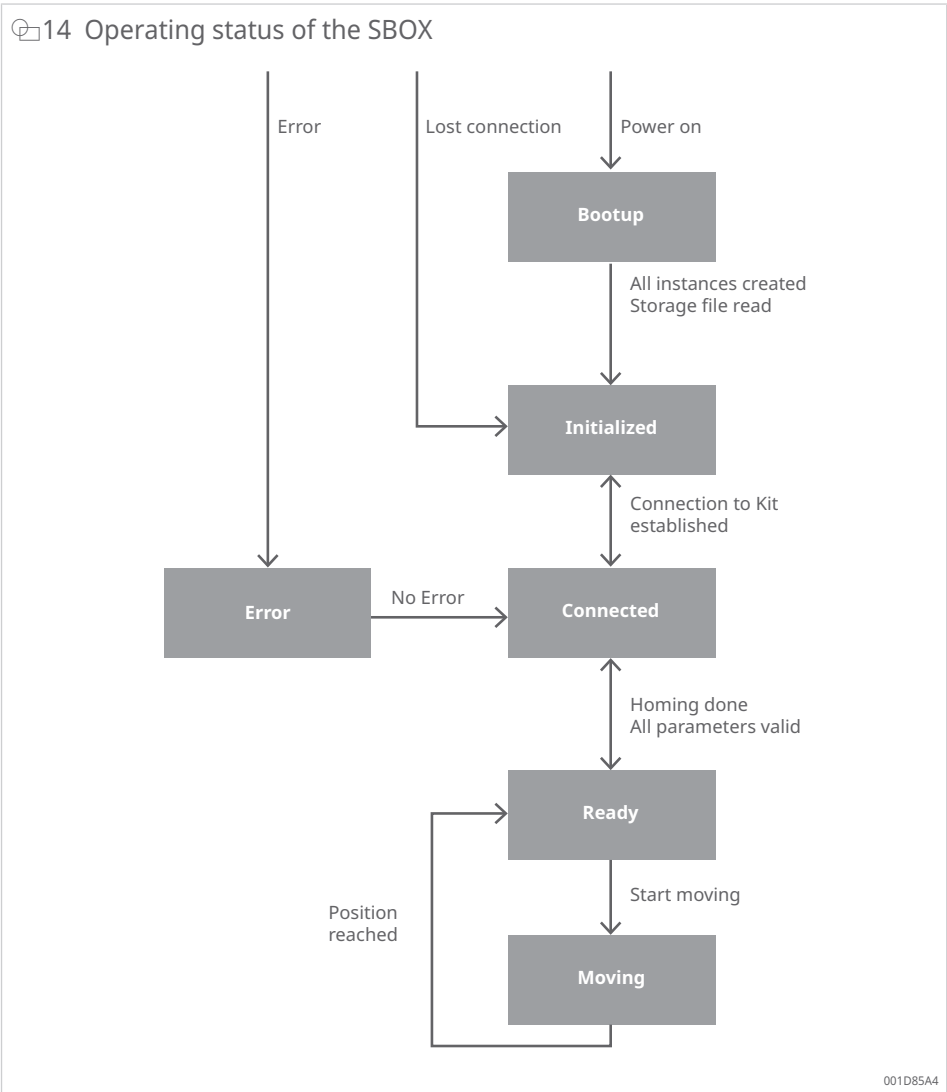
* Conditional restart, virtual limits must be reset.

Query status

To retrieve the current status of the SBOX-L-01 send: "get_status\n"

The function returns the current status in parameter 1 and a message in parameter 2 if the status is not READY or MOVING.

There are six states that the SBOX-L-01 can be in:



7 Status

Parameter 1	Parameter 2	Description
INITIALIZED	Cause	LIFTKIT is not connected to the SBOX-L-01, or a connection has not been established
CONNECTED	Cause	LIFTKIT is connected, but a homing procedure is not being performed, or the column is invalid
READY		LIFTKIT is ready for use, but no movement is occurring
MOVING		LIFTKIT moves to the desired position
ERROR	Cause	An error has occurred

After using the STO safety function while the lift kit is stationary, the SBOX-L-01 remains in the READY state for a few seconds due to the capacitors in the lift kit control system.

