Assembly and Operating Manual

ID 1392477 or 1403607

Gripping Unit - EOA-UR3510-EGL90 or EOA-UR3510-EGL90-AUB

Superior Clamping and Gripping

SCHUNK®

Imprint

Technical changes:

We reserve the right to make alterations for the purpose of technical improvement.

Document number: 1405195

Version: 01.00 | 14/08/2019 | en

Dear Customer,

thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

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1 General

1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

Illustrations in this manual are provided for basic understanding and may differ from the actual product design.

In addition to these instructions, the documents listed under Applicable documents [▶ 6] are applicable.

1.1.1 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.

⚠ DANGER

Danger for persons!

Non-observance will inevitably cause irreversible injury or death.

⚠ WARNING

Dangers for persons!

Non-observance can lead to irreversible injury and even death.

⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

CAUTION

Material damage!

Information about avoiding material damage.

1.1.2 Applicable documents

The applicable documents can be found on the enclosed CD.

Content of the CD

Documentation Parallel Gripper EGL *	Annex 1
Software manual "Motion Control SCHUNK" *	Annex 2
"SCHUNK Drive Protocol (SDP)" software manual *	Annex 3
Connection diagram	Annex 4
Drawing	Annex 5

The documents marked with an astrisk (*) can be downloaded on the following homepages:

* schunk.com

Drawings (see annex)

Drawing-No.	Designation
3 77624 01 0 00	Assembly drawing Gripping Unit EOA-UR3510-EGL90-AUB
3 77624 02 0 00	Assembly drawing Gripping Unit EOA-UR3510-EGL90

NOTE

In addition observe the relevant documentation for the deployed robot.

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the ex-works delivery date under the following conditions:

- Observe the specified maintenance and lubrication intervals
- Observe the ambient conditions and operating conditions

Parts touching the workpiece and wear parts are not included in the warranty.

The warranty does not cover:

- Damage occurring as a result of incorrect operation.
- Claims under warranty are excluded when repair or intervention is carried out by persons not authorized to do so.
- This also applies if accessories and spare parts are used which are not designed for our unit.

1.3 Scope of delivery

The scope of delivery includes

- Gripping Unit - EOA-UR3510-EGL90 or EOA-UR3510-EGL90-AUB ID 1392477 or 1403607 in the version ordered
- Top jaw set (only for EOA-UR3510-EGL90-AUB)
- USB stick with URCap and Assembly and Operating Manual
- Power cable *
- Communication cable *
- USB cable Mini A **
- USB cable Micro B **
- Assembly and Operating Manual EGL, firmware 3.X **
- Commissioning card EGL Profinet **
- DVD **
- Accessory kit

Content of the accessory pack:

- Tool for assembly on the robot
- Velcro cable ties (provisional cabling)

* pre-assembled on the gripper

** not required for use on the UR robot

2 Basic safety notes

2.1 Intended use

The gripper unit was designed as a version of the UR kit for attachment to a robot with ISO-50 interface. The gripper unit with integrated valves and sensor interface is used in the robot application. The customer must integrate top jaws with which workpieces can be gripped, held and released safely.

- The product may only be used within the scope of its technical data, Technical data [▶ 19].
- When implementing and operating components in safety-related parts of the control systems, the basic safety principles in accordance with DIN EN ISO 13849-2 apply. The proven safety principles in accordance with DIN EN ISO 13849-2 also apply to categories 1, 2, 3 and 4.
- The product is intended for installation in a machine/system. The applicable guidelines must be observed and complied with.
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Not intended use

It is not intended use if the product is used, for example, as a pressing tool, stamping tool, lifting gear, guide for tools, cutting tool, clamping device or a drilling tool.

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

2.3 Spare parts

Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorized by SCHUNK.

2.4 Gripper fingers

Requirements for the gripper fingers

Stored energy within the product creates the risk of serious injuries and significant property damage.

- Arrange the gripper fingers in a way that the product reaches either the position "open" or "closed" in a de-energized state.
- Only exchange the gripper fingers when no residual energy remains in the product.
- Make sure that the product and the top jaws are a sufficient size for the application.

2.5 Ambient conditions and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, Technical data [▶ 19].

2.6 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

Trained electrician	Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.
Qualified personnel	Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.
Instructed person	Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.
Service personnel of the manufacturer	Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.7 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

2.8 Notes on safe operation

Incorrect handling of the personnel

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.9 Transport

Handling during transport

Incorrect handling during transport may impair the product's safety and cause serious injuries and considerable material damage.

- When handling heavy weights, use lifting equipment to lift the product and transport it by appropriate means.
- Secure the product against falling during transportation and handling.
- Stand clear of suspended loads.

2.10 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.11 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

2.12 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- If the energy supply is connected, do not move any parts by hand.
- Do not reach into the open mechanism or movement area of the product during operation.

2.12.1 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

2.12.2 Protection during commissioning and operation

Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

2.12.3 Protection against dangerous movements

Unexpected movements

Residual energy in the system may cause serious injuries while working with the product.

- Switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.
- Never rely solely on the response of the monitoring function to avert danger. Until the installed monitors become effective, it must be assumed that the drive movement is faulty, with its action being dependent on the control unit and the current operating condition of the drive. Perform maintenance work, modifications, and attachments outside the danger zone defined by the movement range.
- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted. Limit/prevent accidental access for people in this area due through technical safety measures. The protective cover and protective fence must be rigid enough to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily and quickly accessible. Before starting up the machine or automated system, check that the EMERGENCY STOP system is working. Prevent operation of the machine if this protective equipment does not function correctly.

2.12.4 Protection against electric shock

Possible electrostatic energy

Components or assembly groups may become electrostatically charged. When the electrostatic charge is touched, the discharge may trigger a shock reaction leading to injuries.

- The operator must ensure that all components and assembly groups are included in the local potential equalisation in accordance with the applicable regulations.
- While paying attention to the actual conditions of the working environment, the potential equalisation must be implemented by a specialist electrician according to the applicable regulations.
- The effectiveness of the potential equalisation must be verified by executing regular safety measurements.

2.12.5 Protection against burns

Working with hot surfaces

Depending on the circumstances the surface of the product can get very hot and cause burns when touching it.

- Do not touch hot surfaces, such as brake resistors, heat sinks, drive units, windings and sheet metals.
- Let the surface cool down before working with it. After switching off the cool-down time of some components can average up to an hour.
- Wear protection gloves.

2.13 Notes on particular risks

⚠ WARNING

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

⚠ WARNING

Risk of injury from sharp edges and corners!

Sharp edges and corners can cause cuts.

- Use suitable protective equipment.

⚠ WARNING

Risk of injury due to uncontrolled movements!

In case of malfunction of sensors, pneumatic valves, electro distributors or bus systems, uncontrolled movements of the product may cause serious injuries.

- Connect sensors, pneumatic valves, electro distributors and bus systems correctly.

⚠ WARNING

Risk of injury from crushing and impacts!

Serious injury could occur during the base jaw procedure and when breaking or loosening the gripper fingers.

- Wear suitable protective equipment.
- Do not reach into the open mechanism or the movement area of the product.

⚠ WARNING

Danger of injury due to uncontrolled movements!

Due to incorrect control and incorrect operation, loss of workpieces and uncontrolled movement of the product may occur and can cause serious injuries.

- Take checks in the user's program.
- The danger zone must be secured by suitable measures.

⚠ WARNING

Risk of injury due to falling parts!

Due to broken screw connections or material fault parts may fall down and cause serious injuries.

- Surround the danger zone with a safety fence.
- Wear appropriate safety equipment.

3 Technical data

3.1 Basic data

	EOA-UR3510-EGL90-AUB	EOA-UR3510-EGL90
Mechanical operating data		
Dimension	Assembly drawing	
	Drawing-No. 3 77624 01 0 00	Drawing-No. 3 77624 02 0 00
Weight [kg]	2.57	2.13
Center of gravity with regard to robot flange center		
X	-0.71 mm	-0.86 mm
Y	-0.04 mm	-0.05 mm
Z	74.49 mm	56.03 mm
Tool Center Point (TCP)		
X / Y / Z	0 / 0 / 205.3	0 / 0 / 119.3
Internal motor operating data		
Motor current at max. gripping force [A]	4.25 (corresponds to 100%)	
IMPORTANT! If the product is operated with the voltage supply of the robot, the maximum permitted gripping force is 70%. If a gripping force > 70% is required or other devices are connected to the voltage supply, we recommend the use of an external power supply unit (e.g. SCHUNK ID 31001408).		
Gripping force [N] Min. Max.	 50 600	
Logic supply fuse internal *		
Value [A] Tripping characteristic	1 time delay	
Power supply		
Logic voltage supply [VDC]	24 ± 10%	
Power voltage supply [VDC] (stabilized and smoothed, internal reverse polarity protection)	24 ± 10%	
maximum current input (logic) [A]	2.0	
maximum current input (power) from power supply unit [A]	2.5	
Interface		
PROFINET [100 MBit/s]	X	
USB Mini AB, device, parameterization interface	X	
USB Micro AB, host	X	

* SCHUNK recommends: Littelfuse 1A time delay (0154001 .DRTL)

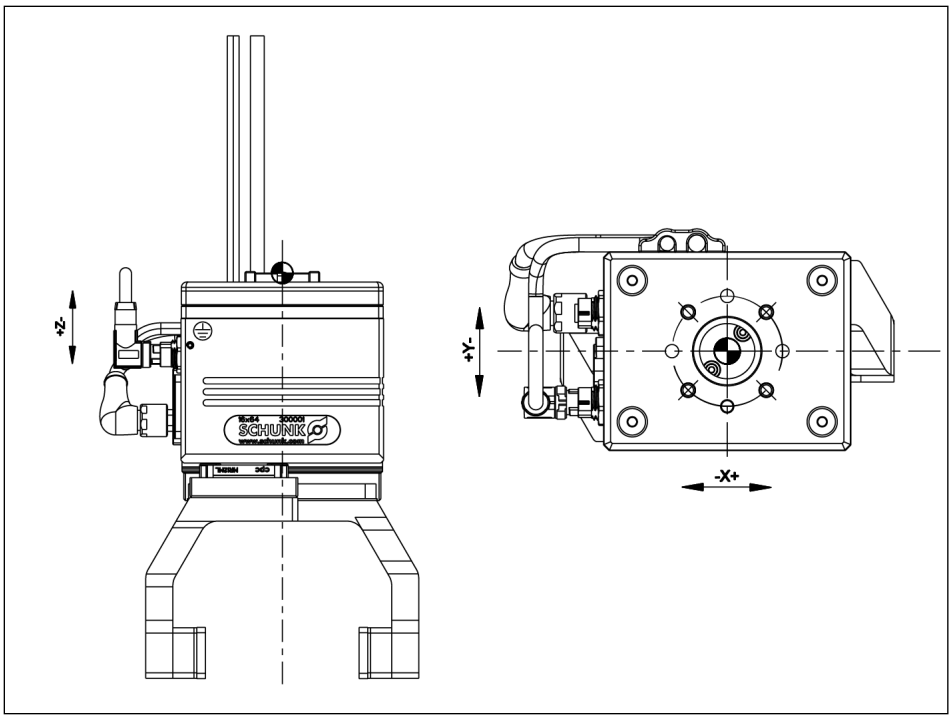
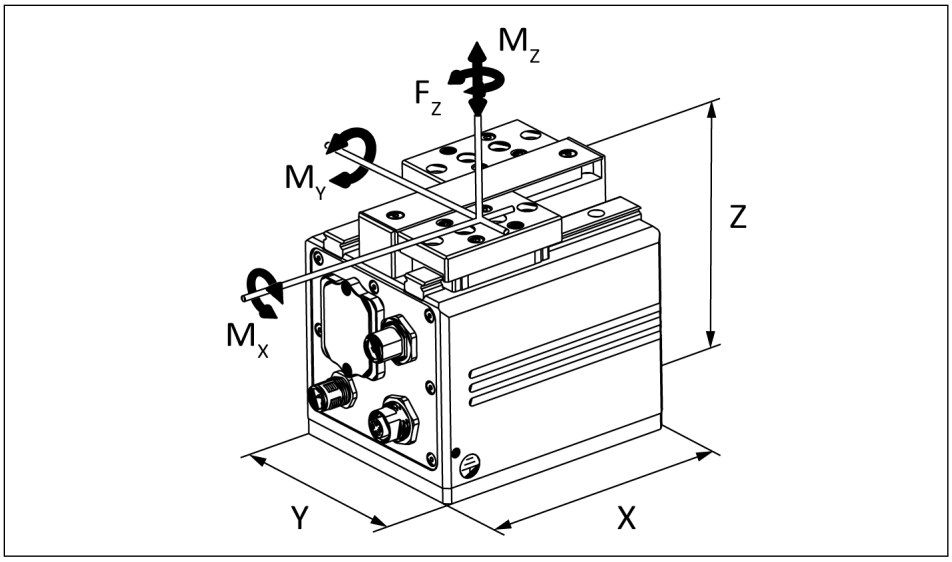


Illustration of coordinate system for TCP and center of gravity



Dimensions and maximum loads

M_x(max.)	20 Nm
M_y(max.)	20 Nm
M_z(max.)	20 Nm
F_z(max.)	400 N

The indicated moments and forces are static values, apply for each base jaw, and may occur simultaneously. M_y may arise in addition to the moment generated by the gripping force itself.

More technical data is included in the catalog data sheet. Whichever is the latest version.

