

Commissioning instructions

SGC

Smart Grasping Camera



Superior Clamping and Gripping

SCHUNK ®

Imprint

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Technical changes:

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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.

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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](#) [► 4] are applicable.

1.1.1 Symbol definition

The following symbols are used in this manual:

- Prerequisite for an action

1. Action 1
2. Action 2

- ✓ Intermediate results

- ✓ Final results

[► 4] Page number in references

1.1.2 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *
- Assembly and operating manual for gripper *EGH* *
- Assembly and operating manual for 3-D camera *rc_visard* *
- *When using a projector*: Assembly and operating instructions for projector *SGC rc_randomdot* *
- Software guide "SCHUNK gripper with IO-Link" *
- Software manual "SCHUNK software component for URcap, Flexible Gripper *EGH*" *
- Assembly and Operating Manual of IO-Link-Master "FEN20-4IOL" **

The documents marked with an asterisk (*) can be downloaded on our homepage schunk.com

The documents labeled with two asterisks (**) can be downloaded from turck.com.

1.1.3 Variants

This operating manual applies to the following variations:

- SGC 160-EGH-UR-S (static)
- SGC 65-EGH-UR-D (dynamic)

1.2 Warranty

If the product is used as intended, the warranty is valid for 12 months from the ex-works delivery date under the following conditions:

- Observe the ambient conditions and operating conditions

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

1.3 Scope of delivery

The scope of delivery includes

Dynamic variant:

- Gripper *EGH* with accessories
- 3D camera *rc_visard 65*
- Adapter flange incl. fixing screws and centering pin
- Calibration plate
- AprilTags
- Commissioning instructions
- USB stick with URCap and example program
- Connection cable (voltage supply + network cable)

Static variant:

- Gripper *EGH* with accessories
- 3D camera *rc_visard 160*
- Adapter plate incl. mounting screws and centering pin
- Calibration plate
- AprilTags
- Commissioning instructions
- USB stick with URCap and example program
- Connection cable (voltage supply + network cable)

1.4 Accessories

The following accessories can be ordered separately for the product:

- SGC rc_randomdot projector
- Power supply unit (ID 31001408)

1.5 Personnel qualifications

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

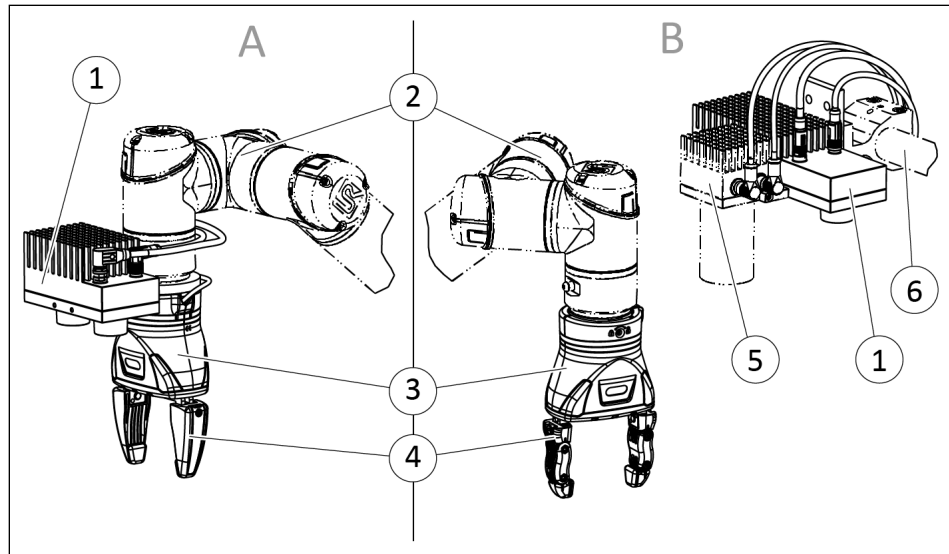
Qualified personnel

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.

The personnel has knowledge and experience in operating and programming UR robots.

2 Design and description

2.1 Design



Setup, **A**: Dynamic variant (camera on robot flange),
B: Static variant (camera on SAS pillar assembly system)

1	Camera
2	Robot arm (customer side)
3	Gripper
4	Gripper finger (rigid, flexible)
5	Projector (available as accessory)
6	SAS pillar assembly system (customer side)

2.2 Description

The application kit SGC combines intelligent object recognition and flexible gripping in one intuitive set.

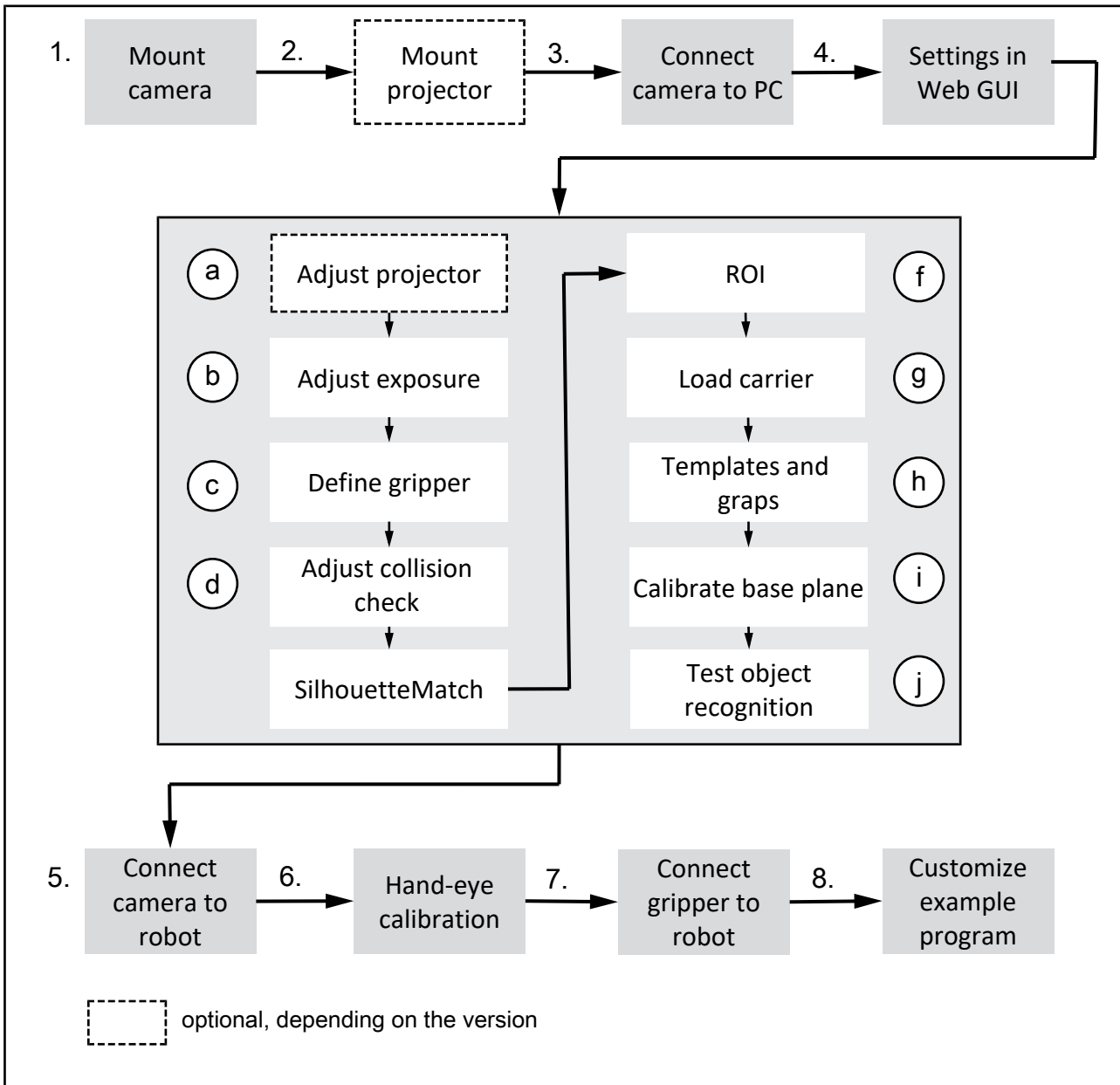
The camera system reliably detects workpieces on a defined plane, even in poor lighting conditions, and calculates possible grips including collision checks.

During workpiece detection, the software function "Template Matching" is used to search for previously defined objects in a scene. If these are detected, collision-free grips are transferred to the robot and the gripper is positioned in the required position.

3 Start-up

This section describes the commissioning of the camera, the gripper and the projector, which is available as an accessory from SCHUNK. Further information can be found in the instructions for the individual components, [Applicable documents](#) [▶ 4].

Observe the safety notes in the component manuals!



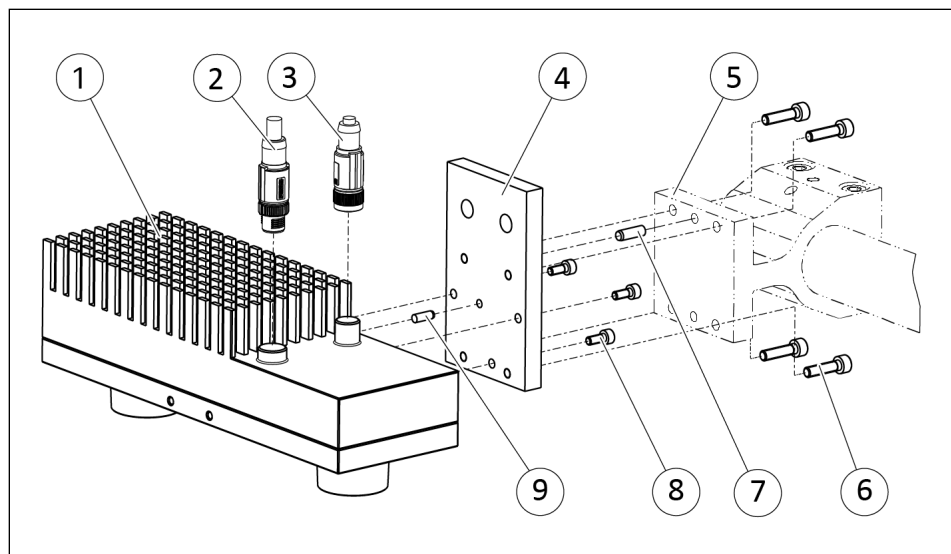
Commissioning sequence

The individual steps are described in the following chapters. Depending on the application, not all of the steps listed may be necessary.

