Commissioning instructions

2D Grasping/SVC Kit

Translation of the original manual

Hand in hand for tomorrow

Imprint

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

Document number: 1530422

Version: 05.00 | 04/12/2025 | 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

Customer Management
Tel. +49-7133-103-2503
Fax +49-7133-103-2189
cmg@de.schunk.com

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 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.

In addition to these instructions, the documents listed under ▸ 1.1.4 [🗋 5] are applicable.

NOTE: The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

1.1.1 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.

NOTICE

Material damage!

Information about avoiding material damage.

1.1.2 Symbol definition

The following symbols are used in this manual:

■ Prerequisite for an action

1. Action 1
2. Action 2
   ⇨ Intermediate results

⇨ Final results

▸ 1.1.2 [🗋 5]: chapter number and [page number] in hyperlinks

1.1.3 Abbreviations

SVC	SCHUNK Vision Controller (Industrial PC)
AI	Artificial Intelligence

1.1.4 Applicable documents

- General terms of business *
- Assembly and operating manual for the gripper *
- Software manual "SCHUNK software module for URCap, *2D Grasping-Kit*" *
- Assembly and operating manual for the camera *ace 2 Basic* **
- Assembly and operating manual for the Industrial PC *AVA-RAGX* ***

The documents labeled with an asterisk (*) can be downloaded from:

*	**schunk.com**
**	**docs.balserweb.com**
***	**adlink.com**

1.1.5 Compatibility of the software versions

SVC version	URCap version	Simple API version
>=1.0.0.	1.0.0	1
>=1.1.0.	1.1.0	1
>=2.0.0.	2.0.0	2
>=2.1.0.	3.0.0	3
>=3.0.0.	4.0.0	4

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 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

- SCHUNK Vision Controller (SVC) incl. SCHUNK software
- *Optional*: SCHUNK gripper with accessories
- *Optional*: Camera incl. lens, heat sink and adapter plate for mounting the camera
- Safety information (product-specific instructions available online)
- Operating manuals for the camera, the power supply unit and the industrial PC
- Connection cable

1.4 Accessories

The following accessories can be ordered separately for the product:

- Calibration set consisting of calibration plate + vision spike (ID 1525649)
- Power supply IP 20 (ID 31001408)
- Power supply IP 67 (ID 1524336)

2 Basic safety notes

2.1 Intended use

- The product is used for automated object detection and gripping planning for robot applications in industrial environments.
- Appropriate use of the product includes compliance with all instructions in this manual.
- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

Example of misuse:

- Use of object recognition for purposes other than gripping planning, e.g., face recognition.

2.2 Notes for the operator/integrator

- Data provided by the 2D Grasping/SVC Kit to the robot control system depends on the quality of the data generated from the end user. As a result, it may be possible for the software to supply implausible grasping pose coordinates or gripper positions to the robot control system. Consider these possible cases when programming robots and ensure that the safety of the entire machine is guaranteed.
- 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.
- SCHUNK recommends the use of appropriate and suitable CE-compliant technology and equipment, e.g. design of the control cabinet according to ISO 60204-1.
- Observe the operating manuals for the individual components, ▶ 1.1.4 [🗋 5].
- To prevent unexpected starts of the robot system, SCHUNK recommends the use of restart protection for the robot control unit or similar protective measures.
- Maintain sufficient distance from moving components during operation.
- Perform cleaning and maintenance only when in de-energized state.
- Check all safety devices regularly.

2.3 Personnel qualifications

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.

The personnel has knowledge and experience of operating and programming robots.

2.4 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.

2.5 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.