3.2 Ambient conditions and operating conditions

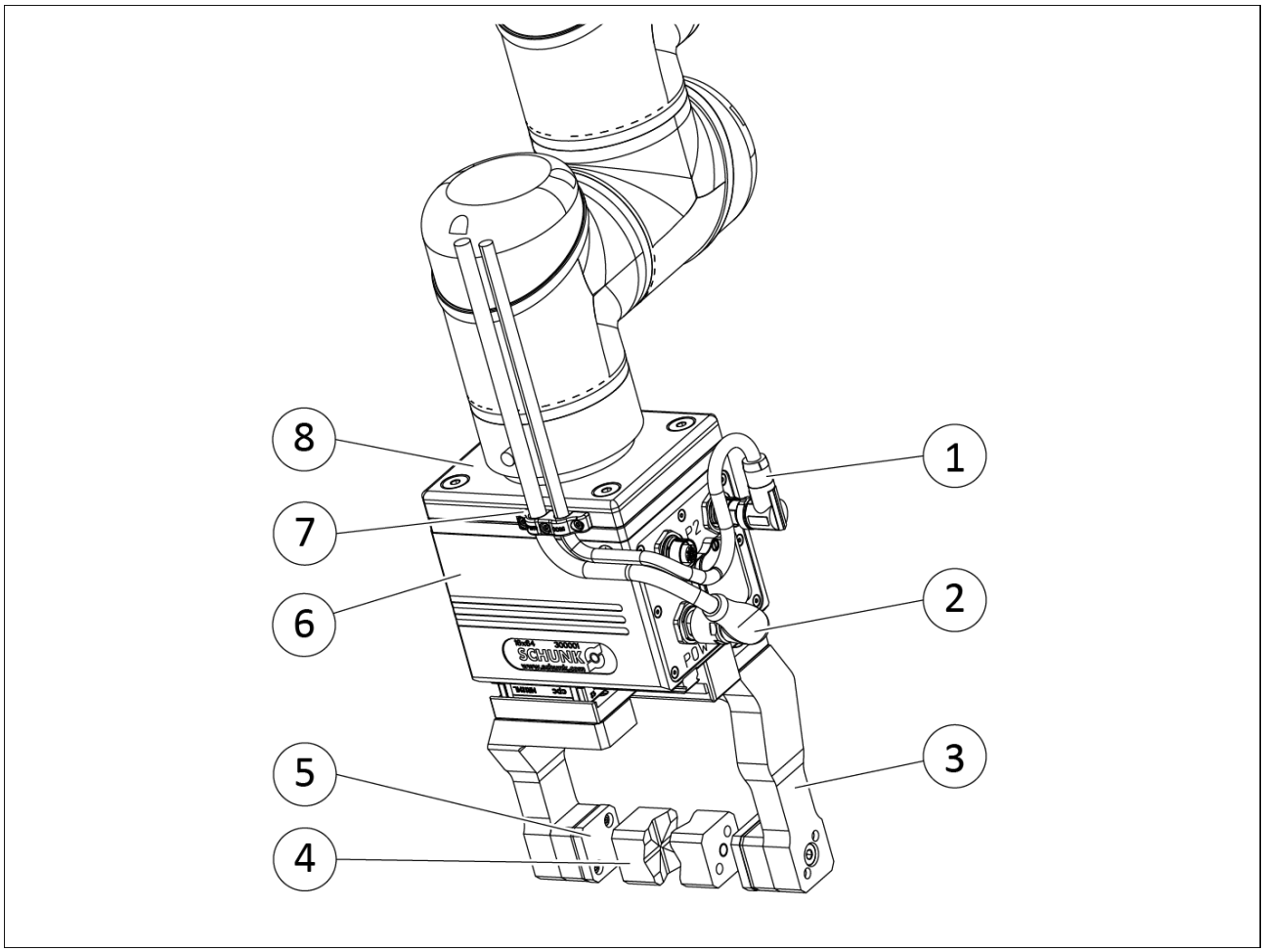
Ambient conditions and operating conditions

	EOA-UR3510-EGL90-AUB	EOA-UR3510-EGL90
Noise emission [dB(A)]	≤ 70	
IP rating*	46	
Ambient temperature [°C] Min. Max.	 5 55	

* For use in dirty ambient conditions (e.g. sprayed water, vapors, abrasion or processing dust) SCHUNK offers corresponding product options as standard. SCHUNK also offers customized solutions for special applications in dirty ambient conditions.

4 Design

4.1 Complete unit



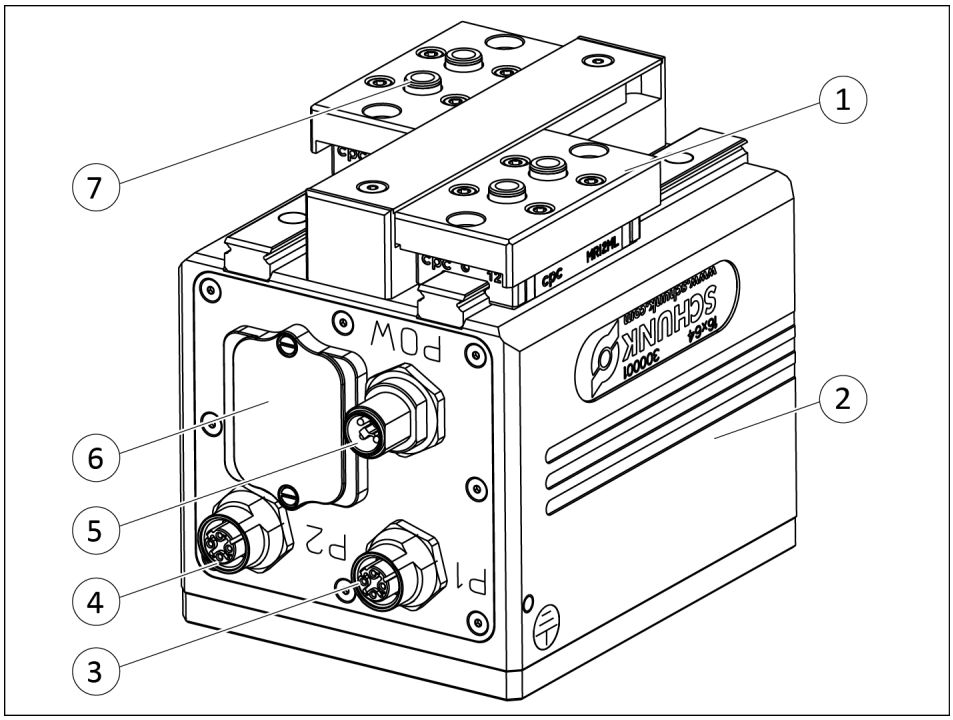
Structure of the complete unit

Item	Designation	see
1	Communication cable PROFINET with angled M12 plug connector as well as robot-side RJ45 plug connector	Electrical connection [▶ 28]
2	Voltage supply connection cable with angled M12 plug connector as well as robot-side open wire ends	Electrical connection [▶ 28]
3	Base body top jaw (prepared for fastening the clamping inserts) *	Installing clamping inserts [▶ 33]
4	Clamping insert with double prism *	Installing clamping inserts [▶ 33]
5	Clamping insert with gripper pads *	Installing clamping inserts [▶ 33]
6	Electric parallel gripper EGL 90	see annex 1
7	Strain relief for communication and voltage supply cable	
8	Mechanical adaptation (ISO 9409-1-50-4-M6) for mechanical connection to robot UR3, UR5 or UR10	Mechanical connection [▶ 25]

* Only for ID 1403607.

Additional information is available on the enclosed CD.

4.2 Gripping unit EGL



2-finger parallel gripper EGL, using PROFINET variant as an example

1	Finger interface
2	Housing
3	PROFINET socket
4	PROFINET socket
5	Voltage supply connector
6	Service window
7	Finger centering sleeves

5 Assembly

5.1 Installing and connecting

⚠ DANGER

Danger from electric voltage!

Touching live parts may result in death.

- Switch off the power supply before any assembly, adjustment or maintenance work and secure against being switched on again.
- Only qualified electricians may perform electrical installations.
- Check if de-energized, ground it and hot-wire.
- Cover live parts.

⚠ WARNING

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

NOTE

Mount the product so that sufficient heat dissipation is guaranteed. A temperature malfunction may occur if the product reaches excessively high temperatures.

- ➢ Attach the product to the robot, Mechanical connection [▶ 25].
- ➢ Connect the cables for voltage supply and communication, Electrical connection [▶ 28].
- ➢ Secure the gripper fingers to the base jaws, Installing gripper fingers [▶ 33].
- ➢ Install the clamping inserts, Installing clamping inserts [▶ 33].
- ➢ Install the software component, Installing the software component [▶ 37].
- ➢ Set up the network connection, Connecting the robot with a network [▶ 40].
- ➢ Establish a connection to the gripper, Establishing a connection to the gripper [▶ 41].
- ➢ Configure the URCap, Configuring the gripper [▶ 42].

5.2 Connections

5.2.1 Mechanical connection

⚠ WARNING

Risk of injury from falling of the product!

During transport and assembly/disassembly the product may fall down and cause serious injuries.

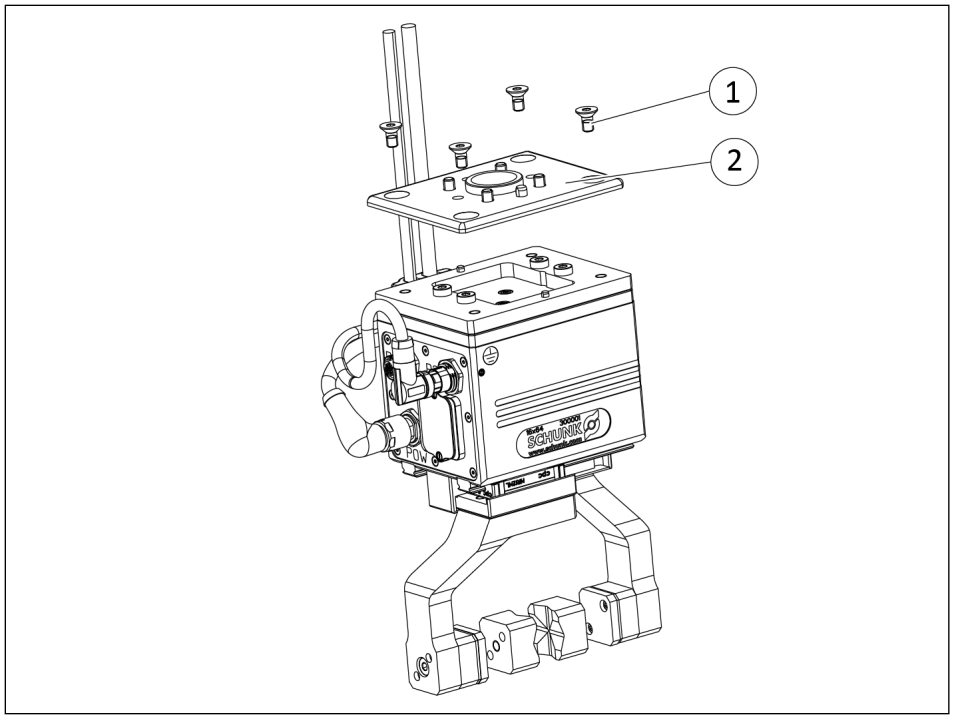
- Secure the product with adequately sized aids.
- Wear suitable protective clothing.

⚠ WARNING

Risk of injury due to unexpected movements!

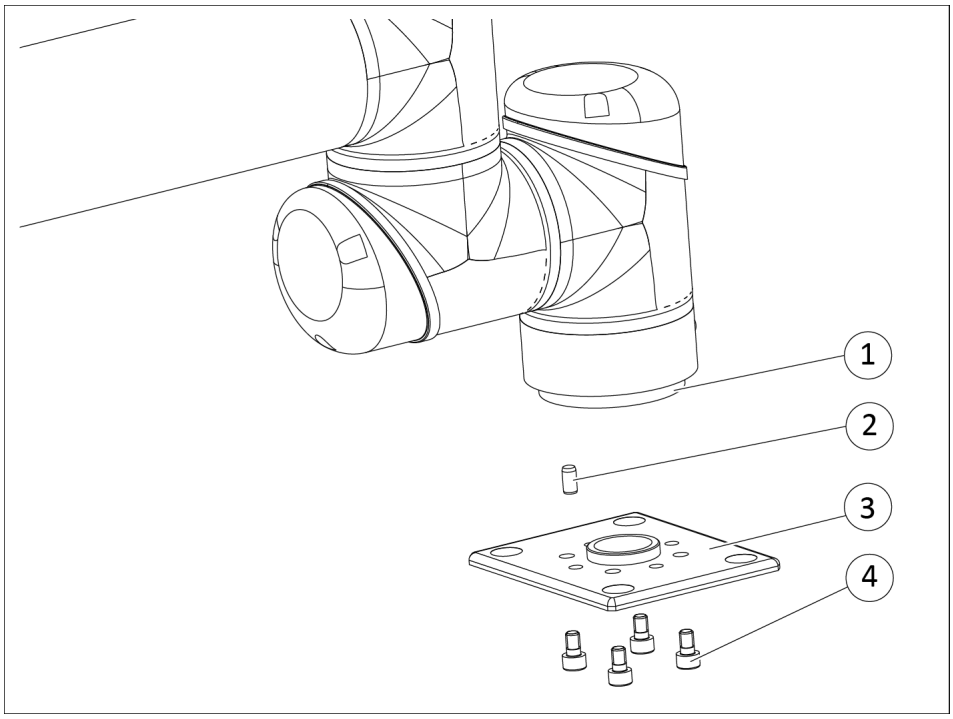
If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.



➢ Take the hexagon socket wrench A/F 4 from the accessory kit.

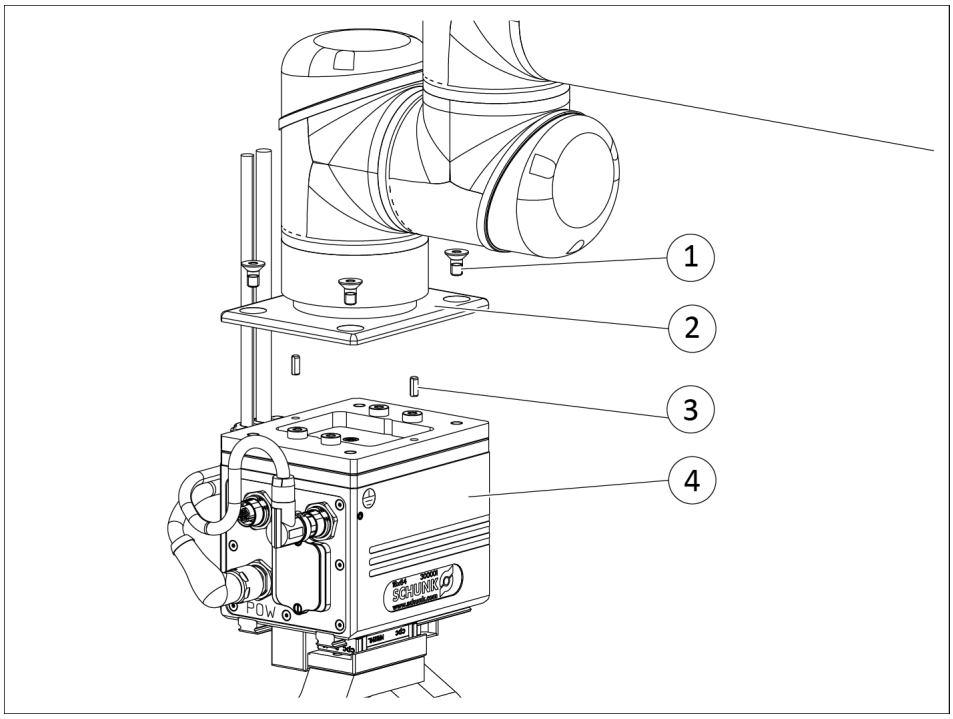
➢ Loosen screws (1) using the hexagon socket wrench A/F 4 and remove the upper adapter plate (2).