3.1 Mount camera

Static variant (camera on bracket)

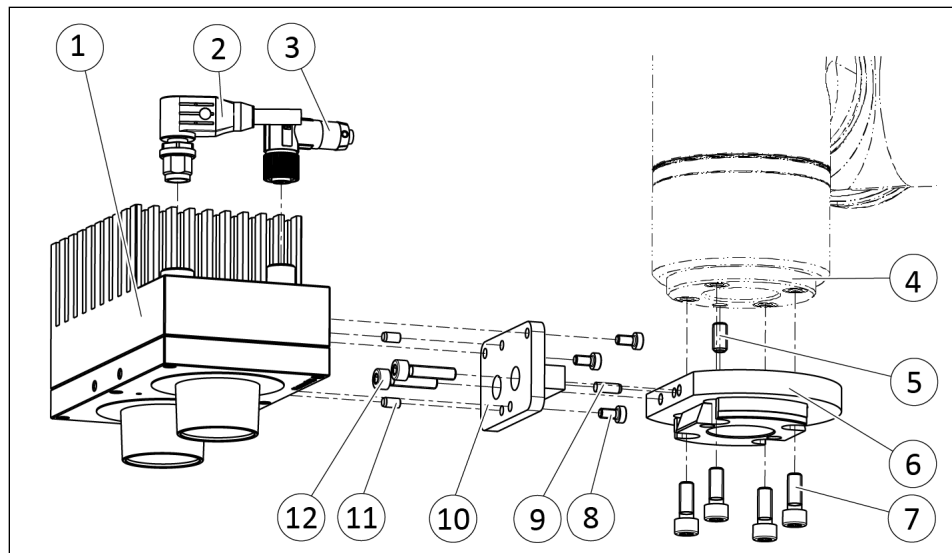
1. Fasten the adapter plate (4) to the camera (1) with three M4 screws (8) and centering pin \varnothing 4x12 (9).
 - ✓ Secure the screws with Loctite No. 243.
 - ✓ Observe the tightening torque: 2.5 Nm
2. Fasten adapter plate (4) to the bracket (4) with four screws M5 (6) and centering pin \varnothing 5x16 (7).
 - ✓ Observe the tightening torque: 11 Nm
3. Connect the network cable (2) and power supply cable (3) to the camera (1).
4. Connect the power supply cable (3) in the control box of the robot.
 - ✓ Connect blue wire strand to the 0V terminal.
 - ✓ Connect brown wire strand to the 24V terminal.
5. Fasten the cable to the bracket outside of camera image with cable ties or Velcro straps.
6. Optional: mount projector on camera, [Mount projector \(optional\)](#) [▶ 11].



Mount the camera, static variant

Dynamic variant (camera on robot flange)

1. Fasten the adapter flange (6) to the robot flange (4) with four M6 screws (7) and centering pin \varnothing 6x12 (6).
 - ✓ Observe the tightening torque: 18 Nm
2. Fasten the bracket (10) to the adapter flange (6) with two M5 screws (12) and centering pin \varnothing 4x12 (9).
 - ✓ Observe the tightening torque: 6.1 Nm
3. Fasten the camera (1) to the bracket (10) with three M4 screws (8) and two centering pins \varnothing 4x8 (11).
 - ✓ Secure the screws with Loctite No. 243.
 - ✓ Observe the tightening torque: 3.1 Nm
4. Connect the network cable (2) and power supply cable (3) to the camera.
5. Connect the power supply cable (3) in the control box of the robot.
 - ✓ Connect blue wire strand to the 0V terminal.
 - ✓ Connect brown wire strand to the 24V terminal.
6. Fasten the cable to the robot arm outside of camera image with cable ties or Velcro straps.
7. Switch on the robot control system.
8. Place the robot arm at the working distance and parallel above the base plane. To do this, press and hold the "Freedrive" button on the robot control system and position the robot arm.



Mount the camera, dynamic variant

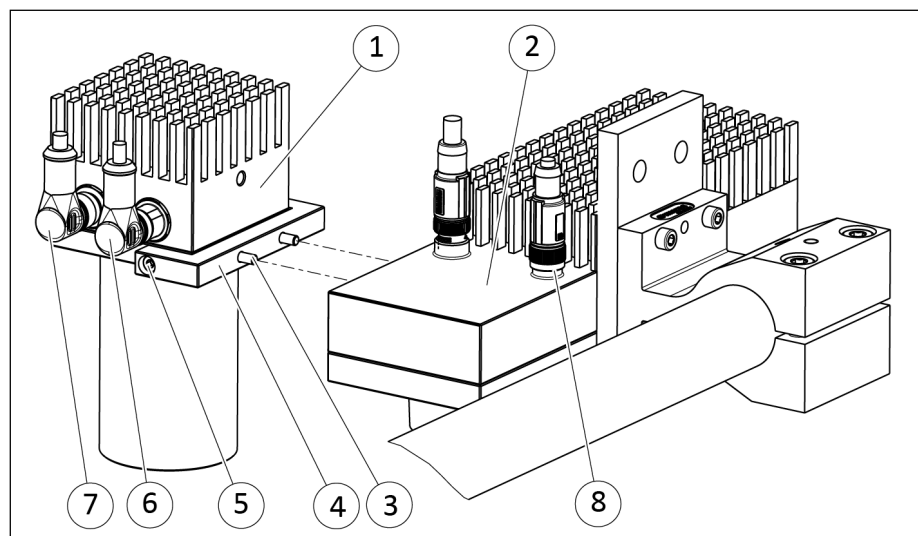
3.2 Mount projector (optional)

NOTE

- SCHUNK recommends the use of a projector for scenes with little or no natural texture, e.g. when using a transport box.
- The projector creates a random pattern and adds more visual features to the scene. This makes it easier for the camera to detect the base plane or the transport box.
- The projector and a power supply unit that is required for operation are available as accessories from SCHUNK, [Accessories](#) [▶ 6].

In the static version the projector is mounted to the camera, in the dynamic version the projector is mounted to a rack on the customer side above the working area.

1. Loosen the screws (5) and remove the mounting bracket (4) from the projector (1).
2. **Static version:** Fasten mounting bracket (4) to camera (2) with two M4 screws (3).
Dynamic version: Fasten mounting bracket (4) to frame with two M4 screws (3).
 - ✓ Secure the screws with Loctite No. 243.
 - ✓ Observe the tightening torque: 2.4 Nm.
3. Fasten the projector (1) to the mounting bracket (4) with two M4 screws (5).
 - ✓ Secure the screws with Loctite No. 243.
 - ✓ Observe the tightening torque: 2.4 Nm
4. Remove the protective cap from the lens ring of the projector.
5. Connect the power supply cable (7) of the projector power supply unit. Connect cable (6) to connector (8) for looping on the power supply. **IMPORTANT! Observe the polarity of the voltage supply, as reversed polarity will damage the projector.**



Mount projector, static variant

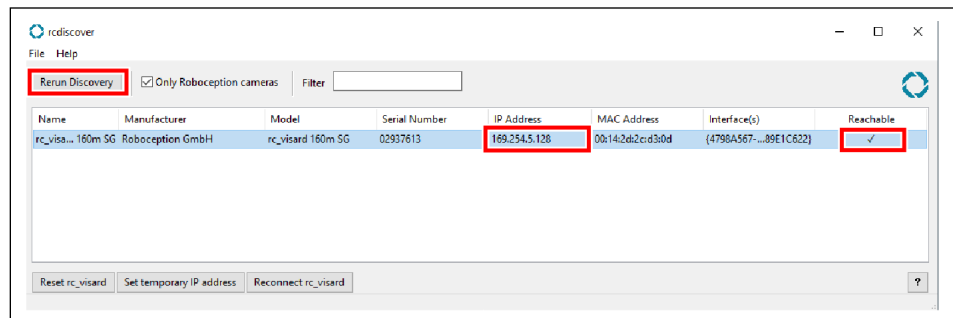
3.3 Connect camera to PC

- Camera is mounted.
 1. Install rcdiscover tool on PC. The tool is located on the USB stick. The latest version can be downloaded at https://schunk.com/de_de/services/downloads/software/.
 2. Connect the network cable of the camera to the Ethernet interface on the PC.
 3. Establish the power supply.

For version without a projector: Switch on robot.

When using a projector: Connect the power supply unit of the projector to the power supply.

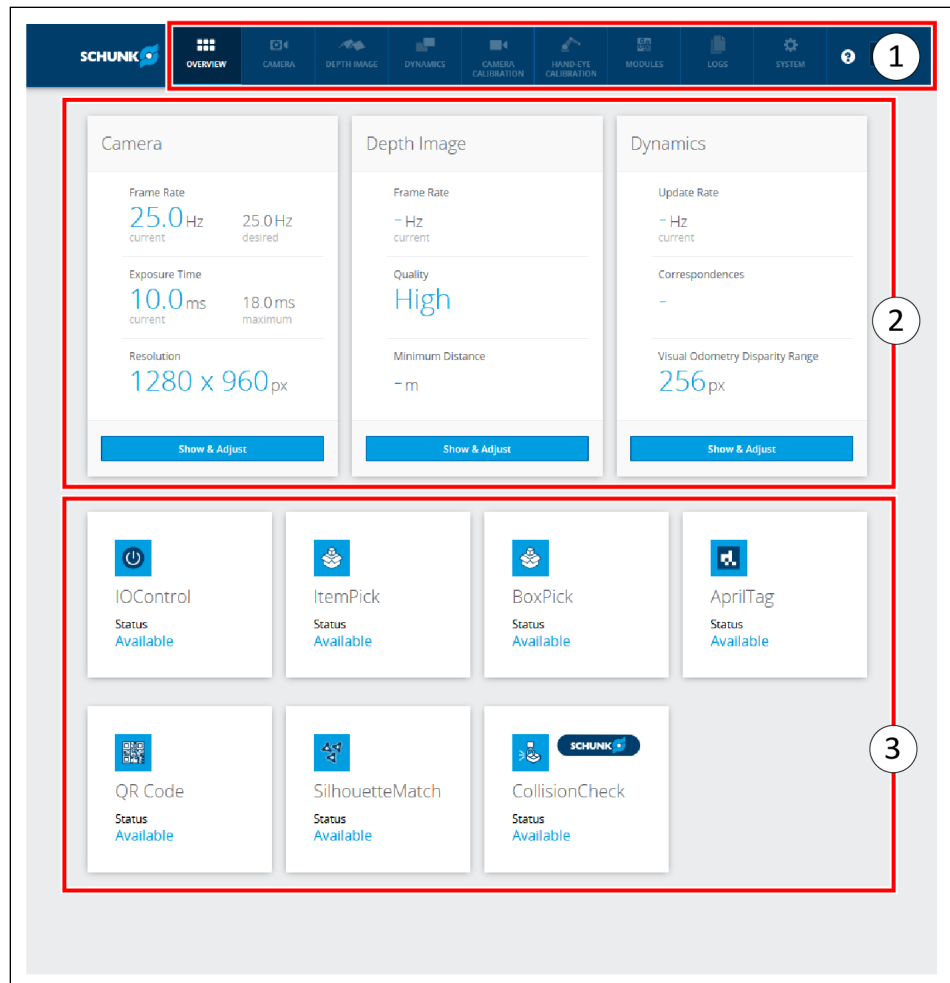
 - ✓ LED on the camera lights up blue.
 4. Wait until camera is ready for use.
 - ✓ After about 2 minutes, the camera will be ready for use. The LED on the camera lights up green.
 - ✓ If the LED flashes red every 5 seconds, there is no network connection. In this case, check that the network cable is properly connected and that the network is properly configured.
 5. Double click to open rcdiscover-gui.exe.



