

SoftGripping Controlbox

Art.No.: SG.BP.1V.C4

Original instructions

This document describes the usage of the SoftGripping Control Box in the combination with a SoftGripper

Revision
Date of Revision: 2025-10-28



Tip: For your own safety, read the operating instructions and follow the warning and safety instructions on the device and in the operating instructions. Keep the operating instructions for future reference.



Tip: If you wish to get the operating manual in an additional language, please send us your request and the corresponding product code via email.



Warning! Not reading the manual properly can lead to injuries. Please mind the warnings provided in the operating instructions.

Technical Support: Do you have questions about the installation or operation of your device?

Email: info@soft-gripping.com

Publisher: SoftGripping GmbH
Hollerithallee 21
30419 Hannover
Germany

www.soft-gripping.com
www.soft-gripping.shop

Version: Product Code: SG.BP.1V.C4
Revision: 1.3.1
Date of Revision: 2025-10-28
Original Instructions
Errors and technical modification subject to change, you can find the newest version on our homepage.

Copyright: This document contains confidential information and may not be reproduced without written consent of SoftGripping GmbH.

© SoftGripping GmbH 2025 All rights reserved.

Contents

1.	About this document.....	4
1.1.	Applicable documents.....	4
2.	Safety.....	4
2.1.	Intended use.....	4
2.2.	General safety information.....	4
3.	Service.....	4
4.	Accessories.....	4
5.	Product Overview.....	5
5.1.	Design.....	Fehler! Textmarke nicht definiert.
5.2.	Pinout.....	6
6.	Function.....	7
7.	Installation.....	7
7.1.	Mechanical.....	7
7.2.	Pneumatic.....	7
7.3.	Electric.....	8
8.	Starting Procedure.....	9
8.1.	Quick Start Guide.....	9
8.1.1.	Step 1: Mounting and Connections.....	9
8.1.2.	Step 2: Software Installation.....	9
8.1.3.	Step 3: Establish Connection.....	9
8.1.4.	Step 4: Choose Operation Mode.....	9
8.1.5.	Step 3: Configure Parameters.....	9
8.1.6.	Step 3: Test and Operate.....	9
8.1.7.	Step 3: Safety Note.....	9
8.2.	Full Setup and Operation Guide.....	10
9.	Simple mode.....	12
9.1.	Pinout for simple mode.....	12
9.2.	Operation of simple mode.....	13
10.	Professional Mode.....	16
10.1.	Professional mode - Boost/Vacuum Switching (mode 1).....	16
10.1.1.	Pinout for professional mode – mode 1.....	16

10.1.2.	Operation of professional mode – mode 1.....	16
10.2.	Professional mode - Multi-Channel Pressure Profiles (mode 2).....	19
10.2.1.	Pinout for professional mode – mode 2.....	19
10.2.2.	Operation of professional mode – mode 2.....	19
11.	Software warnings	21
12.	Decommissioning	22
13.	Maintenance and Troubleshooting.....	22
14.	Disassembly.....	23
15.	Legal information.....	23
15.1.	Damage in transit	23
15.2.	Warranty and warranty conditions	23
15.3.	Declaration of Conformity	23
15.4.	Disposal	24
16.	EC – Declaration of Conformity.....	25

1. About this document

This document describes the usage of the product, certain aspects of the device are described in other documents and must be observed as well.

1.1. Applicable documents

You can find additional information in the Quick Installation Guides and data sheets. For all available documentation visit our website or contact us directly.

2. Safety

2.1. Intended use

The SoftGripping Controlbox is used to operate SoftGripper Fingers in following configurations: high-speed and collaborative pick and place applications, but all basic information is applicable to other product lines as well.

2.2. General safety information

- The product may only be used in its original status without unauthorized modifications.
- Only use the product if it is in perfect technical conditions.
- The use is intended inside building only.
- Take the ambient conditions at the location of use into consideration.

3. Service

Contact our regional SoftGripping partners if you need technical support.

4. Accessories

You can find all accessories in our catalogue and data sheets or on our website.

5. Product Overview

5.1. Design

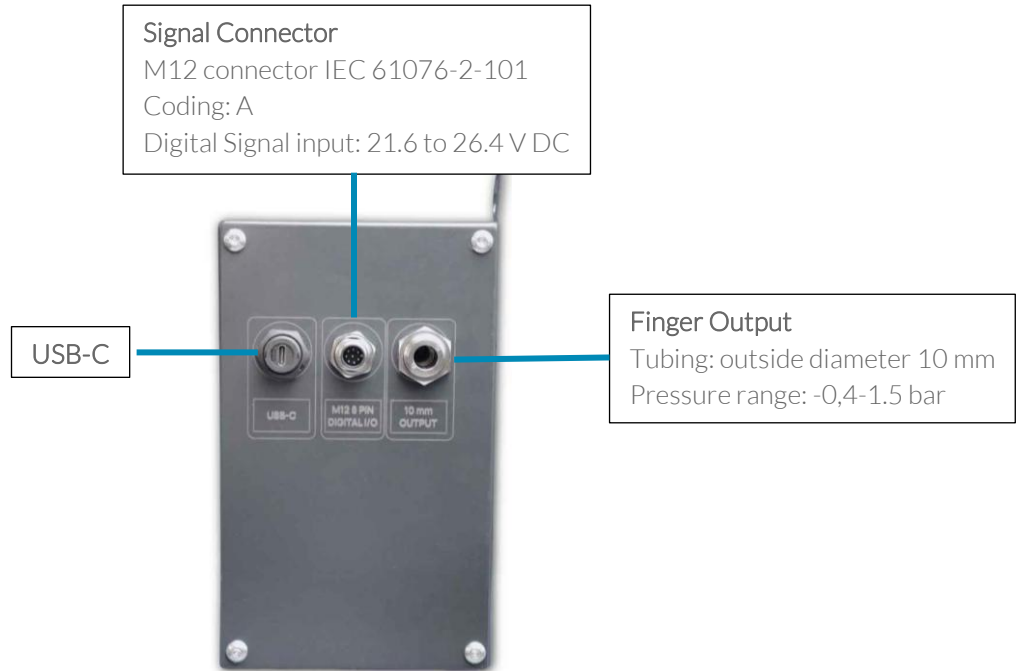


Figure 1: Back side of the SoftGripping Controlbox.



Figure 2: Front side of the SoftGripping Controlbox.