Querying the stroke

To retrieve the stroke of the LIFTKIT, send: "get_stroke\n".

It returns the maximum stroke in [mm] of the LIFTKIT as a number with one decimal place.

For example, "get_stroke,OK,600.0"

Retrieve position

To determine the position of the LIFTKIT, send: "get_position\n"

It returns the maximum stroke in mm] of the LIFTKIT as a number with one decimal place.

For example, "get_position,OK,250.2"

Query virtual limits

To retrieve the LIFTKIT virtual limits, send: "get_virtualLimits\n"

Returns the minimum and maximum virtual limits of the LIFTKIT in [mm] as numbers with one decimal place.

For example, "get_virtualLimits,OK,0.0,600.0"

Set virtual limits

To retrieve the virtual limits of the LIFTKIT, send: "set_virtualLimits,[min],[max]\n"

The dimensions are specified in mm] as a number with at most one decimal place.

For example, "set_virtualLimits,50.5,450.0" or "set_virtualLimits,40,500"

If everything is correct, "set_virtualLimits,OK" is returned.

Movement to the absolute position

To move the LIFTKIT to an absolute position, send: "moveTo_absolutePosition,[position]\n"

The position is specified in [mm] as a number with one decimal place.

For example, "moveTo_absolutePosition,120.5" or "moveTo_absolutePosition,140"

If everything is correct, "moveTo_absolutePosition,OK" is returned.

This is an asynchronous command. The response indicates that the movement has been started. To know when the desired position is reached or if the column is actually moving, the get_position and get_status commands must be used.

Stop movement

To stop the LIFTKIT from moving, send: "stop_moving\n"

If everything is correct, "stop_moving,OK" is returned.

Query type

To retrieve the currently selected LIFTKIT type, send: "get_type\n"

It returns the current type of the LIFTKIT.

For example: "get_type,OK,LIFTKIT-601"

Query available types

To get a list of all available LIFTKIT models, send: "get_typesAvailable\n"

All available LIFTKIT types are returned. These are LIFTKIT-601 and LIFTKIT-00 for the TLT and LIFTKIT-602 for the CPMT. Other types may follow in the future.

For example: "get_typesAvailable,OK,LIFTKIT-601,LIFTKIT-602,LIFTKIT-00"

Set type

To set the LIFTKIT type, send: "set_type,[type] \n" For example: "set_type, LIFTKIT-601"

If everything is correct, "set_type,OK" is returned.

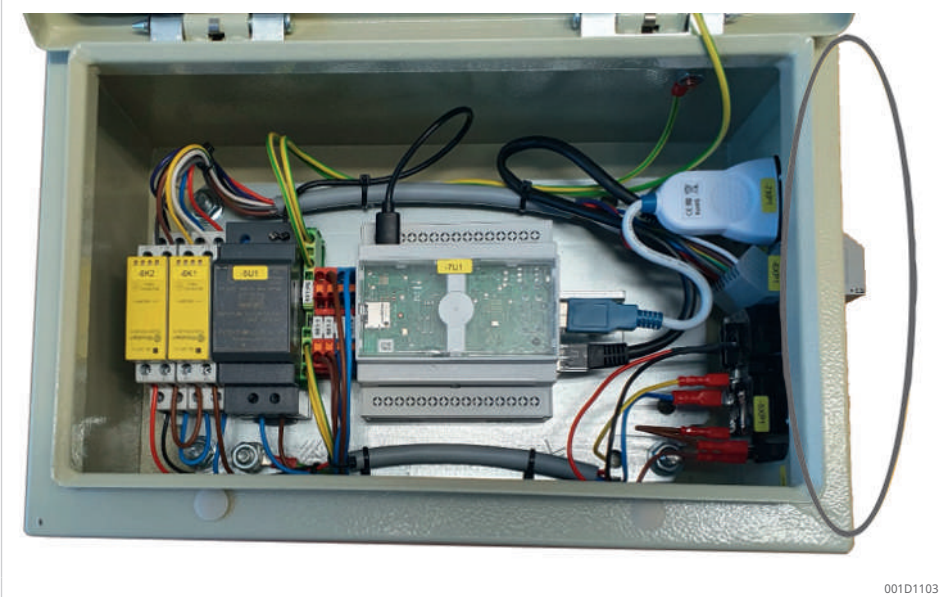
After configuring a new type, the SBOX-L-01 must be restarted and the virtual limits must be reset.