Select camera

- ✓ Detected cameras are displayed.
- ✓ The check mark next to "Reachable" indicates that the camera and the PC are in the same network.
- 6. If no cameras are displayed: Select the "Rerun Discovery" button to search for cameras again.
- 7. Note the IP address of the camera.
- 8. Double click to select camera.
 - ✓ Web GUI opens in the default browser of the operating system. SCHUNK recommends using Google Chrome or Mozilla Firefox as the web browser.

Web GUI home page



Web GUI overview page

Web GUI control elements

The Web GUI enables simple and user-friendly parameterization of the camera.

- The individual pages of the Web GUI can be accessed via the tabs (1).
The detailed manual for the camera is displayed by selecting the help button "?".
- Section (2) enables quick adjustment of the camera.
- Modules (3) makes quick access to optional software modules possible.

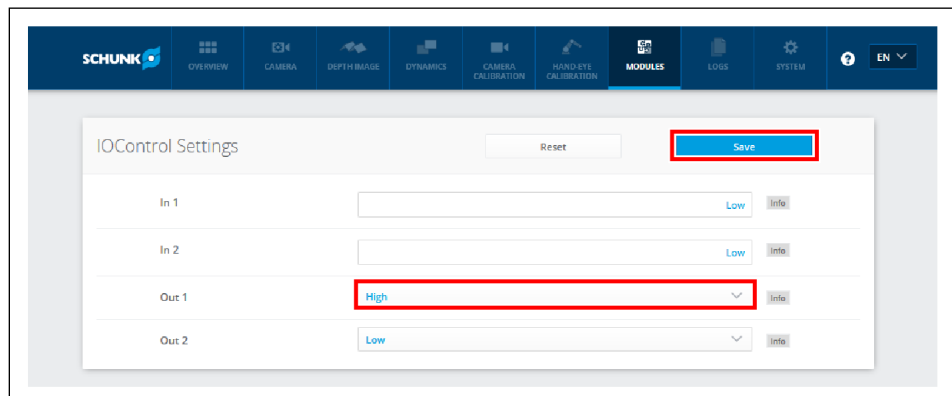
3.4 Adjust camera parameters in the Web GUI

3.4.1 Adjust projector (optional)

NOTE

SCHUNK recommends using a projector for surfaces with little structure. These are available as accessories, [Accessories](#) [► 6].

1. Select the "Module" > "IOControl" tab.



Adjust projector

2. Set Out1 to "High".
 - ✓ Projector lights up.
3. Adjust the focus and brightness on the lens ring of the projector.
 - ✓ First set the maximum brightness on the upper ring.
 - ✓ Focus the image on the lower ring.
 - ✓ Reduce the brightness of the upper ring again. SCHUNK recommends the value "5.6".
The pattern of the projector should still be clearly visible, but not too dark or overexposed.
4. Set Out1 to "Low" again.
5. Select the "Save" button.
6. Select the "Depth image" tab.



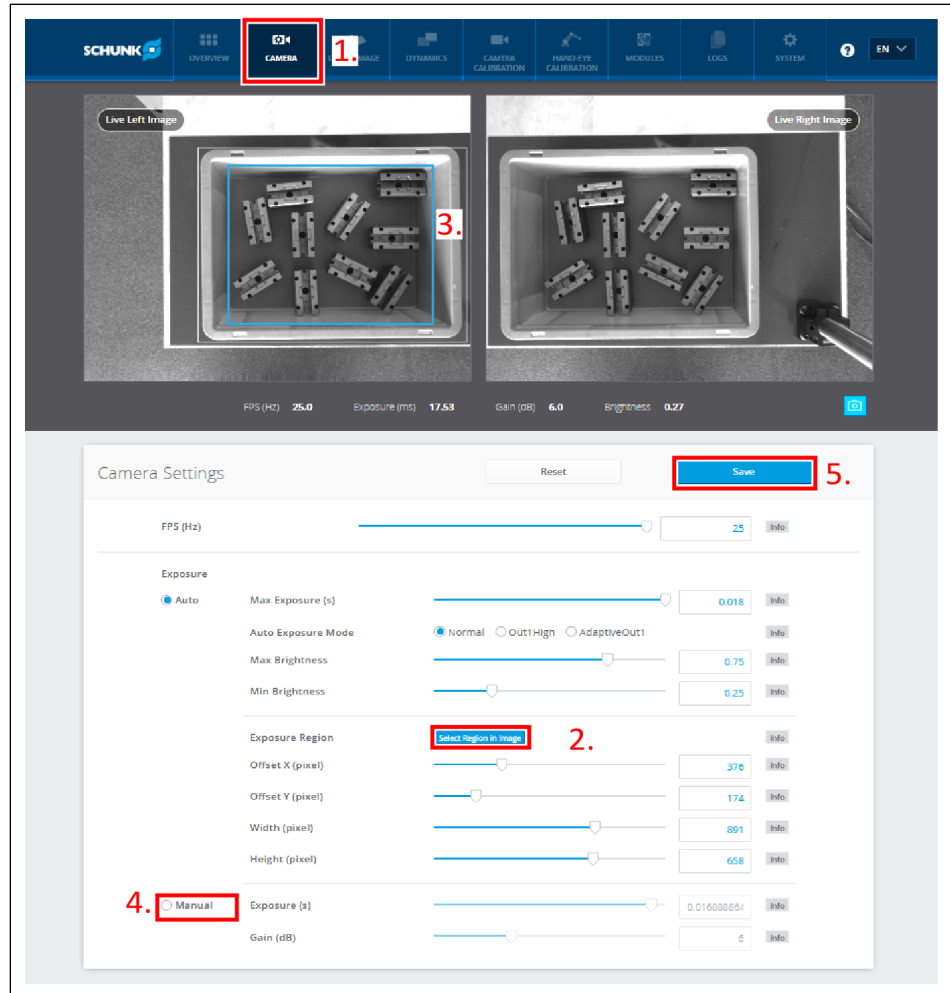
Depth image, recording mode

7. Activate recording mode "Single+Out1".
8. Select the "Save" button.

3.4.2 Adjust exposure

- The scene is under real operational and lighting conditions.
- The objects to be detected are under the camera.

1. Select the "Camera" tab.



Adjust exposure

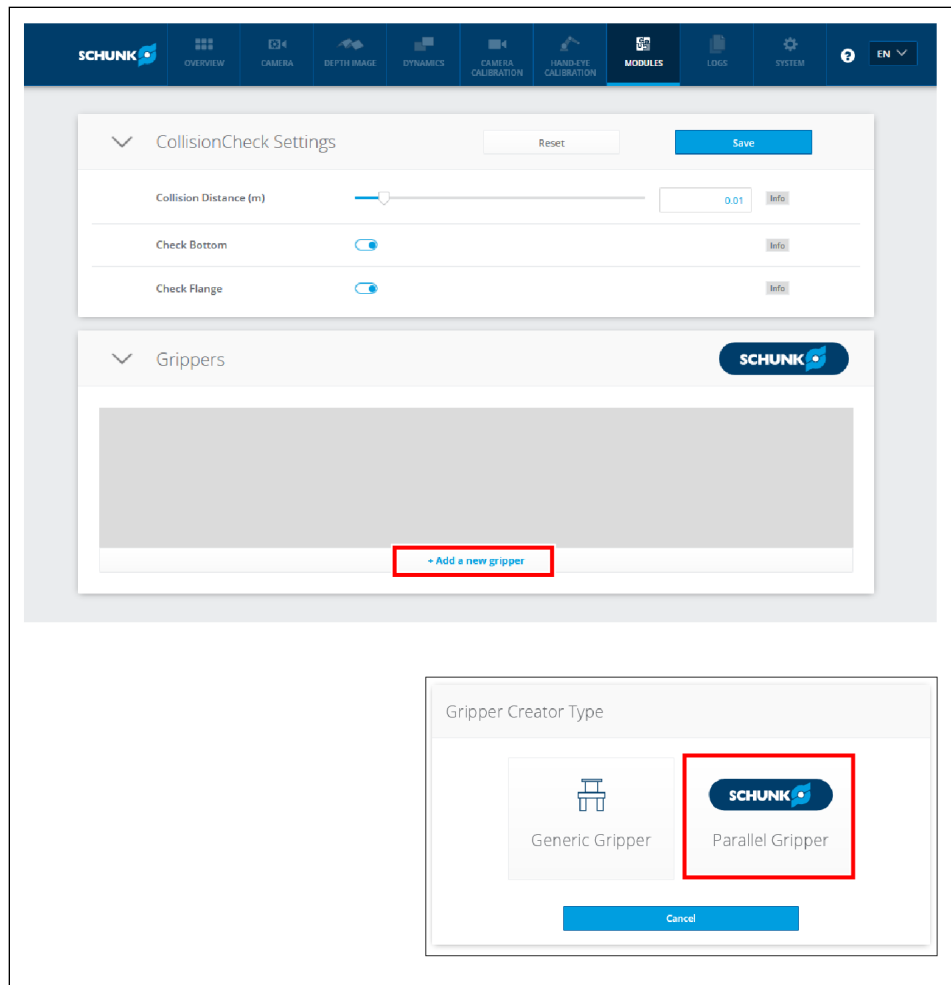
- ✓ Objects are completely visible in the live images.
2. Select the "Select Region in Image" button.
 3. Click inside the left live image and drag a region over the objects while holding down the left mouse button.
 - ✓ The frame is displayed in the live image.
 - ✓ Automatically calculated exposure parameters are displayed.
 - ✓ The image should contain few shadows and be evenly lit. The brightness should not be set too high.
 4. If the exposure still needs to be optimized, activate "Manual" and adjust the setting using the sliders.
 5. Select the "Save" button.

3.4.3 Define gripper

The dimensions of the EGH were stored at the factory.

- The gripping direction and geometry of the gripper fingers are known.
- The stroke per gripper finger required for the object to be gripped is known.

1. Select the "Module" > "CollisionCheck" tab.



Define gripper

2. In the "Gripper" drop-down menu, select the "Add a new gripper" button.
3. Select the "Parallel gripper" button.
 - ✓ A new window appears.

-
4. Enter application-specific parameters. For more information on the parameters, see the info buttons on the right.
 - ✓ Name of the gripper
 - ✓ Robot flange diameter
 - ✓ Camera mounting method
 - ✓ Selection of the quick-change adapter, if available
 - ✓ Gripper finger type
 - ✓ Gripping direction
 - ✓ Gripping stroke
(stroke per gripper finger + collision distance)
 5. Note the entered gripping stroke.
 6. Select the "Save" button.