Characteristics

Input Air Pressure Connection	1 x 10 mm outside Ø
Output Pressure Connector	1 x 10 mm outside Ø
Input Pressure	3 - 8 bar
Output Pressure	- 0.4 to 1,5 bar
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]
Ambient Temperature	0 °C to 50 °C
Temperature of the medium	0 °C to 50 °C
Solenoid valve duty cycle	100 %
Signal Connector	M12 connector IEC 61076-2-101 5 Pins male
Digital Signal Input	7x 21.6 - 26.4 V DC 120 mA
Compatible Hardware	Soft-Gripping Fingers

Figure 3: Characteristics of the SoftGripping Control Box.

5.2. Pinout

Table 1: Pinout of the M12 connector.

Pin	Function	Mode 1	Mode 2	Color
1	+24VDC	24V DC Supply	24V DC Supply	White
2	GND	Ground	Ground	Brown
3	DIN 1	Pressure	Digital Input 1 (Trigger)	Green
4	DIN 2	Vacuum	Digital Input 2 (Slot Select LSB)	Yellow
5	DIN 3	Trigger	Digital Input 3 (Slot Select MSB)	Grey
6	DIN 4	Reserved (N.C.)	Reserved (N.C.)	Pink
7	DIN 5	Reserved (N.C.)	Reserved (N.C.)	Blue
8	DIN 6	Reserved (N.C.)	Reserved (N.C.)	Red

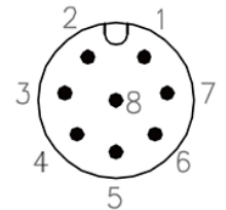


Figure 4: M12 connector male pinout.

6. Function

The SoftGripping Controlbox is used to operate any SoftGripper or SoftActuator. On the front side of the pneumatic box, the silencer is mounted to reduce the noise generated by the ejector's airflow. The pressure inlet is also located on the front. On the rear side of the box, you will find a USB-C port, an M12 8-pin connector, and the pressure outlet for the actuators and grippers.

7. Installation



Figure 5: SoftGripping Controlbox

7.1. Mechanical

Place the SoftGripping Controlbox in a suitable position to allow unhindered operation and ensure a safe working environment.



An unfavorable mounting position can impair the functionality of this product:

- Install the unit in a place where no condensation water from the compressed air line can collect in the device.
- Be sure that the box and the internal components are not heated above the maximal permitted operating temperature, either by the surrounding or hot compressed air.

7.2. Pneumatic

The SoftGripping Controlbox comes with the tubing needed to operate SoftGripper Fingers. You find two connectors for pneumatics, one on the front side and one on the back side. The input connector is used to supply the pressurized air on which the system operates. Make sure to use the right diameter of tubing and the compressor to be suitable for the task and does not exceed the maximal operating pressure. Connect the tubing

to the output connector and corresponding grippers. Ensure that the connections are not under pressure or energized before connecting. The compressed air to operate the SoftGripping Box, Fingers etc. must be in accordance with ISO 8573-1:2010 [7:4:4].



Keep the dangers of compressed air and the following points in mind:

- Make sure to connect and disconnect tubing while the compressor is turned off.
- Do not bend the tubing excessively. The flow must be provided at any time.
- Check the tubing for leaks and abrasions. Verify that you are using suitable tubing.
- Mind, that tubing with the right diameter must be used.
- The maximal input pressure should not be exceeded at any time.



Warning! Injury caused by pressurized system. To minimize risks of injuries while handling pneumatics:



- Wear personal protective equipment (PPE) such as hearing and eye protection at any time.
- and operate high pressure equipment behind a blast shield.

7.3. Electric

Connect the 8-pin M12 connector of the SoftGripping Control Box VP to your automation system. The pin assignment varies depending on the selected operation mode and is described in the corresponding subsections. Connect the USB-C port to a PC for configuration.



Keep the dangers of compressed air and the following points in mind:

- Make sure to connect and disconnect the plug while system is turned off.
- Make sure to operate the device with voltage according to the voltage range.
- Keep the component away from moisture.

Warning! Improper operation can cause electric shocks, damage to the machine and system.



- For the electrical power supply, only use PELV circuits in accordance with IEC 60204-1/EN 60204-1.
- Only use voltage sources that ensure a reliable electric separation from the mains network in accordance with IEC 60204-1/EN 60204-1.
- Keep the requirements of IEC 60204-1/EN 60204-1 for PELV circuits.

8. Starting Procedure

8.1. Quick Start Guide

This Quick Start Guide provides a condensed overview for setting up and commissioning the SoftGripping Control Box VP. It is intended for users who are already familiar with basic automation hardware and pneumatics.

8.1.1. Step 1: Mounting and Connections

Place the Control Box on a stable surface in a dry and ventilated environment. Connect the pneumatic input (\varnothing 10 mm tubing) to a regulated compressed air source (3–8 bar). Connect the pneumatic output to the gripper. Plug the M12 (8-pin) signal connector into your automation system. Connect the USB-C port to your PC using the supplied cable.

⚠ Ensure all pneumatic lines are depressurized before connecting.

8.1.2. Step 2: Software Installation

Download the configuration software at: <https://soft-gripping.com/assets/Soft-Gripping-installer.exe>
Launch the installer and follow the on-screen instructions. Start the SoftGripping-USB application.

8.1.3. Step 3: Establish Connection

In the software, select the correct COM port from the dropdown menu. Click “Connect”. The button will turn yellow during connection and green once successful. If the connection remains yellow, click “Disconnect”, check the port, and try again.

8.1.4. Step 4: Choose Operation Mode

Select either:

Simple Mode: For predefined gripping setups.

Professional Mode: For detailed pressure and timing configuration.

8.1.5. Step 3: Configure Parameters

Adjust finger size, number, spread speed, and vacuum angle (in Simple Mode). In Professional Mode, configure pressure channels, ramp times, and trigger behavior. Press “Apply Parameters” to write settings to the control box.

Tip: Use the “Readout Parameters” button to load existing device settings.

8.1.6. Step 3: Test and Operate

In Manual Mode, trigger actions via the GUI (“Grip”, “Relax”, “Spread”). In Automatic Mode, control is handled via digital inputs (M12 pins). Use binary signals (on pins 4–5) to select between up to 4 pressure profiles.

8.1.7. Step 3: Safety Note

Always verify the output pressure before activating the gripper. Never exceed the maximum pressure defined for your SoftGripper model. Commissioning must only be performed by qualified personnel.

8.2. Full Setup and Operation Guide

After connecting all components, turn on the robot and compressor. The SoftGripping Controlbox comes pretested and adjusted to 1 bar / 0.1 MPa output pressure.

Download the SoftGripping software using the Link <https://soft-gripping.com/assets/Soft-Gripping-installer.exe> or use the following QR-code:



Launch the SoftGripping installer and follow the on-screen instructions to complete the installation. Start the Soft-Gripping-USB program. After launching the software, the Start window will appear.

