Commissioning instructions
EGU / EGK / EZU for Yaskawa cobots
SCHUNK software module for Yaskawa

Translation of original commissioning instructions

Hand in hand for tomorrow

Imprint

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

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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

Customer Management
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Please read the operating manual in full and keep it close to the product.

Table of Contents

1 General

1.1 About this manual

This manual contains information about the SCHUNK software module for Yaskawa and its use in the robot control interface.

The software is used to easily integrate and actuate the following products:

- EGU EI: with EtherNet/IP™ interface
- EGK EI: with EtherNet/IP™ interface
- EZU EI: with EtherNet/IP™ interface

Definition of terms "Product"

The term "product" replaces the product names listed above in this manual.

The manual describes the software environment on a Yaskawa robot with the "YRC 1000micro" controller and the "Smart Pendant" teach pendant.

In addition to these instructions, the documents listed under ▸ 1.5 [🗋 6] are applicable.

Abbreviations

The following abbreviations are used:

- GPE: Gripping force and position retention
  Variant "M" products are equipped with gripping force and position retention (GPE). When sending control commands with these products, you can specify whether workpieces and positions are to be retained by the drive control or GPE.
- SG: Single Gripper
- DG: Double Gripper
- TCP: Tool Center Point
- COM: Center of Mass (center of gravity)

1.2 Target group

This manual is intended for robot integrators who have basic mechanical and electrical training skills and who are also familiar with elementary programming concepts.

Commissioning and troubleshooting may only be performed by qualified personnel with appropriate training.

The following knowledge is required:

- Basic knowledge of robotics
- Knowledge in handling YASKAWA robots

Electrical installations may only be carried out by a suitably trained electrician.

1.3 Symbol definition

The following symbols are used in this manual:

- ■ Prerequisite for an action
1. Action 1
2. Action 2
   - ⇨ Intermediate results
- ⇨ Final results

▸ 1.3 [🗋 5]: chapter number and [page number] in hyperlinks

1.4 Presentation of Warning Labels

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

⚠ DANGER

Dangers 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.

1.5 Applicable documents

- Assembly and operating manual for the product:
  - Universal gripper EGU, electric *
  - Gripper for small components EGK, electric *
  - Electric centric gripper EZU *
- Commissioning instructions:
  - EGU with EtherNet/IP™ interface *
  - EGK with EtherNet/IP™ interface *
  - EZU with EtherNet/IP™ interface *
- Yaskawa robot operating manual

The documents labeled with an asterisk (*) can be downloaded from **schunk.com/downloads**.

2 Functional description

The software module facilitates operation and application creation for SCHUNK products on a collaborative Yaskawa robot.

All necessary controls are installed via the software module. After the installation is complete, the programming elements are deployed within the graphical user interface (GUI). The GUI supports the entire configuration and parameterization of SCHUNK products as well as the necessary control and programming options.

The following functions are available in the software module and can be used in a robot program:

- **Grip**: When workpiece gripping (simple gripping movement), a workpiece is gripped with a specified gripping force value **without** specifying the workpiece position.
- **Grip workpiece at expected position**: When workpiece gripping at an expected position, a workpiece is gripped at the specified workpiece position with the specified gripping force value using a combined gripping movement.
- **Release**: When releasing a workpiece, the product executes a relative positioning movement. Starting from the current position, a defined distance is moved in the opposite direction to the gripping direction.
- **Jog mode**: With jog mode, a movement is executed to the outside or inside.
- **Absolute position**: Absolute positioning of the gripper fingers
- **Relative Position**: Relative positioning of the gripper fingers
- **Acknowledge**: Acknowledge pending warnings and errors
- **Stop**: Controlled stop
- **Fast Stop**: Cancel movements
- **Test Brake**: Perform brake test *(only for products of variant "M" and with firmware version 5.2 or higher)*

For further information, see ▶ 9 [🗋 35].

3 Connecting the product to the robot control system

Before connecting or commissioning the product, read the operating manual of the robot and observe the instructions in this manual!

⚠ 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.

⚠ CAUTION

Risk of injury from electric shock due to contact with live parts!

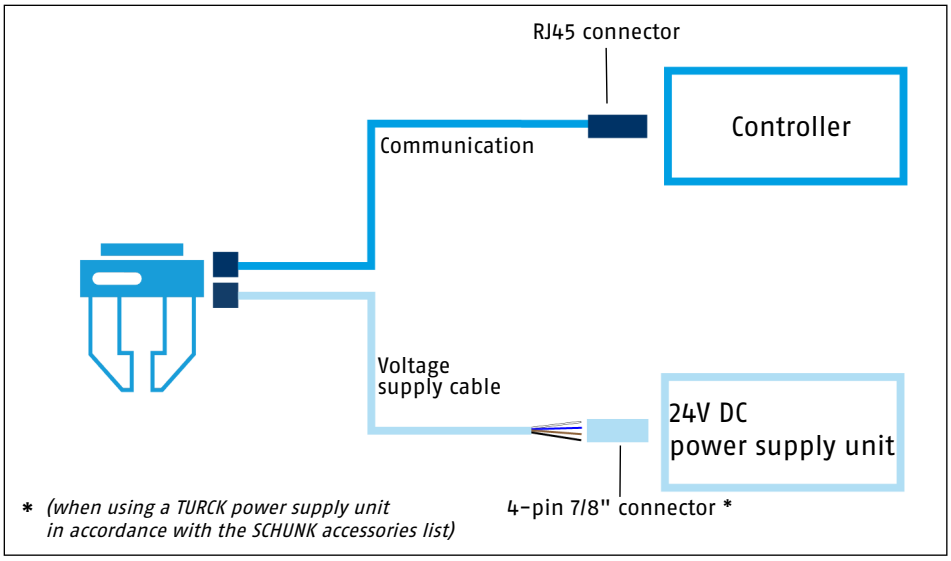
- Follow the operating manual for the robot.
- Before starting any work on the product: Switch off the energy supply and secure against re-connection.

NOTE

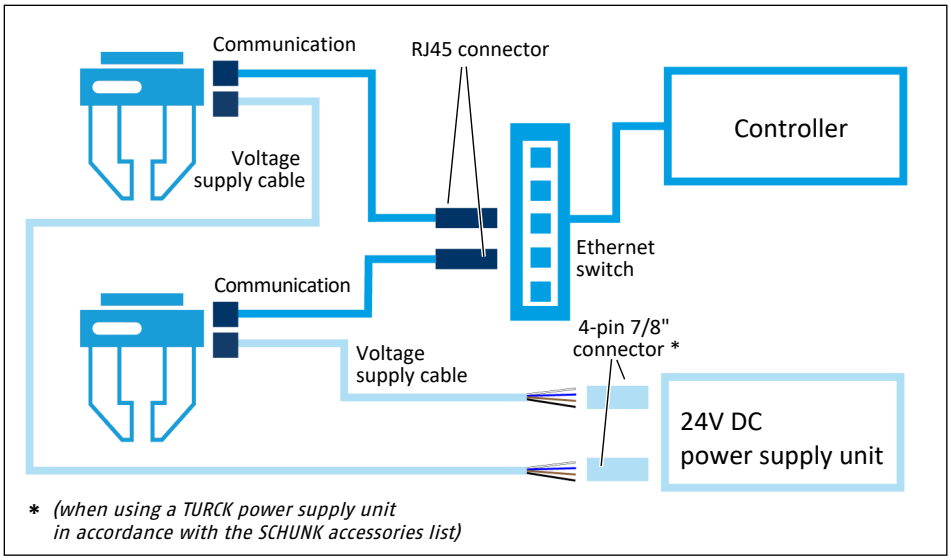
Safety-relevant signals (e.g. emergency stop) must be wired externally, e.g. via safety relays, thus completely disconnecting the product from the power supply.

- Perform a risk assessment for the entire robotic application based on legal requirements to evaluate all safety-related aspects of the application.

Connection diagram



Connection diagram for one product



Connection diagram for two products

Signal	Wire strand color voltage supply cable	Pin 7/8" connector on power supply unit
V_LOG	Brown	1
GND_PWR	White	3
GND_LOG	Blue	4
V_PWR	Black	2
n.c.	–	–

Tab.: Pin assignment 4-pin 7/8" connector (when using a TURCK power supply unit in accordance with the SCHUNK accessories list)

NOTE

TURCK power supply units with an output voltage of 24 V and an input voltage range of 100 V – 240 V are optimized for the product's power supply and available as accessories from SCHUNK. For more information, see the product data sheet.

- There is **no** energy supply.
- Product is mounted on the robot. Suitable adapter plates are available from SCHUNK, see catalog data sheet.

1. **Connecting one product**: Connect cable for communication with RJ45 connector to the robot control system.
   Connecting two products: Connect cable for communication per product to the switch. Connect cable from the switch with the RJ45 connector to the robot control system.
2. *When using a TURCK power supply unit: Install a* 7/8" connector on the voltage supply cable. For the pin assignment, see the previous table. **IMPORTANT! Since the cable diameter is too small, the connector cannot be sufficiently sealed. Therefore, SCHUNK does not guarantee an IP protection class on the power supply unit!**
3. Connect the power supply unit.
4. Connect logic and power supply.
   ⇨ "Power" LED lights up green.

4 Installing the software module

NOTE
SCHUNK recommends checking the software version of the controller and the teach pendant before installation and updating them if necessary.

CAUTION

Possible damage to product!

The product or the robot may get damaged if electrical cables are connected or disconnected during operation.

- Connect or disconnect electrical connections only when the device is switched off.

NOTE
To install the software, SCHUNK recommends using a USB stick.

Prepare the USB stick

The USB stick must meet the following requirements:

- Formatted in FAT format
- Description of the removable drive: "SCHUNK EGx"

Installing the software module

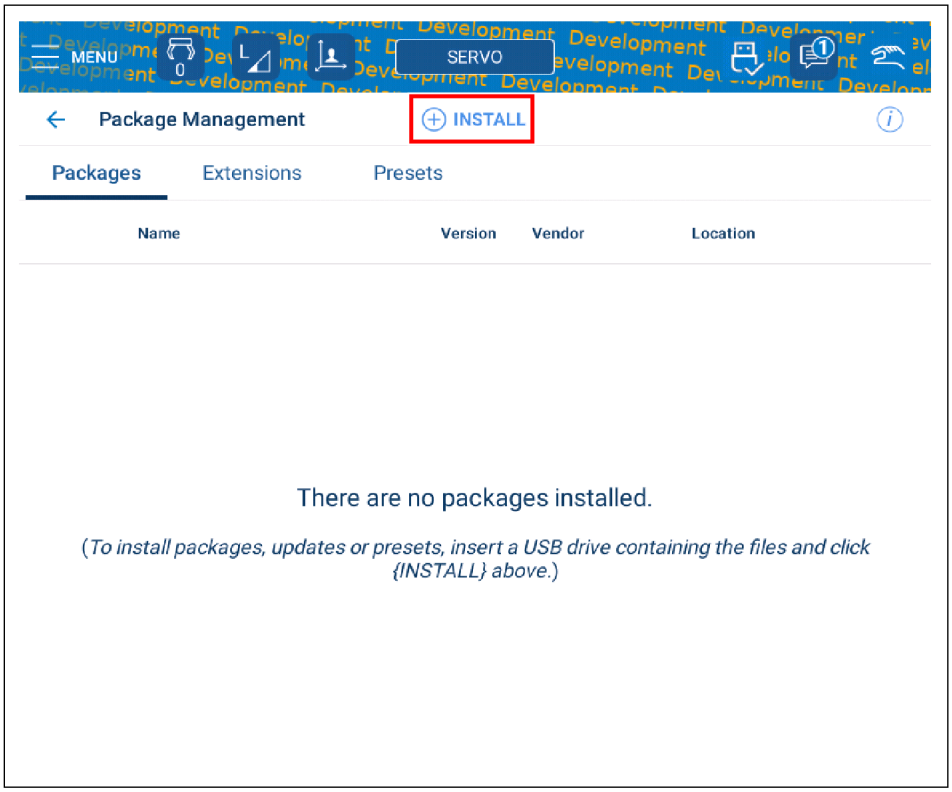
NOTE
To avoid malfunctions, SCHUNK recommends installing the current version of the software module.