6.2.4 Software update SBOX

Software updates can be carried out by flashing a new image onto the controller's SD card. 1.

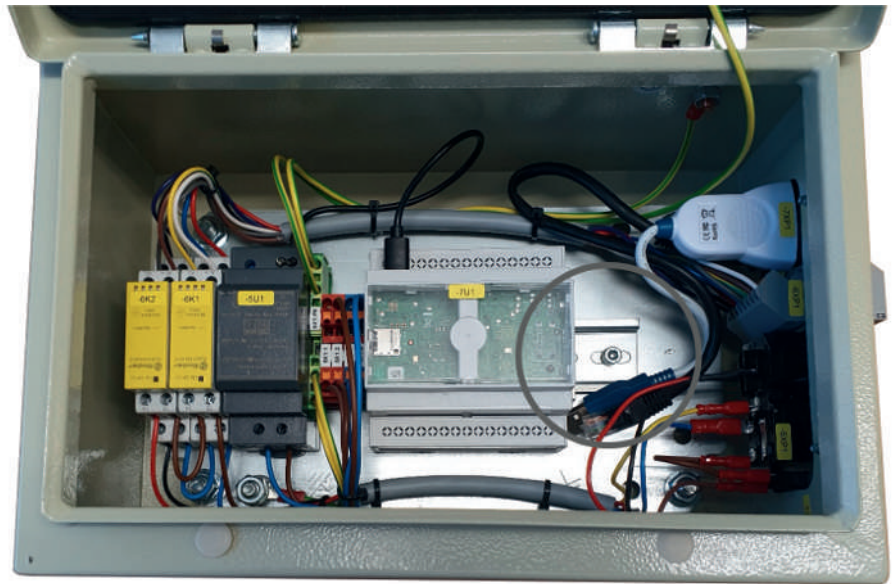
1. Remove all cables connected to the SBOX.

15 Remove cables



2. Disconnect the USB and Ethernet plugs from the controller.

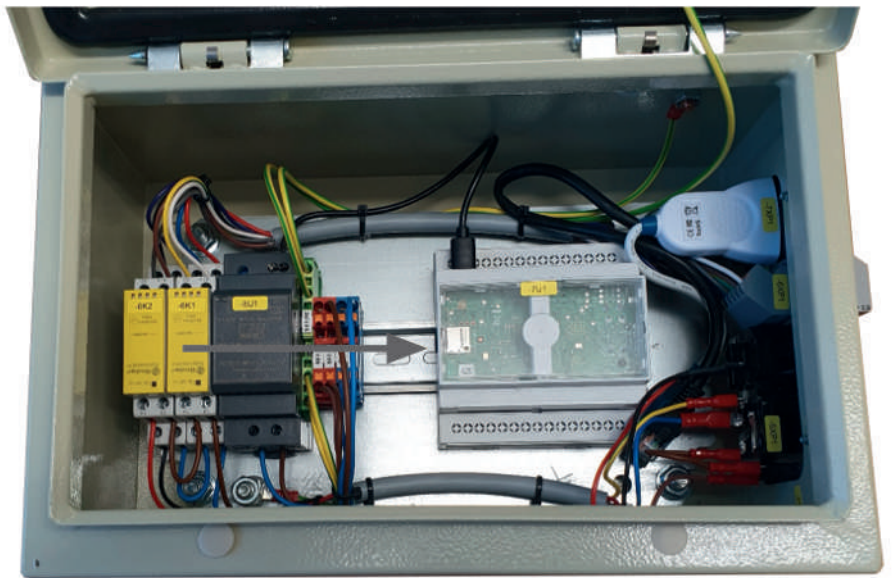
16 Disconnect USB and Ethernet plugs from the controller