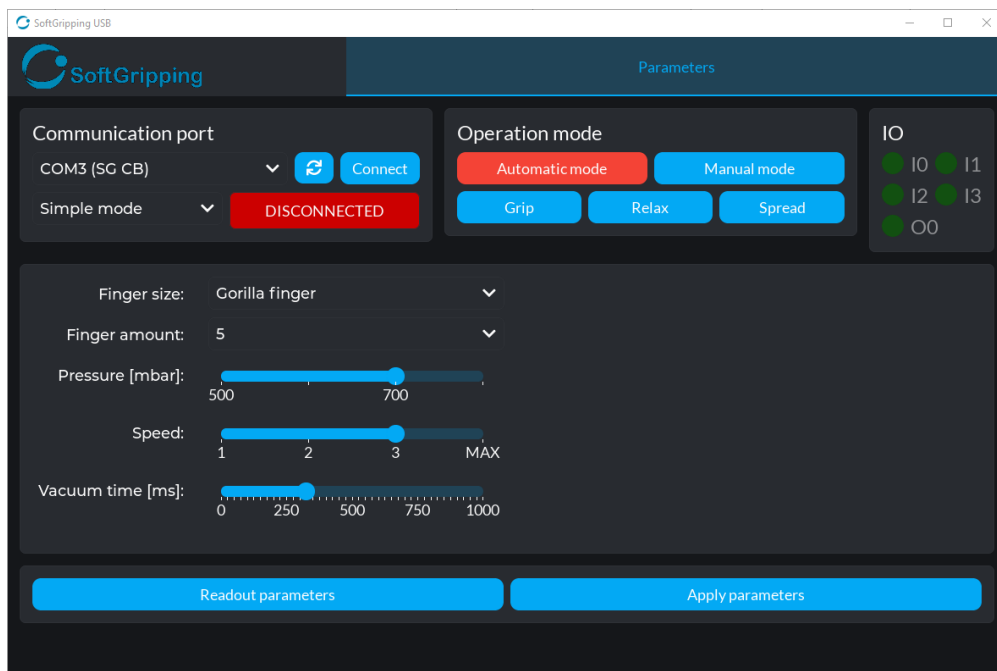


Figure 6 Start window

To establish communication with the control box, select the correct Com port from the drop-down menu (1). Then, click the "Connect" button (2) to initiate the connection.

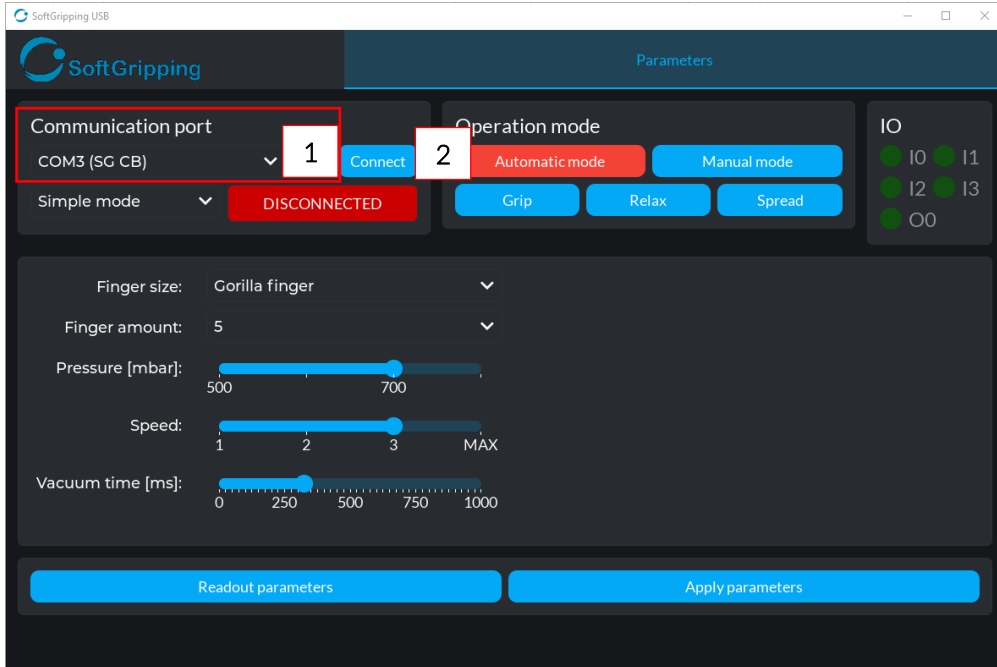


Figure 7 Com port

While the connection is being established, the button turns yellow. If the connection is successful, the red button labeled "Disconnected" will change to green and display the label "Active" (3). If the button remains yellow for an extended period and does not switch to green, click "Disconnect" and check whether the correct COM port is selected.

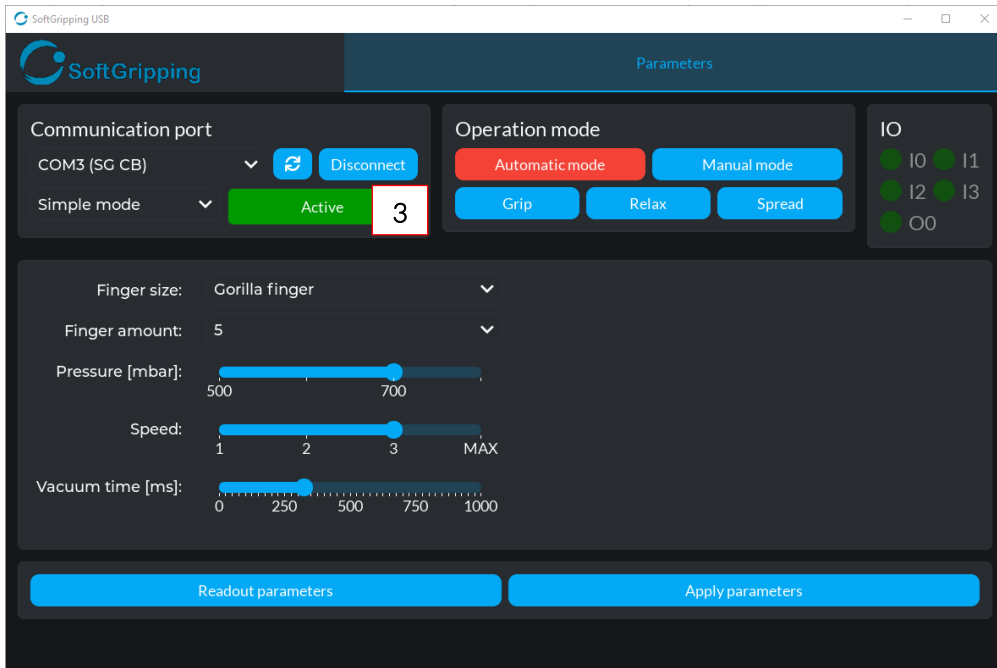


Figure 8 Active connection

You can choose between two modes: Simple Mode and Professional Mode (4).