■ The current software version is installed on the controller and teach pendant.

1. Download the current version of the software module from **schunk.com/downloads-software** and copy it to the USB stick.
2. Switch on the robot control system.
3. Connect the USB stick to the teach pendant. The USB interface is located on the bottom of the teach pendant.
   ⇨ The robot control system is started.

4. Select "Menu" > "System Settings" > "Packages".

5. Select the "INSTALL" button.
6. Select and install the SCHUNK software module.
   ⇨ The software module is installed.



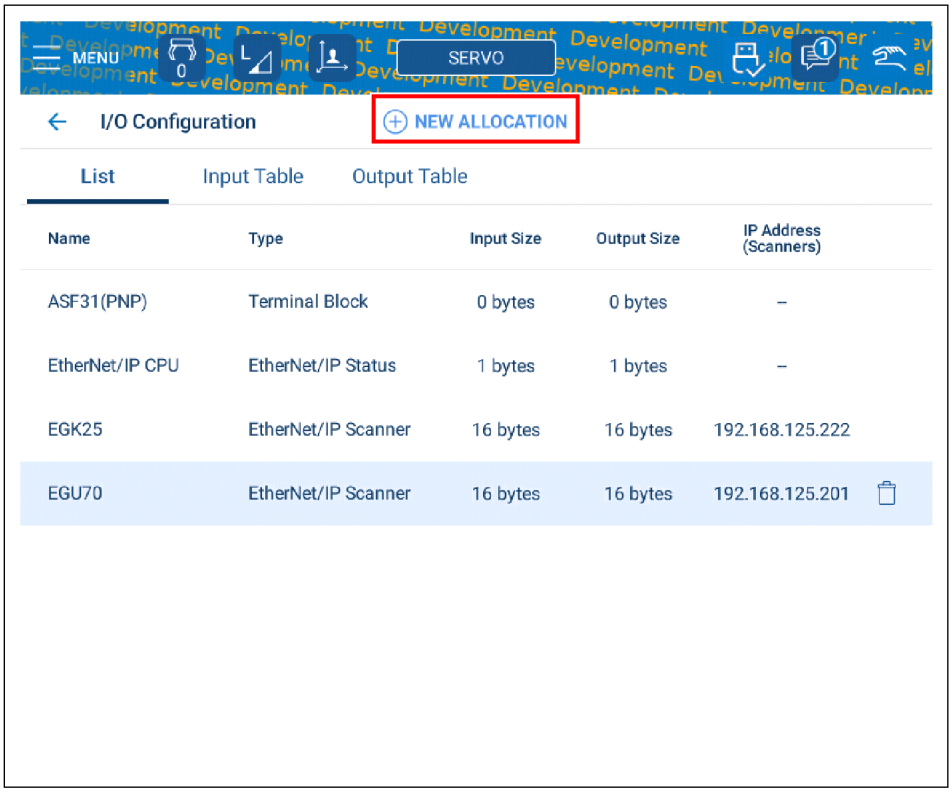
   ⇨ After successful installation, the software module is displayed in the list.

Configuring SCHUNK products

NOTE
A maximum of two products are supported by the software module.

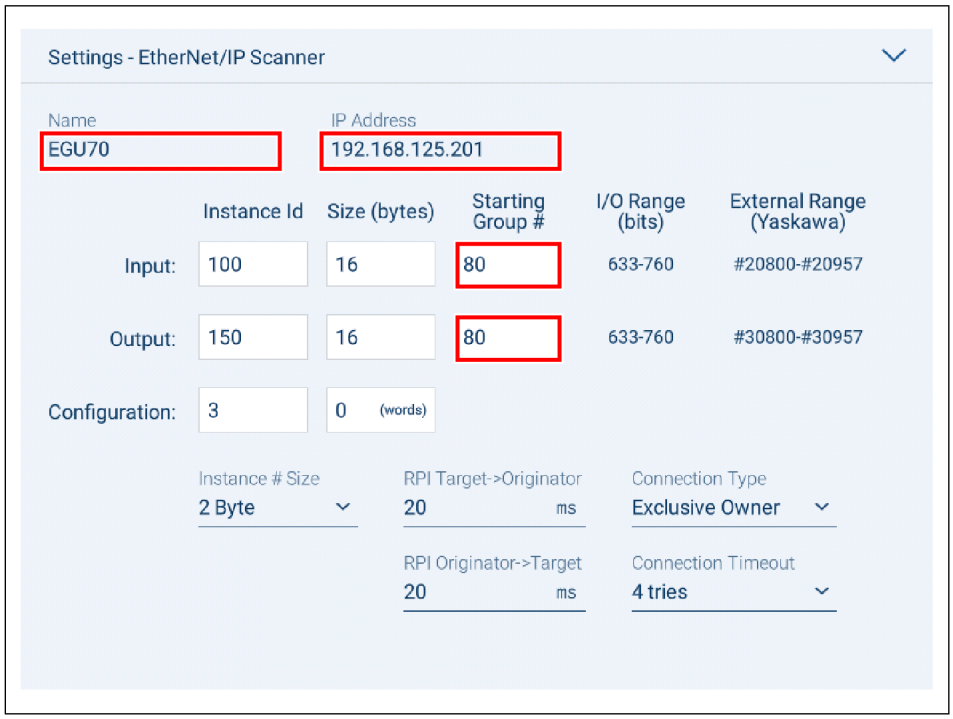
- The SCHUNK software module is installed.

1. Select "Menu" > "System Settings" > "I/O Configuration".
   ⇨ All products that have already been configured are displayed in a list.
2. Select the button "NEW ALLOCATION" > "SCHUNK Gripper".
3. Select the desired product.



4. Enter name.
   NOTE: The product will later be selected under this name in the software module.

5. Enter the IP address of the product.
   NOTE: The IP address of the product can be assigned and displayed with the commissioning tool SCHUNK Control Center. The IP address must be in the address range of the controller.
6. Enter start groups for input and output. The individual bits of the data frame are stored in the start groups. The start groups must be selected so that 16 bytes are occupied contiguously.
   NOTE If you enter start groups that are already occupied, an error message appears. A graphical display of occupied and free bytes is possible under "Input-Table" and "Output-Table".



7. Optionally add and configure another product.
8. Remove the USB stick.
9. Restart the robot controller.
   ⇨ The system restarts.

4.1 SCHUNK Control Center – Mechatronic Grippers app

The *Mechatronic grippers* application can be started via the SCHUNK Control Center. This app enables fast commissioning and parameterization of the module.

The software can be downloaded from **schunk.com/downloads-software**.

Range of functions of the *Mechatronic grippers* app

- Configuration and commissioning:
  - Display of status information
  - Execution of gripping and movement commands
  - Changing the IP address
  - Display and save error messages
  - Executing firmware updates
  - Saving and reading configuration files
- Automatic and manual search for modules in the network
- Optical display of the connected module
- Configuration and control via computer possible
- Resetting to factory settings

Start software

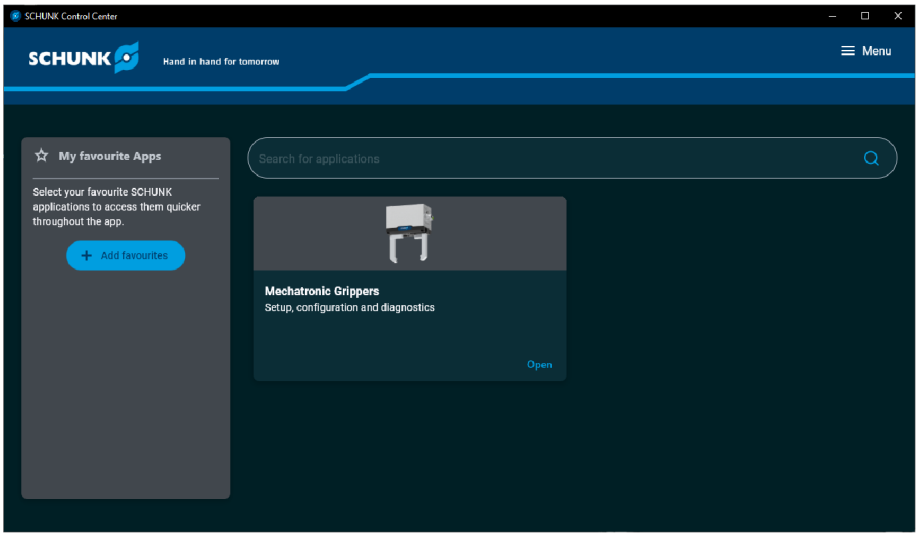
NOTE

In order to ensure the *Mechatronic Grippers* app communicates with the module via an Ethernet network, ensure that communication is not prevented by a firewall or any other network technology.

- The module is electrically connected to the power supply unit.
- SCHUNK Control Center is installed.

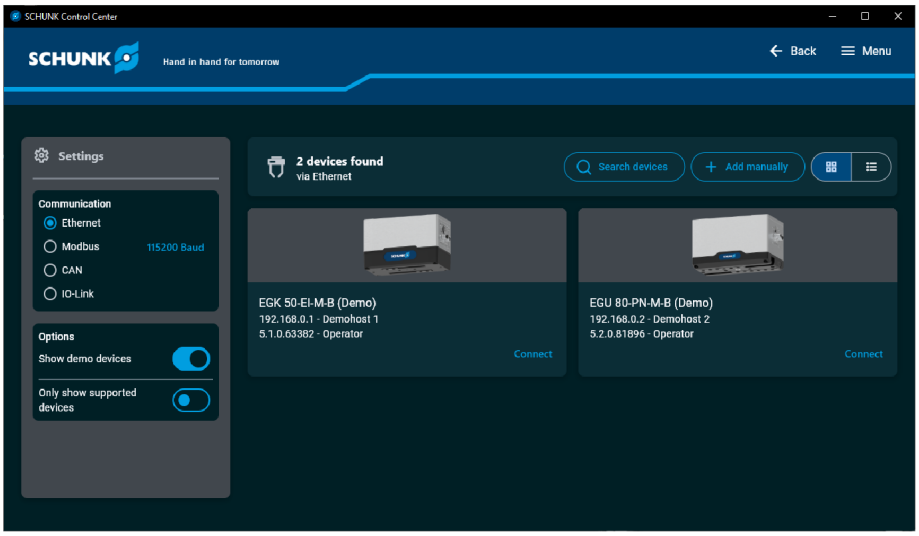
1. Connect the computer directly to the module via Ethernet.
   OR:
   Connect the computer to the network in which the module is integrated.