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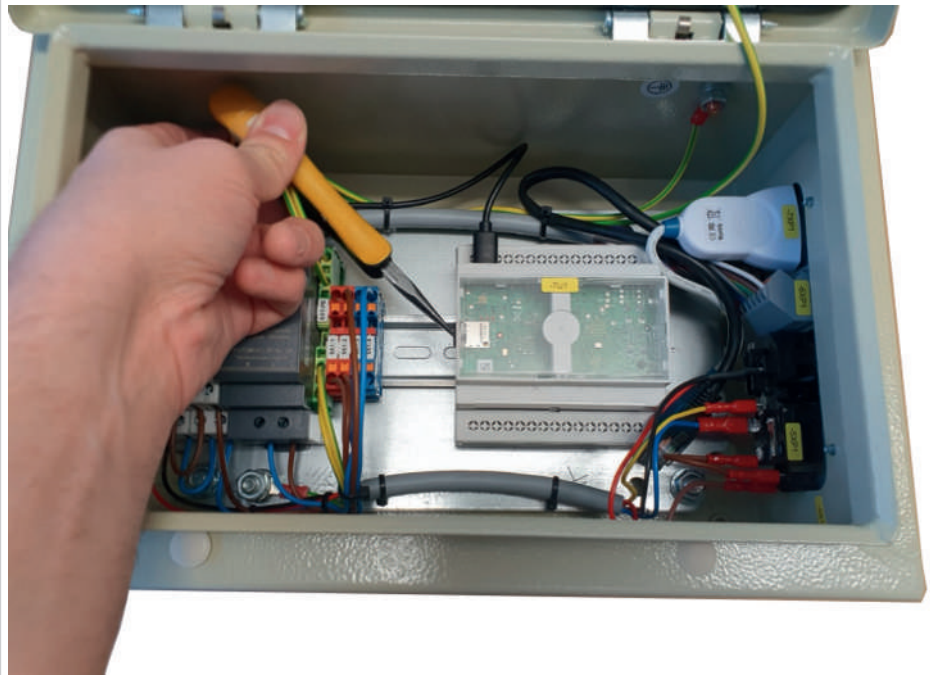
3. Slide the controller onto the front plate.

17 Slide controller onto the front plate



001D1108

4. Remove the SD card using a small tool such as pliers

 18 Remove SD card

001D1109

5. Download and install one of the following tools:
 - Raspberry imager, from [https://www.raspberrypi.org/ Downloads/](https://www.raspberrypi.org/Downloads/)
 - balenaEtcher, from <https://www.balena.io/etcher/>
6. Copy the image to the SD card:
 - Insert the SD card into your laptop.
 - Do not format the SD card.
 - start Raspberry imager or balenaEtcher
 - select image
 - select SD card
 - start writing process
7. Reinsert the SD card into the controller and perform steps 1 - 4 in reverse order.