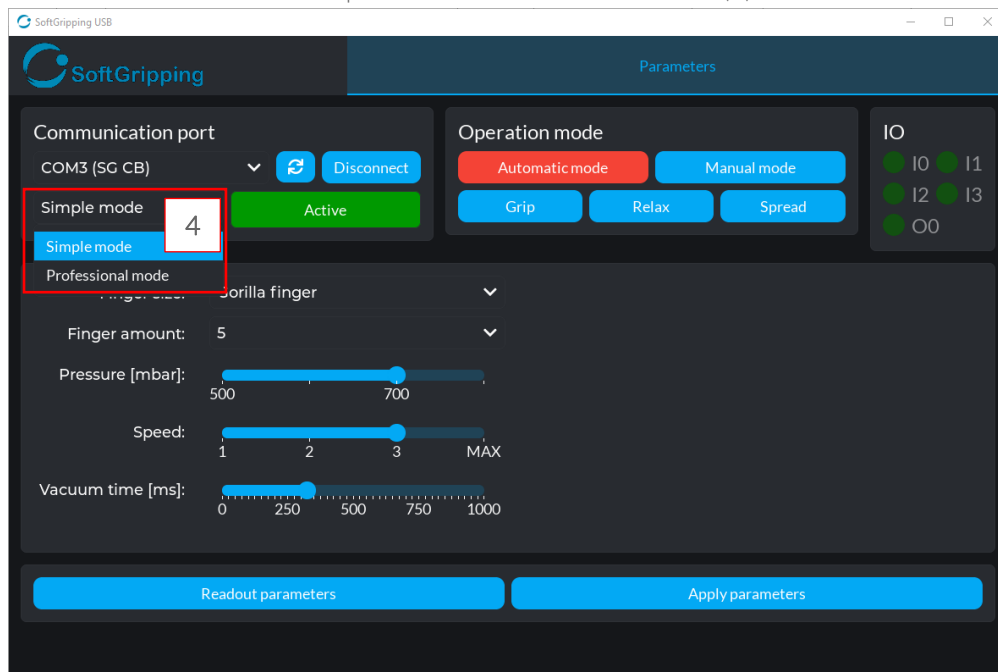


Figure 9 Mode selection

9. Simple mode

9.1. Pinout for simple mode

Table 2: Pinout of the M12 connector for simple mode

Pin	Function	Description	Color
1	+24VDC	24V DC Supply	White
2	GND	Ground	Brown
3	DIN 1	Digital Input 1 (Trigger)	Green
4	DIN 2	Digital Input 2 (Digital Input)	Yellow
5	DIN 3	Digital Input 3 (Digital Input)	Grey
6	DIN 4	-	Pink
7	DIN 5	-	Blue
8	DIN 6	-	Red

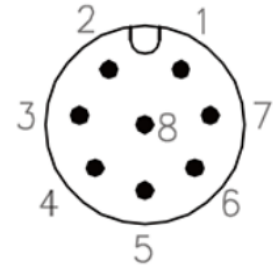


Figure 10: M12 connector male pinout.

9.2. Operation of simple mode

In “Simple mode”, the size (5) and number of fingers (6) must be selected.