- Take cylinder pin (2) from the accessory kit.
- Insert cylinder pin (2) into the ISO A50 flange (1).
- Place the upper adapter plate (3) on the ISO flange.
- Take the hexagon socket wrench A/F 5 from the accessory kit.
- Fasten the adapter plate (3) to the ISO flange (1) using screws (4) and the hexagon socket wrench A/F 5.

NOTE

The adapter plate can be rotated about the longitudinal axis in 90° steps to enable the optimum installation position of the gripping unit.



- Take cylinder pins (3) from the accessory kit.
- Insert cylinder pins (3) into the gripping unit.
- Fasten the gripping unit (4) to the adapter plate (1) using screws (1) and the hexagon socket wrench A/F 4.

Further information contains the assembly drawing on the CD.

Additional information on the connections of the components can be found in the documentation on the CD,
Applicable documents [▶ 6].

5.2.2 Electrical connection

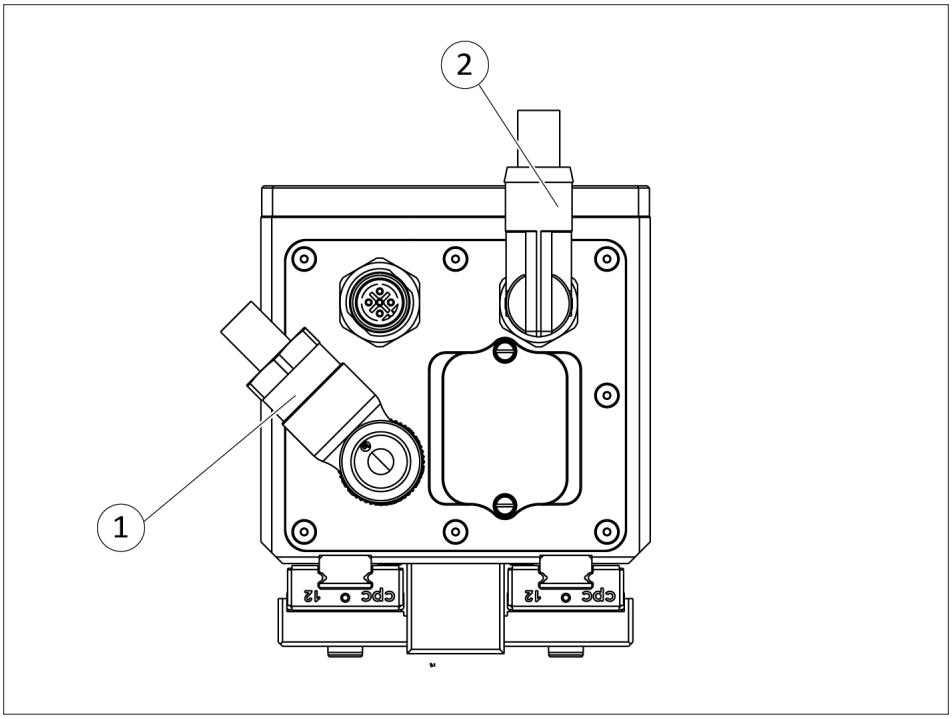
CAUTION

Risk of damage to the electronics!

A faulty connection can cause damage to the internal electronics.

- The supply network must be a network of type "PELV" for power and logic.
- Observe the PIN assignment of the connecting terminals.
- Make sure that all components are grounded correctly.

5.2.2.1 Electrical interface



Cable outlets

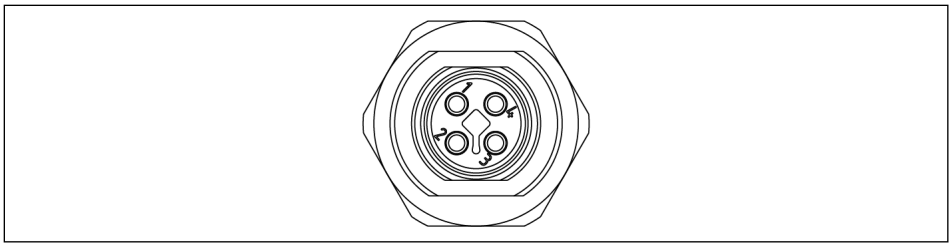
1	Voltage supply connection cable
2	PROFINET communication connection cable

CAUTION

Material damage due to incorrect assembly!

- If the cable is tightened with a tool, e.g. a wrench, do not exceed maximum tightening torque of 0.8 Nm.

5.2.2.2 PIN allocation for voltage supply



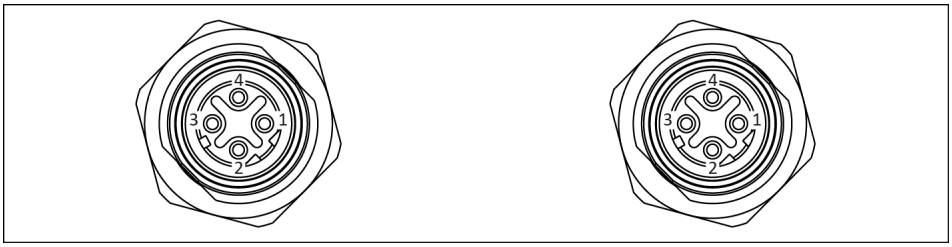
PIN allocation for voltage supply

1	Logic voltage +24V
2	Logic voltage GND
3	Motor voltage GND
4	Motor voltage +24V

5.2.2.3 PIN allocation for PROFINET

PROFINET

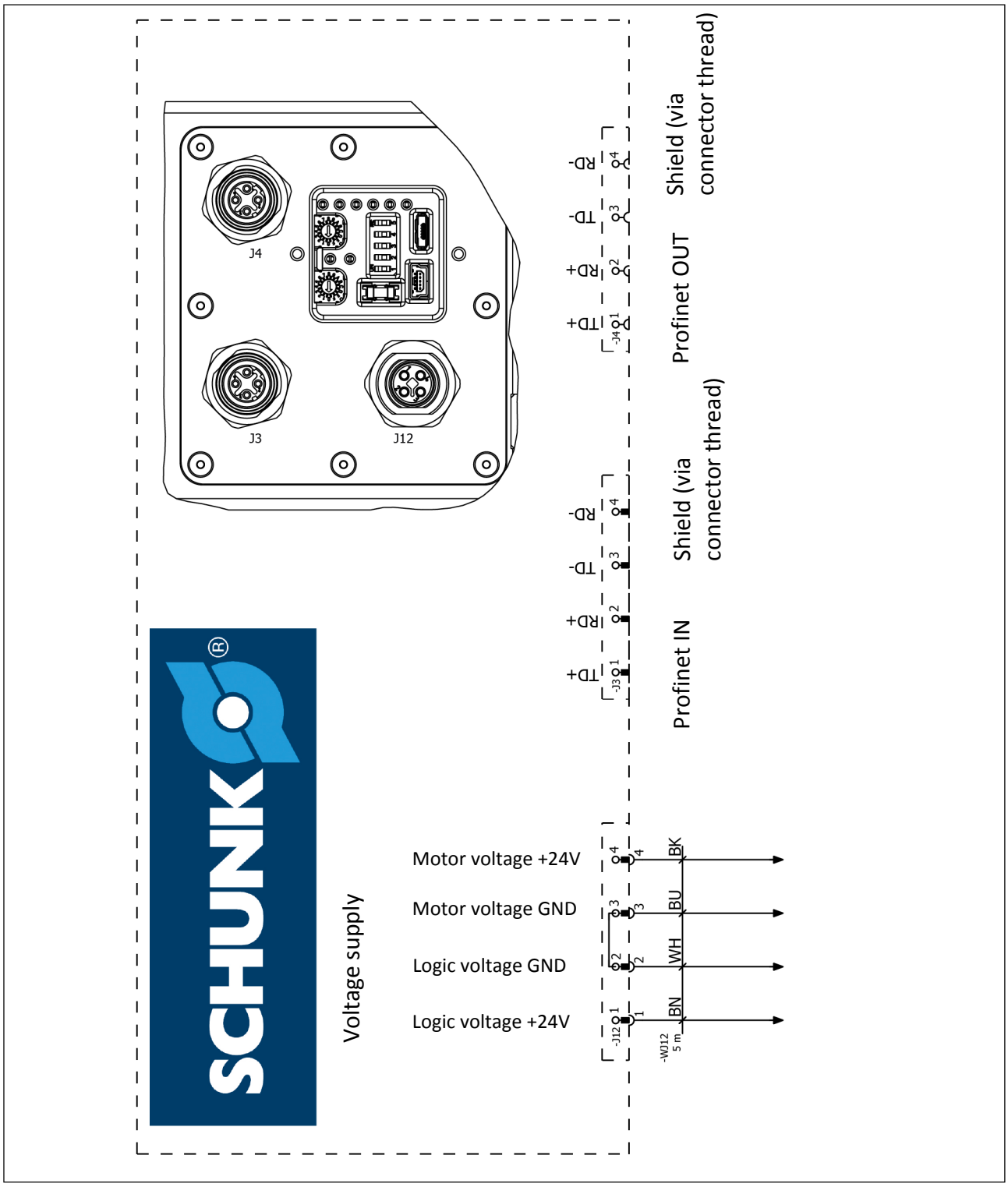
PROFINET is achieved via two M12 sockets. The sockets of the PROFINET are D-coded.



PIN allocation of socket and socket, PROFINET variant

PROFINET			
1	TD+	4	RD-
2	RD+	5	Shield via connector housing
3	TD-		

5.2.2.4 Wiring diagram

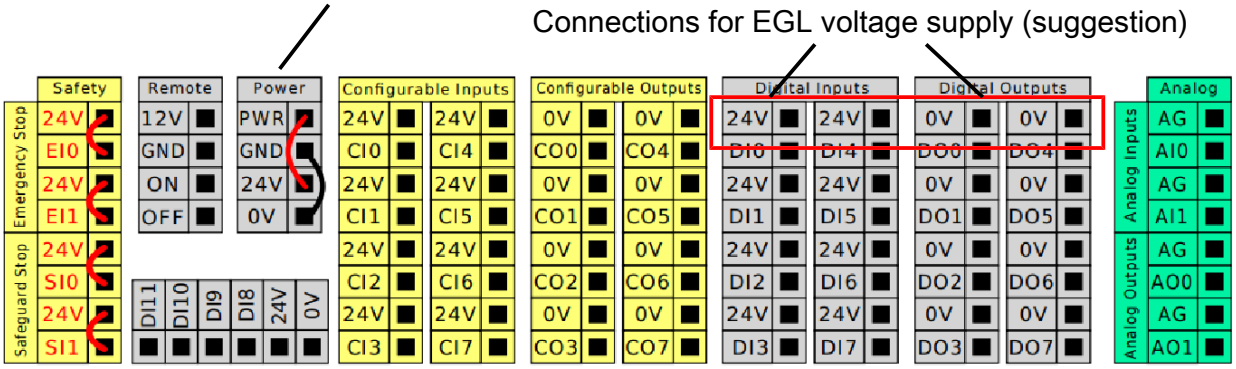


Wiring diagram

Under 70% gripping force

At a gripping force up to 70%, the gripper can be connected to the voltage supply of the robot.

Connection of an external power supply unit via bypass (optional); for details, see the operating manual of the robot



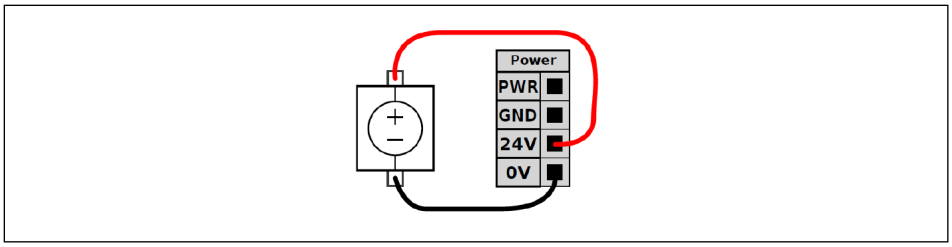
Connections on the robot control system

Over 70% gripping force

The power supply unit integrated in the robot control system provides 2 A power. This ensures the operation of the EGL up to 70% gripping force as long as no other actuators are connected. If the EGL is operated with full force, or several actuators are connected, the voltage must be supplied via an external power supply unit.

There are two options for this:

- Direct connection to an external power supply unit: The voltage supply of the EGL can be connected directly to an external power supply unit with 24V DC/3A (stabilized and smoothed). The SCHUNK range includes an appropriate power supply unit (order number: 31001408).
- Connection of an external power supply unit to the voltage supply of the robot (bypass): An external power supply unit can be used for additional voltage supply to the robot control system. This option is recommended if several actuators are to be operated on the robot control system.



Connection of an external power supply unit to the voltage supply of the robot

For further information, see the operating manual of the robot.