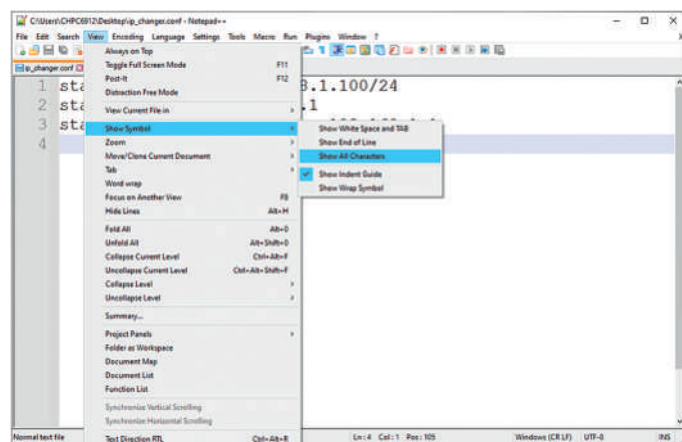
6.2.5 Setting the IP address on the EWELLIX SBOX

The EWELLIX SBOX uses a static IP address. The default address is 192.168.1.100.

If you need to set a different IP address, follow the steps below:

1. Create a file named ip_changer.conf on your PC. We recommend using the freeware Notepad++ or a similar program.
2. Insert the following content:
static ip_address=192.168.1.100/24
static routers=192.168.1.1
static domain_name_servers=192.168.1.1
3. Adjust the addresses to your requirements. Ensure that "/24" remains after the static IP address.
4. Show all characters.

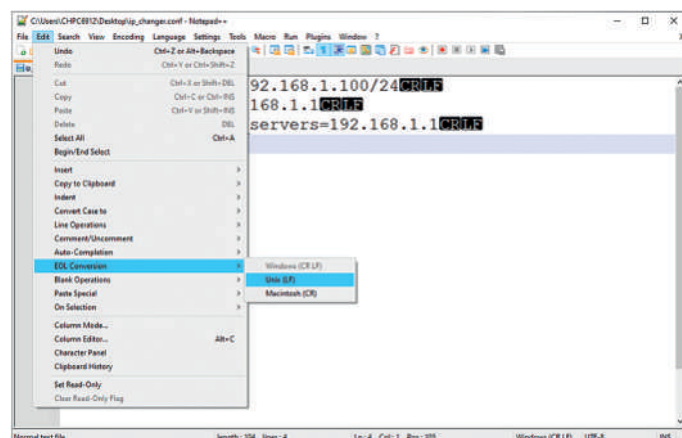
19 Show all characters



001C3C81

5. Convert the line ending to Unix (LF).

20 Convert line ending to Unix (LF)



001C3C82

6. Save the file to a USB stick previously formatted in FAT32.

EWELLIX SBOX with external USB port

Proceed with the following steps:

1. Switch off the EWELLIX SBOX using the switch and make sure the light is off.
2. Insert the USB stick into the external USB port.

 21 Insert USB stick into external USB port



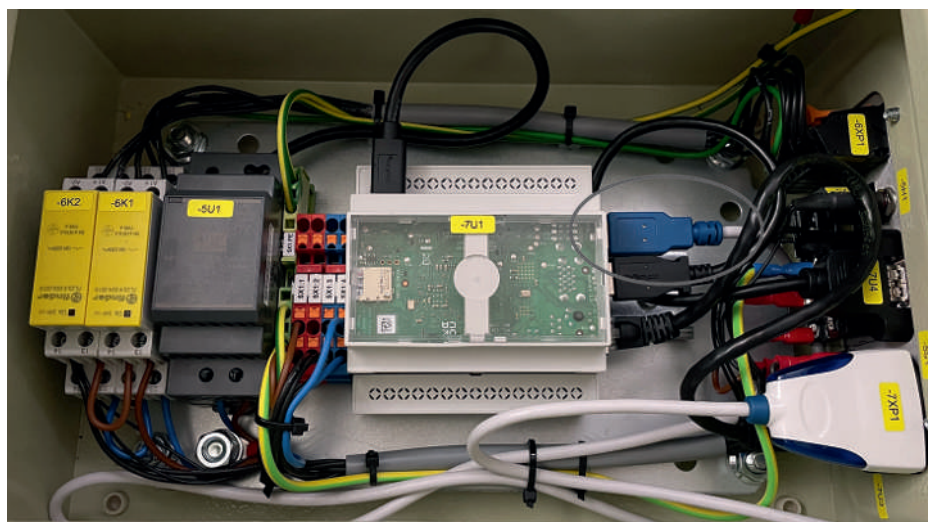
3. Switch on the EWELLIX SBOX using the switch and make sure the light is on.
4. Wait 5 min.
5. Switch off the EWELLIX SBOX using the switch and make sure the light is off.
6. Remove the USB stick from the USB port.
7. Switch on the EWELLIX SBOX using the switch and make sure the light is on.
8. The following empty file is created on the USB stick to confirm the successful change of the IP address:
update_ip_address_successfull_from_“Name des USB-Sticks”.