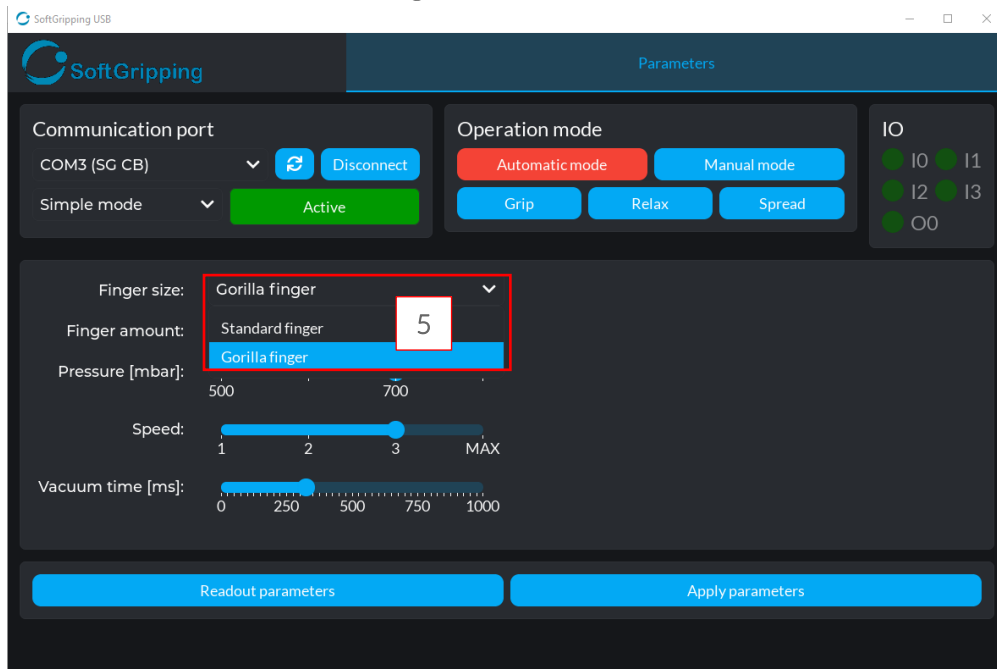


Figure 11 Finger size

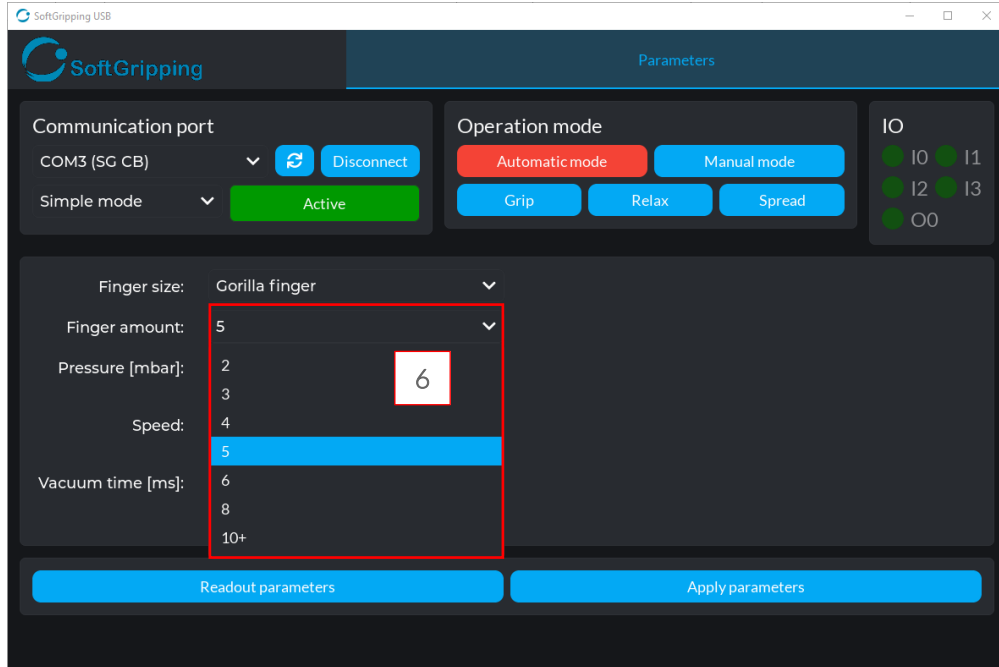


Figure 12 Finger amount

For each configuration, four predefined speed levels are available for the finger spreading motion (7). Note that higher speeds may reduce the overall lifespan of the system. The spreading angle of the fingers can be adjusted using the vacuum slider (8).

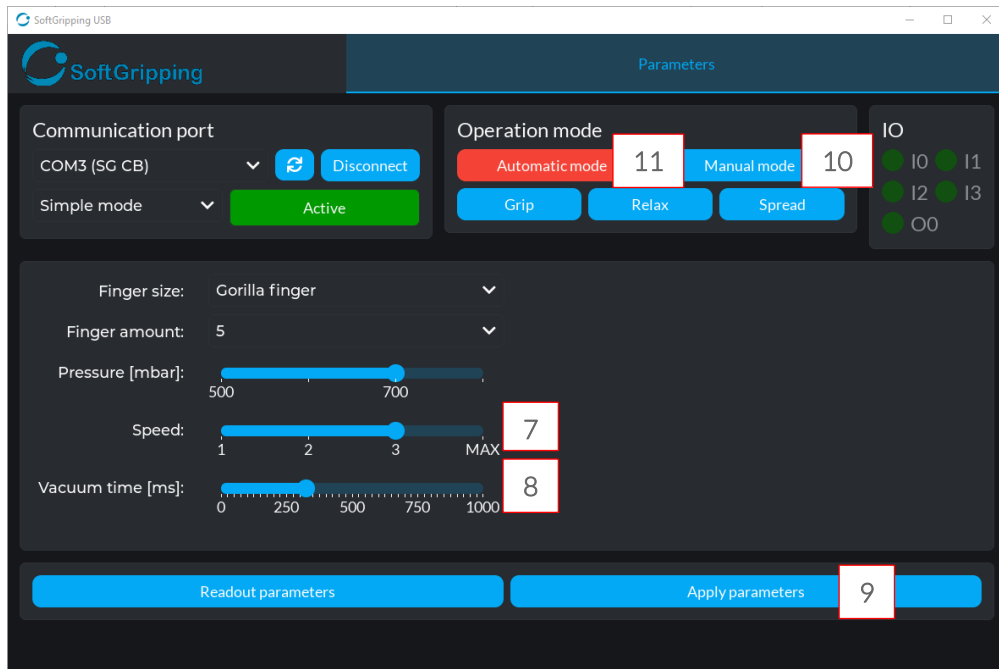


Figure 13 Further settings in simple mode

Once you have configured the parameters according to your requirements, click the "Apply Parameters" button to transfer the values to the control box (9).

You can choose between two operation modes by clicking the corresponding button. The end effector can be operated manually (10) using the "Grip", "Relax", and "Spread" buttons. In Automatic Mode (11), the actuation is controlled via the M12 connector by the system.

10. Professional Mode

If further adjustments are required, you can switch to Professional mode (12), where two operation modes (1 and 2) are available. Each mode allows the storage of a unique parameter set for pressure and timing settings.

10.1. Professional mode - Boost/Vacuum Switching (mode 1)

10.1.1. Pinout for professional mode – mode 1

Table 3: Pinout of the M12 connector.

Pin	Function	Mode 1	Mode 2	Color
1	+24VDC	24V DC Supply	24V DC Supply	White
2	GND	Ground	Ground	Brown
3	DIN 1	Pressure	Digital Input 1 (Trigger)	Green
4	DIN 2	Vacuum	Digital Input 2 (Slot Select LSB)	Yellow
5	DIN 3	Trigger	Digital Input 3 (Slot Select MSB)	Grey
6	DIN 4	Reserved (N.C.)	Reserved (N.C.)	Pink
7	DIN 5	Reserved (N.C.)	Reserved (N.C.)	Blue
8	DIN 6	Reserved (N.C.)	Reserved (N.C.)	Red

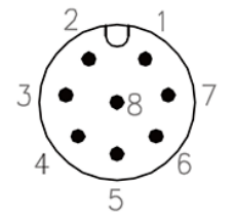


Figure 14: M12 connector male pinout.

10.1.2. Operation of professional mode – mode 1

In mode 1 you can configure one pressure level:

Pressure 1	Set pressure (in mbar)
Boost pressure 1	Optional pressure boost value (in mbar)
Max pressure	Upper limit for pressure
Min pressure	Lower threshold for operation
Spread time 1	= Vacuum time (in ms) with which the spread angle of the fingers is set
Relax ramp time	Time to gradually relax pressure (in ms)
Ramp time	Overall ramp-up time for pressure buildup (in ms)

To better understand the effect of the configurable parameters in professional mode, the diagram below illustrates the pressure profile over time for chosen configurations.