3.4.4 Adjust collision check

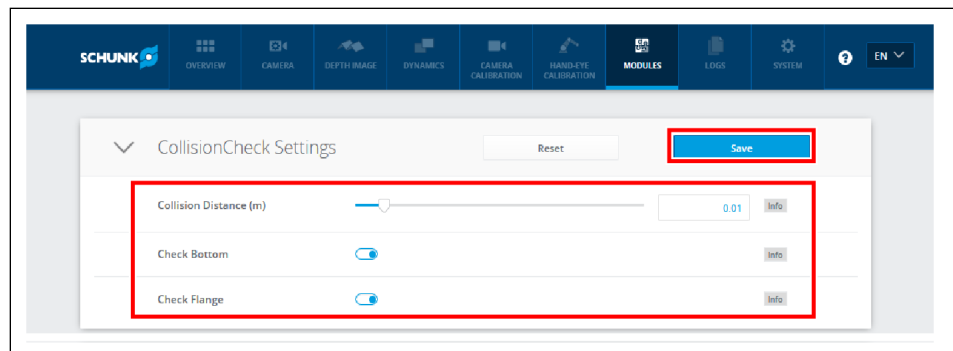
A collision check between the gripper and the transport box must be carried out to ensure that the gripper does not drive against the side walls or onto the bottom of the transport box.

A gripping process is considered to be collision-free if the set collision distance between the gripper and any wall of the transport box at a minimum is maintained.

Note: When using templates that were created from a CAD model, the collision between gripper and objects can also be detected.

A collision distance of 1 cm was set at the factory.

1. Select the "Module" > "CollisionCheck" tab.



Adjust collision check

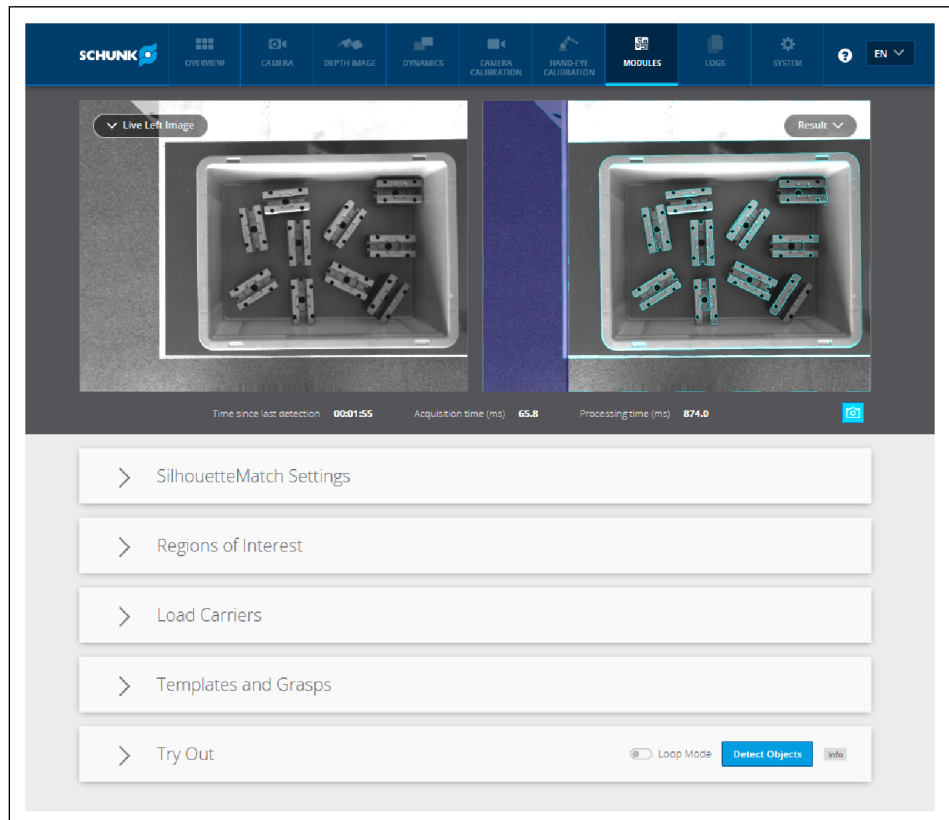
2. Set the collision distance between the gripper and the side walls and bottom of the transport box.
3. Activate Check Flange if collisions of the robot flange with the transport box are to be prevented. Collisions are detected as soon as the robot flange is inside the transport box.
4. Activate Check Bottom if collisions of the gripper with the bottom of the transport box are to be checked.
Note: Depending on the application, e.g. flat components, it may be necessary to deactivate the Check Bottom. For more information, see the info button on the right.
5. Select the "Save" button.

3.4.5 SilhouetteMatch

In the "SilhouetteMatch" module, the settings for object recognition and grasps are defined.

The module detects objects by comparing a predefined silhouette ("template") with edges in the image.

- **Call up:** the "Module" > "SilhouetteMatch" tab.



SilhouetteMatch

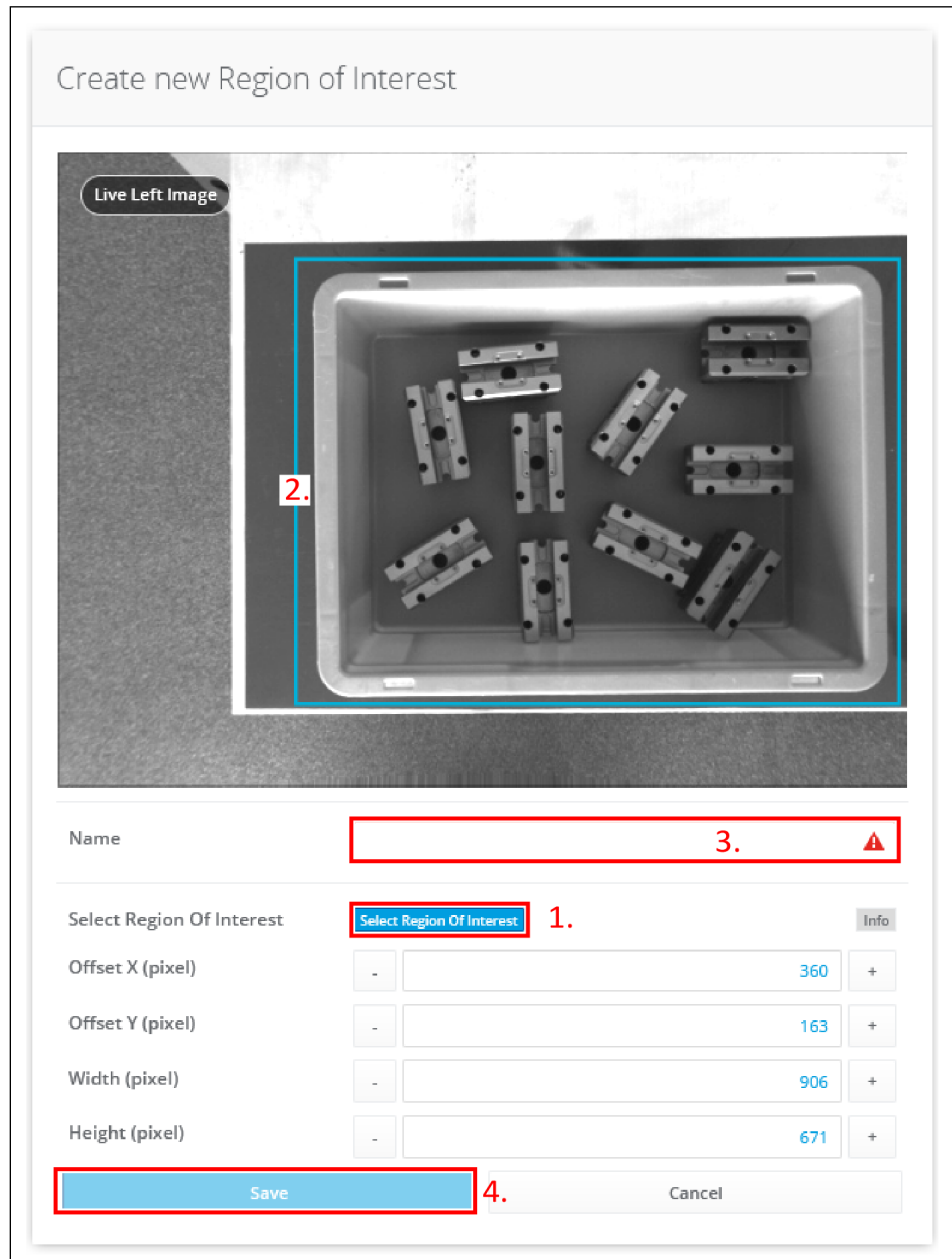
3.4.5.1 Define parameters

This section describes how to create an area (regions of interest), a Load Carrier (transport box) and a template with grasps.

Regions of Interest (ROI)

The ROI is used to limit the working range of the camera.

- **Call up:** "Regions of Interest" > "Add a new ROI".



Create ROI

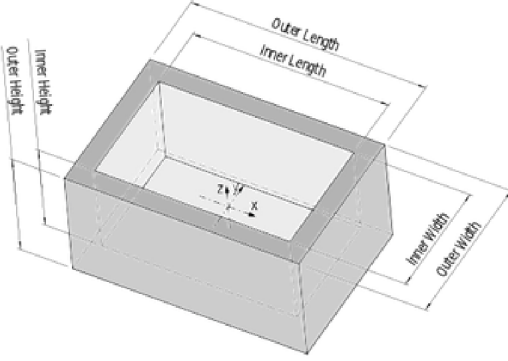
1. Select the "Select Region of Interest" button.
2. In the camera image, place a generous area over the objects by holding down the left mouse button.
When using a transport box: Draw the area around the external contours of the transport box.
3. Enter name.
4. Select the "Save" button.
5. *When using a transport box:* Create another ROI for the internal contour of the transport box in the same way as with the steps above. To do this, draw an area inside the transport box. The side walls of the transport box should *not* be included in this area.

Load carrier

- **Call up:** "Load Carrier" > "Add a new Load Carrier".

Create new Load Carrier

Type 1 1.
Type 2



Name 2.

Dimensions

Outer Length (m)	<input style="width: 90%; border: 1px solid gray; border-bottom: 2px solid red;" type="text"/> 0 ▲	Info
Outer Width (m)	<input style="width: 90%; border: 1px solid gray; border-bottom: 2px solid red;" type="text"/> 0 ▲	Info
Outer Height (m)	<input style="width: 90%; border: 1px solid gray; border-bottom: 2px solid red;" type="text"/> 0 ▲	Info
Inner Length (m)	<input style="width: 90%; border: 1px solid gray; border-bottom: 2px solid red;" type="text"/> 0 ▲	Info
Inner Width (m)	<input style="width: 90%; border: 1px solid gray; border-bottom: 2px solid red;" type="text"/> 0 ▲	Info
Inner Height (m)	<input style="width: 90%; border: 1px solid gray; border-bottom: 2px solid red;" type="text"/> 0 ▲	Info

Save 4.
Cancel

Create Load Carrier

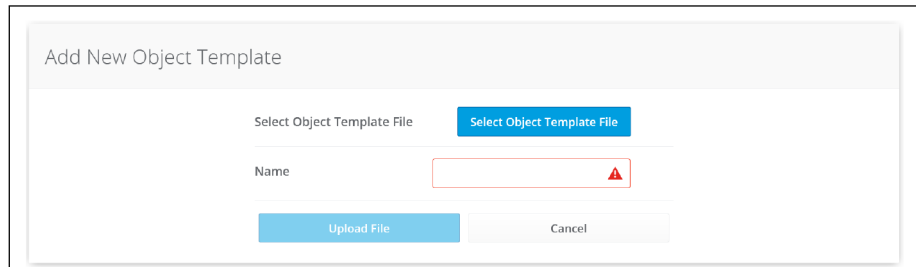
1. Select the appropriate type.
2. Enter name.
3. Enter dimensions.
4. Select the "Save" button.