EWELLIX SBOX without external USB port

Proceed with the following steps:

1. Remove all cables connected to the EWELLIX SBOX.
2. Open the EWELLIX SBOX using the key provided.
3. Insert the USB stick into a free USB port of the EWELLIX SBOX controller.

22 Insert USB stick into USB port



001C3C89

4. Close the EWELLIX SBOX.
5. Plug the mains cable into the EWELLIX SBOX.
6. Switch on the SBOX.
7. Wait five minutes.
8. Switch off the EWELLIX SBOX.
9. Remove all cables from the EWELLIX SBOX.
10. Open the EWELLIX SBOX.
11. Remove the USB stick.
12. Close the EWELLIX SBOX.
13. Connect all cables.
14. To confirm the successful change of the IP address, the following empty file is created on the USB stick:
update_ip_address_successfull_from_"Name des USB-Sticks".

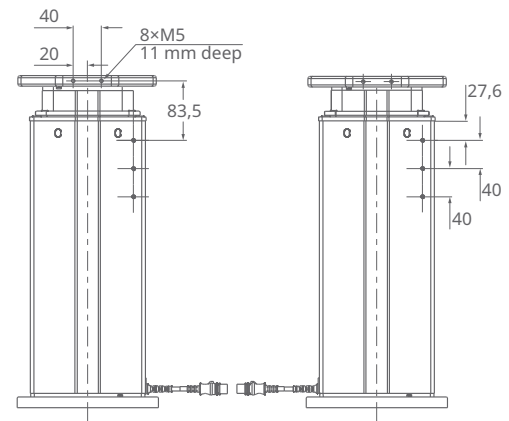
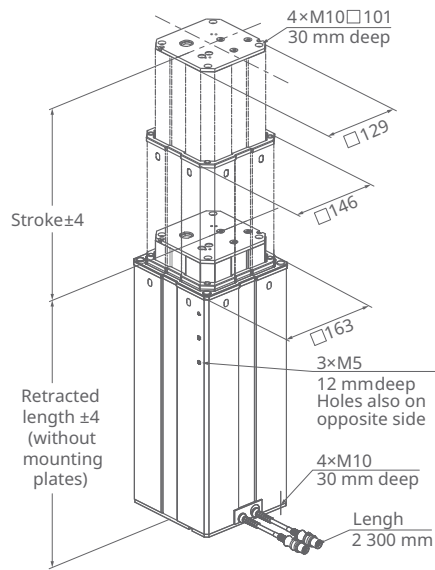
7 Technical data