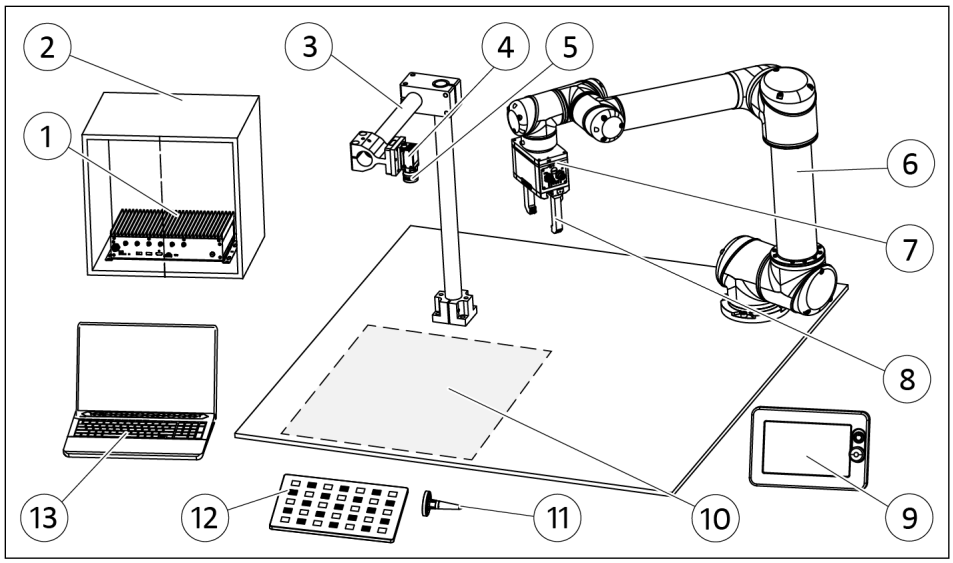
2.6 Malfunctions

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.

3 Design and description

3.1 Design – Camera static



Design 2D Grasping/SVC Kit

1	SVC (SCHUNK Vision Controller) = Industrial PC with SCHUNK AI-based end user software
2	Control cabinet incl. robot control system (Supplied by the customer)
3	Pillar assembly system (Supplied by the customer)
4	Camera
5	Lens
6	Robot (Supplied by the customer)
7	Gripper
8	Gripper fingers
9	Robot control panel (Supplied by the customer)
10	Machining area
11	Vision spike (calibration spike), optional
12	Calibration plate
13	User PC (Supplied by the customer)

3.2 Description

The 2D Grasping/SVC Kit is an optimally coordinated package consisting of camera, gripper, SVC (industrial PC) incl. software and the necessary accessories.

The package enables camera-based 2D gripping position determination of non-position-oriented workpieces. No image processing programming knowledge is required by the user.

The software intuitively guides the user. It enables simple capturing and labeling of object images, training of AI as well as testing. After that, the system is able to transfer collision-free grasping poses to the robot controller independently.