Templates and Grasps

NOTE

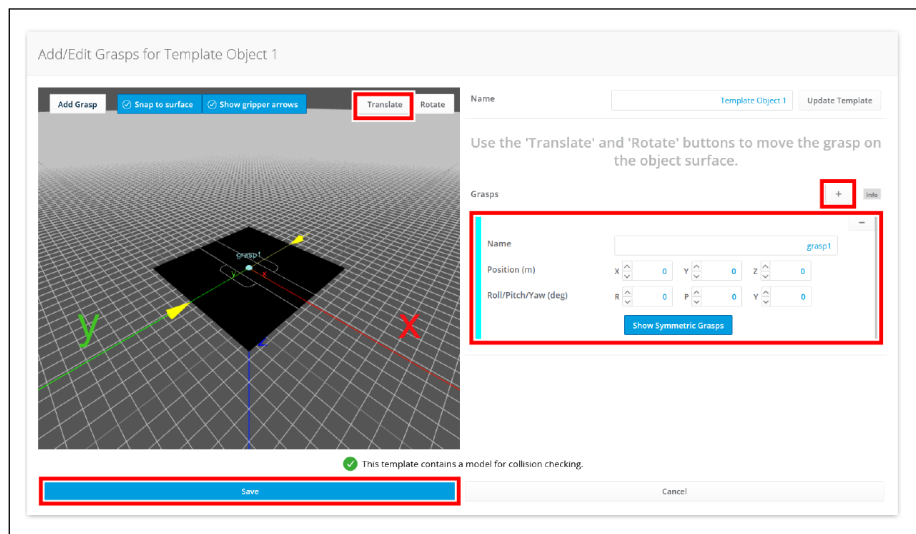
Templates of the objects to be gripped are created by SCHUNK and can be requested at mechatronics@de.schunk.com.

- **Call up:** "Templates and Grasps" > "Add a new Template"



Upload template

1. Select the "Select Object Template File" button and choose the template file from the file system.
2. Adjust the name if necessary.
3. Select the "Upload File" button.
 - ✓ Template is then loaded and displayed on the left side of the screen.



Define the Grasps

4. Select the "+" symbol to add a new grasp.
5. Use the "Translate" button on the left of the image to move the grasp to the desired position and orientation. The grasp is the center of the gripping stroke.

Note: If the template has symmetries, grasps that are symmetrical to the defined grasp can be displayed by selecting "Show Symmetric Grasps".
6. If necessary, define an additional, alternative grasp.
7. Select the "Save" button.

3.4.5.2 Calibrate Base Plane

Object recognition using the "SilhouetteMatch" module only works if the objects are placed on a defined plane. This plane has to be defined. There are two ways to do this in the Web GUI:

- *AprilTag*: This method detects the AprilTags in the scene and places a layer through the tags. At least three AprilTags must be placed on the base plane. This method should be used when the base plane is untextured and no external projector is connected.
- *Stereo*: This method obtains 3D information by comparing two images taken from different angles. This method is suitable for structured surfaces or when using a projector.
- *When using a transport box*: The transport box without objects is located under the camera.
- **Call up**: "SilhouetteMatch Settings" > "Calibrate Base Plane".



Calibrate Base Plane, stereo method

1. Select "AprilTag" or "Stereo" method.
For the "AprilTag" method, place three AprilTags on the base plane in the field of view of the camera. The AprilTags should form as large a triangle as possible.
2. Select "Region of Interest" (ROI).
Note: For the "stereo" method and when using a transport box, use the previously defined ROI without side walls.
3. If necessary, set "Plane Selection" and "Offset". Select the "Info" button to obtain further information.

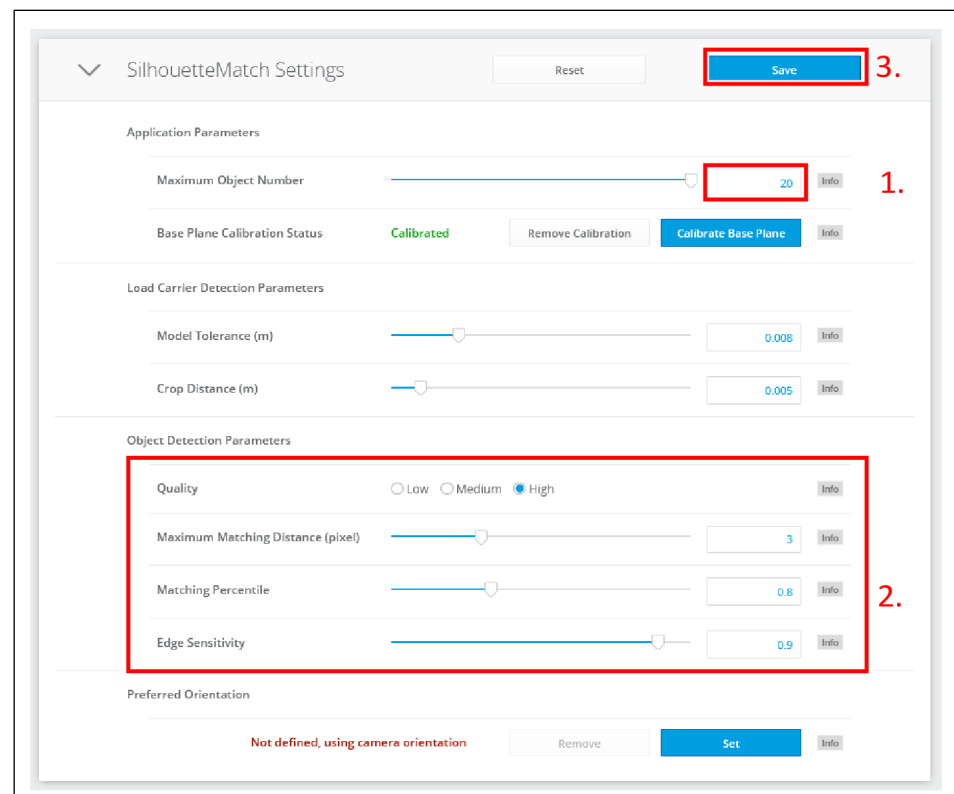
4. Click the "Start calibration" button.
 - ✓ Calibration is successful when the desired plane is displayed in green in the image.
 - ✓ Information regarding distance and inclination is displayed.
5. If calibration was not successful, adjust the parameters and select "Start calibration" again.

3.4.5.3 Test object recognition

In order to detect objects, the SilhouetteMatch parameters have to be individually adjusted to the scene and the objects. To do this, place as many objects as possible on the base plane in the field of view. Make sure that no objects are on top of each other.

Settings

- Objects are under the camera.
- **Call up: "SilhouetteMatch Settings"**

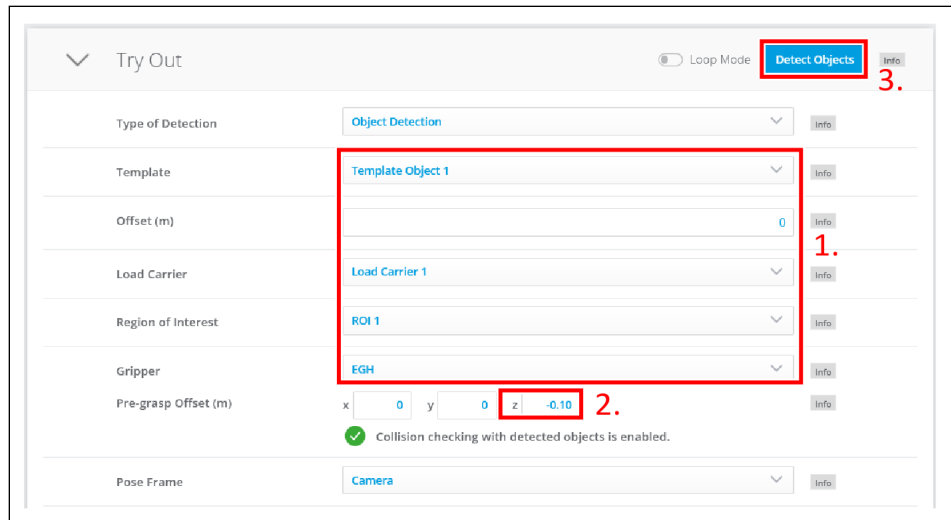


SilhouetteMatch Settings

1. Enter the Maximum Object Number "20".
2. Adjust object detection parameters individually to the scene. SCHUNK initially recommends the following values:
 - Maximum Matching Distance: 3
 - Matching Percentile: 0.8
 - Edge Sensitivity: 0.9
3. Select the "Save" button.

Test object recognition

- **Call up: "Try Out"**



Test object recognition

1. Select the previously defined parameters "Template", "Load Carrier", "Region of Interest (ROI)*" and "Gripper" in the drop-down menus.
 - * If a transport box is used, select the previously defined ROI for the external contours.
2. Enter the pre-grasp offset for the Z axis, e.g. "-0.1".
3. Select the "Detect Objects" button.
 - ✓ The object detection is started. The predefined template is compared with the object contours in the image.
 - ✓ Detected contours are marked in red. Reachable grasps are displayed as green dots, grasps in collision as red dots.
4. If object detection was *not* successful: Make adjustments according to the following table.
5. Select the "Save" button.
 - ✓ Camera parameters are set for the real scene.
 - ✓ The objects are detected by the camera.