2. Open SCHUNK Control Center.
   ⇨ The start screen is displayed.



Start screen

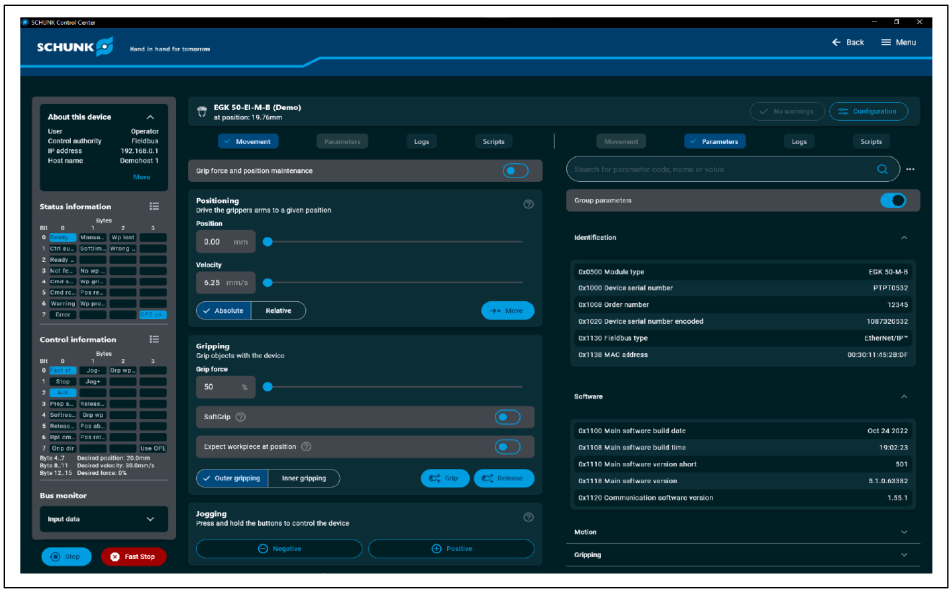
3. Select the *Mechatronic grippers* app.
   ⇨ The system automatically searches for modules that are located in the network.
   ⇨ Modules found are displayed in the selection window of the communication interfaces.



Communication interfaces selection window

4. Select the desired module.
   ⇨ The app connects to the module.

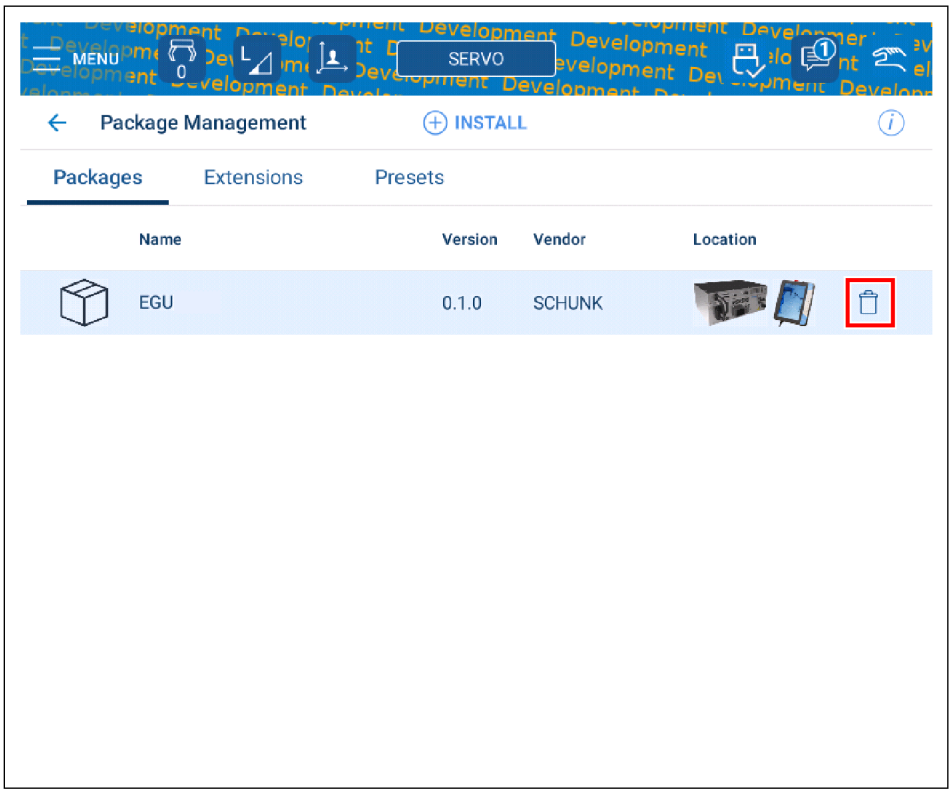
⇨ Access to the functions of the module is possible.



Range of functions

4.2 Uninstalling the software module

1. Switch on the robot control system.
   ⇨ The robot control system is started.
2. Select "Menu" > "System Settings" > "Packages".
3. Select SCHUNK software module.
4. Select recycle bin symbol.



5. Restart the robot controller.

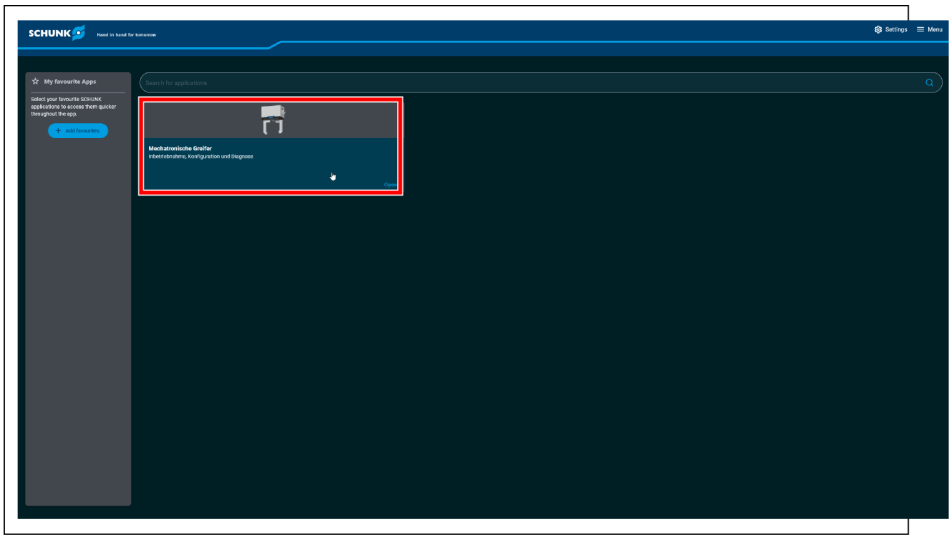
5 Setting IP address

The product is shipped with the IP address 0.0.0.0 by default. DHCP is enabled.

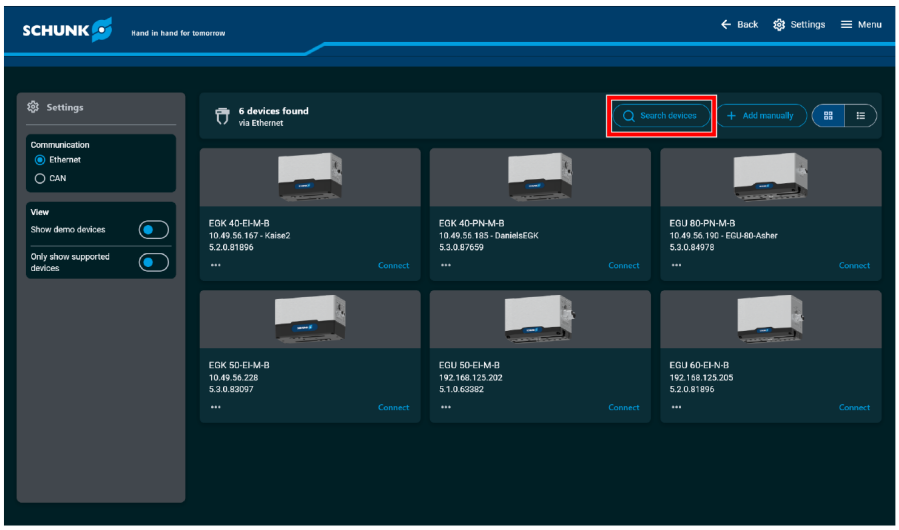
The IP address must be changed before commissioning and must be within the robot controller address space.

- Product is connected to a PC.
- SCHUNK Control Center is installed, ▶ 4.1 [🗋 16].

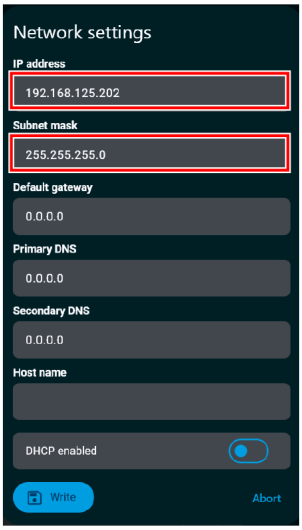
1. Open the SCHUNK Control Center and select the *Mechatronic grippers* app on the start page.



2. Select the "Search for device" button.
   ⇨ The products are displayed.
   ⇨ *If the product does not appear in the list:*
   – Check the firewall settings and add exception for SCHUNK Control Center.
   – Enable DHCP for the network adapter.



3. Select the gripper and open the Quick Select menu (•••) Select "Settings > Network settings".
4. Enter values for IP address and subnet mask.



6 General operating instructions

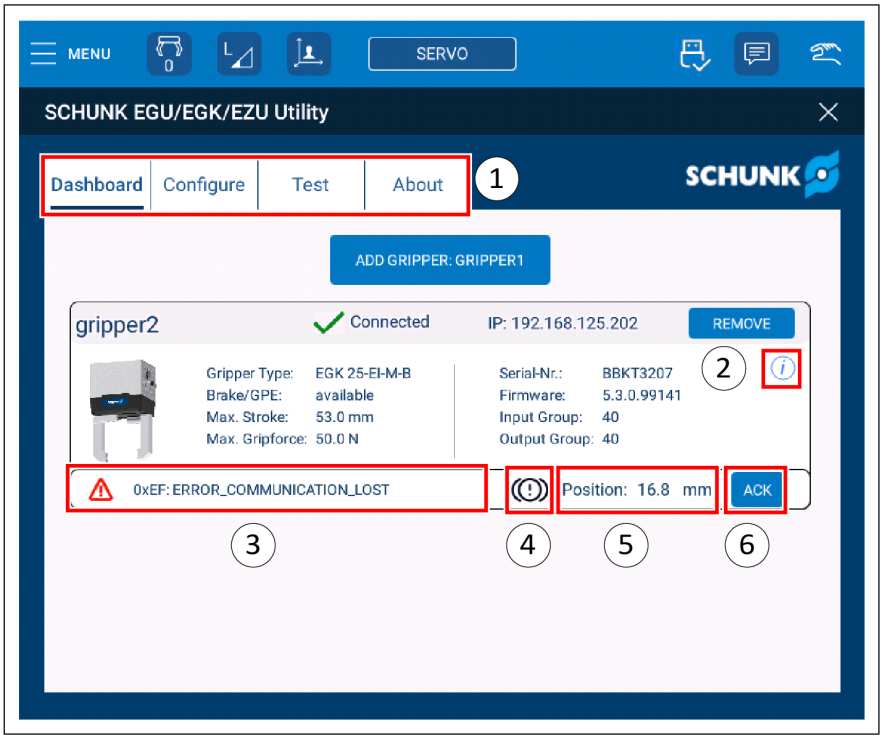
After successful installation of the software module, the following menus are available:

- SCHUNK Utility
- SCHUNK in the Job Editor

SCHUNK Utility

Products can be parameterized and tested under "SCHUNK Utility".