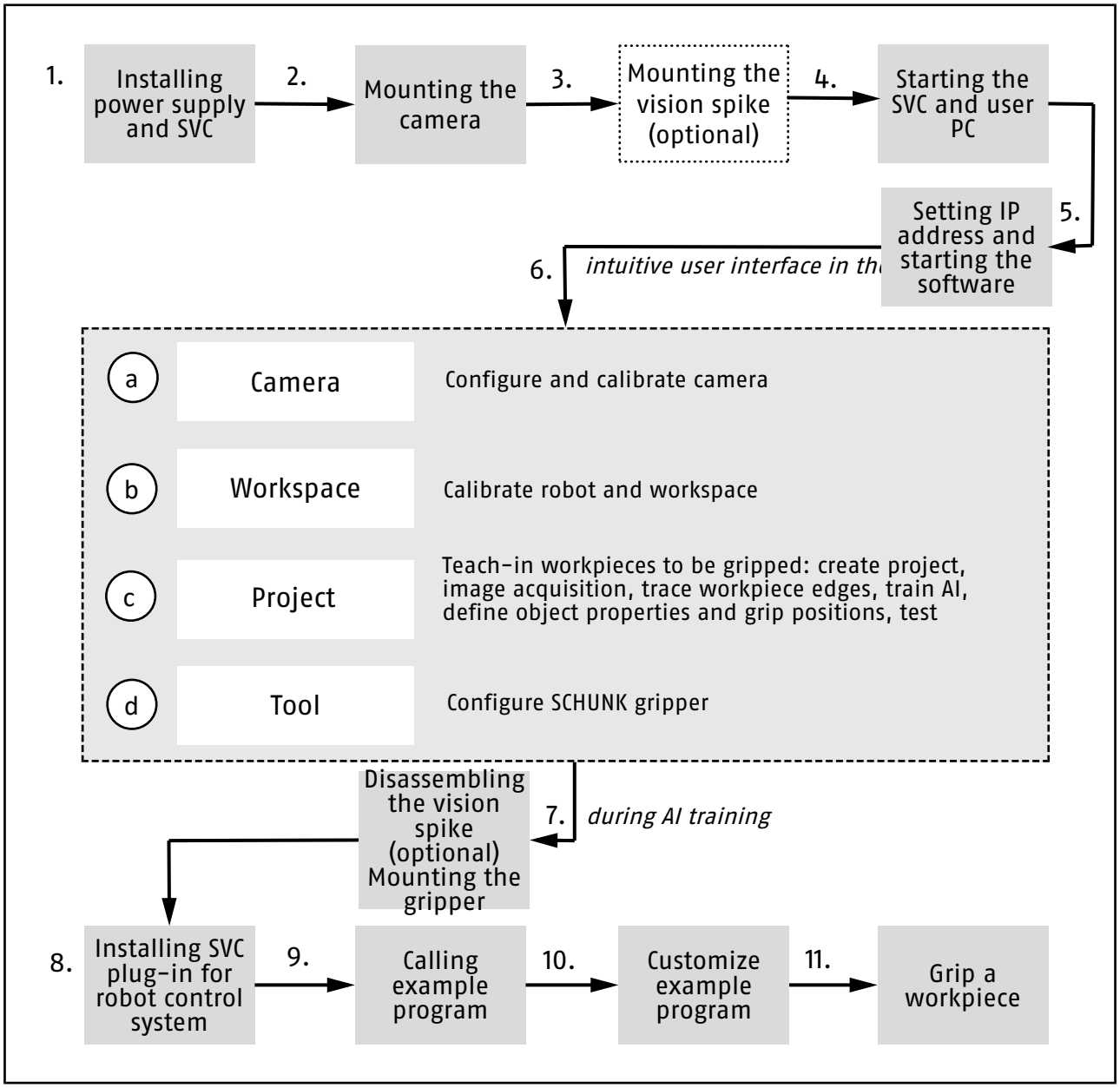
The integrator is responsible for controlling the robot arm and gripper.

4 Start-up

Note: The robot's ToolCenterPoint (TCP) must be calibrated by the customer for rotation and translation.

This section provides an overview of commissioning the 2D Grasping/SVC Kit.

Further information can be found in the following chapters, the manuals for the individual components, ▶ 1.1.4 [🗋 5] as well as help texts and videos in the software.



Commissioning sequence

4.1 Safety

⚠ 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.

Observe the additional safety notes in the component manuals!

4.2 Installing power supply and SVC

Wiring the 24V power supply cable

The scope of delivery includes a 24V voltage supply cable with open wire strands for connection to a power supply unit. A suitable power supply unit is available as an accessory from SCHUNK, ▶ 1.4 [🗋 6].

NOTE

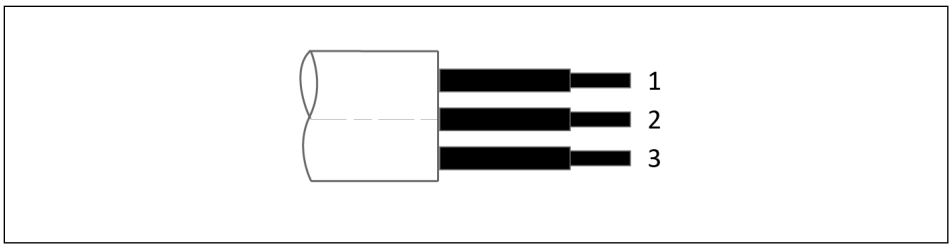
The power supply cable is not suitable for permanent movements. Use is only permitted for *non-automated movements*.

The power supply must meet the following requirements:

- Output voltage: 24V DC nominal
- Output power: at least 90 W
- Safety extra-low voltage SELV/PELV
- Design according to CE Directives 2014/30/EU and 2014/35/EU

Connection assignment Voltage supply cable

1. Wire strands 2 and 3 of the power supply cable to the power supply unit.
2. Signal of ignition pin 1 switchable (24 V/open).
   Note: The signal must be statically applied at all times during operation.