8 Technical information for the LIFTKIT-OS-601 and LIFTKIT-OS-620

Characteristic	Unit	LIFTKIT-OS-601	LIFTKIT-OS-620
Column type	–	TLT	TLT
Rated push force	N	1500	1500
Rated pull force	N	0	0
Max. static bending moment	Nm	3000	3000
Max. linear speed	mm/s	80	80
Duty cycle of operation	–	10 % (20 % at 500 N)	10 %
Screw type		Lead screw	Lead screw
Strokes	mm	500 to 1400	800
Retracted length (virtually limited)	mm	Stroke/2 + 275	Stroke/2 + 475
Mass at 0-mm stroke	kg	21	26 (800-mm stroke)
Δ mass per 100-mm stroke	kg	1.7	5.1
Compatible robots	–	Small and medium-sized robots (< 50 kg)	Large robots (50 kg to 75 kg)
Cable management	–	Threads on column and adapter plate for attaching cables	Threads on column and adapter plate for attaching cables
AC voltage	V	120	120
Amperage	A	6.5	6.5
AC voltage	V	230	230
Amperage	A	3.3	3.3
Input frequency	Hz	50 to 60	50 to 60
Input fuse	A	10	10
DC I/O voltage	V	24	24
I/O amperage	A	max. 10, not protected	max. 10, not protected
Emergency stop	–	Safe Torque Off (STO) up to PLe, Cat. 4	Safe Torque Off (STO) up to PLe, Cat. 4
Control interface	–	TCP/IP	TCP/IP
Positioning	mm	±1	±1
Achievable positions	–	Any	Any
Feedback	–	Position and status	Position and status
Soft start and soft stop	–	Implemented for smooth running	Implemented for smooth running
Protection class	–	IP40	IP40
Ambient temperature	°C	+10 to +40	+10 to +40
Max. humidity	%	85	85
Vibration	–	Stationary industrial environment	Stationary industrial environment

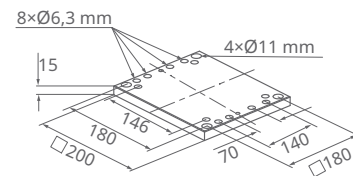
7.1 Dimensional drawing of a LIFTKIT-OS

23 EWELLIX lifting column TLT



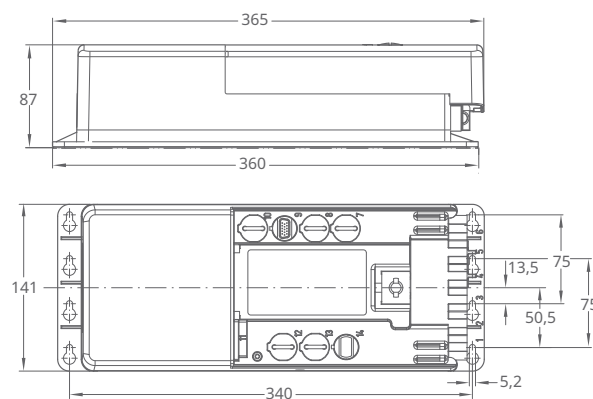
001C1D4C

24 Lower fixation plate



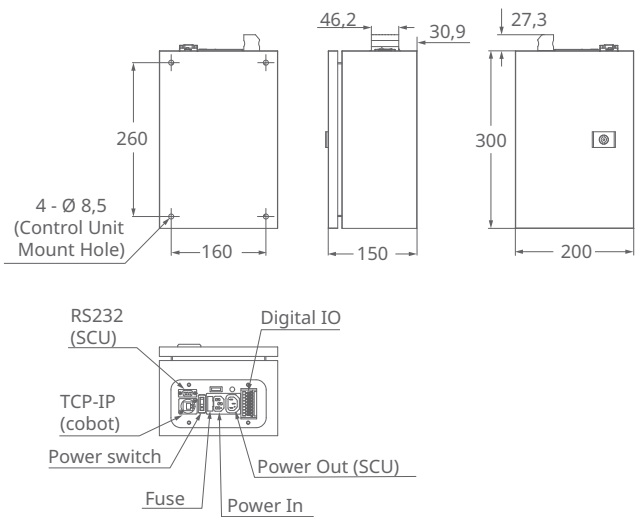
001C1D4E

25 EWELLIX control unit SCU



001C3A0F

26 EWELLIX SBOX



001C49C1

Schaeffler Technologies AG & Co. KG

Georg-Schäfer-Straße 30

97421 Schweinfurt

Germany

www.schaeffler.de/en

info.de@schaeffler.com

In Germany:

Phone 0180 5003872

From other countries:

Phone +49 9721 91-0

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