Open: "Menu" > "Utility" > "SCHUNK Gripper".



SCHUNK Utility

Item	Designation	Description
1	SCHUNK Utility menu	In various menu items, products can be assigned to the software module, parameterized, tested and the manufacturer information displayed.
2		Help buttons can be placed next to input fields, buttons or checkboxes. When selected, a pop-up window opens with additional information.
3	Status	The following symbols indicate the current status of the product.
		The product is ready for operation.
		There is a warning.
		There is an error.
4		The brake (GPE) is active; only available for products with GPE.

Item	Designation	Description
5	Position	The current approached position is displayed.
6	Button	Depending on the current status of the product, the display alternates between "FS" and "ACK".
	FS	If "FS" is selected, the gripper is stopped immediately. A fast stop is executed.
	ACK	If "ACK" is selected, errors requiring acknowledgment are confirmed.

NOTE

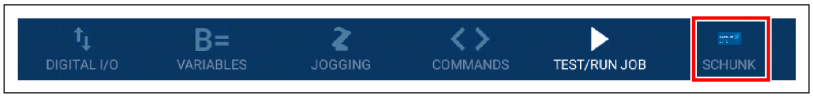
Depending on the selected products, the display in the different menu items may vary.

- For example, the "Brake active" symbol only appears for products of the "M" variant (with GPE).
- The gripping force modes "StrongGrip" and "SoftGrip" (▸ 10.1 [🗋 45]) as well as gripping force and speed displays also depend on the product and size.

Job Editor

In the Job Editor, there is a "SCHUNK" button in the footer. When selected, the display changes to the programming mode of the robot control system. Commands can be added to a robot program here, ▸ 9 [🗋 35].

Open: "Menu" > "Job List" > "SCHUNK".



Footer in the Job Editor

7 Parameterizing and testing products

⚠ WARNING

Risk of injury due to sudden movements!

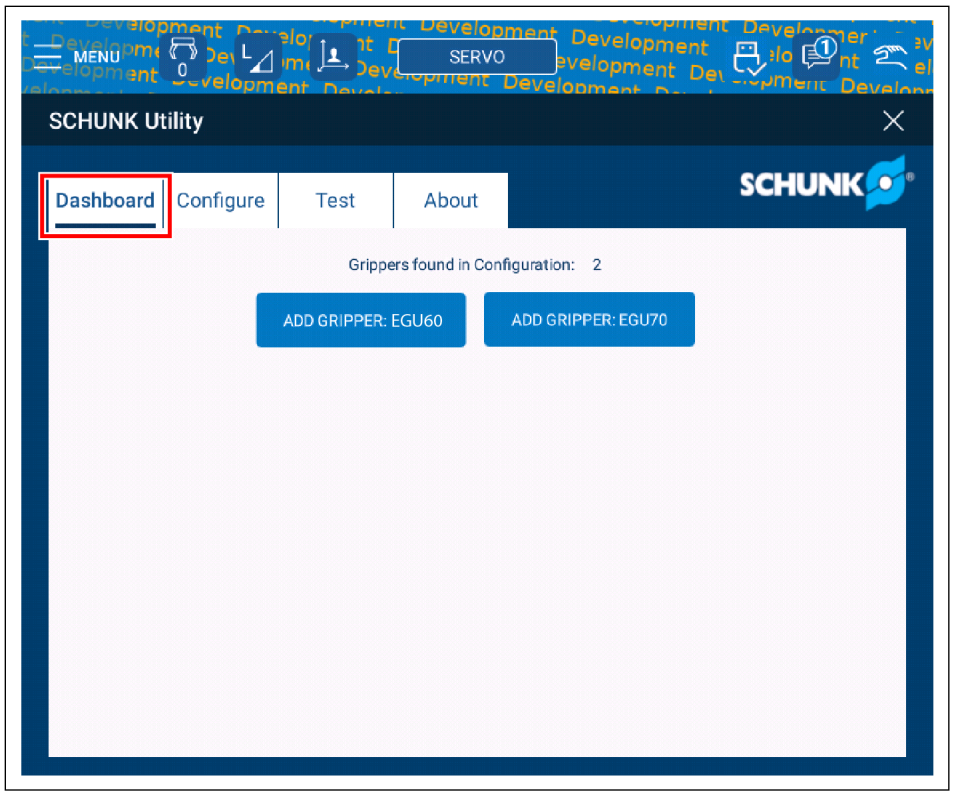
Components could move unexpectedly and result in serious injuries.

- During commissioning, observe all warnings displayed on the software interface.
- Keep a safe distance and wear suitable protective equipment.

Add product

- Robot is switched on.
- The SCHUNK software module is installed.
- SCHUNK products are configured.

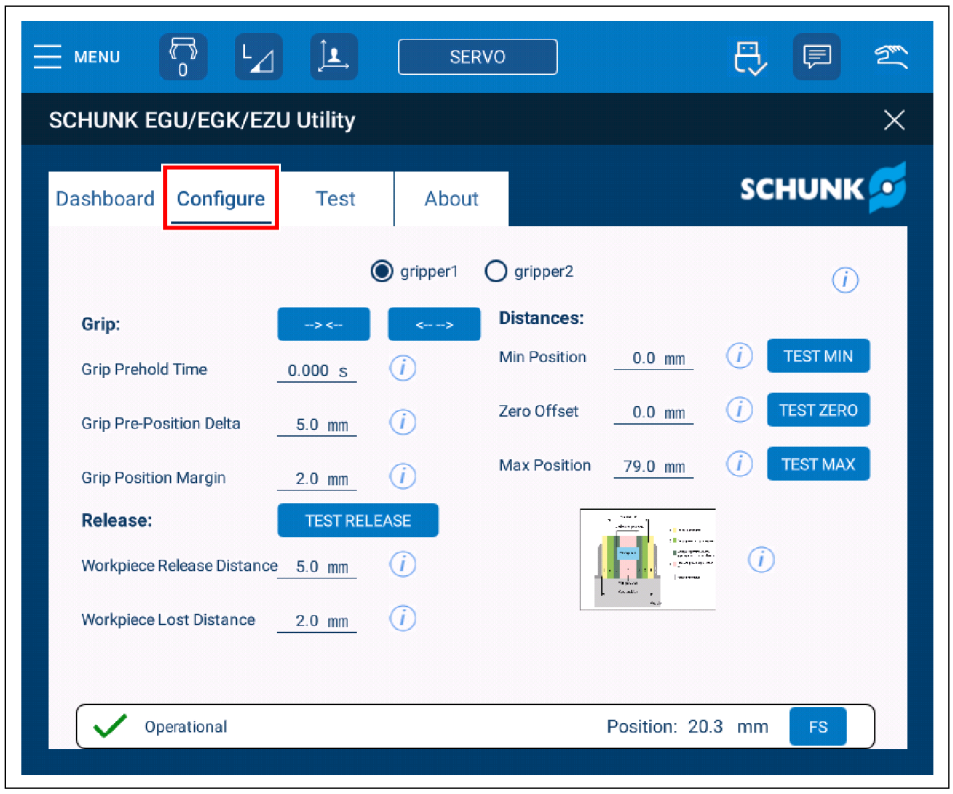
1. Select "Menu" > "Utility" > "SCHUNK Gripper".
   ⇨ The "SCHUNK Utility" menu appears.
2. Select the "Dashboard" button.
   ⇨ Configured SCHUNK products are displayed.
3. Select the desired product.



   ⇨ As soon as the product has been added, a display with all configured parameters appears. This process can take up to 20 seconds.
4. If the robot is to support two SCHUNK products: Add another product.

Parameterizing products

1. Select the "Configure" button.
2. Select the desired product.
   ⇨ Test commands and the corresponding parameters are displayed.
3. Enter parameter values. For more information about the parameters, see the following table or select the help button.
4. Select the desired button to test the command with the selected parameter values.



Designation	Description
Grip Prehold Time	• The parameter can be used to parameterize the time span of the re-gripping. The maximum time span for re-gripping is 60,000 ms (1 minute). In StrongGrip mode, the maximum gripping time is 2000 ms.
Grip Pre-Position Delta	• The parameter can be used to set the difference in position amount between the workpiece position window and the pre-position, see the following section "Pre-position", ▶ 7 [🗋 28].
Grip Position Margin	• The parameter can be used to parameterize the value from which the minimum and maximum positions of the

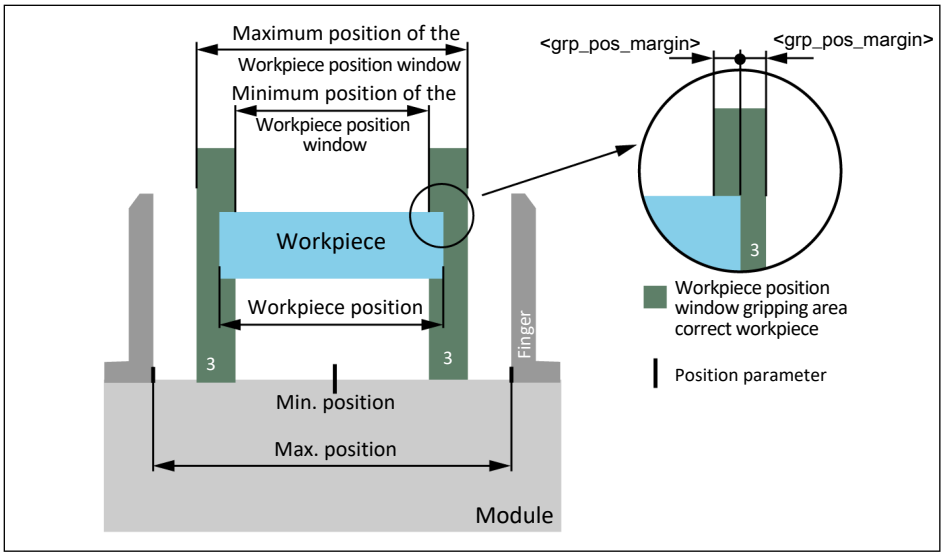
Designation	Description
	workpiece position window are calculated, see the following section "Minimum and maximum position", ▶ 7 [🗋 27].
Workpiece Release Distance	• The parameter can be used to parameterize the relative distance that the module moves during release.
Min Pos	• The parameter can be used to define the position limit within which movements are permitted. The value of the parameter corresponds to the smallest position value that can be approached.
Zero Offset	• The parameter can be used to parameterize the distance by which the zero point is shifted with a sign.
Max Pos	• The parameter can be used to define the position limit within which movements are permitted. The value of the parameter corresponds to the largest position value that can be approached.
Workpiece Lost Distance	• The parameter can be used to parameterize the distance that the gripper fingers are allowed to travel after the workpiece is lost before a workpiece loss is detected.
Use Brake	• This function is only available for products of the "M" variant. If the checkbox is selected, the brake of the product is engaged by default after each movement command, if nothing else is configured in the command.
Stop Program on Error	• If the checkbox is selected, the robot program stops automatically when the maximum waiting time is reached when the "Wait for Complete" parameter is configured.