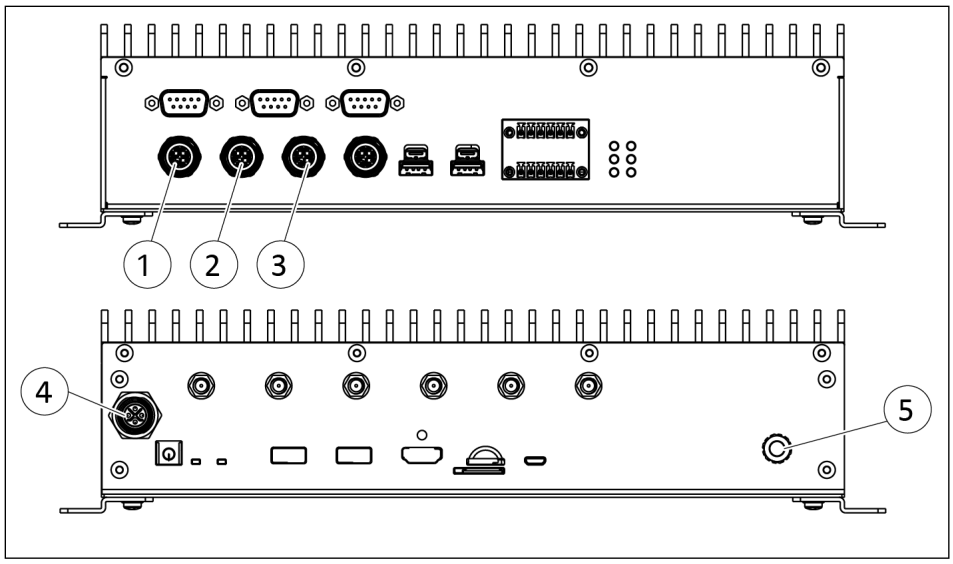


Cable with open wire strands

No.	Signal
1	Ignition/Starting the SVC. Note: SVC starts up when Vin + (24V) is statically applied here.
2	Vin + / +24V
3	Vin – / 0V GND

Installing and connecting SVC

Connections on the SVC



Connections on the SVC housing

Item	Connection for	Dimensions	SCHUNK ID Connection cable	Cable end
1	Camera (Ethernet and PoE=Power over Ethernet)	M12 connector, 8-pin, X-coded	1525641	Plug RJ45
2	Robot (Ethernet)			
3	User PC (Ethernet)			
4	Power supply unit (voltage supply 24V DC)	M12 connector, 4-pin, S-coded	1525644	Open wire strands
5	PE grounding conductor	M5		

1. Install the SVC at a suitable location, e.g. in a control cabinet. Observe the manufacturer's specifications, e.g. protection class, operating temperature, etc.
2. Push the ring clamp of the grounding cable onto the grounding bolt item 5 and secure it with an M5 nut.
3. Connect 24V power supply cable at item 4 and tighten the cap nut so it is hand-tight.
4. Connect three connection cables from the scope of delivery to items 1, 2 and 3 and tighten the cap nuts so they are hand-tight.

5. Insert the RJ 45 connector of the connection cable (1) into the camera, ▶ 4.3 [🗋 17].
6. Insert the RJ 45 connector of the connection cable (2) into the robot control system.
7. Insert the RJ 45 connector of the connection cable (3) in the user PC.