The graphs show how the applied pressure (in mbar) builds up over time (in milliseconds) for a six finger gripper (not integrated) after a command is issued. The measured data reflects different combinations of:

- Set pressure (target pressure)
- Boost pressure (additional short-time pressure to reduce the time for pressure to rise)

- Ramp time (time for pressure to rise from atmospheric pressure to selected pressure level if boost is not applied, limited by hardware)
- Spread time (duration of vacuum application)

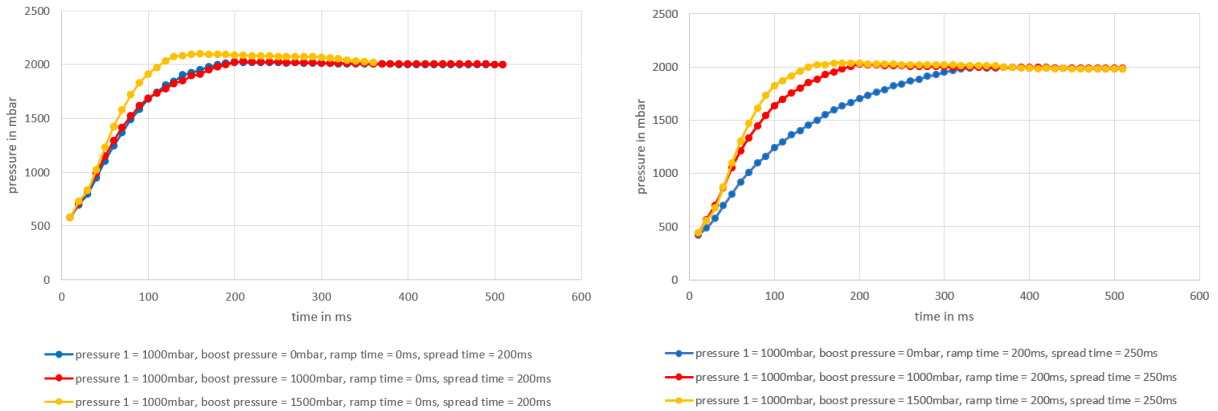


Figure 15 Pressure changes within a finger with different settings

Note: The diagrams show absolute pressure, not the pressure difference relative to atmospheric pressure. This is important when interpreting values below or near ambient pressure (approx. 1000 mbar).

Use these charts as a reference to fine-tune gripping behavior depending on the application.

A higher boost pressure leads to a faster and more aggressive pressure rise. Excessive boost pressure can cause overshooting, where the system briefly exceeds the intended target pressure. This may lead to undesirable force on the object and reduce the fingers' service life. Without boost the pressure increases more gradually. All curves approach the same final pressure, but the speed of response varies depending on the selected parameters.

The ramp time controls how fast the pressure ramps up toward the setpoint. It describes the time for pressure to rise from atmospheric pressure to selected pressure level if boost is not applied and is limited by the used hardware.

The spread time influences how long vacuum is applied. The longer the spread time, the lower (stronger) the vacuum becomes, as the system has more time to evacuate air.

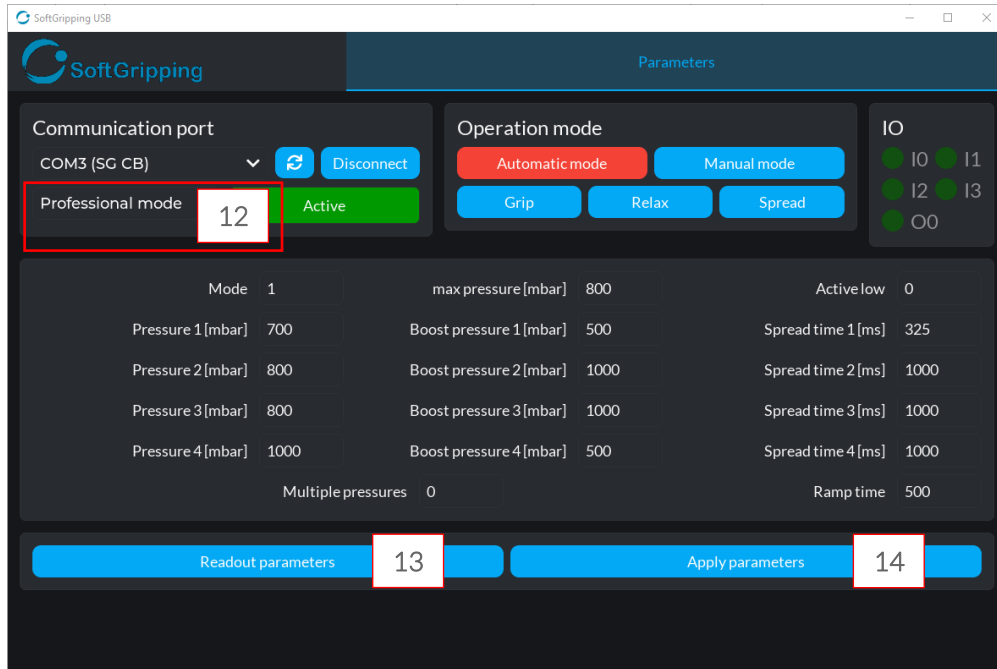


Figure 16 Professional mode – mode 1

The pressure levels 2 to 4 are not available in this mode. In Mode 1, activating the trigger in automatic mode only switches between boost pressure and vacuum.

The "Active low" parameter (set to 0 or 1) defines how the gripper reacts to control signals in automatic mode: if set to 0, the corresponding pin is activated by a high signal (opens); if set to 1, the pin is activated by a low signal (closes). This setting determines whether the gripper will open or close the valve in response to a signal.

If you want to read the parameters from an existing configuration, simply click the "Readout parameters" (13) button. This will load all current settings from the connected device into the interface, allowing you to review and, if necessary, adjust them. After making any desired changes, press the "Apply parameters" (14) button to send the updated values back to the device. This ensures that the gripper operates with the most recent and correct pressure and timing settings.

10.2. Professional mode - Multi-Channel Pressure Profiles (mode 2)

10.2.1. Pinout for professional mode – mode 2

Table 4: Pinout of the M12 connector for Mode 2 in professional mode

Pin	Function	Description	Color
1	+24VDC	24V DC Supply	White
2	GND	Ground	Brown
3	DIN 1	Digital Input 1 (Trigger)	Green
4	DIN 2	Digital Input 2 (Profile Select LSB)	Yellow
5	DIN 3	Digital Input 3 (Profile Select MSB)	Grey
6	DIN 4	-	Pink
7	DIN 5	-	Blue
8	DIN 6	-	Red

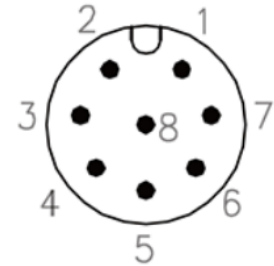


Figure 17: M12 connector male pinout.