Minimum and maximum position

The parameter <grp_pos_margin> can be used to parameterize the value from which the minimum and maximum positions of the workpiece position window are calculated.

NOTE

- The minimum position of the workpiece position window is calculated according to: *workpiece position* – <grp_pos_margin>.
- The maximum position of the workpiece position window is calculated according to: *workpiece position* + <grp_pos_margin>.



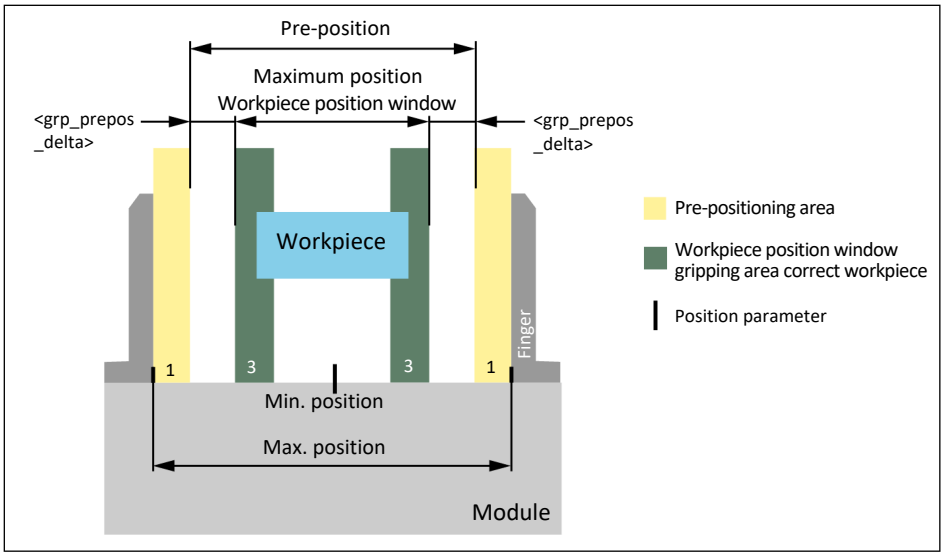
Minimum and maximum position of the workpiece position window

Pre-position

The parameter <grp_prepos_delta> can be used to parameterize the difference in position amount between the workpiece position window and the pre-position.

NOTE

- The pre-position is calculated from the minimum or maximum position of the workpiece position window depending on the direction from which a workpiece is gripped.
- The pre-position during I.D. gripping is calculated according to: minimum position workpiece position window **-** <grp_prepos_delta>.
- The pre-position during O.D. gripping is calculated according to: maximum position workpiece position window **+** <grp_prepos_delta>



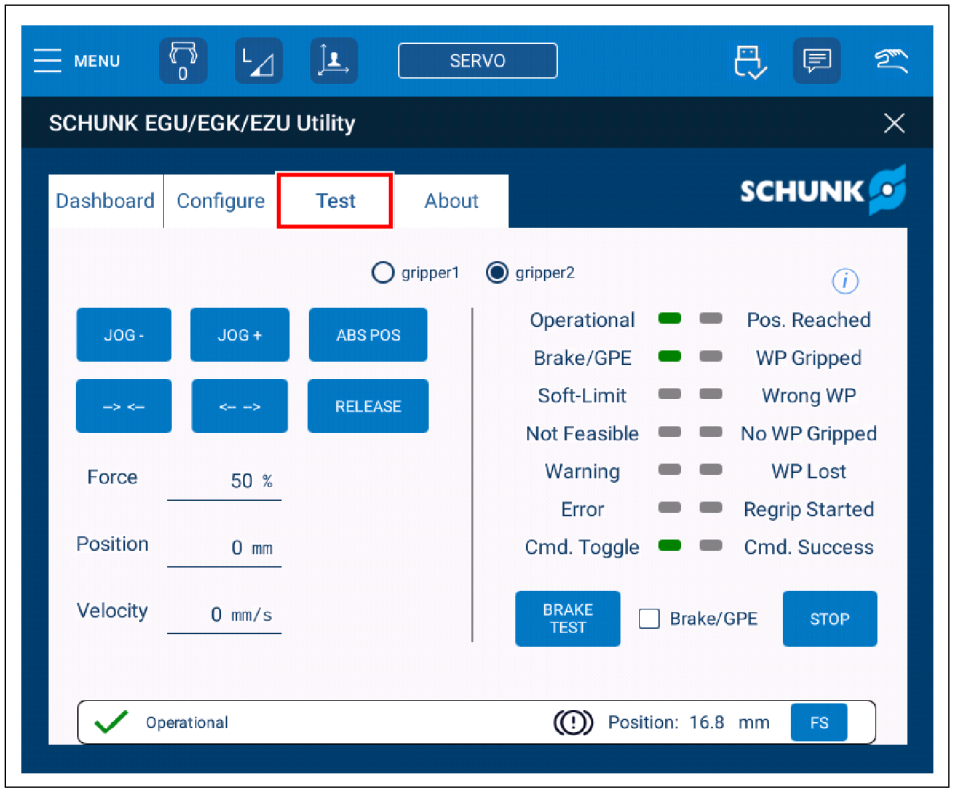
Pre-positioning area for O.D. gripping

Testing products

The following commands can be tested:

- Jog mode "JOG -" and "JOG+"
- Grip workpiece with "Inside or Outside GRIP" in BasicGrip mode using the "<- ->" or "-> <-" buttons.
- Workpiece releasing "RELEASE"
- Movement finished "STOP"
- Absolute positioning movement "ABS POS"
- Brake test "BRAKE TEST"*(only with variant "M" products and firmware version 5.2 or above)*

1. Select the "Test" button.
2. Select the desired product.
3. Enter gripping force, position and speed if necessary.
   Activate "Brake/GPE" checkbox if gripping force and position maintenance is to be used.
   Note: By default, values that were last entered are displayed.
4. **CAUTION Risk of injury due to moving parts!** Select the desired button to test the command.
   ⇨ Activated bits are indicated by LEDs illuminated in green.
   ⇨ Command is executed.



Displaying manufacturer information

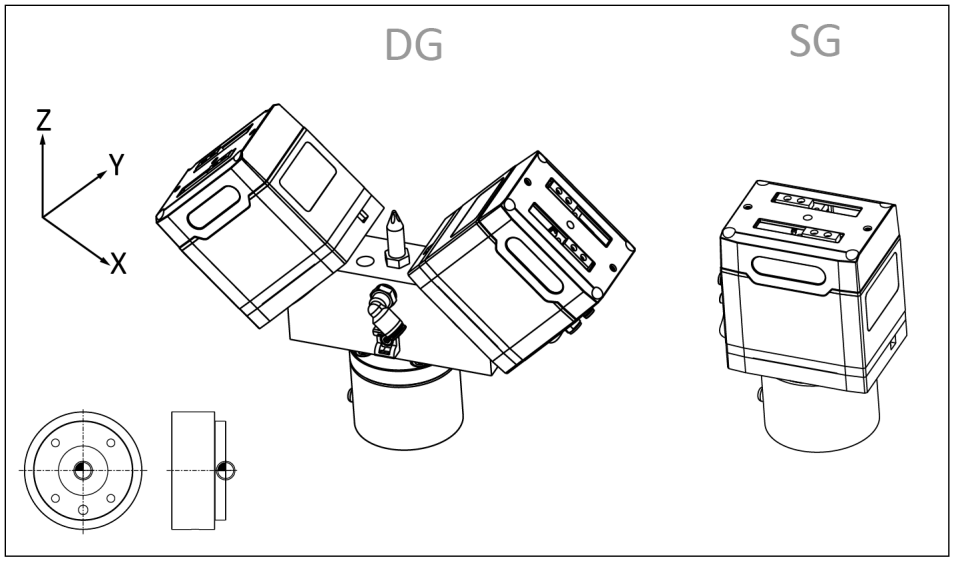
- Select the "About" button.
  ⇨ Detailed information about the software module is displayed.

8 Adjusting the Tool Center Point (TCP), center of gravity and weight

For proper use of the product on a Yaskawa robot, it is recommended to store the Tool Center Point (TCP), center of gravity and gripper weight in the robot settings.

1. Select "Menu" > "Robot Settings" > "Tools".
2. Take the suitable values for gripper weight, TCP values and center of gravity from the following tables and enter them in the input fields.

8.1 Values for EGK



EGK: Tool Center Point, DG: two products mounted, SG: one product mounted

ISO 50

Size	TCP				Center of gravity			
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	Weight [kg]
SG: one mounted product								
EGK 25	–	–	90.2	–	−1.5	−0.1	42.7	0.8
EGK 40	–	–	94.5	–	−0.5	−0.3	44.9	1.3
EGK 50	–	–	102	–	0.5	−0.2	49.1	2.1
DG: two mounted products								
EGK 25	±111.8	–	114.6	±45	0	0	64.7	2.3
EGK 40	±114.8	–	117.6	±45	0	0	71	3.3
EGK 50	±131.6	–	137.9	±45	0	0	87.3	5.3

Tab.: EGK: TCP, centre of gravity and weight with ISO 50 flange

GP4 series

Size	TCP				Center of gravity			
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	Weight [kg]
SG: one mounted product								
EGK 25	–	–	90.2	–	-1.6	-0.1	42.6	0.8
EGK 40	–	–	94.5	–	-0.5	-0.3	44.4	1.3

Tab.: EGK: TCP, center of gravity and weight for Yaskawa GP4 series

GP7/GP8 series

Size	TCP				Center of gravity			
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	Weight [kg]
SG: one mounted product								
EGK 25	–	–	90.2	–	-1.6	-0.1	43.3	0.8
EGK 40	–	–	94.5	–	-0.5	-0.3	45.2	1.3
EGK 50	–	–	102	–	0.5	-0.2	49.1	2.1
DG: two mounted products								
EGK 25	±111.8	–	112.7	±45	0	0	64.5	2.3
EGK 40	±114.8	–	115.7	±45	0	0	70.5	3.3