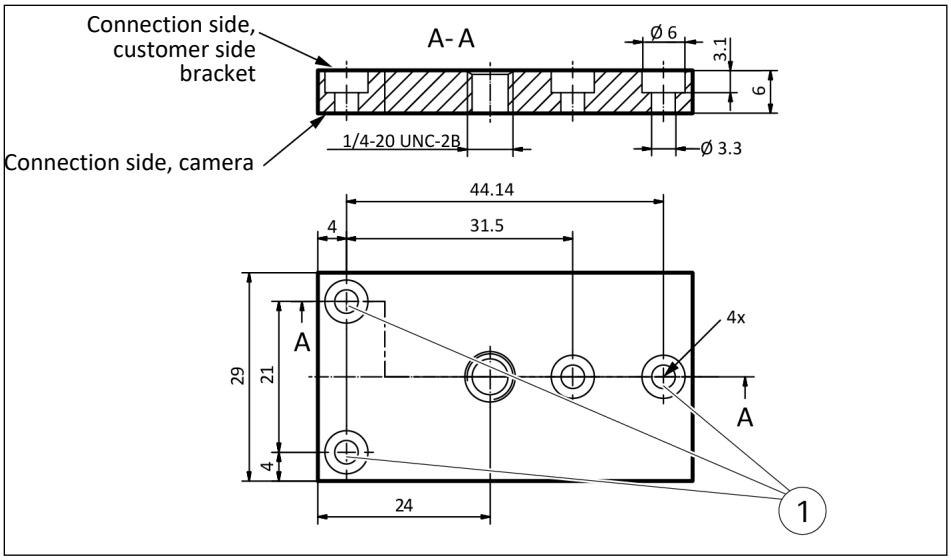
4.3 Mount camera

The camera can be mounted to the customer's bracket using an adapter plate or a heat sink. Alternatively, the camera can be mounted on the gripper/robot arm depending on the application.

Note: The following describes the process for mounting with an adapter plate on the customer's bracket. Mounting with a heat sink is similar.

- Dimensions of the adapter plate and the existing mounting holes (1) are included in the following drawing.
- Depending on the application, the adapter plate can be adapted with further additional mounting holes for mounting on the bracket.

Adapter plate

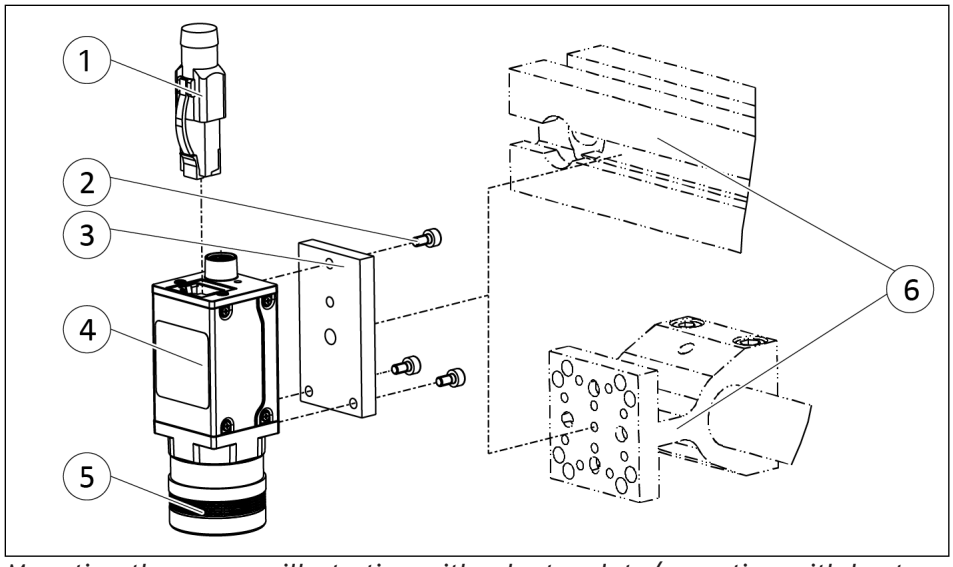


Adapter plate dimensions

Mounting the camera

- The adapter plate can be attached to the customer's bracket.

1. Fasten the adapter plate (3) to the camera (4) with three M3 screws (2).
2. Attach the adapter plate (3) to the customer's bracket (6).
   Note: The correct distance to the working surface depends on the focal length of the lens.
3. Remove the protective caps on the camera (4) and lens (5) and carefully unscrew the lens (5).
4. Insert the RJ 45 connector of the connection cable (1) into the camera and screw tight, ▶ 4.2 [🗋 15].
5. Attach the cable (1) outside of the camera image, observing the maximum permissible bending radii.
   Note: The voltage supply is supplied to the camera via the PoE output of the SVC (observe the maximum permissible power data).