5.3 Installing gripper fingers

NOTE

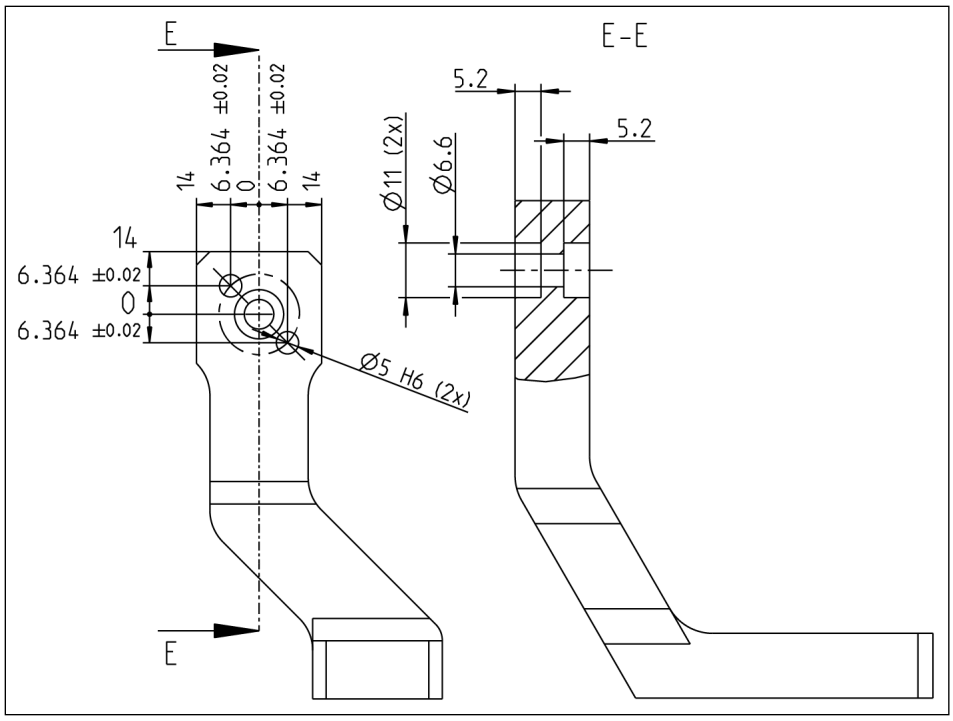
For the gripping unit with ID 1392477, the gripper fingers are available as accessories from SCHUNK; see the catalog data sheet for further information.

The finger set consists of the top jaws and two clamping inserts. The clamping inserts with gripper pads are installed at the factory. The prismatic clamping inserts are supplied. Customer-specific clamping inserts are also possible.

5.3.1 Installing clamping inserts

NOTE

To enable both inside and outside gripping, the clamping inserts can be fastened on both sides of the top jaw.

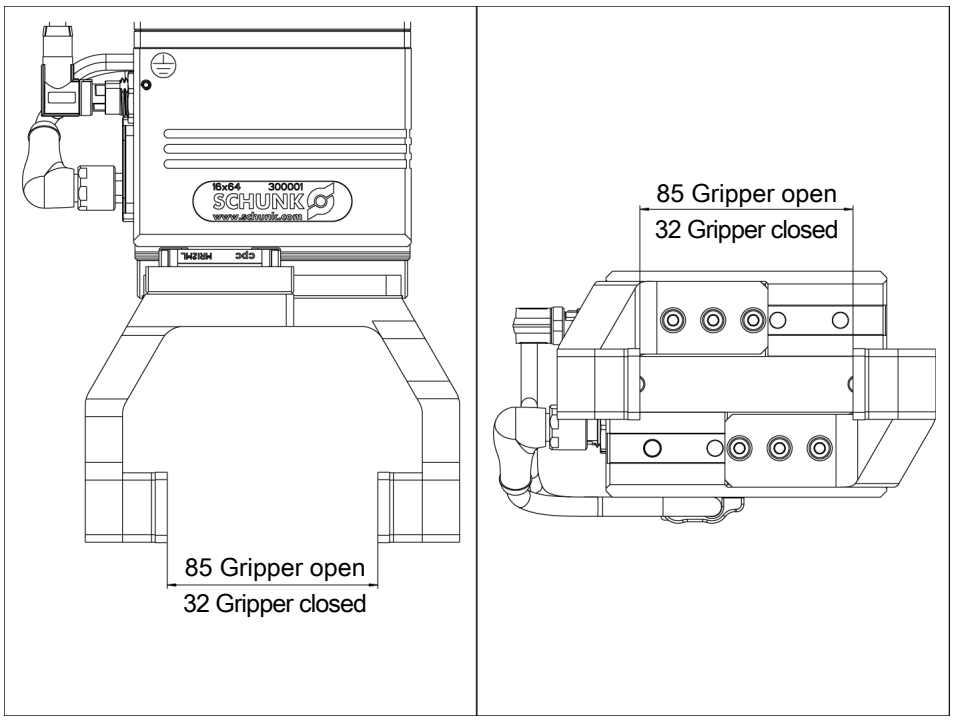


Drilling pattern of the top jaw

- Fasten the clamping inserts to the top jaw using an M6 cylindrical screw with low head (DIN 7984) and two alignment pins Ø 5 m6.

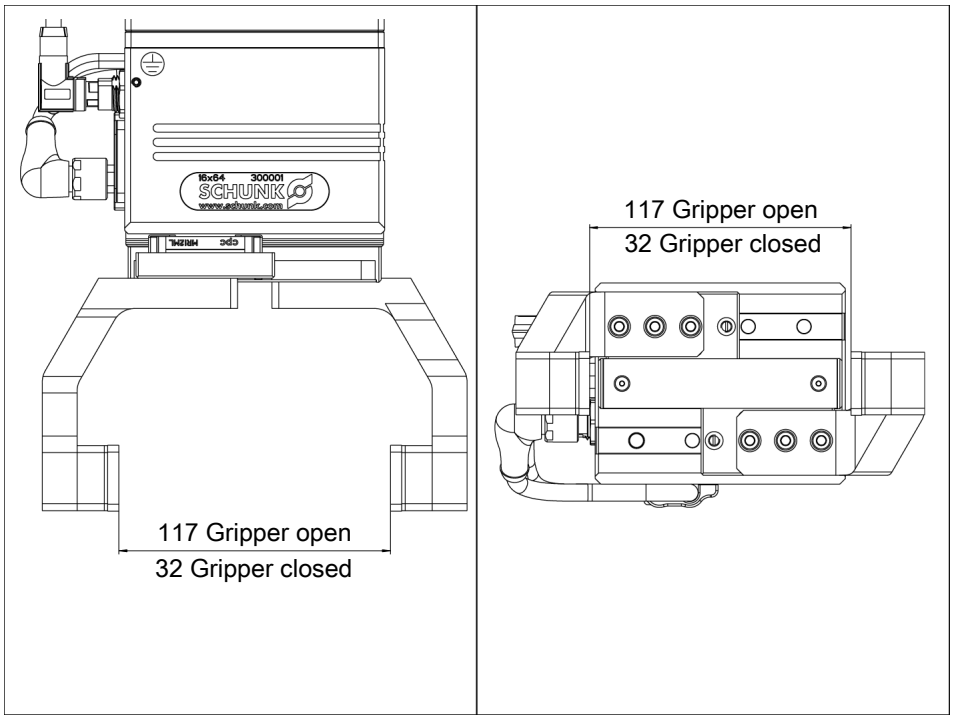
Clamping insert with gripper pads – outside gripping

At the factory, the top jaws are installed on the base jaws of the gripper as illustrated in the following graphic. The gripper pads are used to increase the coefficient of friction.



Clamping insert with gripper pads with a clamping range of 0 mm to 85 mm

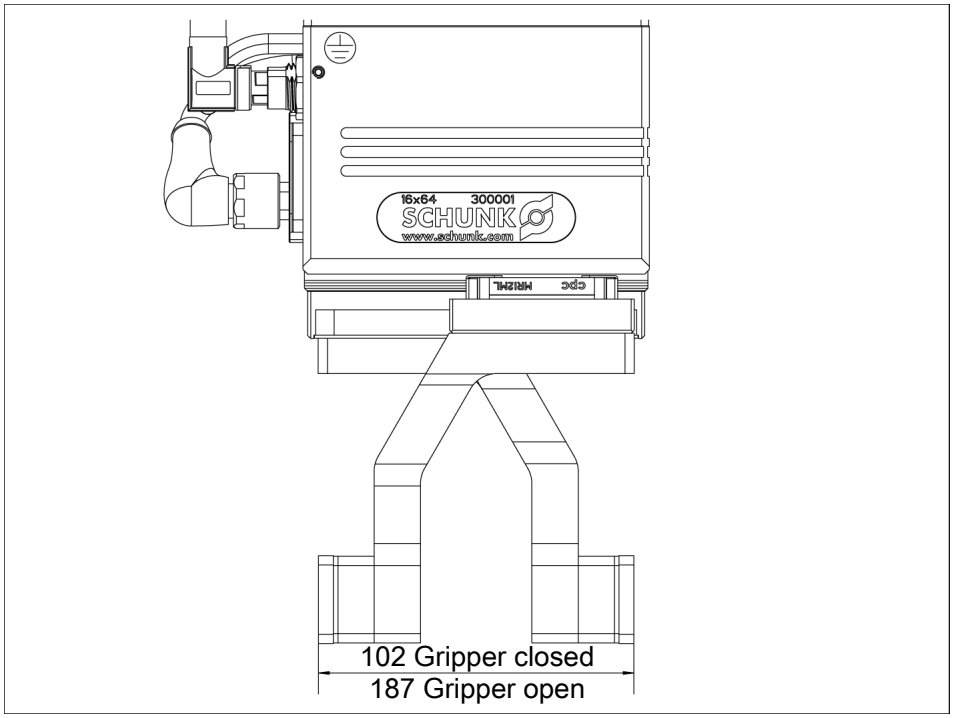
To increase the clamping range, the top jaws can also be installed so that they are offset outwards by one increment.



Clamping insert with gripper pads with a clamping range of 32 mm to 117 mm

Clamping insert with gripper pads – inside gripping

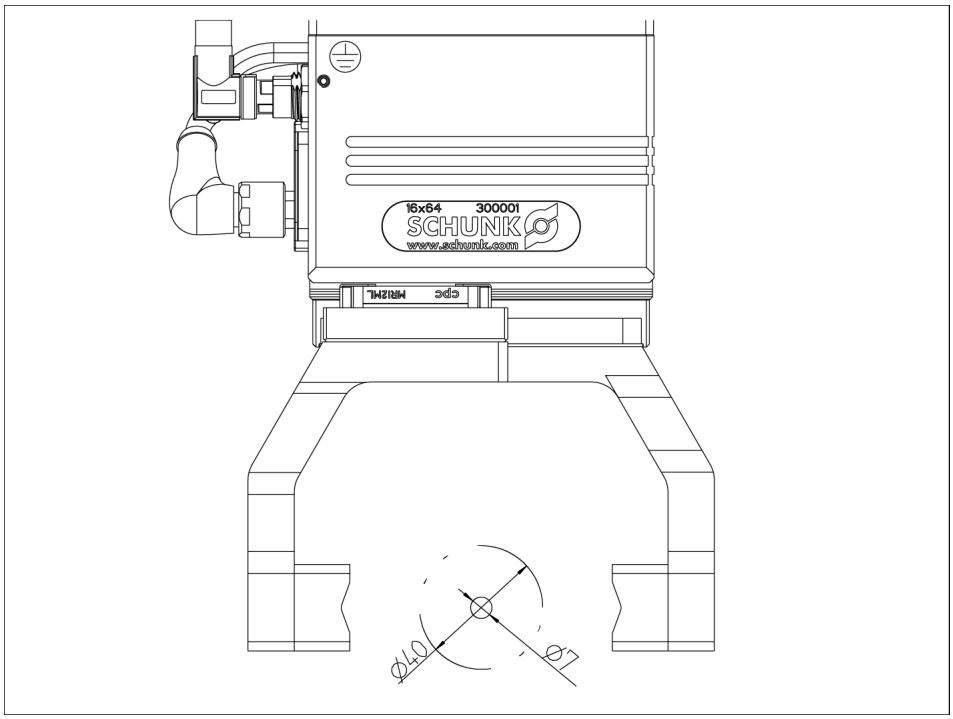
For inside gripping of a workpiece, the clamping range is 102 mm to 187 mm.



Clamping insert with gripper pads with a clamping range of 102 mm to 187 mm

Clamping inserts with double prism

With the prismatic clamping inserts (included in the accessory kit), cylindrical workpieces with a diameter of 7 mm to 40 mm can be gripped horizontally or vertically.



Clamping insert with double prism

6 Start-up

NOTE

This chapter refers to e series UR robots. There may be deviations for the CB series. In this regard, see the manual for the UR robot.

6.1 "URCap" software

6.1.1 Functional description

The "URCap" software is used for simple commissioning and programming of the SCHUNK gripper EGL 90 in combination with robots from Universal Robots. The "URCap" software is integrated seamlessly into the programming environment of Universal Robots. The programming and configuration of the gripper are supported via the control panel of the robot. "URCap" uses port number "56789" for Ethernet communication.

NOTE

These instructions apply to software version 1.01.