10.2.2. Operation of professional mode – mode 2

In mode 2 you can configure up to four pressure levels if you set “Multiple pressure” (15) to 1:

Pressure 1-4	Set pressure (in mbar)
Boost pressure 1-4	Optional pressure boost value (in mbar)
Max pressure	Upper limit for any pressure
Min pressure	Lower threshold for operation
Spread time 1-4	= Vacuum time (in ms) with which the spread angle of the fingers is set
Relax ramp time	Time to gradually relax pressure (in ms)
Ramp time	Overall ramp-up time for pressure buildup (in ms)

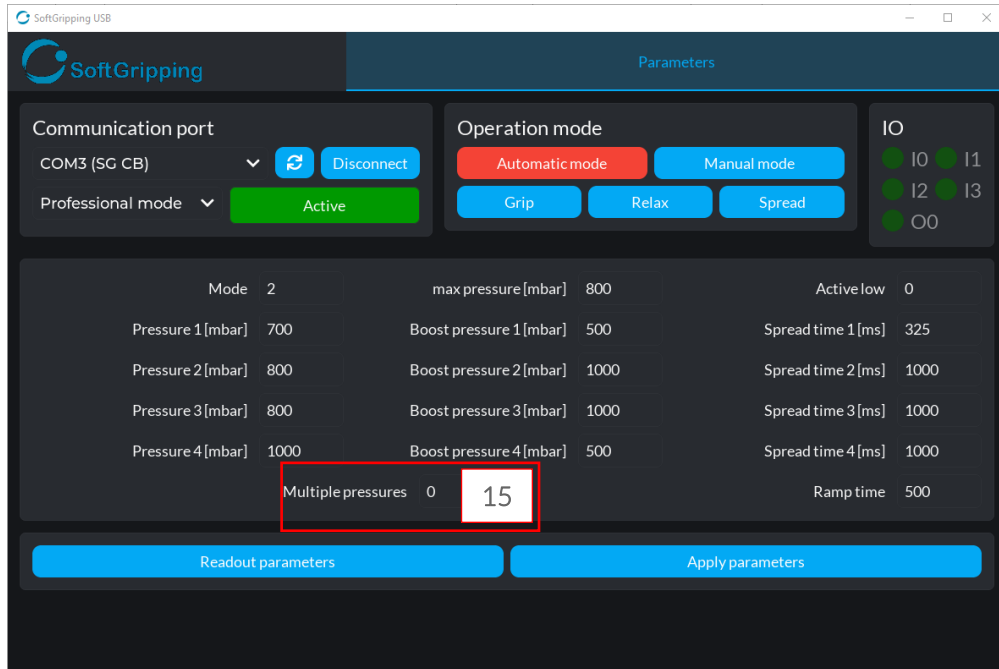


Figure 18 Professional mode – mode 2

The Fingers are operated by triggering the respective pins described in the Pinout.

Binary (Pin 4–5)	Pressure Profile (Mode)
00	Pressure 1
10	Pressure 2
01	Pressure 3
11	Pressure 4

11. Software warnings

If a maximum pressure value greater than 1000 mbar is entered in the configuration, a warning message will appear before applying the parameters (Figure 19).

This message informs the user that operating the system at elevated pressure levels may significantly reduce the lifespan of the SoftGripper.

The dialog provides two options:

- Accept – Confirms the warning and proceeds with applying the high-pressure settings.
- Cancel – Cancels the operation, allowing the user to adjust the pressure settings.

⚠ Important: Only proceed if your SoftGripper is rated for operation above 1000 mbar. Prolonged use beyond the recommended pressure range can lead to premature wear or damage to the system.

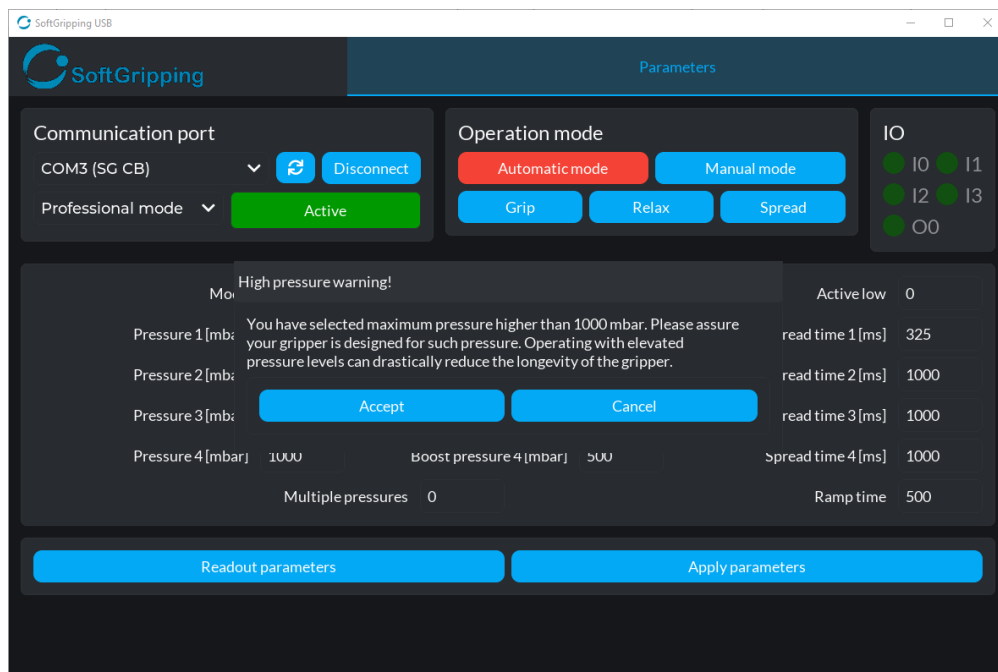


Figure 19 Professional mode – High pressure warning

If a parameter value exceeds the permissible range, it will be highlighted in red after clicking the “Apply parameters” button. In the example shown in Figure 20, the max pressure value of 1600 mbar exceeds the recommended upper limit, which is typically 1000 mbar for standard operation and 1500 mbar in total.

This red highlight serves as a visual warning to the user that the current input is outside the safe or supported range. The software will not accept or apply the invalid value until it is corrected.

To proceed: Adjust the highlighted value to a valid range and click “Apply parameters” again.