Mounting the camera, illustration with adapter plate (mounting with heat sink is similar)

NOTE

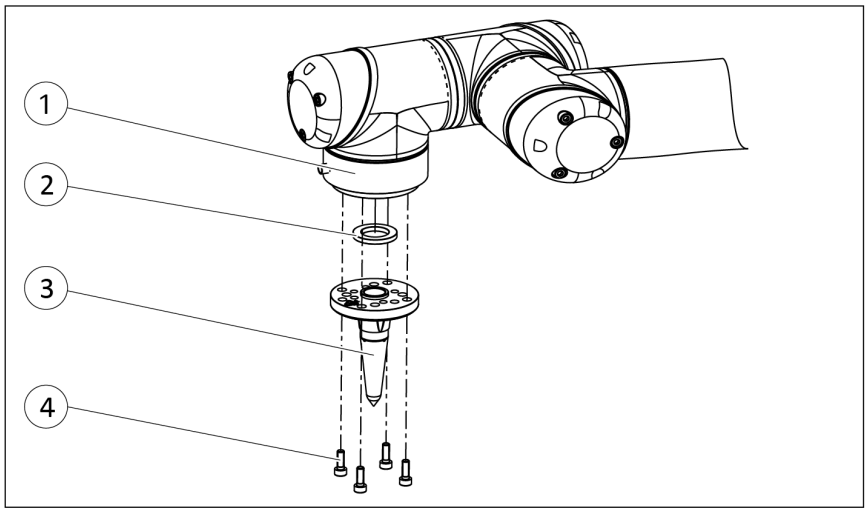
Further instructions for fine adjustment of the camera and lens and for calibration are provided after the software has started. The image sharpness, aperture and focus are adjusted manually on the lens.

4.4 Mounting the vision spike (optional)

NOTE

The vision spike is a calibration tip and is required together with a calibration plate to calibrate the robot. The calibration set is available as an accessory from SCHUNK, ▶ 1.4 [🗋 6].

1. Two centering rings are included in the scope of delivery of the vision spike. Select the centering ring (2) suitable for the robot flange (1) and insert it into the vision spike (3).
2. Fasten the vision spike (3) to the robot flange (1) with four screws (4).



Mounting the vision spike

NOTE

Further instructions for calibrating the robot are provided after the software has started.

4.5 Starting the SVC and user PC

- SVC is installed and connected to the 24V voltage supply.
- User PC, robot control system and camera are connected to the SVC with Ethernet cables, ▶ 4.2 [🗋 15].

1. Switch on the power supply.
2. Switch on the SVC, ▶ 4.2 [🗋 14].
   ⇨ SVC starts up or begins the boot process.
   ⇨ On the SVC, the blue LED on the on/off button lights up.
3. Switch on the user PC.
   ⇨ User PC boots up.

Switch off the SVC.

- Select the "SHUTDOWN" button in the software.
  ⇨ SVC shuts down.
  ⇨ On the SVC, the blue LED on the on/off button goes off.

NOTE

When you remove and re-apply the 24V signal at ignition pin 1 (▶ 4.2 [🗋 14]) the SVC will restart.

Notes in case of a failure of the mains voltage

- A short-term failure of the mains voltage is bridged by the SVC or the 24V power supply unit according to their CE certification.
- A prolonged failure of the mains voltage leads to a hard shutdown of the SVC. The operating system can handle this in principle but data from ongoing write operations will be lost, e.g. data from ongoing AI training.

  The same hard shutdown occurs when switching off the 24V signal at ignition pin 1 during ongoing operation and is therefore not recommended.
- The 24V DC supply of the SVC should not be switched off otherwise date and time data in the BIOS will not be up-to-date.

  Note: A power cap (buffer capacitor) is installed in the SVC, which can buffer the time and date in the BIOS for a few hours – without 24V voltage supply.

  If the device is disconnected from the voltage supply for a longer period of time, the date and time must be reset via the SVC software at *Settings > Date and Time*.

4.6 Setting IP address and starting the software

1. In the user PC under *Control Panel > Network Adapter > Properties* :
   Set static IP address 192.168.0.*xxx*.
   Enter subnet mask 255.255.255.0.
   - ⇨ Note on *xxx*: Except for "101", the last three digits can be freely selected, e.g. "100".
     However, make sure that the selected IP address is not yet assigned in the network.
   - ⇨ The IP address 192.168.0.*101* is reserved for the SVC and cannot be changed in the software. SCHUNK recommends noting the address on the SVC.
2. In the user PC, enter the IP address *192.168.0.101* in the address line of a browser.
   - ⇨ Note: Internet Explorer is not supported.
   - ⇨ The start page for the SVC software is displayed in the browser window.