6.1.2 Compatibility with UR robots

	CB series	e series
Version of the robot control system	3.1	3.9
Software version	from SW 3.10.0	from SW 5.4.0

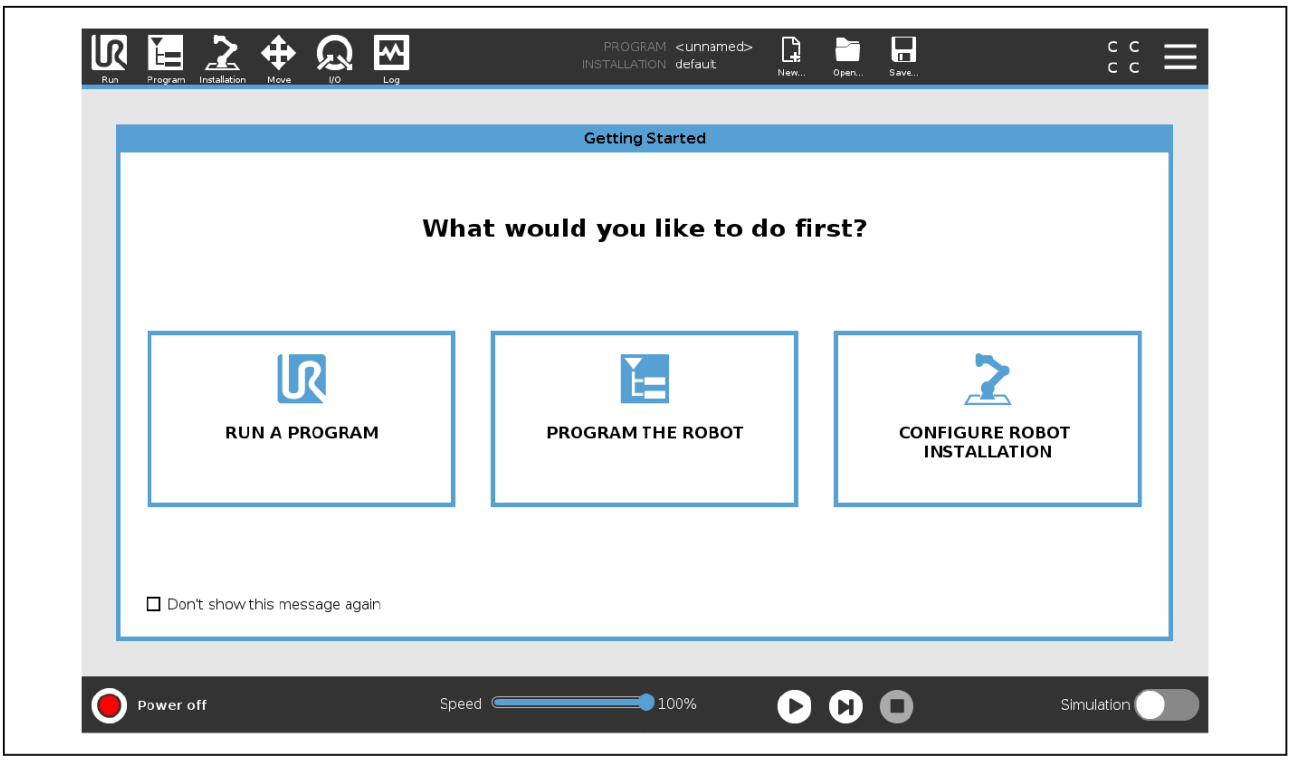
6.2 Installing the software component

NOTE

To install the software, use the enclosed USB stick.

- Connect the USB stick to the control panel of the robot. The USB interface is located at the back.

- Switch on the control panel and select the "Configure Robot Installation" button in the Explorer window.

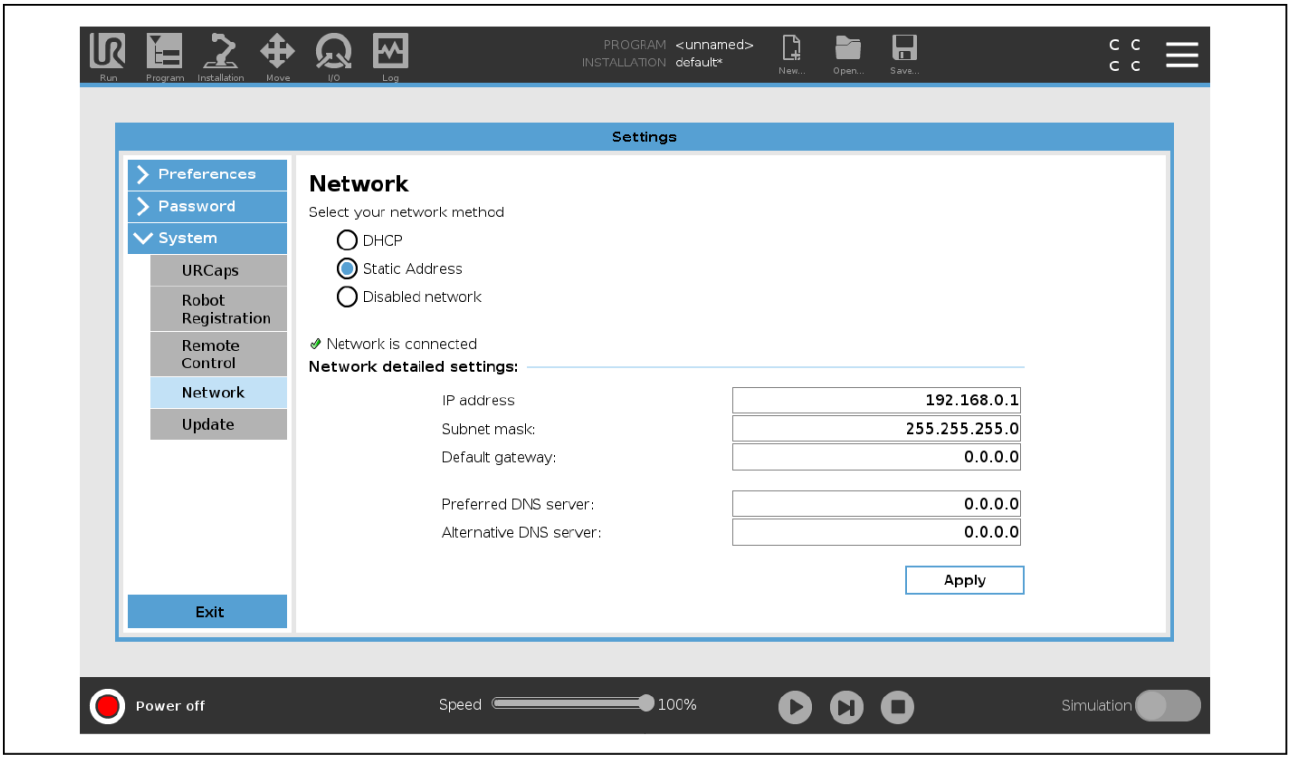


- ➢ Select the "System" button in the left menu.
  - ✓ A submenu opens.
- ➢ Select the "URCaps" button.
  - ✓ The already active URCaps are displayed in the left Explorer window. Inactive URCaps are displayed in the window on the right.

- Select the "+" button to install a new URCap.
- Select "USB Disk".
- Select the "SCHUNK_Gripper_EGL-1.0.0.urcap" software component.
- Select the "+" button to install a software component on the control panel.
- Select the "Restart" button to complete the installation.
  - ✓ The system restarts.
- Remove the USB stick from the control panel of the robot.
  - ✓ The "SCHUNK_Gripper_EGL_for_UR" URCap is displayed with a green check mark.

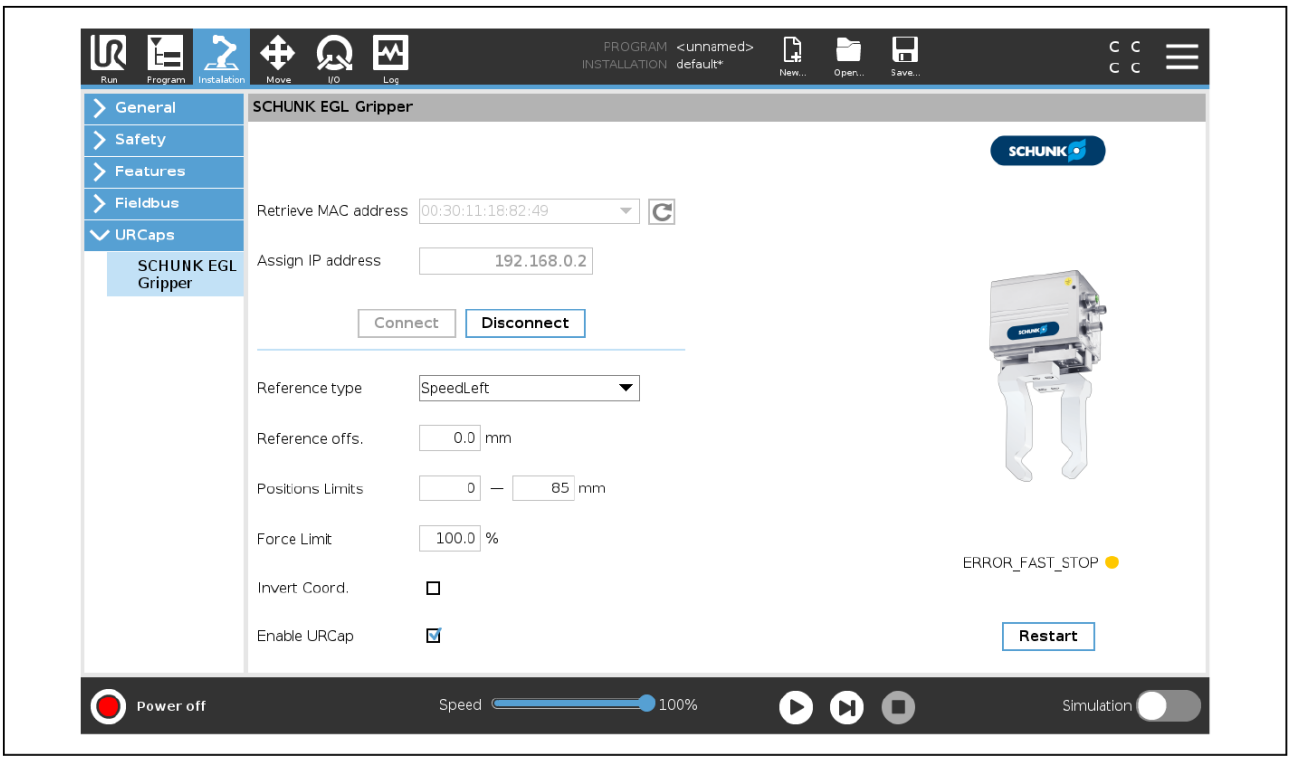
6.3 Connecting the robot with a network

- ➢ Select the "System" button in the left menu.
  - ✓ A submenu opens.
- ➢ Select the "Network" button.
  - ✓ The network settings are displayed in the Explorer window.
- ➢ Configure the connection via "Static IP Address".
- ➢ In the "IP Address" field, enter the IP address of the robot.
- ➢ Enter the appropriate entry in the "Subnet Mask" field.
- ➢ Select the "Apply" button.
  - ✓ The settings are saved.



6.4 Establishing a connection to the gripper

- Select the "Installation" button in the header line.
- Select the "URCaps" button in the left menu.
  - ✓ A submenu opens.
- Select the "SCHUNK EGL Gripper" button.
  - ✓ The Explorer window displays the configuration data and an image of the product.



NOTE

If no MAC address is displayed, select the "Update" button next to the drop-down menu or select the MAC address from the drop-down menu.

- Define the IP address, e.g. 192.168.0.2.

NOTE

The IP address must be within the same address range (subnet mask) as the robot.

- Select the "Connect" button.
  - ✓ A status message and a status indicator is displayed under the product image. When it is commissioned for the first time, the product will start with an error message, e.g. ERROR_FAST_STOP.

6.5 Configuring the gripper

⚠ WARNING

Risk of injury from components falling or being ejected!

The power from the integrated power supply unit of the robot control system cannot cover the power required for gripping forces greater than 70%. Components can fall or be ejected during operation.

- Use an external power supply unit for a gripping force > 70%.

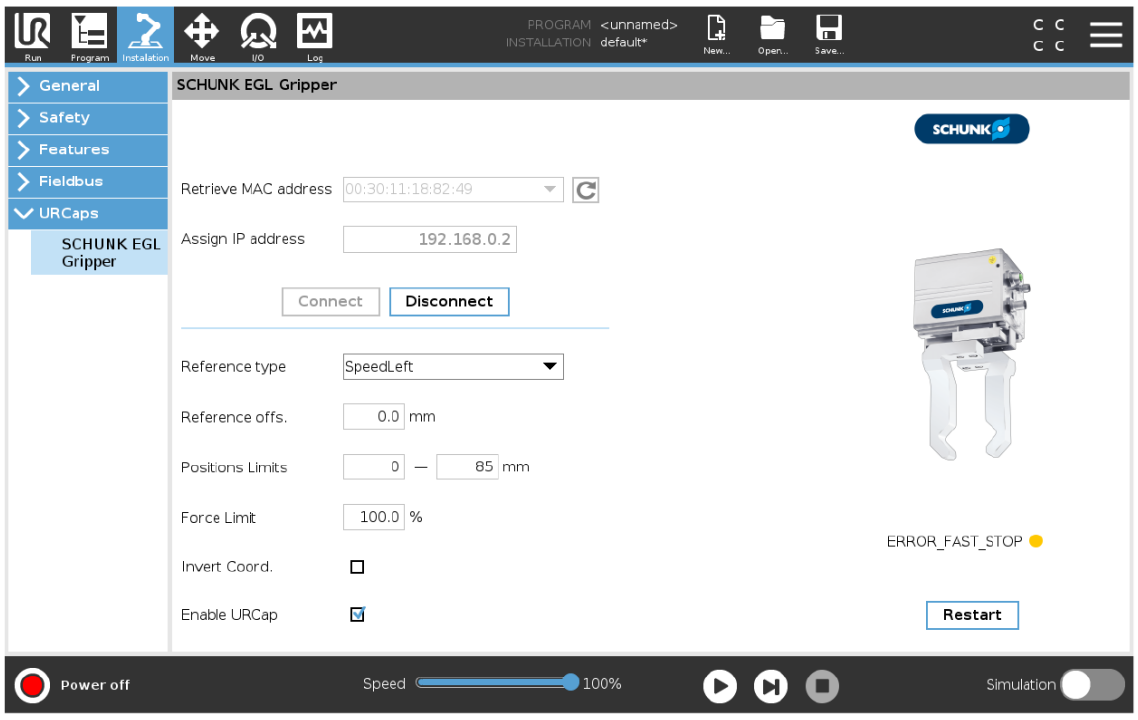
➢ Select the "Installation" button in the header line.

➢ Select the "URCaps" button in the left menu.

✓ A submenu opens.

➢ Select the "SCHUNK EGL Gripper" button.

✓ The Explorer window displays the configuration data and an image of the product.



➢ Configure the gripper.

➢ After successful configuration, select the "Restart" button.