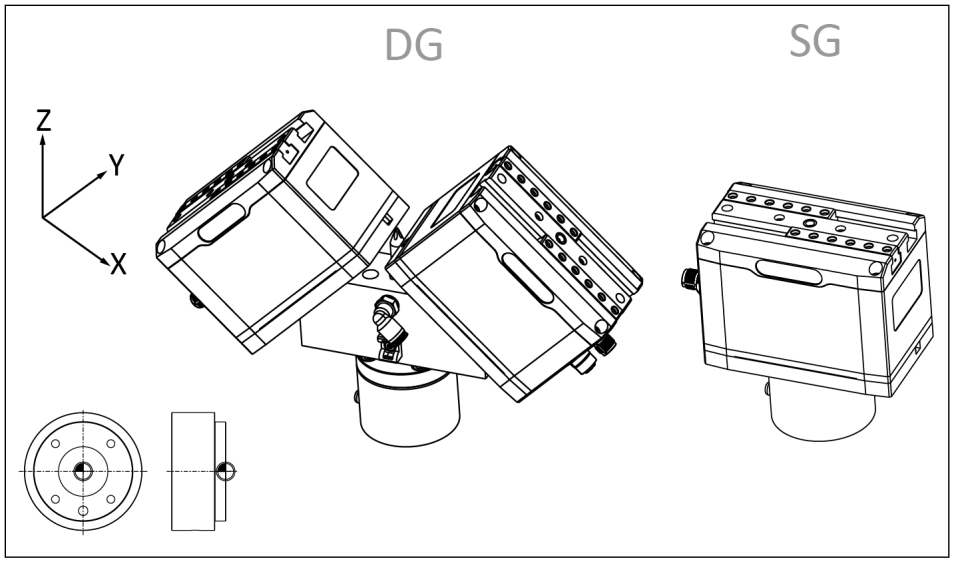
Tab.: EGK: TCP, center of gravity and weight for Yaskawa GP7 / GP8 series

GP12 series

Size	TCP				Center of gravity			
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	Weight [kg]
DG: two mounted products								
EGK 25	±111.8	–	114.6	±45	0	0	62.5	2.4
EGK 40	±114.8	–	117.6	±45	0	0	69.3	3.4
EGK 50	±131.6	–	137.9	±45	0	0	86	5.4

Tab.: EGK: TCP, center of gravity and weight for Yaskawa GP12 series

8.2 Values for EGU



EGU: Tool Center Point, DG: two products mounted, SG: one product mounted

ISO 50

Size	TCP				Center of gravity			
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	Weight [kg]
SG: one mounted product								
EGU 50	–	–	93.5	–	−0.3	−0.3	47.9	1.8
EGU 60	–	–	119	–	1.6	−0.7	61.3	3.3
EGU 70	–	–	135.4	–	0.8	−0.8	71.4	5.2
EGU 80	–	–	142.9	–	3	−0.2	73.4	8.4
DG: two mounted products								
EGU 50	±114.1	–	116.9	±45	0	0	75.2	4.2
EGU 60	±143.6	–	149.9	±45	0	0	99.7	7.7

Tab.: EGU: TCP, center of gravity and weight with ISO 50 flange

GP7/GP8 series

Size	TCP				Center of gravity			
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	Weight [kg]
SG: one mounted product								
EGU 50	–	–	93.5	–	−0.3	−0.3	48	1.7
EGU 60	–	–	119	–	1.7	−0.7	61.2	3.3

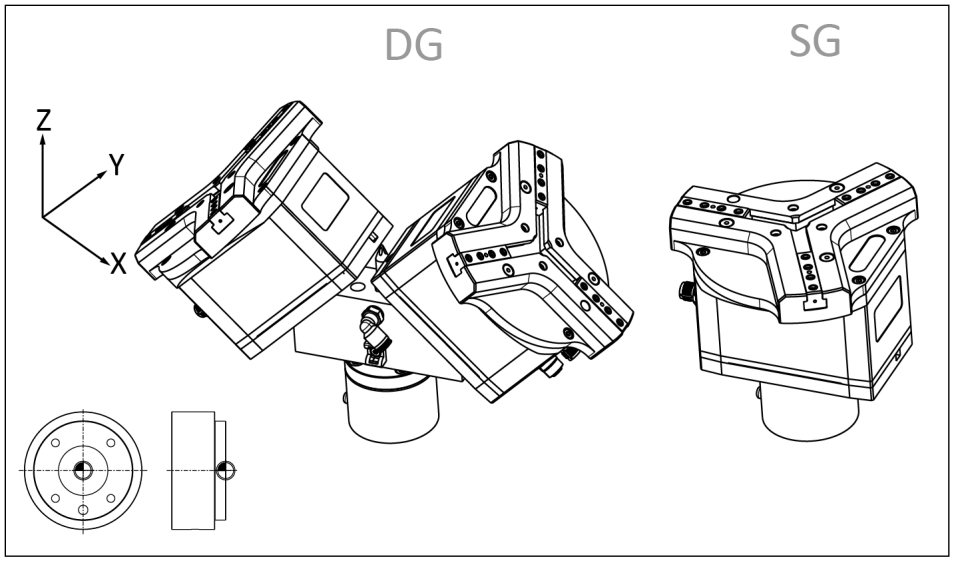
Tab.: EGU: TCP, center of gravity and weight for Yaskawa GP7 / GP8 series

GP12 series

Size	TCP				Center of gravity			
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	Weight [kg]
SG: one mounted product								
EGU 50	–	–	89	–	-0.3	-0.3	44.1	1.7
EGU 60	–	–	114.5	–	1.7	-0.8	57	3.3
DG: two mounted products								
EGU 50	±114.1	–	116.9	±45	0	0	73.8	4.3

Tab.: EGU: TCP, center of gravity and weight for Yaskawa GP12 series

8.3 Values for EZU



EZU: Tool Center Point, DG: two products mounted, SG: one product mounted

ISO 50

Size	TCP				Center of gravity			
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	Weight [kg]
SG: one mounted product								
EZU 30	–	–	107	–	-0.9	-0.3	62	2.6
EZU 35	–	–	135.5	–	0.5	-0.7	79.2	4.9
EZU 40	–	–	156.9	–	0	-0.8	94.3	8.2
DG: two mounted products								
EZU 30	±123.7	–	126.5	±45	0	0	86.3	5.9
EZU 35	±155.3	–	161.6	±45	0	0	113.4	10.9

Tab.: EZU: TCP, center of gravity and weight with ISO 50 flange

GP7/GP8 series

Size	TCP				Center of gravity			
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	Weight [kg]
SG: one mounted product								
EZU 30	–	–	107	–	−0.9	−0.3	62.5	2.6
EZU 35	–	–	135.5	–	0.5	−0.7	79.6	4.9

Tab.: EZU: TCP, center of gravity and weight for Yaskawa GP7 / GP8 series

GP12 series

Size	TCP				Center of gravity			
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	Weight [kg]
SG: one mounted product								
EZU 30	–	–	102.5	–	−0.9	−0.3	57.7	2.6
EZU 35	–	–	131	–	0.5	−0.7	74.4	4.9
DG: two mounted products								
EZU 30	±123.7	–	126.5	±45	0	0	84	6

Tab.: EZU: TCP, center of gravity and weight for Yaskawa GP12 series

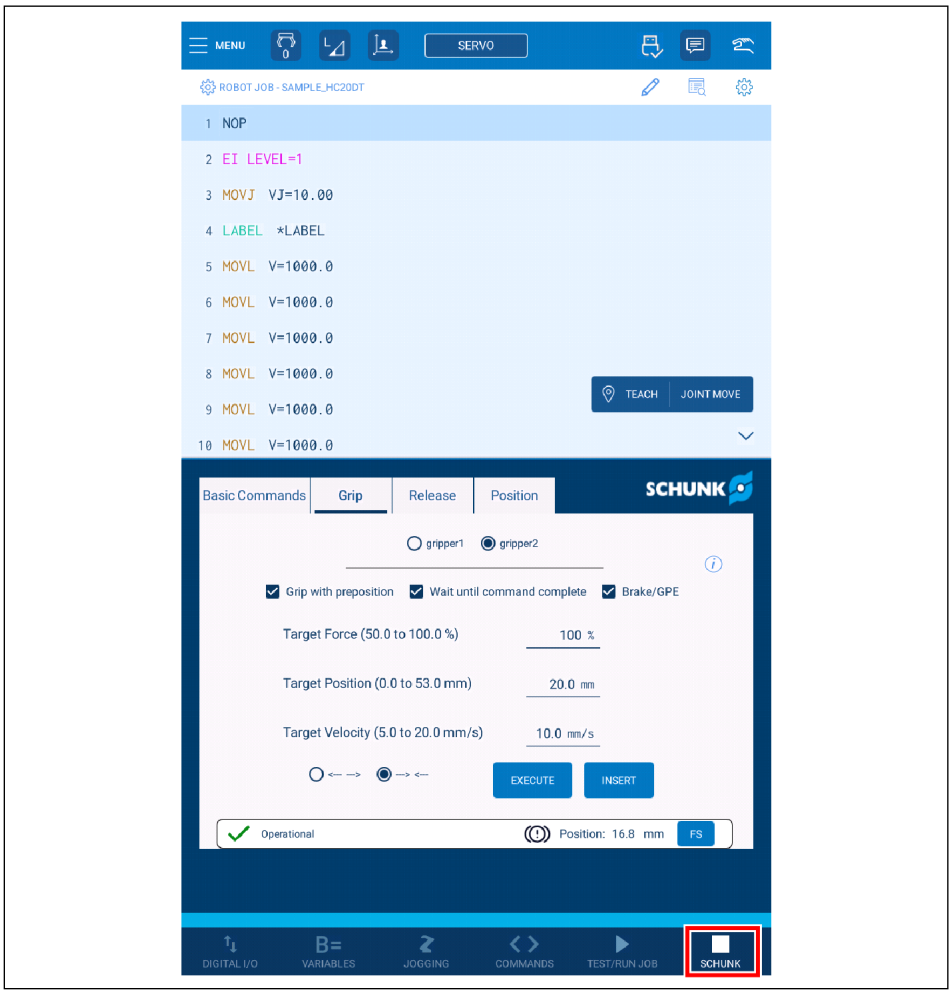
9 Creating robot program

After installing the software module, the following functions can be inserted into a robot program.

Function	Description
BasicCommands, ▶ 9.1 [🗋 37]	• Acknowledge: Acknowledge pending warnings and errors • Fast Stop: Immediate cancellation of a movement • Controlled Stop: Controlled stop of a movement
Grip, ▶ 9.2 [🗋 38]	Gripping a workpiece
Release, ▶ 9.3 [🗋 39]	Releasing a workpiece
Position, ▶ 9.4 [🗋 40]	Approaching a position

Adding a function to the robot program

1. Select "Menu" > "Job List".
2. Select the desired robot program or create a new one and select the "Edit" button.
3. Select the "SCHUNK" button.
   ⇨ All available functions are displayed in the menu.