Start window after the first call in the browser

NOTE

After starting the software for the first time, the end user is guided step by step in the "walkthrough".

The software supports all further necessary entries and settings with help pages.

5 Disassembly and disposal

⚠ 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.

- Disconnect the entire energy supply from the product, discharge any accumulated residual energy.
- Remove any lubricant and dispose of in an environmentally friendly manner.
- Follow local regulations on dispatching product components for recycling or proper disposal.

6 Translation of the original declaration of incorporation

in terms of the Directive 2006/42/EG, Annex II, Part 1 Section B.

Manufacturer/ Distributor	SCHUNK SE & Co. KG Spanntechnik | Greiftechnik | Automatisierungstechnik Bahnhofstr. 106 – 134 D–74348 Lauffen/Neckar

We hereby declare that the partly completed machine described below

Product designation:	2D Grasping/SVC Kit / /electric
ID number	1533275

meets the following basic occupational health and safety of the Machinery Directive 2006/42/EC:

No. 1.1.1, No. 1.1.2, No. 1.1.3, No. 1.1.5, No. 1.3.2, No. 1.5.1, No. 1.5.2; No. 1.5.4, No. 1.5.6, No. 1.5.8, No. 1.5.10, No. 1.5.11, No. 1.5.13

The partly completed machinery may not be put into operation until it has been confirmed that the machine into which the partly completed machinery is to be installed complies with the provisions of the Machinery Directive (2006/42/EC). The declaration shall be rendered invalid if modifications are made to the product.

Applied harmonized standards, especially:

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

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

Person authorized to compile the technical documentation:
Stefanie Walter, Address: see manufacturer's address

Signature: see original declaration

Lauffen/Neckar, April 2024

Dr.–Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

7 UKCA declaration of incorporation

in accordance with the Supply of Machinery (Safety) Regulations 2008.

Manufacturer/ Distributor	SCHUNK Intec Limited Clamping and gripping technology 3 Drakes Mews, Crownhill MK8 0ER Milton Keynes

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
"Supply of Machinery (Safety) Regulations 2008".
The declaration shall be rendered invalid if modifications are made to the product.

Product designation:	2D Grasping/SVC Kit / / electric
ID number	1533275

The partly completed machine may not be put into operation until it has been confirmed that the machine into which the partly completed machine is to be installed complies with the provisions of the "Supply of Machinery (Safety) Regulations 2008".

Applied harmonized standards, especially:

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

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

Person authorized to compile the technical documentation:
Marcel Machado, address: refer to manufacturer's address

Lauffen/Neckar, April 2024

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

8 Information on the RoHS Directive, REACH Regulation and Substances of Very High Concern (SVHC)

RoHS Directive

SCHUNK products are classified as "large-scale stationary installations" or as "large-scale stationary industrial tools" within the meaning of Directive 2011/65/EU and its extension 2015/863/EU "on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)", or fulfill their intended function only as part of one. Therefore products from SCHUNK do not fall within the scope of the directive at this time.

REACH Regulation

Products from SCHUNK fully comply with the regulations of Regulation (EC) No. 1907/2006 "concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)" and its amendment 2022/477. SCHUNK attaches great importance to completely avoiding chemicals of concern to humans and the environment wherever possible.

Only in rare exceptional cases do SCHUNK products contain SVHC substances on the candidate list with a mass content above 0.1%. In accordance with Article. 33 (1) of Regulation (EC) No. 1907/2006, SCHUNK complies with its duty to "communicate information on substances in articles" and lists the components concerned and the substances used in an overview that can be viewed at **schunk.com\SVHC**.

Signature: see original declaration

Lauffen/Neckar, April 2024

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

SCHUNK SE & Co. KG
Spanntechnik | Greiftechnik | Automatisierungstechnik

Bahnhofstr. 106 – 134
D-74348 Lauffen/Neckar
Tel. +49-7133-103-0
info@de.schunk.com
schunk.com

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