The following gripper values can be configured:

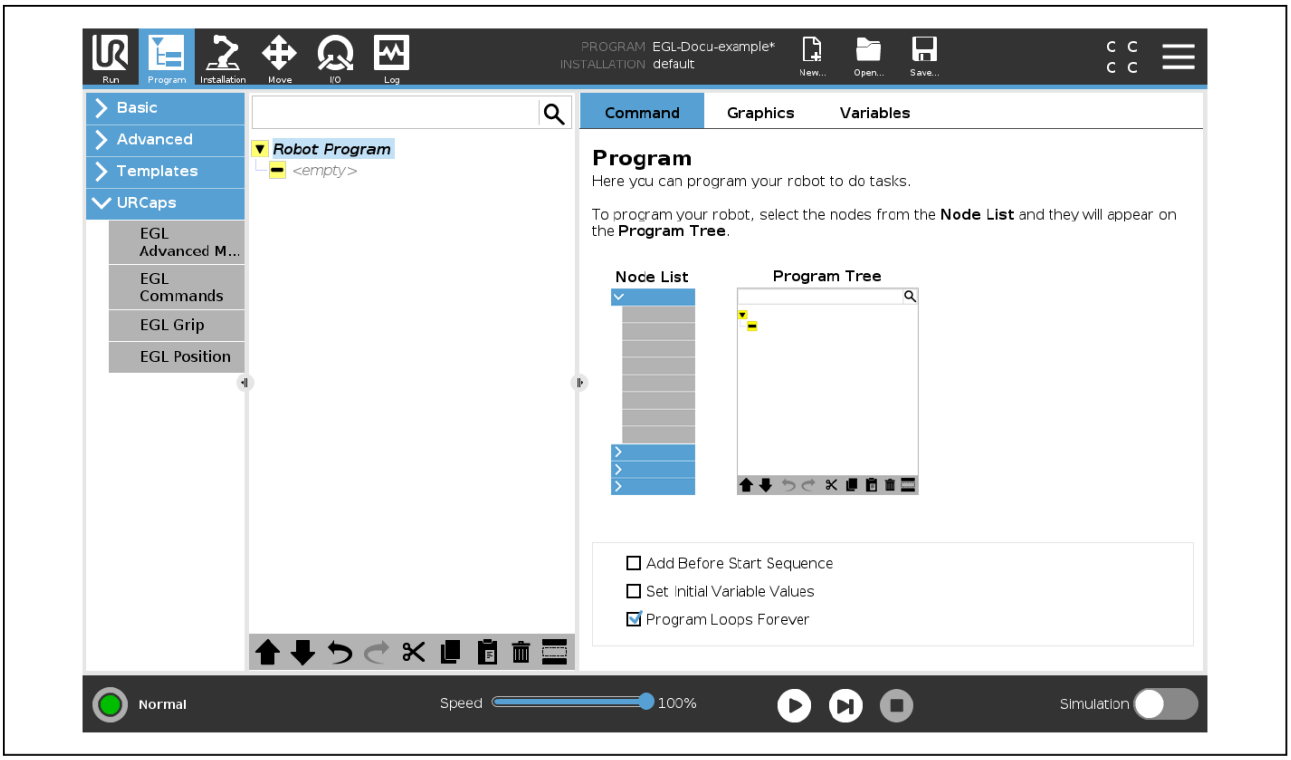
Configuration options on the product

Specification	Basic setting	Note
Reference type	SpeedLeft	Various referencing options are available to optimize the accuracy of different gripping tasks.
Reference offs.	0.0 mm	To move the origin of the coordinate system, e.g. if the finger geometry results in a minimum opening > 0.0 mm.
Position Limits	0.0 mm-85.0 mm	To limit the gripper stroke, e.g. if the finger geometry restricts the available stroke or if the smallest stroke is > 0.0 mm.
Force Limit	100.0%	To limit the gripping force when handling sensitive components or to adapt the gripping force to the integrated power supply unit of the robot control system. If the robot control system is connected to the integrated power supply unit, set "Force Limit" to 70%. If the full gripping force is required, connect the gripper to an external power supply unit, Electrical connection [▶ 28].
Invert Coord.	deactivated	To reverse the direction of movement of the coordinate system, e.g. if the finger geometry results in a reversed direction of movement. Upon activation, also adjust the "Reference type", e.g. to "SpeedRight".
Enable URCap	activated	For deactivation of the URCap without uninstallation. The product commands are no longer displayed in the "Program" menu. If required, this setting can be used at any time to reactivate the URCap and apply the commands.

6.6 Creating the robot program

➢ Select the "Program" button in the header line.

✓ The robot program and a short description for creating the program are displayed in the Explorer window.

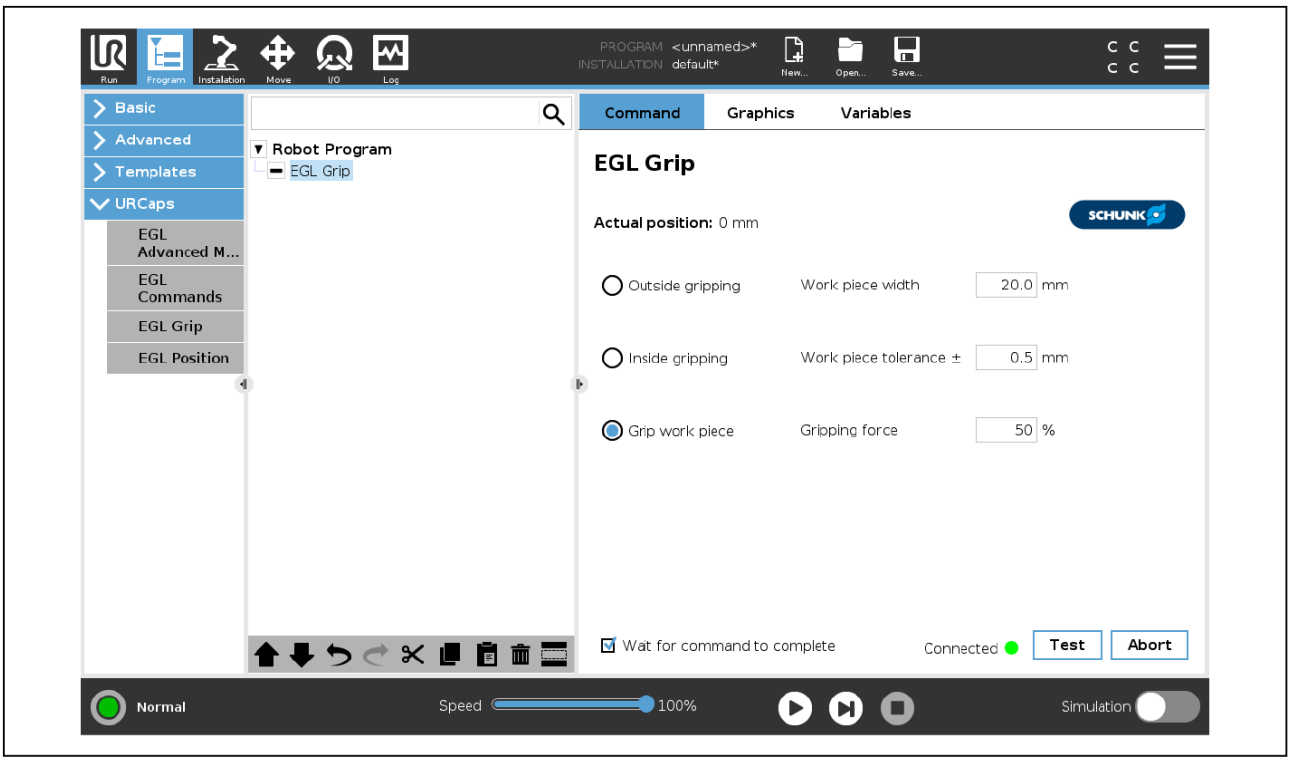


The following commands can be selected and configured for a robot program:

Command	Function
EGL Commands	Basic functions such as acknowledging errors, referencing, or triggering a stop command
EGL Position	Positioning of the gripper fingers in a defined position, e.g. the previous position before the gripping operation
EGL Grip	Gripping a component
EGL Advanced Motion Control	Fine adjustment of a specific motion sequence, e.g. movement at fixed speed

6.6.1 Selecting and configuring commands

- ➢ Select the desired command from the URCap commands in the left menu.
  - ✓ The selected command appears under "Robot Program".
  - ✓ The input fields for configuring the command are displayed in the Explorer window.
  - ✓ The current position of the gripper fingers is displayed in the Explorer window.



- ➢ Configure the command.
- ➢ Select the "Wait for command to complete" command to have the robot program wait until the command has been performed in full before the next command is performed.

⚠ WARNING

Risk of injury from crushing and impacts!

A command is performed immediately by selecting the "Test" button. The gripper can apply a force of up to 600 N.

- Only operate the gripper behind closed safety devices, e.g. a protective fence.
- Ensure that the range of motion of the gripper fingers is clear.
- When gripping sensitive components, first test the grip with reduced gripping force.

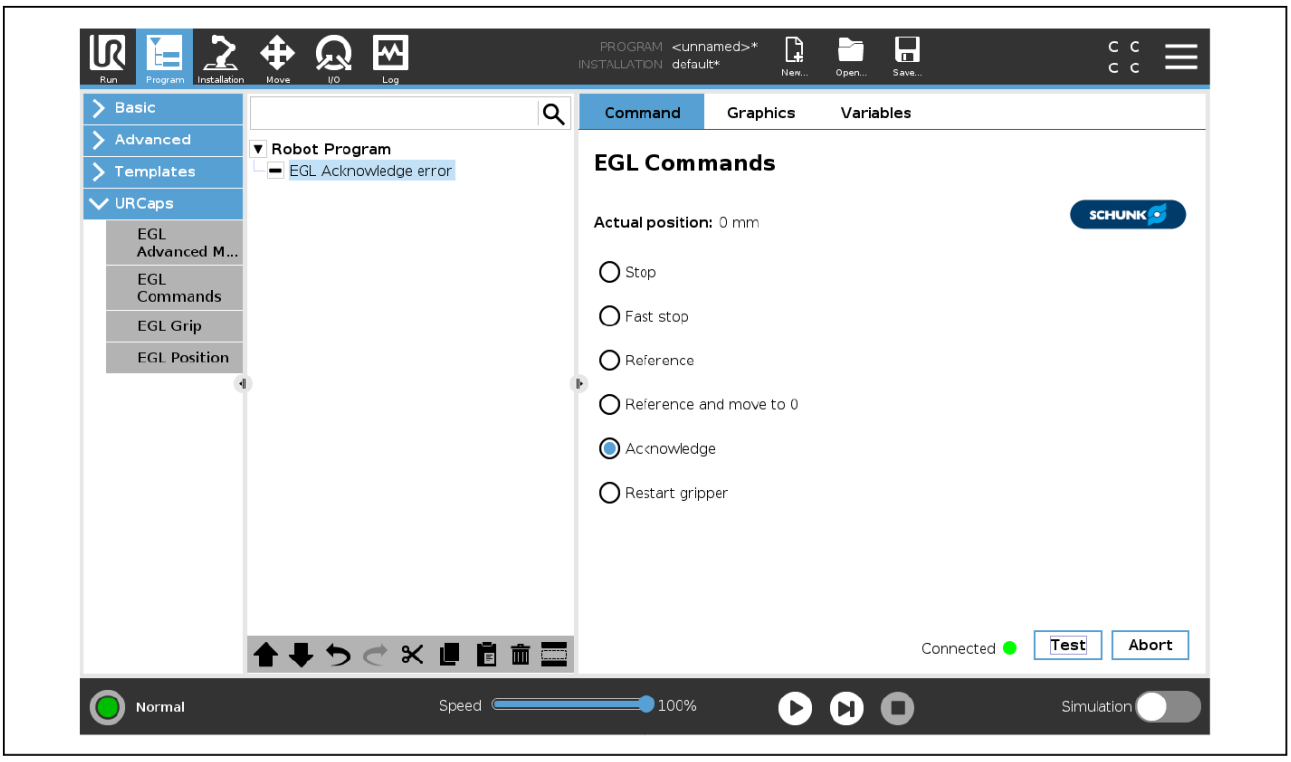
➢ Select the "Test" button to verify the changes for the selected command.

➢ Select the "Abort" button to cancel the command.

NOTE

The "Abort" button immediately triggers a fast stop. After this, an acknowledge command must be sent to reestablish operational readiness.

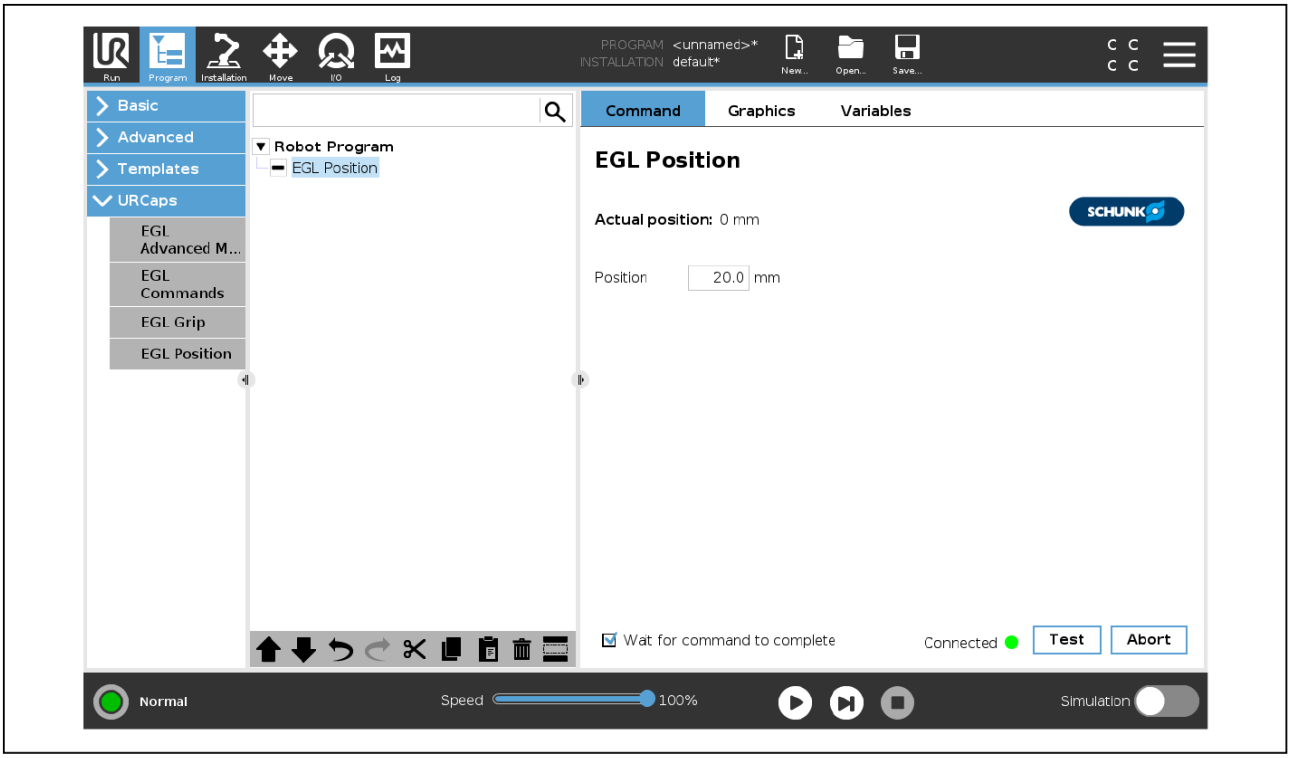
6.6.1.1 EGL Commands



The following basic functions are combined in this command:

Function	Description
Stop	The gripper performs a controlled stop. The gripper remains operational for further commands.
Fast stop	The gripper immediately short-circuits the motor phases; the position brake is applied with a delay.
Reference	Redetermine the zero point of the gripper coordinate system. The gripper moves up to a mechanical stop. This stop returns the zero position plus "Reference offs".
Reference and move to 0	Redetermine the zero point of the gripper coordinate system. The gripper then moves to the zero position.
Acknowledge	Acknowledge a pending error or a message requiring acknowledgment (e.g. Restart gripper, Fast stop).
Restart gripper	The gripper restarts.