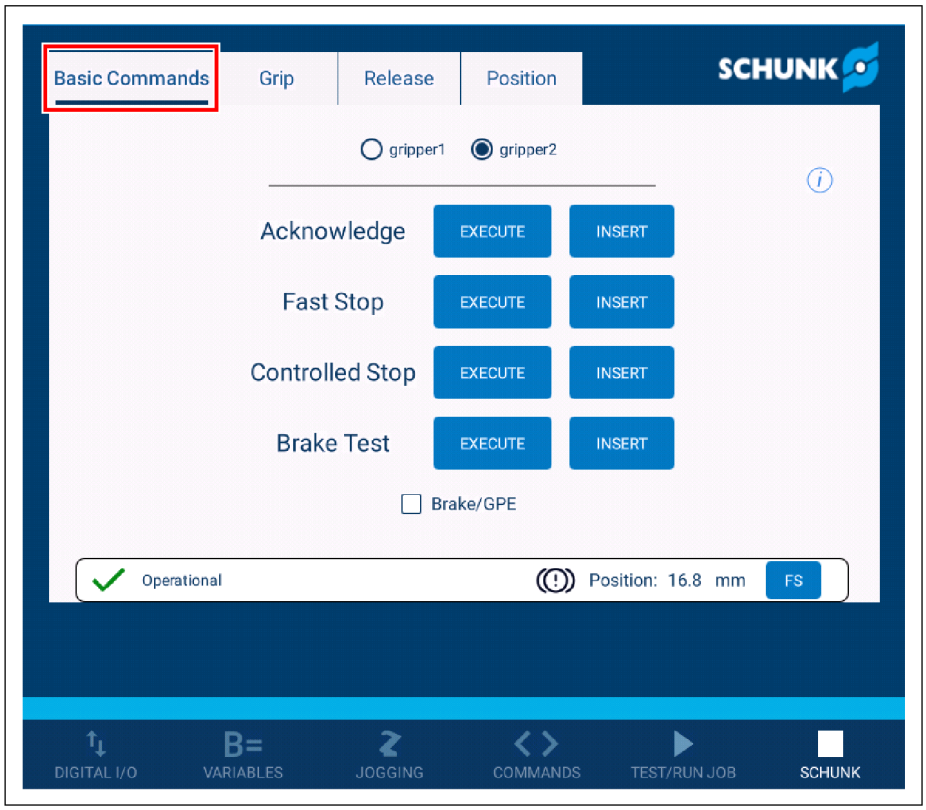


4. For further information on the functions, see the following sections.

9.1 BasicCommands

- In the robot program, the position where the function is to be inserted is marked.

1. Select the "Basic Commands" button.

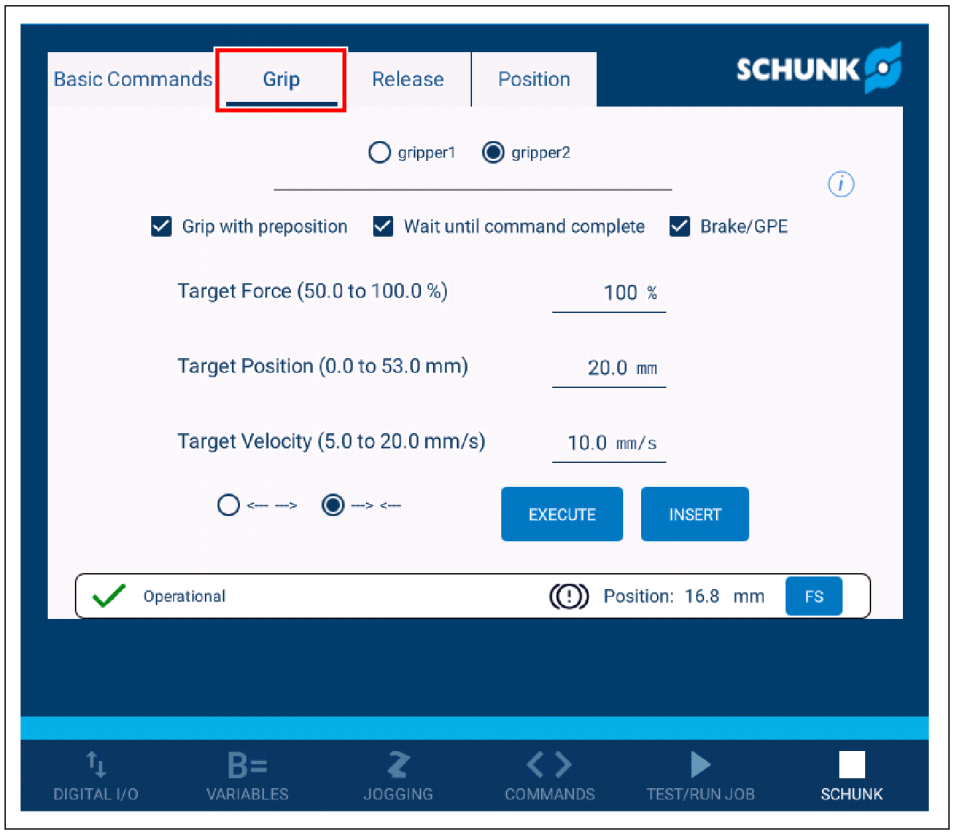


2. Select the desired product.
3. **CAUTION Risk of injury! The gripper fingers move.** Select the "EXECUTE" button to test the function.
   - ⇨ *Acknowledge*: If errors requiring acknowledgment are present, they are actuated by this command.
   - ⇨ *Fast Stop*: This command stops the current movement immediately and forces it to standstill. An error requiring acknowledgment is set.
   - ⇨ *Controlled Stop*: This command is used to stop the current movement as quickly as possible until it comes to a controlled standstill.
   - ⇨ *Brake Test*: Test brakes *(only available with variant "M" products and firmware version 5.2 or above)*.
4. Optional: Activate the "Brake/GPE" checkbox.
   - ⇨ For products of the "M" variant, the brake is activated after a controlled stop; GPE is active.
5. Select the "INSERT" button to add the function to the program.
   - ⇨ The selected function has been added to the program code.

9.2 Grip

- In the robot program, the position where the function is to be inserted is marked.

1. Select the "Grip" button.



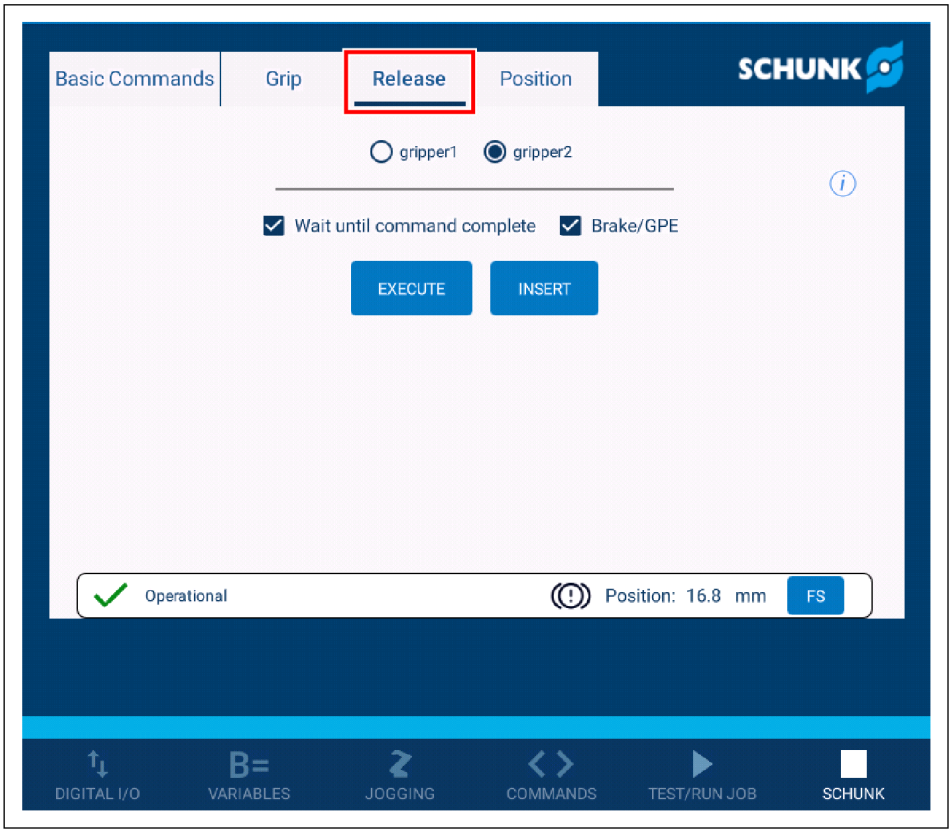
2. Select the desired product.
3. Optional: Select desired options by activating the check box.
   - ⇨ *Grip with preposition*: When workpiece gripping at an expected position, a workpiece is gripped at the specified workpiece position with the specified gripping force value using a combined gripping movement.
   - ⇨ *Wait until command complete*: The following command is executed only after the inserted gripping command has been completely processed.
   - ⇨ *Brake/GPE*: the brake is activated for "M" variant products; GPE is active.
4. Enter gripping force, position and speed.
5. Select gripping direction.
   - ⇨ *Inside Grip* : (<- ->) By moving the gripper fingers *outward*, a workpiece can be gripped from the *inside*, hence the name I.D. gripping.
   - ⇨ *Outside Grip* : (-> <-) By moving the gripper fingers *inward*, a workpiece can be gripped from the *outside*, hence the name O.D. gripping.

6. **CAUTION Risk of injury! The gripper fingers move.** Select the "EXECUTE" button to test the function.
7. Select the "INSERT" button to add the function to the program.
   ⇨ The selected function has been added to the program code.

9.3 Release

- In the robot program, the position where the function is to be inserted is marked.

1. Select the "Release" button.



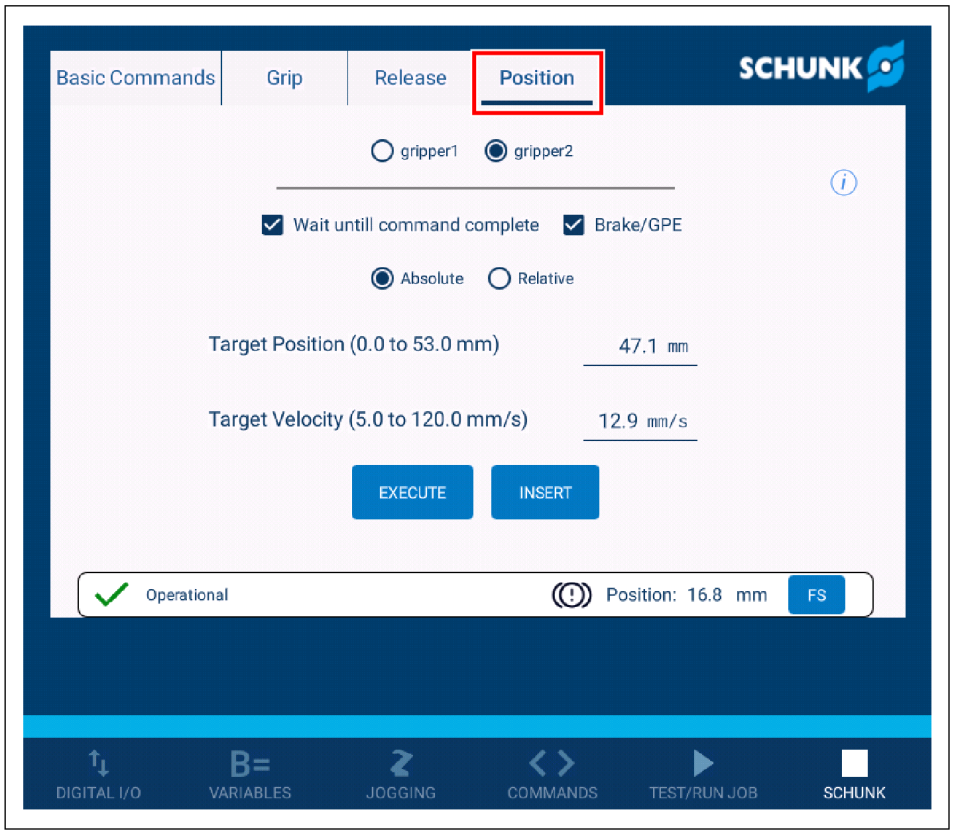
2. Select the desired product.