Actions in case of faulty object detection

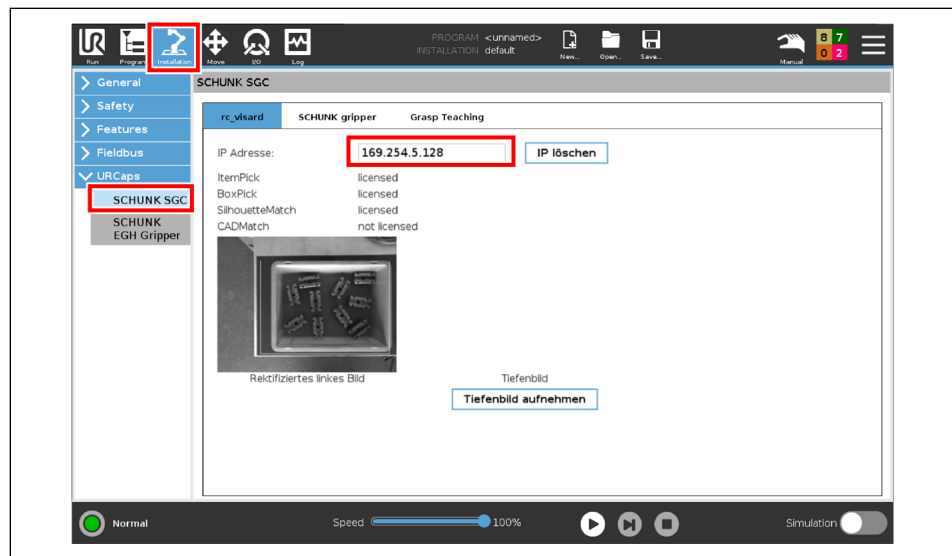
Event	Action
Not all objects are detected.	<ul style="list-style-type: none"> • Adjust the object detection parameters in "SilhouetteMatch Settings": <ul style="list-style-type: none"> – Increase Edge Sensitivity so that all edges necessary for object detection are displayed in blue in the image. – Increase the Maximum Matching Distance by 0.2 step by step. – Gradually reduce the Matching Percentile. – Select "Detect Objects" again. • If necessary, adjust the exposure parameters, Adjust exposure [▶ 15]. • Contact SCHUNK if object detection was unsuccessful.
Not all grasps are detected. Error message "All grasps are in collision" appears.	<ul style="list-style-type: none"> • Check whether objects are actually in the collision area and that a collision-free grip is not possible. • Check gripper finger geometry, grasps and gripping direction (O.D./I.D. gripping) and adjust if necessary. • Reduce collision distance or deactivate Check Bottom, Adjust collision check [▶ 18]
Transport box was not detected.	<ul style="list-style-type: none"> • Check whether the transport box is within the defined ROI. • Check the dimensions of the Load Carrier, Define parameters [▶ 21] • Increase model tolerance in "SilhouetteMatch Settings". • If necessary, adjust the exposure parameters, Adjust exposure [▶ 15].

3.5 Connect camera to robot

After the camera parameters have been set and saved on the PC, the camera can be connected to the robot.

- Camera is mounted on camera bracket.
 - Camera parameters are set and stored on the camera.
 - IP address of the camera is known, [Connect camera to PC](#) [► 12].
 - URCap of the camera (SCHUNK SGC) and the gripper (EGH SCHUNK) as well as the example program are available on the USB stick.
1. Connect the gripper electrically to the robot, see the assembly instructions for the gripper.
 2. Switch on the robot control system.
 3. Insert the USB stick into the interface on the back of the panel.
 4. Load URCaps "SCHUNK SGC" and "EGH SCHUNK" to the robot control system:
 - ✓ Select "Settings" > "System" > "URCaps" > "+" menu.
 - ✓ Select the software module "SCHUNK SGC" or "EGH SCHUNK" from the USB stick.
 - ✓ Select the "Open" button.
 - ✓ Select the "Restart" button to complete the installation.
 5. Select the "Open" > "Program" button.
 6. Load example program from USB stick.
 7. Select the "Save" > "Save program" button and save the program to the robot control system (not to the USB stick).
 8. Acknowledge the message "Overwrite file".
 9. Switch on the robot.
 10. Disconnect the network cable from the PC and connect to the EtherNet interface of the IO-Link Master.

11. Select the "Installation" > "URCaps" > "SCHUNK SGC" button.



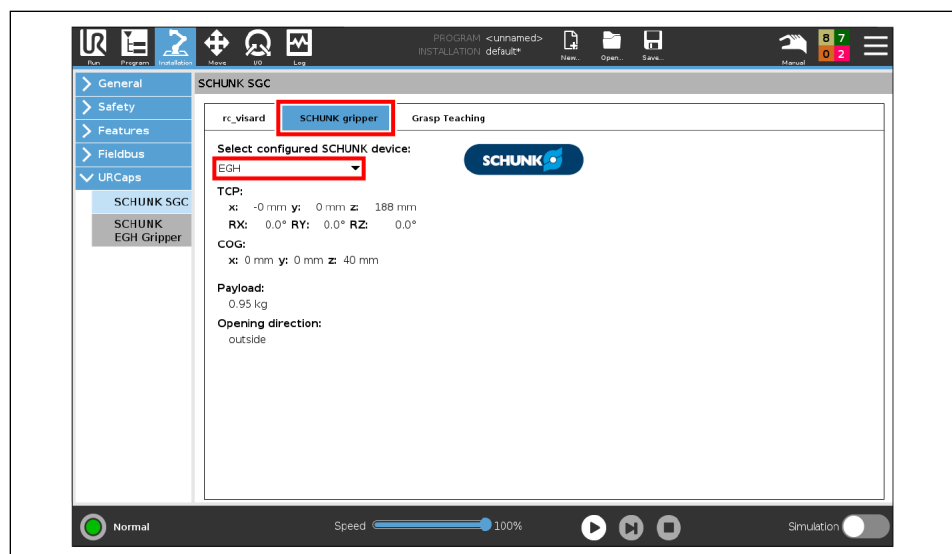
Select camera

12. Enter the IP address of the camera.

- ✓ After successful installation, the live image of the camera is displayed.

13. If no live image is displayed: Select the "SCHUNK SGC" button again to reload the page.

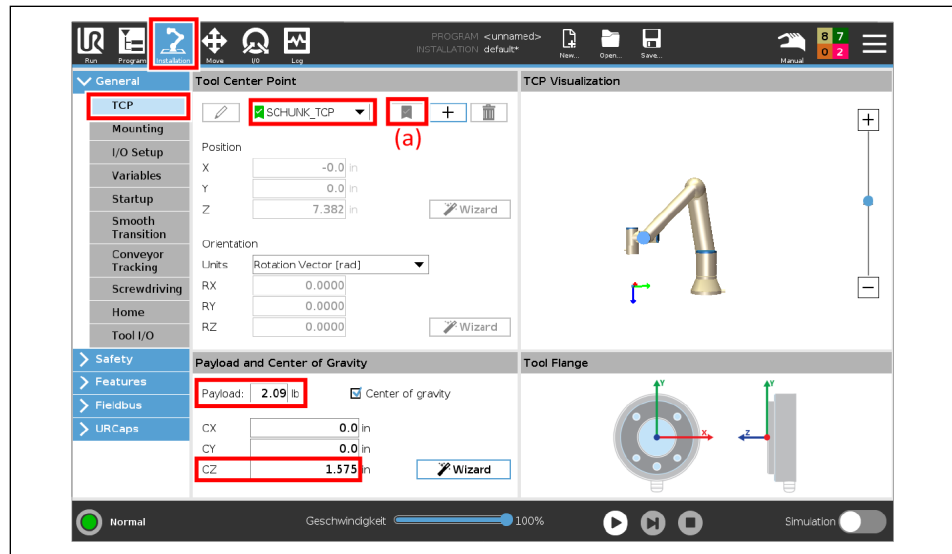
14. Select the "SCHUNK Gripper" button.



Select the gripper

15. In the drop-down menu, select the gripper previously defined in Web GUI.

16. Select the "Installation" > "General" > "TCP" button.



Set the Tool Center Point

17. Select "SCHUNK_TCP" in the drop-down menu.

Select (a) button to set selection to "Default".

18. Adjust payload and center of gravity "CZ".

- ✓ Payload: 0.95 kg
- ✓ CZ: 40 mm
- ✓ Camera is connected to the robot.
- ✓ Gripper defined in the Web GUI is selected.
- ✓ Example program for programming the robot is stored on robot control system.

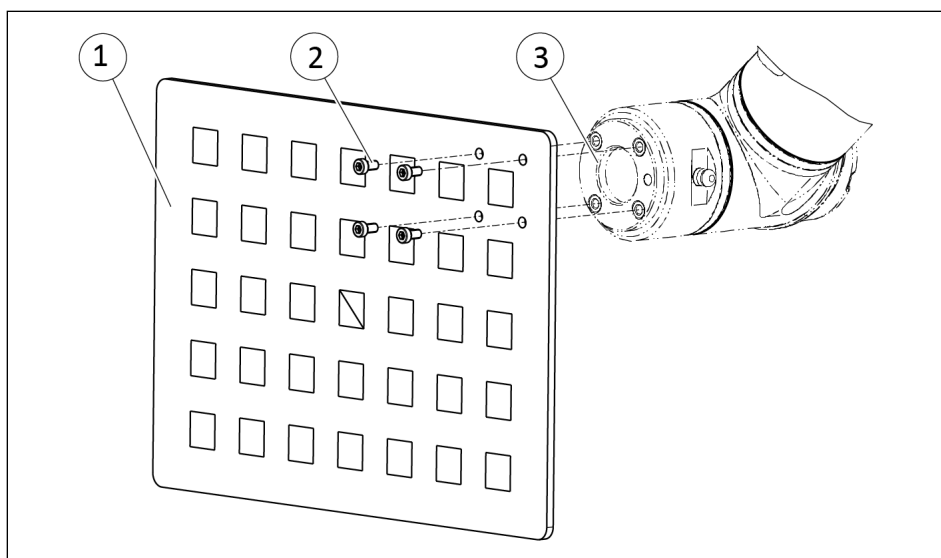
3.6 Hand-eye calibration

During hand-eye calibration, the coordinate system of the camera is calibrated to the respective robot coordinate system. Four different positions (poses 1 to 4) are set and stored with a calibration plate. Based on the calibration patterns from the different perspectives, the calibration is calculated automatically.

NOTE

Mounting the calibration plate to the robot arm is only necessary for the static variant. For the dynamic variant, the calibration plate is placed in the working area.

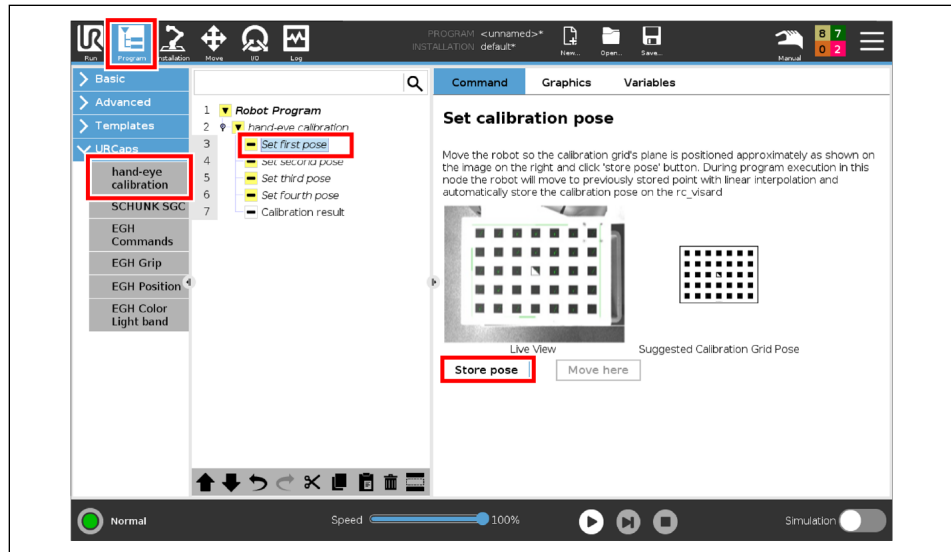
- Calibration plate is clean and free of scratches.
1. **Static variant:** Mount the calibration plate (1) to the robot flange (3) with four screws (2).
Dynamic variant: Place the calibration plate in the machining area, e.g. on the base plane. The position of the calibration plate may not be changed during the calibration process.