6.6.1.2 EGL Position



- In the input field, enter the desired position for the gripper.
- Select the "Test" button.
  - ✓ The gripper moves to the desired position.

NOTE

This command is not intended for gripping components.

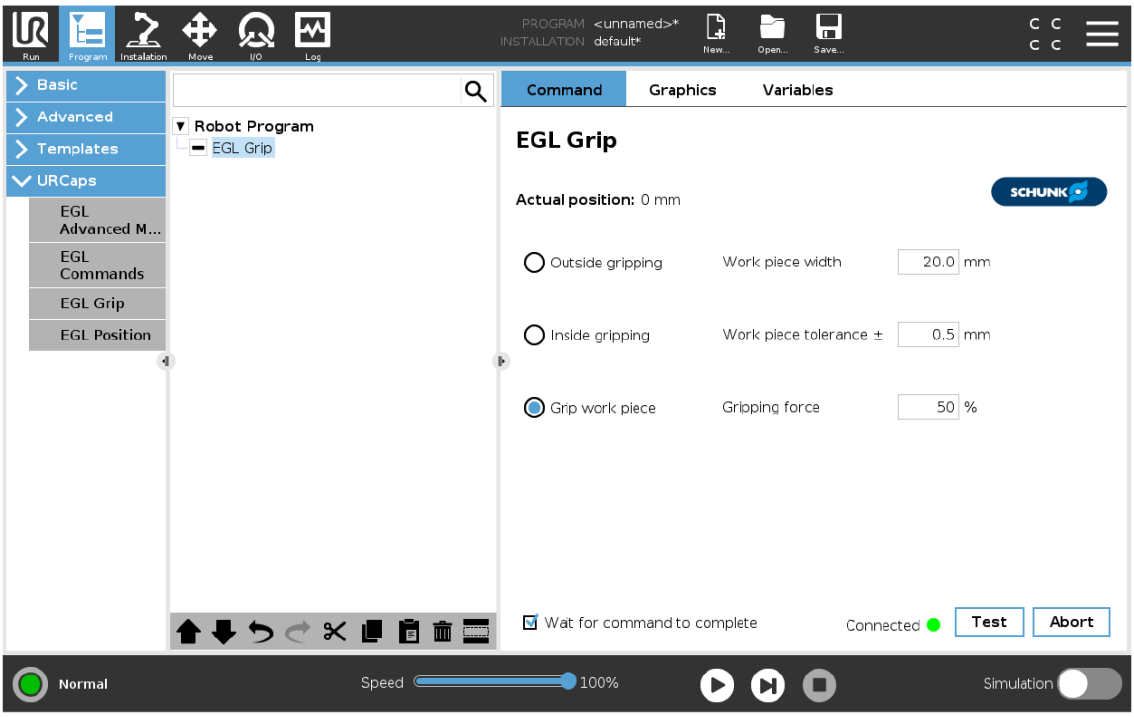
6.6.1.3 EGL Grip

⚠ WARNING

Risk of injury and property damage from ejected and falling parts!

When moving and accelerating the robot arm, the gripped workpiece may come loose and injure persons or damage objects in its vicinity.

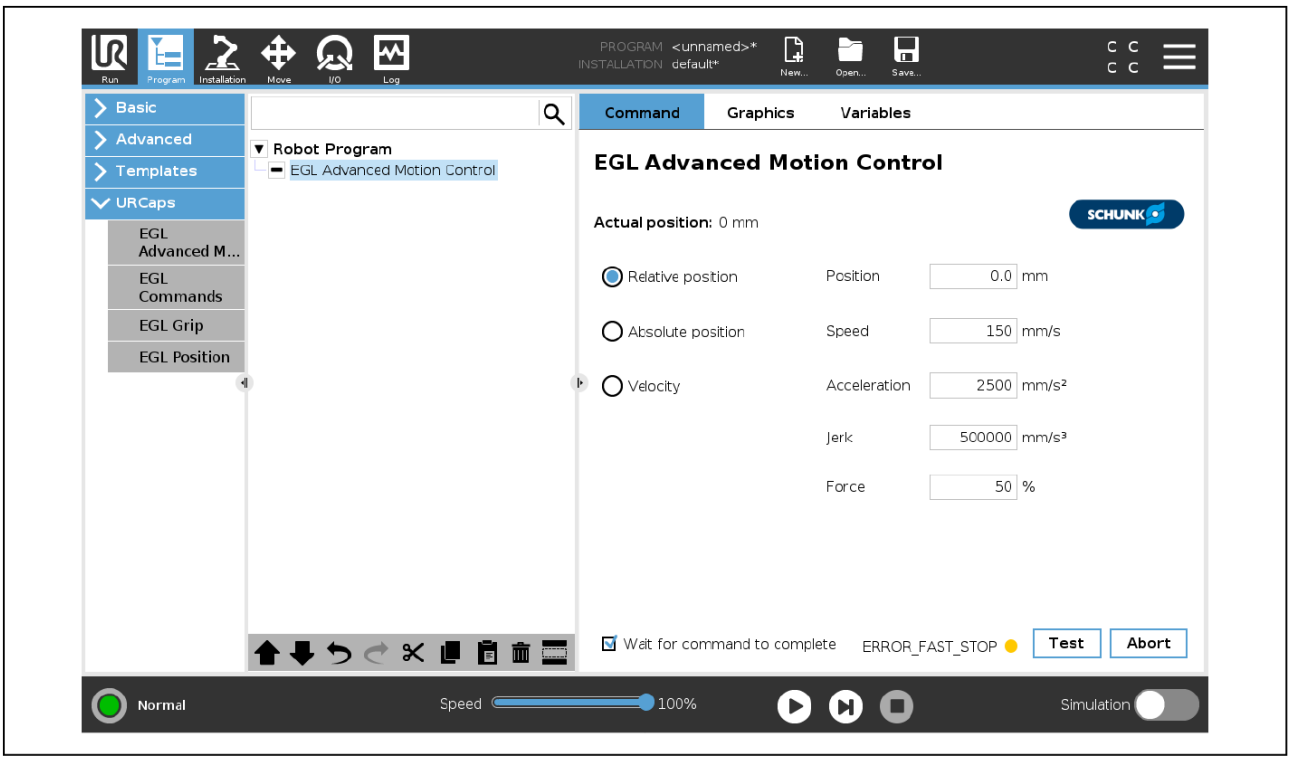
- Use an external power supply unit for a gripping force > 70%.
- Configure the correct gripping force.
- Pay attention to special considerations such as frictional or form-fit gripping.



The "EGL Grip" command is used to grip a workpiece. There are three options:

	Description	Message
Outside gripping	Outside gripping of a workpiece with unknown dimensions. The gripper moves from the current position in the direction of the minimum position. The configured gripping force is applied.	The grip is reported as successful ("eglGraspOK()"=1) if the end stop is not reached.
Inside gripping	Inside gripping of a workpiece with unknown dimensions. The gripper moves from the current position in the direction of the maximum position. The configured gripping force is applied.	
Grip work piece	Gripping of a workpiece with unknown dimensions. • Work piece width: Diameter of the workpiece at the gripping point • Work piece tolerance: Tolerance of the workpiece at the gripping point • Gripping force: The gripping force to be used	The grip is reported as successful ("eglGraspOK()"=1) if the movement is blocked within the tolerance. The grip is reported as unsuccessful ("eglGraspOK()" = 0) if the minimum or maximum position is reached or if the movement is stopped outside the tolerance.

6.6.1.4 EGL Advanced Motion Control



The "EGL Advanced Motion Control" command is used to perform finely adjusted motion profiles.

NOTE

This command is not intended for gripping components.

NOTE

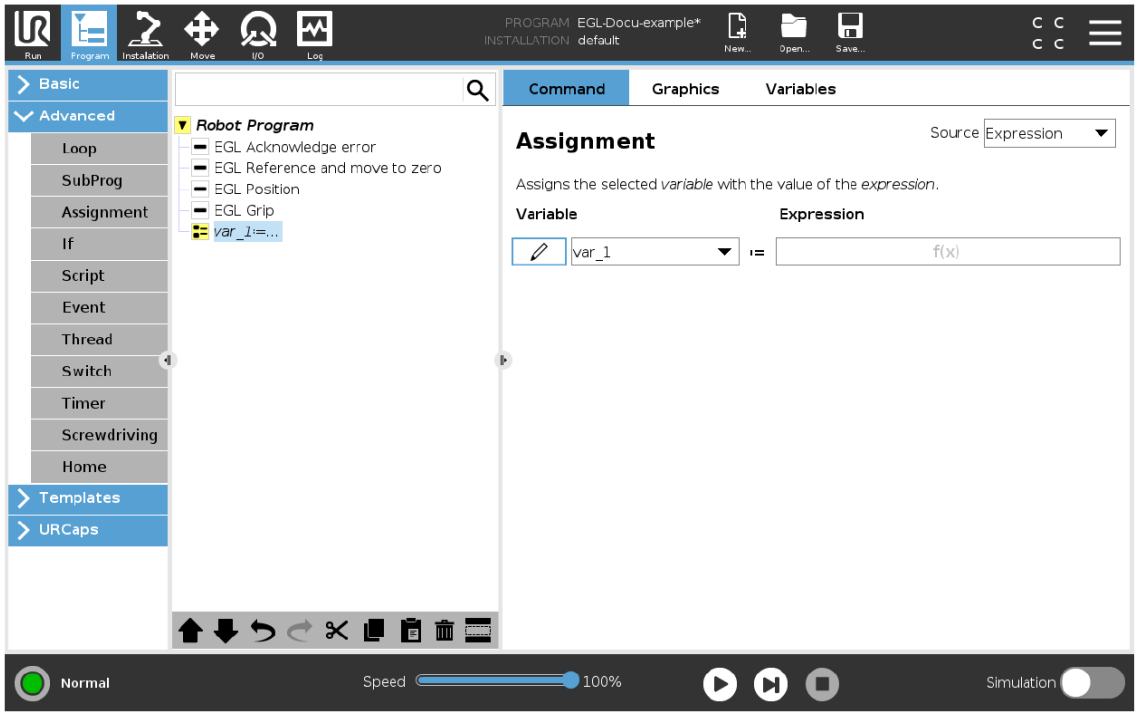
For further information, see the documentation of the EGL and the software manual "SDP SCHUNK Drive Protocol", Applicable documents.

The following settings can be configured:

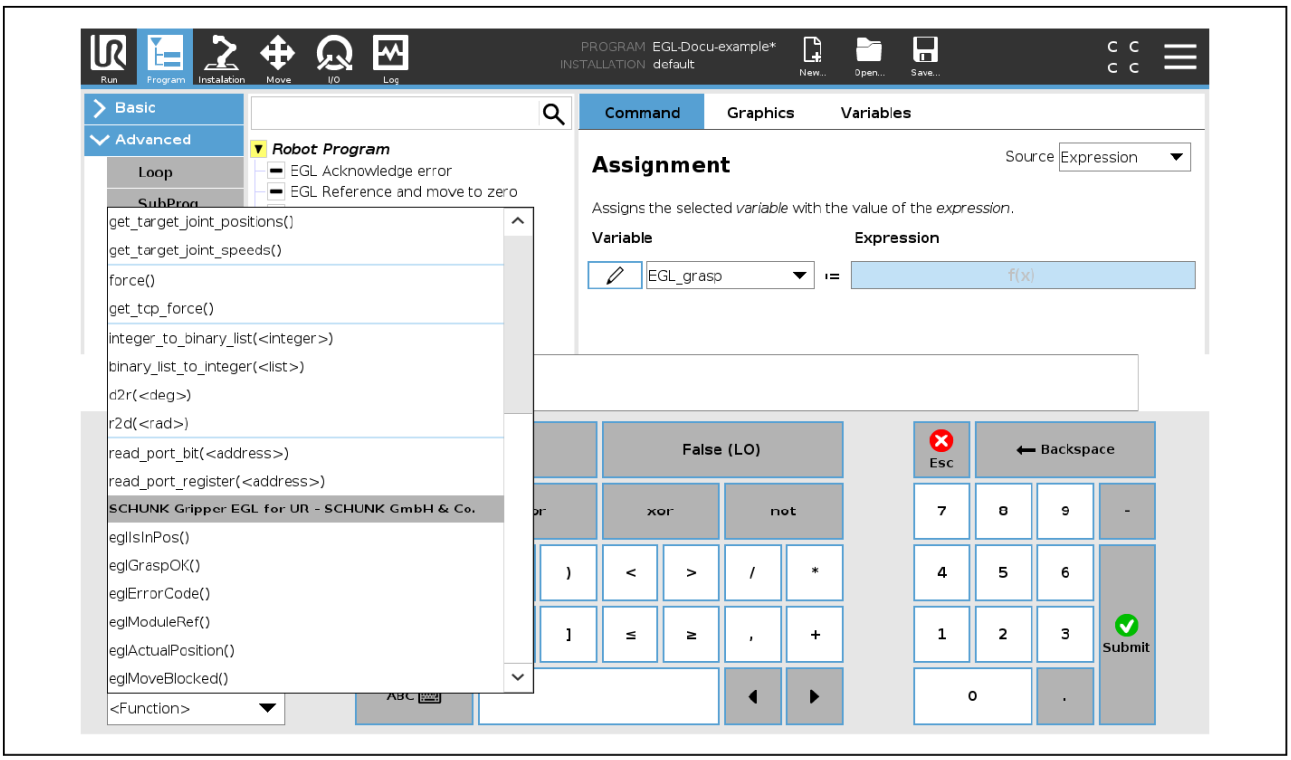
Setting	Description	Parameter
Relative position	To perform a relative movement. The transferred position value is used as the traverse path. For a positive value, the gripper fingers are opened along the specified path; for a negative value, the gripper fingers are closed along the specified path.	"Position", "Speed", "Acceleration", "Jerk" and "Force" are used for detailed fine adjustment of the movement. The entered values of the parameters are used as an upper limit here. The corresponding movement is regulated so that these upper limits are achieved as quickly as possible. The movement can be canceled with a "Stop" command or with a "Fast Stop" command before the mechanical stop is reached.
Absolute position	To perform a position movement. The transferred position value is used as the target position. The gripper fingers are moved to the specified position.	
Velocity	To perform a speed movement. The position value is ignored here. The gripper fingers move to a mechanical stop at the transferred speed. For a positive speed value, the gripper fingers are opened; for a negative speed value, the gripper fingers are closed.	