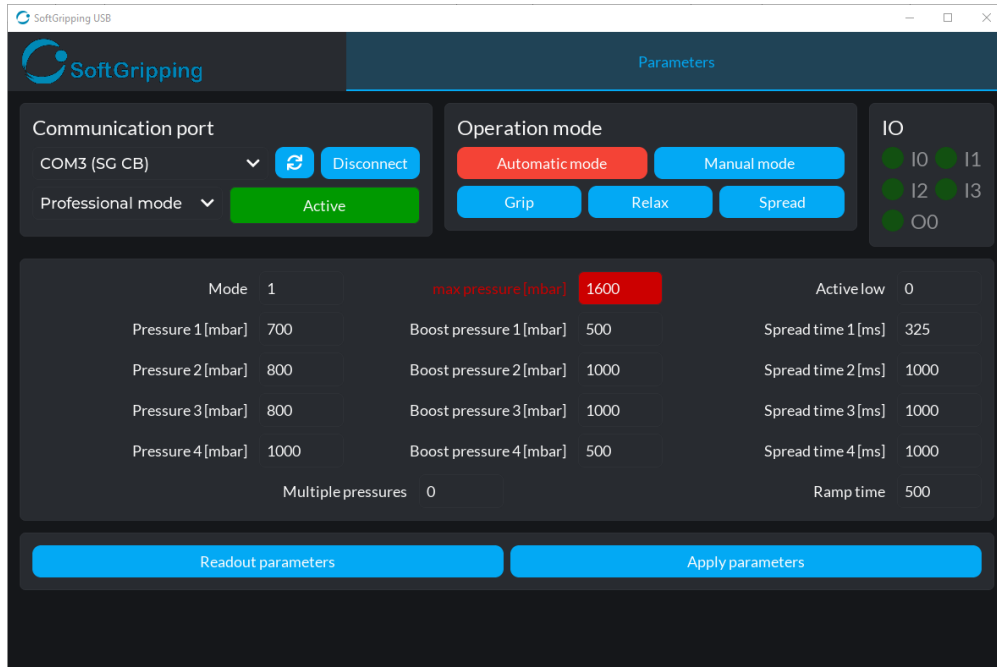


Figure 20 Professional mode – Invalid values



Always check the output pressure set before operating the robot to avoid damaging the Fingers. Commissioning should only be carried out by qualified personnel.

12. Decommissioning

Set all pins to low and turn off the air compressor. If you are planning to disconnect the device after decommissioning, make sure to disconnect the signal connector first. Before disconnecting any tubing, be sure that the system is not pressurized. Store the SoftGripping Control Box under dry conditions.



Do not disconnect the pneumatics while the system is still pressurized.

13. Maintenance and Troubleshooting

If you find problems using the system, please follow the following steps checking the components:

1. Are all connections made?
2. Is the input pressure suitable?
3. Can you find leaks, excessive bends or ruptures in the tubing?
4. Is the input voltage suitable? Does the device receive inputs?

If you still have problems operating the device, please contact our service team.

14. Disassembly

The disassembly must be carried out by qualified personnel in order to guarantee the warranty.

15. Legal information

15.1. Damage in transit

The packaging of our devices ensures the best possible protection against transport damage. Check the packaging for transport damage. In case of damage, contact the manufacturer's technical customer service within three working days and inform the carrier.

15.2. Warranty and warranty conditions

The factory warranty for the device is contractually agreed. During the warranty period, the manufacturer will replace or repair free of charge any material or construction-related defects. Please inform yourself about our terms and conditions on the website.

Warranty claims will become void in the event of unauthorized intervention in the device. Also excluded from the warranty:

- Unintentional or intentional damage
- Damage or defects caused by third parties not contractually bound to the manufacturer at the time of damage
- Wearing parts
- Damage due to negligence or improper operation of the device
- Packaging and shipping damage

If your device malfunctions, contact the manufacturer directly:

SoftGripping GmbH
Hollerithallee 21
30419 Hannover
Germany

Phone: +49 (0) 511 27019 301
E-Mail: info@soft-gripping.com

15.3. Declaration of Conformity

The declaration of conformity can be obtained directly from the manufacturer.

15.4. Disposal

Old devices or dismantled old assemblies can be returned to the manufacturer or a certified disposal company for proper disposal.



16. EC – Declaration of Conformity

DE EU-Konformitätserklärung
EN EC- Declaration of Conformity
FR CE-Déclaration de conformité
ES Certificado de conformidad CE
IT Dichiarazione di conformità CE
NL CE Conformiteitsverklaring

Hersteller / Manufacturer / Fabricant / Fabricante / Produttore / Fabrikant:
SoftGripping GmbH, Hollerithallee 21, D – 30419 Hannover

Produktbezeichnung / Product name / Designation du produit / Denominación del producto / Denominazione del prodotto / Beschrijving van de machine:
SoftGripping Controlbox (SG.BP.1V.C4)

Erfüllte einschlägige EU-Richtlinien / Applicable EC directives met / Directives CE applicables respectées / Directivas vigentes de la CE cumplidas / Direttive CE applicate ed osservate / Nagekomen betreffende EG-richtlijnen:

2006/42/EG	Maschinenrichtlinie / Machinery Directive / Directive sur les machines / Directiva para máquinas / Direttiva macchine / Machinerichtlijn
2014/30/EU	Elektromagnetische Verträglichkeit / Electromagnetic Compatibility / Compatibilité électromagnétique / Compatibilidad electromagnética / Compatibilità elettromagnetica / Elektromagnetische compatibiliteit

Angewendete harmonisierte Normen / Harmonised standards applied / Normes d'harmonisation appliquées / Normas armonizadas aplicadas / Norme armonizzate adottate / Toegepaste geharmoniseerde normen:

EN ISO 12100: 2011-03	Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobeurteilung und Risikominderung / Safety of Machinery - General principles for design - Risk assessment and risk reduction / Sécurité des machines - Principes généraux de conception - Appréciation du risque et réduction du risque / Seguridad de máquinas - Principios generales de diseño - Evaluación del riesgo y reducción del riesgo / Sicurezza delle macchine - Principi generali di progettazione - Valutazione del rischio e riduzione del rischio / Veiligheid van machines - Algemene beginselen voor ontwerp - Risicobeoordeling en de risicoreductie
EN 61000-6-2: 2012-11	Elektromagnetische Verträglichkeit - Störaussendung / Electromagnetic Compatibility - Emission / Compatibilité électromagnétique - Norme sur l'émission / Compatibilidad electromagnética - Emisión de interferencias / Compatibilità elettromagnetica - Norma generica sull'emissione / Elektromagnetische compatibiliteit - emissie
EN 61000-6-2: 2006-03	Elektromagnetische Verträglichkeit - Störfestigkeit / Electromagnetic Compatibility - Immunity / Compatibilité électromagnétique - Immunité / Compatibilidad electromagnética - Resistencia a interferencias / Compatibilità elettromagnetica - Immunità / Elektromagnetische compatibiliteit - immunititeit

Dokumentationsverantwortlicher / Person responsible for documentation / Responsable de la documentation / Responsable de documentació / Responsabile della documentazione / Verantwoordelijk voor de documentatie:



Hannover, 28.10.2025

Alexey Stepanyuk / SoftGripping GmbH, Hollerithallee 21, D – 30419 Hannover