Mount calibration plate, only for static version

2. **Static variant:** Place the robot arm roughly under the camera. To do this, press and hold the "Freedrive" button on the robot control system and position the robot arm under the camera.

3. Select "New" > "Program" > "URCaps" > "Hand-Eye Calibration" button.
4. Select the camera mounting type in the drop-down menu.
5. Select "Set first pose".



Hand-eye calibration, pose 1

6. Position the robot arm so that the calibration plate is visible in the live image like the pose shown in the illustration on the right. To do this, pull the robot arm into position by holding down the "Freedrive" button or select "Store pose" to move the robot arm using movement commands (arrow keys). The camera should be as close as possible to the calibration plate.
 - ✓ Once the calibration plate is detected by the camera, a green frame appears around the calibration plate in the live image.
7. Select the "Store Pose" > "OK" button to save the position.
8. Perform calibration for poses 2 to 4. To do this, select "Set second pose" to "Set fourth pose" and repeat the process as with pose 1. The greatest possible inclination of the calibration plate should be visible in the live image.
9. Start robot program. **WARNING! The robot moves! Reduce speed if necessary.**
 - ✓ Positions are approached.

10. Select the "Next" > "Calibration result" button.
 11. Select the "Save calibration" button if the calibration was successful.
 - ✓ Note: If the program terminates because the calibration plate is not recognized, restart the program. If necessary, readjust the calibration positions or adjust the lighting conditions.
 12. Select the "Save" > "Save all" button in the header to save the calibration program.
 13. Disassemble the calibration plate from the robot arm or remove it from the base plane.
- ✓ Coordinate systems of the robot and camera are referenced.

NOTE

If the position of the camera to the robot is changed, the hand-eye calibration must be performed again.

Calibrate Base Plane

After the hand-eye calibration, the base plane must be calibrated via the robot control system.

- *When using a transport box:* The transport box without objects is located under the camera.
 1. Select "Program" > "New" > "URCaps" > "SCHUNK SGC" button.
 2. Select "SilhouetteMatch" and "CalibratePlane" from the drop-down menus.
 3. Select Method, ROI*, Offset – as previously done in the Web GUI – in the same manner.
 - * When using a transport box, use the previously defined ROI without side walls.
 For further information, [Calibrate Base Plane](#) [▶ 23]
 4. Select the "Calibrate" button.

3.7 Connect gripper to robot

NOTE

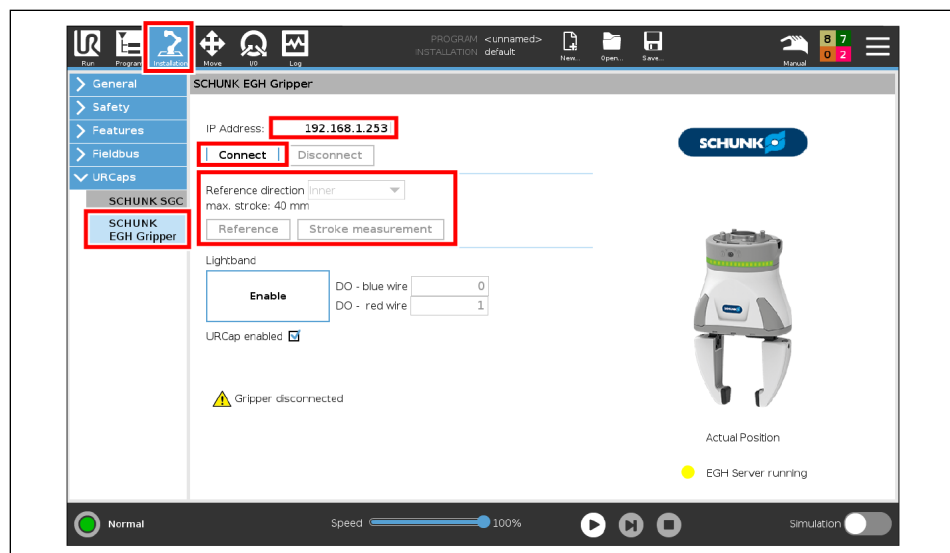
For detailed information on mounting and configuration, see the assembly instructions for the gripper and the software manual "SCHUNK Software Module for URCap, Flexible Gripper EGH", [Applicable documents](#) [▶ 4].

Mount gripper to robot

1. Mount gripper to robot:
 - ✓ **Static variant:** Mount ISO flange on robot.
 - ✓ Mount the gripper to the ISO flange.
 - ✓ Attach cable to robot arm using Velcro straps.
2. Secure gripper fingers to base jaws.

Connect gripper to robot control system

- Gripper is electrically connected.
 - TCP is set and URCap of the gripper (EGH SCHUNK) is installed, [Connect camera to robot](#) [▶ 28].
1. Select the "Installation" > "URCaps" > "SCHUNK EGH Gripper" button.
 2. Enter the IP address "192.168.1.253".
 3. Select the "Connect" button.
 4. Acknowledge error.
 5. Select the reference direction.
 6. Reference the gripper. **WARNING! The gripper moves!**



Connect and reference the gripper

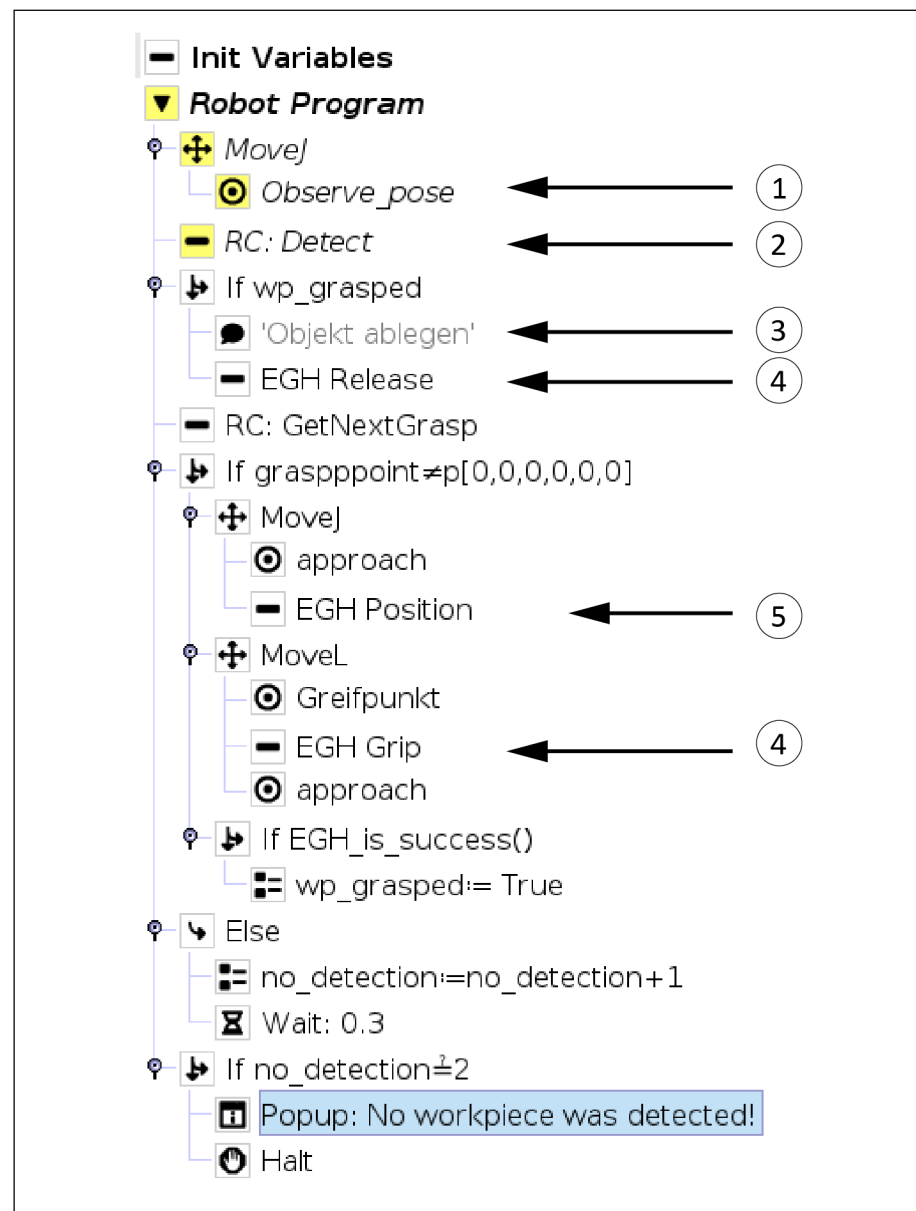
- ✓ Gripper is connected to the robot.

3.8 Create robot program

In order to provide the user with an easy introduction to programming, SCHUNK provides a program that implements a Pick&Place application. The program can be adjusted with just a few changes.

3.8.1 Load and adjust example program

- The objects are under the camera.
 - Example program is saved on the robot control system, [Connect camera to robot](#) [▶ 28].
1. Select the "Open" > "Program" button in the header line.
 2. Load example program.
 - ✓ The example program is displayed in the Explorer window.