3. Optional: Select desired options by activating the check box.
   ⇨ *Wait until command complete*: The following command is executed only after the inserted gripping command has been completely processed.
   ⇨ *Brake/GPE*: the brake is activated for "M" variant products; GPE is active.
4. **CAUTION Risk of injury! The gripper fingers move.** Select the "EXECUTE" button to test the function.
   ⇨ The selected function has been added to the program code.

9.4 Position

- In the robot program, the position where the function is to be inserted is marked.

1. Select the "Position" button.



"Gripper" function – when double gripper is selected

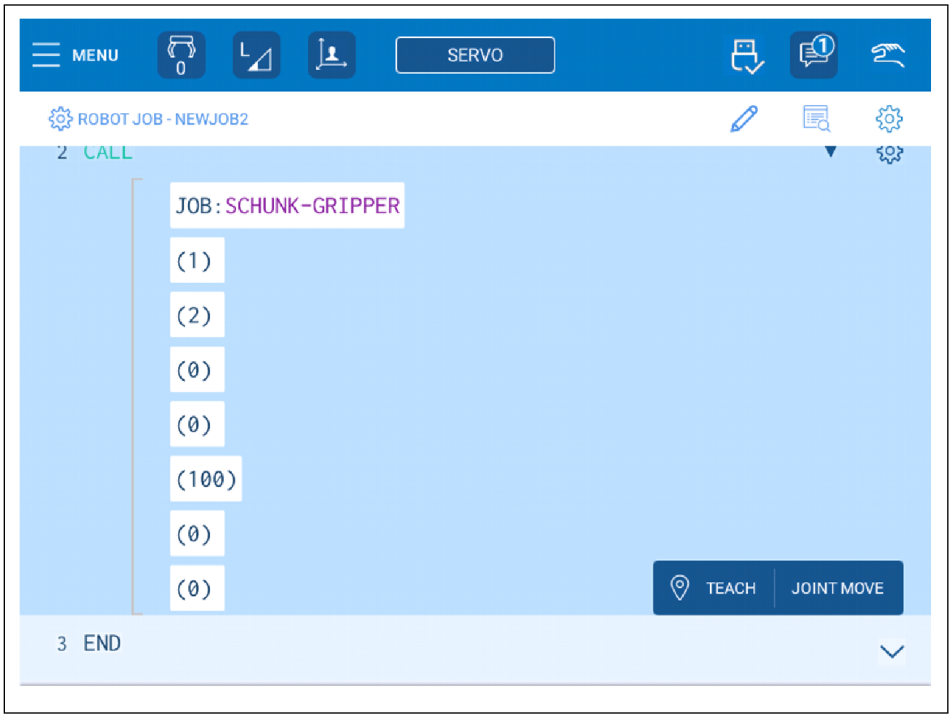
2. Select the desired product.

3. Optional: Select desired options by activating the check box.
   ⇨ *Wait until command complete*: The following command is executed only after the inserted gripping command has been completely processed.
   ⇨ *Brake/GPE*: the brake is activated for "M" variant products; GPE is active.
4. Select positioning type.
   ⇨ *Absolute*: With absolute positioning, the product moves to the cyclically transferred position value. This position value refers to the parameterized zero point of the module.
   ⇨ *Relative*: With relative positioning, the product moves from the current position by the cyclically transferred and signed position value.
5. Enter target position.
6. Enter speed.
7. **CAUTION Risk of injury! The gripper fingers move.** Select the "EXECUTE" button to test the function.
8. Select the "INSERT" button to add the function to the program.
   ⇨ The selected function has been added to the program code.

9.5 Example of a robot program

This example shows the use of a gripper to pick up an object with 2 grippers at a given position and place it. If the gripping or placing fails, the program is stopped.

Gripper commands are generally transmitted to the gripper via the "SCHUNK Gripper" job. The seven parameters shown in the table below must be transferred to this job. When inserting the gripper commands into the robot program via the software module, the parameters are set automatically.



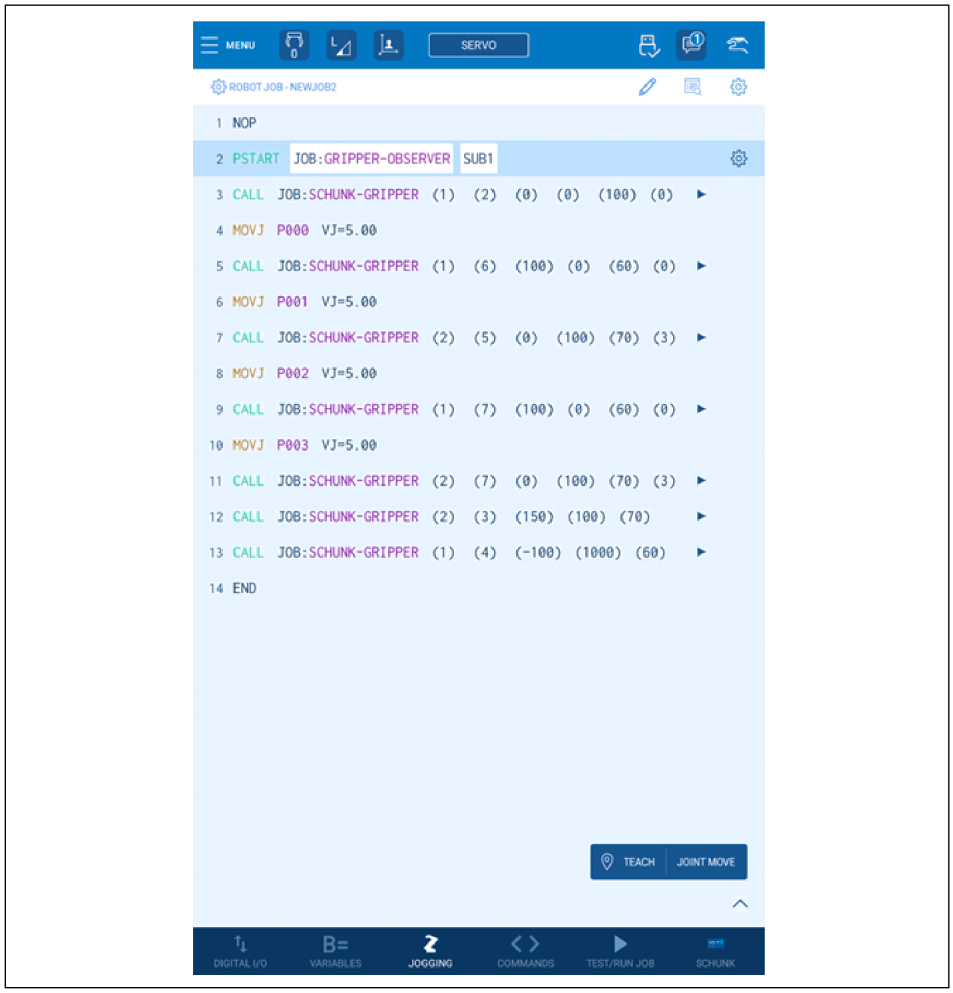
JOB: SCHUNK GRIPPER

Argument	Description
1	Gripper instance (integer)
2	Command (integer): 1: Fast Stop 2: Acknowledge 3: Absolute positioning movement 4: Relative positioning movement 5: Basic grip 6: Gripping workpiece with pre-positioning 7: Releasing workpiece
3	Desired position in µm (integer)
4	Desired speed in µm/s (integer)
5	Desired gripping force in % (integer)

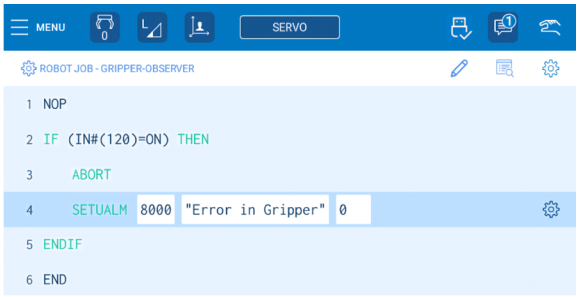
Argument	Description
6	Flags for GPE and gripping direction (integer): 0: O.D. gripping, GPE deactivated 1: I.D. gripping, GPE deactivated 2: O.D. gripping, GPE activated 3: I.D. gripping, GPE activated
7	Wait until Command Complete (integer)

Tab.: Description of parameter JOB: SCHUNK GRIPPER

Example program



Example program

Item	Description
1	Parallel to the main program, the "Gripper-Observer" job is started to detect whether gripper 1 is in an error state. If this is the case, the program is stopped and an alarm is issued. Input 120 corresponds to the "Error" bit in the status word of gripper 1. 
2	Any errors that may be present are acknowledged for gripper 1.
3	The robot arm moves to position 0, where gripper 1 is to grip a workpiece.
4	Gripper 1 grips the workpiece at the expected workpiece position. The speed should be selected automatically by the gripper, so that the value 0 is selected as the parameter.
5	The robot arm moves to position 1, where the second workpiece is to be gripped.
6	Gripper 2 grips the workpiece with a force of 70% of the maximum gripping force.
7 – 11	The robot arm moves to the respective position where the workpieces are to be placed. The grippers release the workpieces.
12 – 13	The two grippers perform an absolute or relative positioning movement to optimally position the fingers for picking up new workpieces. The option "Wait until Command complete" can be deactivated so that the gripping movement takes place simultaneously with a movement of the robot.

Tab.: Robot example description

10 Appendix

10.1 Definition of gripping force mode

BasicGrip

This gripping mode is available for all variants of the product. In BasicGrip, the workpiece is gripped with the nominal gripping force or less. The motor is permanently energized, which allows the workpieces to be continuously re-gripped.

Note: The gripping velocity changes depending on the set gripping force.

SoftGrip

This gripping mode is available for all EGK variants.

The SoftGrip mode can be used to gently grip delicate, fragile or fracture-sensitive workpieces such as electronics, glass and ceramics.

To influence the force pulse at SoftGrip, a gripping velocity value must be transferred. This gripping velocity value must be between the minimum gripping velocity <min_vel> and the calculated gripping velocity used in BasicGrip mode with the same gripping force.

Note: The gripping force changes depending on the set gripping velocity.

StrongGrip

This gripping mode is only available for the "M" variant with the EGU and EZU.

In StrongGrip mode, the workpiece is gripped with a gripping force greater than 100 percent, which makes it possible to grip heavy workpieces.

In this mode, the motor briefly activates a higher power level, and an elastomer stores the high gripping force. After an adjustable time, the motor brake engages and the workpiece is held.

10.2 Brands

- YASKAWA is a registered trademark of Kabushiki Kaisha Yaskawa Denki (Japan).

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