6.7 Monitoring the gripper status

The status of the gripper is monitored via standard functions of the UR robot, e.g. to declare a gripper feedback signal as a variable.



- ➢ Select the "Advanced" button in the left menu.
  - ✓ A submenu opens.
- ➢ Select the "Assignment" button.
  - ✓ An assignment appears in the robot program (e.g. "Var 1").
- ➢ Specify further details of the assignment in the Explorer window.
- ➢ Select the pen button to change the variable name (e.g. "Grip").
- ➢ In the drop-down menu at the top right, select "Source" > "Expression".
- ➢ In the input field, click "Expression".
  - ✓ An input window opens.



- Expand the "Function" drop-down menu at the bottom left.
- Scroll to the heading "SCHUNK Gripper EGL for UR - SCHUNK GmbH & Co.".

  ✓ Different functions are displayed under the heading.

Function	Description
eglIsInPos()	The system returns the value "1" if a position movement was triggered and the target position was reached. The system returns the value "0" if the specified position was not reached for a position movement or if another movement was triggered.
eglGraspOK()	The system returns the value "1" if a gripping movement was triggered and the movement was blocked before the maximum or minimum position was reached. For the "Grip Workpiece" setting, the value "1" is only returned if the movement was blocked within the tolerance window of the component. The system returns the value "0" if the specified position was not reached for a position movement or if another movement was triggered.

Function	Description
eglErrorCode	The system returns the value "0" if the gripper is operational. An error ID is returned if there is an error message. For more detailed information on the error IDs, see the software manual "SDP SCHUNK Drive Protocol", Applicable documents [▶ 6].
eglModuleRef	The system returns the value "1" if a reference run was performed successfully. The system returns the value "0" if the gripper is not referenced. Referencing must be performed after a potential pending error has been acknowledged.
eglMoveBlocked	The system returns the value "1" if a jaw movement was blocked. The jaws can be blocked either by the end stop of the gripper, the contour of the attachment fingers, or an object such as a workpiece. Otherwise, the system returns the value "0".
eglActualPosition	The system returns the current position value of the base jaws.

The supplied USB stick contains an example program with a simple gripping cycle. The robot program contains the following commands:

- EGL Acknowledge error
- EGL Reference and move to zero
- EGL Position
- EGL Grip
- EGL_Griff=eglGraspOK()
- Message
- EGL Position

7 Trouble shooting

Once an error with an error message is eliminated, this error message must be acknowledged, see the "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals. The error is indicated in the service window via LED 4.

A list of the information and error codes can be found in the "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software modules.
Detailed error information can be read out via "Motion Tool SCHUNK (MTS)"; see the "SCHUNK Motion Control (SMP)" software manual.

7.1 Communication malfunction

Possible cause	Corrective action
Logic supply fuse triggered	Check logic supply fuse and replace if necessary.
The connection between the product and "Motion Tool SCHUNK (MTS)" was interrupted	Check bus cable or USB cable for damage and replace if necessary.
Values are saved in EEPROM but not activated	Restart product after writing. OR: Before writing, stop the product using fast stop. **IMPORTANT! New values are not saved in EEPROM if the product is under control or in motion.**

7.2 Product moves in a jerky fashion, is sluggish or blocked

Possible cause	Corrective action
Product is overloaded	Check the maximum torque.
Power supply malfunction	Check the power output of the power supply unit.
	Check power cable line and cable cross sections (high loss of voltage possible with 24 VDC power supply).
	Check power cable for shorts and breakage.
Sporadic breaks in communication	Check bus connection. Electrical connection [▶ 28]
Dirt deposits on product (increasing sluggishness)	Clean product. Maintenance intervals [▶ 58]
Moisture in the product (oil, cutting fluid, cleaning agent)	Clean product. Maintenance intervals [▶ 58]
	Check for appropriate IP class.
Mechanical defect	Check product and replace if necessary.

7.3 Product does not open

Possible cause	Corrective action
No voltage connected. (emergency stop chain interrupted, safety light curtain triggered)	Check the power supply requirement, Technical data [▶ 19].
Insufficient voltage.	
Power supply fuse triggered	Check power supply fuse and replace if necessary.
Error message pending	Eliminate errors and acknowledge error message, see the "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals.
Setpoint settings for current, speed, jerk and acceleration are not suitable or too low	Check setpoint settings and enter suitable values, see the "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals.

8 Maintenance

8.1 Maintenance intervals

Interval [Mio. cycles] for ID 1392477 or 1403607	Maintenance work
2	• Clean the product dry. (The product corresponds to the protection class IP 46). Remove all coarse dirt and chips from the cavities in the product. • Inspect the product for damage. Replace the product if necessary. Have all repair work on the product carried out only by SCHUNK.

8.2 Disassembly and assembling

This product must not be disassembled for maintenance.

CAUTION

Material damage due to improper disassembly!

Incorrect works can cause damage to the mechanics and internal electronics.

- Disassembly or opening of the product is not permitted.
- Only allow SCHUNK to repair the product.

9 Spare parts and wearing parts

Item	ID number	Designation	Quant-ity	Spare spart [s.p.] / wear part [w.p.]
3	1325750	PROFINET communication cable torsion compatible	1	V
4	1405098	EGL90 power cable torsion compatible	1	V
6	1405800	Top jaws (set incl. clamping inserts with gripper pads HKI or double prism)	1	V
7	1405803	Clamping insert with gripper pads *	1	V
8	1405801	Prismatic clamping insert *	1	V

* Only one clamping insert per order; this article must be ordered twice to make one set.

10 EU-Declaration of Conformity

Manufacturer/ Distributor	SCHUNK GmbH & Co. KG Spann- und Greiftechnik Bahnhofstr. 106 – 134 D-74348 Lauffen/Neckar
Product designation:	Gripping Unit - EOA-UR3510-EGL90 or EOA-UR3510-EGL90-AUB ID 1392477 or 1403607
ID number	1392477, 1403607

We hereby declare on our sole authority that the product meets the requirements of the following directive at the time of declaration.
The declaration is rendered invalid if modifications are made to the product.

- **EMC Directive 2014/30/EU**
  Directive of the European Parliament and the Council of February 26, 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility

Applied harmonized standards, especially:

EN 61000-6-2 (2005)	Electromagnetic compatibility (EMC) - Partl 6-2: Generic standards -Immunity for industrial environments IEC 61000-6-2: 2005
EN 61000-6-3: 2007+ A1:2011	Electromagnetic compatibility (EMV) - Part 6-3: Generic standards - Interference emissions in residential, commercial, industrial and light industrial environments IEC 61000-6-3: 2006 + A1:2010

Signed for and on behalf of: SCHUNK GmbH & Co. KG

Signature: see original declaration

Jochen Ehmer, Global Head of Business Unit,
Gripping Systems

Lauffen/Neckar, August 2019

11 Translation of original declaration of incorporation

in terms of the Directive 2006/42/EG, Annex II, Part 1.B of the European Parliament and of the Council on machinery.

Manufacturer/ Distributor	SCHUNK GmbH & Co. KG Spann- und Greiftechnik Bahnhofstr. 106 – 134 D-74348 Lauffen/Neckar

We hereby declare that on the date of the declaration the following partly completed machine complied with all basic safety and health regulations found in the directive 2006/42/EC of the European Parliament and of the Council on machinery. The declaration is rendered invalid if modifications are made to the product.

Product designation:	Gripping Unit - EOA-UR3510-EGL90 or EOA-UR3510-EGL90-AUB / ID 1392477 or 1403607 / electric
ID number	1392477, 1403607

The partly completed machine may not be put into operation until conformity of the machine into which the partly completed machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction

The manufacturer agrees to forward on demand the relevant technical documentation for the partly completed machinery in electronic form to national authorities.

The relevant technical documentation according to Annex VII, Part B, belonging to the partly completed machinery, has been created.

Person authorized to compile the technical documentation:
Robert Leuthner, Address: see manufacturer's address

Signature: see original declaration

Lauffen/Neckar, August 2019

Global Head of Business Unit,
Gripping Systems

12 Annex to Declaration of Incorporation

according 2006/42/EG, Annex II, No. 1 B

1.Description of the essential health and safety requirements pursuant to 2006/42/EC, Annex I that are applicable and that have been fulfilled with:

Product designation	Gripping Unit - EOA-UR3510-EGL90 or EOA-UR3510-EGL90-AUB, ID 1392477 or 1403607

To be provided by the System Integrator for the overall machine			⇓
Fulfilled for the scope of the partly completed machine		⇓	
Not relevant	⇓		

1.1	**Essential Requirements**			
1.1.1	Definitions		X	
1.1.2	Principles of safety integration		X	
1.1.3	Materials and products		X	
1.1.4	Lighting		X	
1.1.5	Design of machinery to facilitate its handling		X	
1.1.6	Ergonomics		X	
1.1.7	Operating positions			X
1.1.8	Seating			X

1.2	**Control Systems**			
1.2.1	Safety and reliability of control systems		X	
1.2.2	Control devices		X	
1.2.3	Starting		X	
1.2.4	Stopping		X	
1.2.4.1	Normal stop		X	
1.2.4.2	Operational stop		X	
1.2.4.3	Emergency stop		X	
1.2.4.4	Assembly of machinery		X	
1.2.5	Selection of control or operating modes		X	
1.2.6	Failure of the power supply			X

1.3	**Protection against mechanical hazards**			
1.3.1	Risk of loss of stability			X
1.3.2	Risk of break-up during operation			X
1.3.3	Risks due to falling or ejected objects			X
1.3.4	Risks due to surfaces, edges or angles		X	
1.3.5	Risks related to combined machinery			X
1.3.6	Risks related to variations in operating conditions			X

1.3	Protection against mechanical hazards			
1.3.7	Risks related to moving parts		X	
1.3.8	Choice of protection against risks arising from moving parts			X
1.3.8.1	Moving transmission parts		X	
1.3.8.2	Moving parts involved in the process			X
1.3.9	Risks of uncontrolled movements			X

1.4	Required characteristics of guards and protective devices			
1.4.1	General requirements			X
1.4.2	Special requirements for guards			X
1.4.2.1	Fixed guards			X
1.4.2.2	Interlocking movable guards			X
1.4.2.3	Adjustable guards restricting access			X
1.4.3	Special requirements for protective devices			X

1.5	Risks due to other hazards			
1.5.1	Electricity supply		X	
1.5.2	Static electricity		X	
1.5.3	Energy supply other than electricity		X	
1.5.4	Errors of fitting		X	
1.5.5	Extreme temperatures			X
1.5.6	Fire			X
1.5.7	Explosion			X
1.5.8	Noise			X
1.5.9	Vibrations			X
1.5.10	Radiation	X		
1.5.11	External radiation	X		
1.5.12	Laser radiation	X		
1.5.13	Emissions of hazardous materials and substances			X
1.5.14	Risk of being trapped in a machine	X		
1.5.15	Risk of slipping, tripping or falling	X		
1.5.16	Lightning			X

1.6	Maintenance			
1.6.1	Machinery maintenance		X	
1.6.2	Access to operating positions and servicing points		X	
1.6.3	Isolation of energy sources		X	
1.6.4	Operator intervention		X	
1.6.5	Cleaning of internal parts		X	

1.7	**Information**			
1.7.1	Information and warnings on the machinery		X	
1.7.1.1	Information and information devices		X	
1.7.1.2	Warning devices		X	
1.7.2	Warning of residual risks		X	
1.7.3	Marking of machinery	X		
1.7.4	Instructions	X		
1.7.4.1	General principles for the drafting of instructions	X		
1.7.4.2	Contents of the instructions	X		
1.7.4.3	Sales literature	X		

	The classification from Annex 1 is to be supplemented from here forward.			
2	Supplementary essential health and safety requirements for certain categories of machinery			X
2.1	Foodstuffs machinery and machinery for cosmetics or pharmaceutical products			X
2.2	Portable hand-held and/or guided machinery			X
2.2.1	Portable fixing and other impact machinery			X
2.3	Machinery for working wood and material with similar physical characteristics			X
3	Supplementary essential health and safety requirements to offset hazards due to the mobility of machinery		X	
4	Supplementary essential health and safety requirements to offset hazards due to lifting operations		X	
5	Supplementary essential health and safety requirements for machinery intended for underground work			X
6	Supplementary essential health and safety requirements for machinery presenting particular hazards due to the lifting of persons		X	