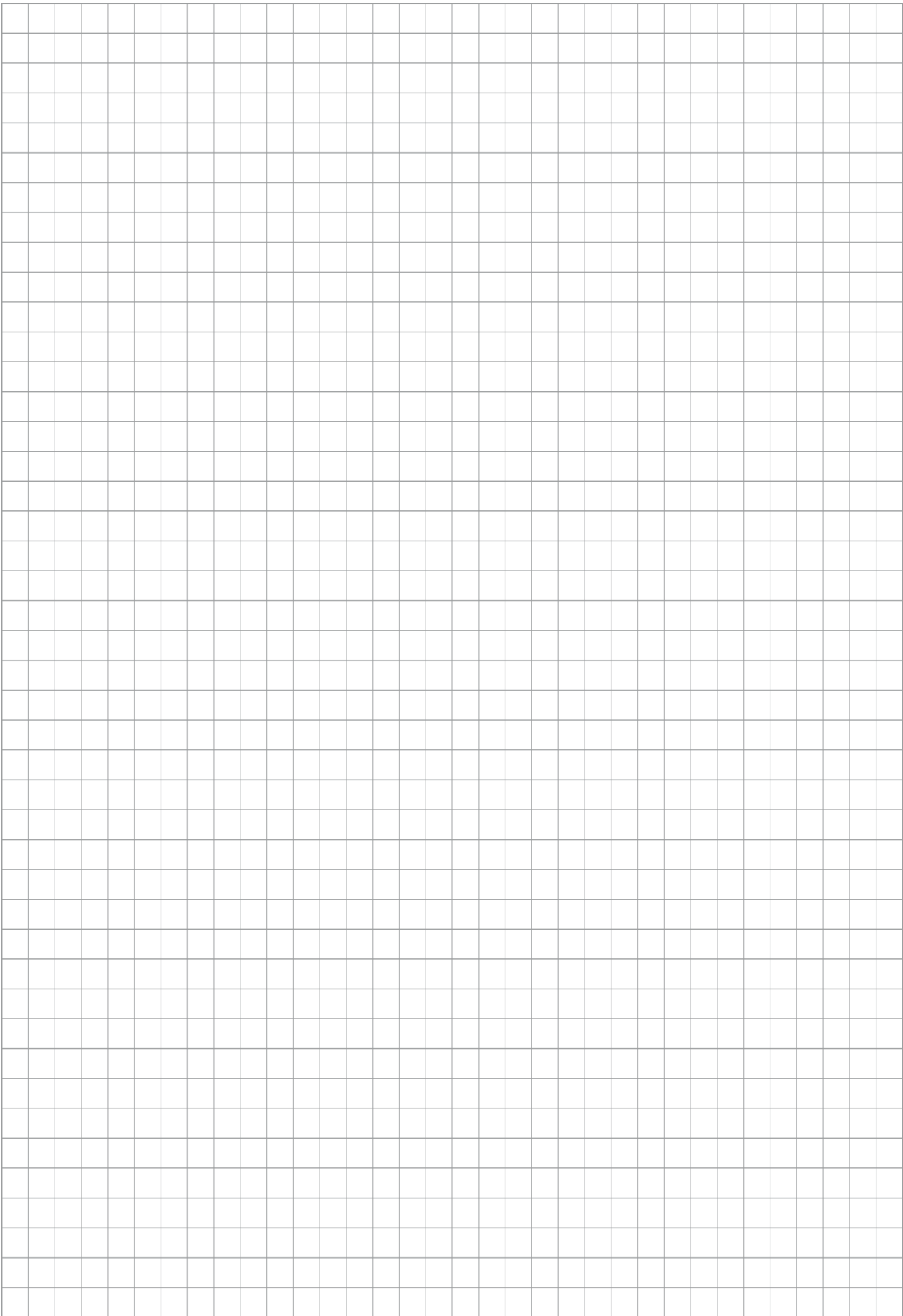


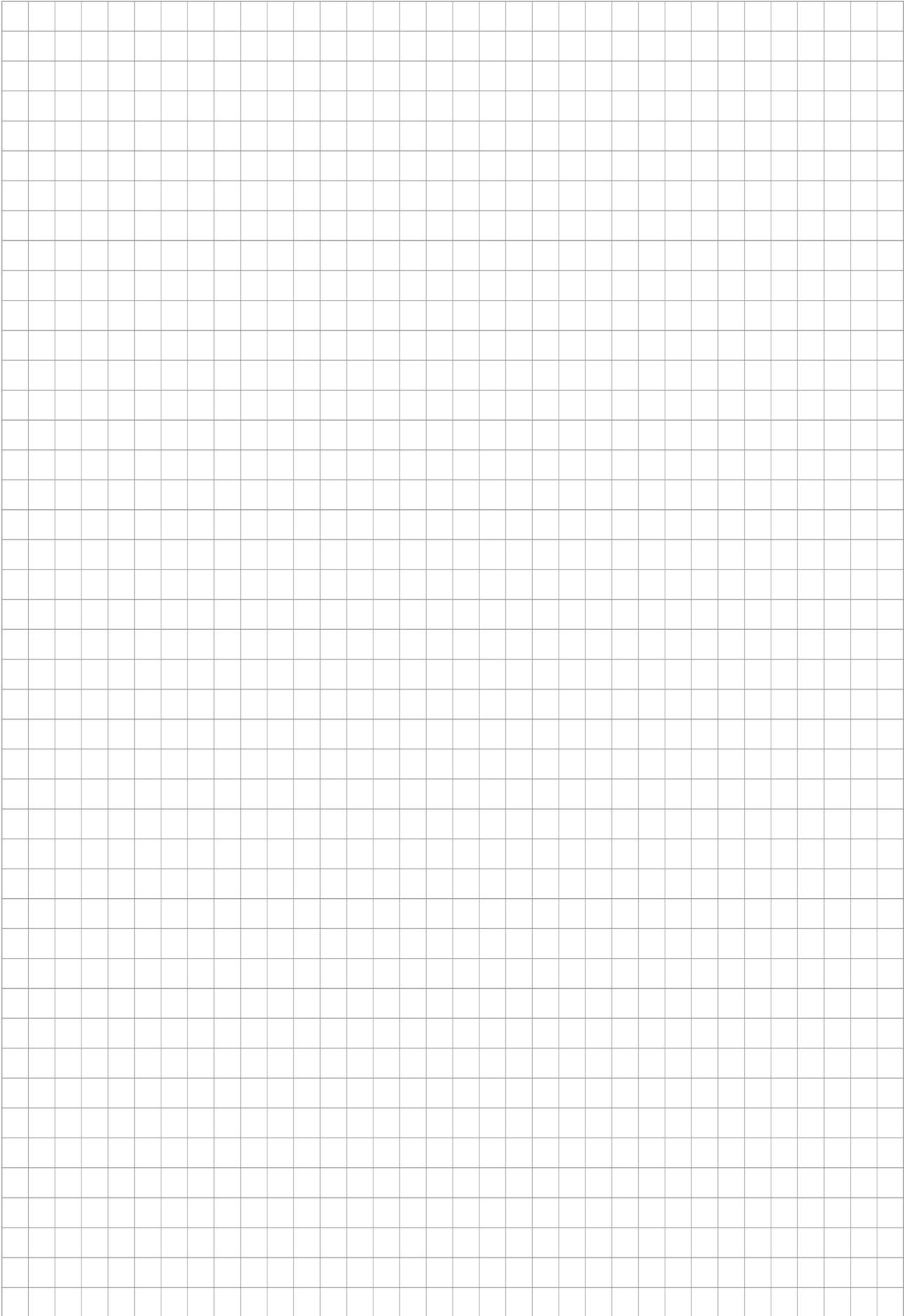
Example program

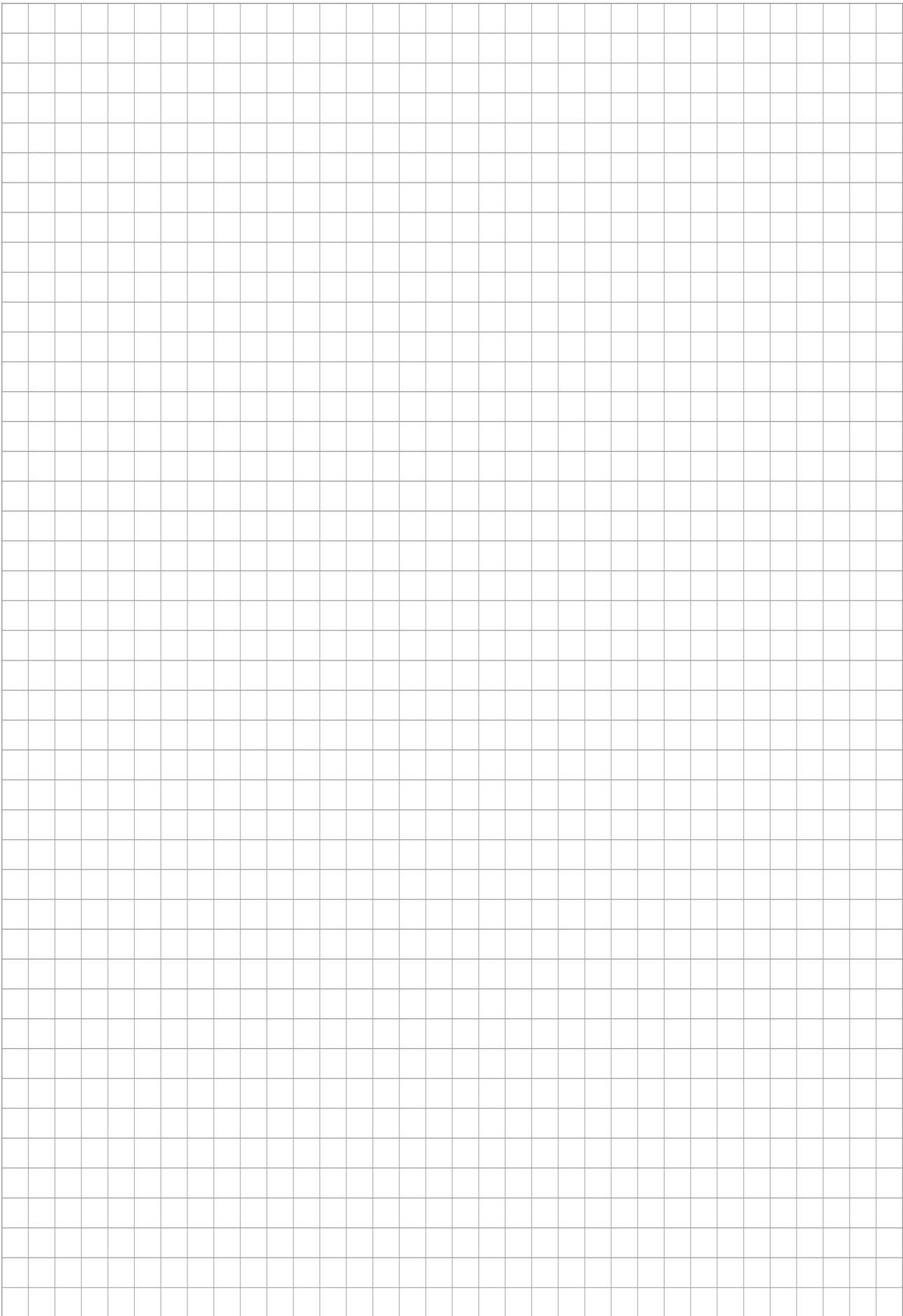
3. Adjust the program steps, see the following table.
4. Start the program. **WARNING! The robot moves!**
 ✓ Objects are recognized and gripped.

3.8.2 Adjustments in the example program

Item	Description
1	<p>Teach the position at which the picture is taken</p> <p>Static: Set waypoint outside the field of view of the camera between the Pick&Place position.</p> <p>Dynamic: Set waypoint above the workpieces to be detected, parallel to the base plane.</p> <p>Overwrite "observe" with the desired position.</p>
2	<p>In "Detect":</p> <p>Select template of the desired object, set Load Carrier, select ROI*, select gripper, set Pre-Grasp-Offset**.</p> <p>* ROI: When using a transport box, use the previously defined ROI for the external contours.</p> <p>** Pre-grasp offset in mm and negative for approach point above the detected object, e.g. -100.</p>
3	<p>Place object:</p> <p>Instead of the command "Place Object", a place function must be programmed by the user. Where should the picked objects be placed?</p>
4 (2x)	<p>If necessary, adjust the gripping direction of the EGH</p>
5	<p>Pre-positioning of the gripper to avoid collision.</p> <p>Adjust position to the workpiece to be gripped (take collision distance into account).</p>







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