

Operating instructions

# Compact Ejector SCPSc

**Note**

The Operating instructions were originally written in German. Store in a safe place for future reference. Subject to technical changes without notice. No responsibility is taken for printing or other types of errors.

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# 1 Important Information

## 1.1 Note on Using this Document

J. Schmalz GmbH is generally referred to as Schmalz in this document.

The document contains important notes and information about the different operating phases of the product:

- Transport, storage, start of operations and decommissioning
- Safe operation, required maintenance, rectification of any faults

The document describes the product at the time of delivery by Schmalz and is aimed at:

- Installers who are trained in handling the product and can operate and install it
- Technically trained service personnel performing the maintenance work
- Technically trained persons who work on electrical equipment

## 1.2 The technical documentation is part of the product

1. For problem-free and safe operation, follow the instructions in the documents.
2. Keep the technical documentation in close proximity to the product. The documentation must be accessible to personnel at all times.
3. Pass on the technical documentation to subsequent users.
  - ⇒ Failure to follow the instructions in these Operating instructions may result in injuries!
  - ⇒ Schmalz is not liable for damage or malfunctions that result from failure to heed these instructions.

If you still have questions after reading the technical documentation, contact Schmalz Service at:  
[www.schmalz.com/services](http://www.schmalz.com/services)

## 1.3 Type Plate

The type plate is permanently attached to the product and must always be clearly legible. It contains product identification data and important technical information.

The QR code on the nameplate enables access to the digital technical documentation for the product.

- ▶ For spare parts orders, warranty claims or other inquiries, have the information on the type plate to hand.

## 1.4 Symbols



This symbol indicates useful and important information.

- ✓ This symbol represents a prerequisite that must be met before an action is performed.
- ▶ This symbol represents an action to be performed.
- ⇒ This symbol represents the result of an action.

Actions that consist of more than one step are numbered:

1. First action to be performed.
2. Second action to be performed.

## 2 Fundamental Safety Instructions

### 2.1 Intended Use

The ejector is designed to generate a vacuum for gripping and transporting objects when used in conjunction with suction cups. The ejector is operated with discrete control signals.

Neutral gases are approved as evacuation media. Neutral gases include air, nitrogen and inert gases (e.g. argon, xenon and neon).

The product is built in accordance with the latest standards of technology and is delivered in a safe operating condition; however, hazards may arise during use.

The product is intended for industrial use.

Intended use includes observing the technical data and the installation and operating instructions in this manual.

### 2.2 Non-Intended Use

Schmalz accepts no liability for damages caused by non-intended usage of the ejector.

In particular, the following are considered non-intended use:

- Use in potentially explosive atmospheres
- Use in medical applications
- Evacuation of objects that are in danger of imploding
- Filling pressurized containers, driving cylinders, valves or other pressure-operated functional elements

### 2.3 Personnel Qualification

Unqualified personnel cannot recognize dangers and are therefore exposed to higher risks!

The operating company must ensure the following points:



- The personnel must be commissioned for the activities described in these operating instructions.
- The staff must be at least 18 years of age and physically and mentally capable.
- The operating staff have been instructed in the operation of the product and have read and understood the operating instructions.
- Work on electrical equipment must be carried out only by qualified electrical specialists.
- Installation, maintenance, and repairs must be carried out only by specialists or by persons who can prove that they have undergone appropriate training.

Applicable for Germany:

A qualified employee is defined as an employee who has received technical training and has the knowledge and experience – including knowledge of applicable regulations – necessary to enable him or her to recognize possible dangers and implement the appropriate safety measures while performing tasks. Qualified employees must observe the relevant industry-specific rules and regulations.

## 2.4 Warnings in This Document

Warnings warn against hazards that may occur when handling the product. The signal word indicates the level of danger.

Signal word	Meaning
 <b>WARNING</b>	Indicates a medium-risk hazard that could result in death or serious injury if not avoided.
 <b>CAUTION</b>	Indicates a low-risk hazard that could result in minor or moderate injury if not avoided.
<b>NOTE</b>	Indicates a danger that leads to property damage.

## 2.5 Residual Risks

The system integrator must carry out a risk assessment of the entire system for all operating modes and define the danger zone precisely. In doing so, country-specific provisions and regulations must be observed.



### **CAUTION**

#### **Falling product**

Risk of injury

- ▶ Securely attach the product at the site of operation.
- ▶ Wear safety shoes (S1) and safety glasses when handling and mounting/dismounting the product.



### **CAUTION**

#### **Unexpected movement of the handling system or dropping the lifted payload when the device is active**

Risk of injury (trapping or impact) due to collision or the release of a payload

- ▶ Do not sit or stand in the transport area of the lifted payload.
- ▶ Wear protective work shoes and gloves.



### **WARNING**

#### **Noise pollution due to the escape of compressed air**

Hearing damage!

- ▶ Wear ear protectors.
- ▶ The ejector must only be operated with a silencer.





### **⚠ WARNING**

#### **Extraction of hazardous media, liquids or bulk material**

Personal injury or damage to property!

- ▶ Do not extract harmful media such as dust, oil mists, vapors, aerosols etc.
- ▶ Do not extract aggressive gases or media such as acids, acid fumes, bases, biocides, disinfectants or detergents.
- ▶ Do not extract liquids or bulk materials, e.g. granulates.



### **⚠ WARNING**

#### **Uncontrolled movements of system components or falling objects caused by incorrect activation and switching of the device while persons are in the plant (safety door opened and actuator circuit switched off)**

Serious injury

- ▶ Ensure that the components are enabled via the actuator voltage by installing a potential separation between the sensor and actuator voltage.
- ▶ Wear the required personal protective equipment (PPE) when working in the danger zone.



### **⚠ CAUTION**

Depending on the purity of the ambient air, the exhaust air can contain particles, which escape from the exhaust air outlet at high speed.

Eye injuries!

- ▶ Do not look into the exhaust air flow.
- ▶ Wear eye protection.



### **⚠ CAUTION**

#### **Vacuum close to the eye**

Severe eye injury!

- ▶ Wear eye protection.
- ▶ Do not look into vacuum openings such as suction lines and hoses.

## **2.6 Modifications to the Product**

Schmalz assumes no liability for consequences of modifications over which it has no control:

1. The product must be operated only in its original condition as delivered.
2. Use only original spare parts from Schmalz.
3. The product must be operated only in perfect condition.

## 3 Product Description

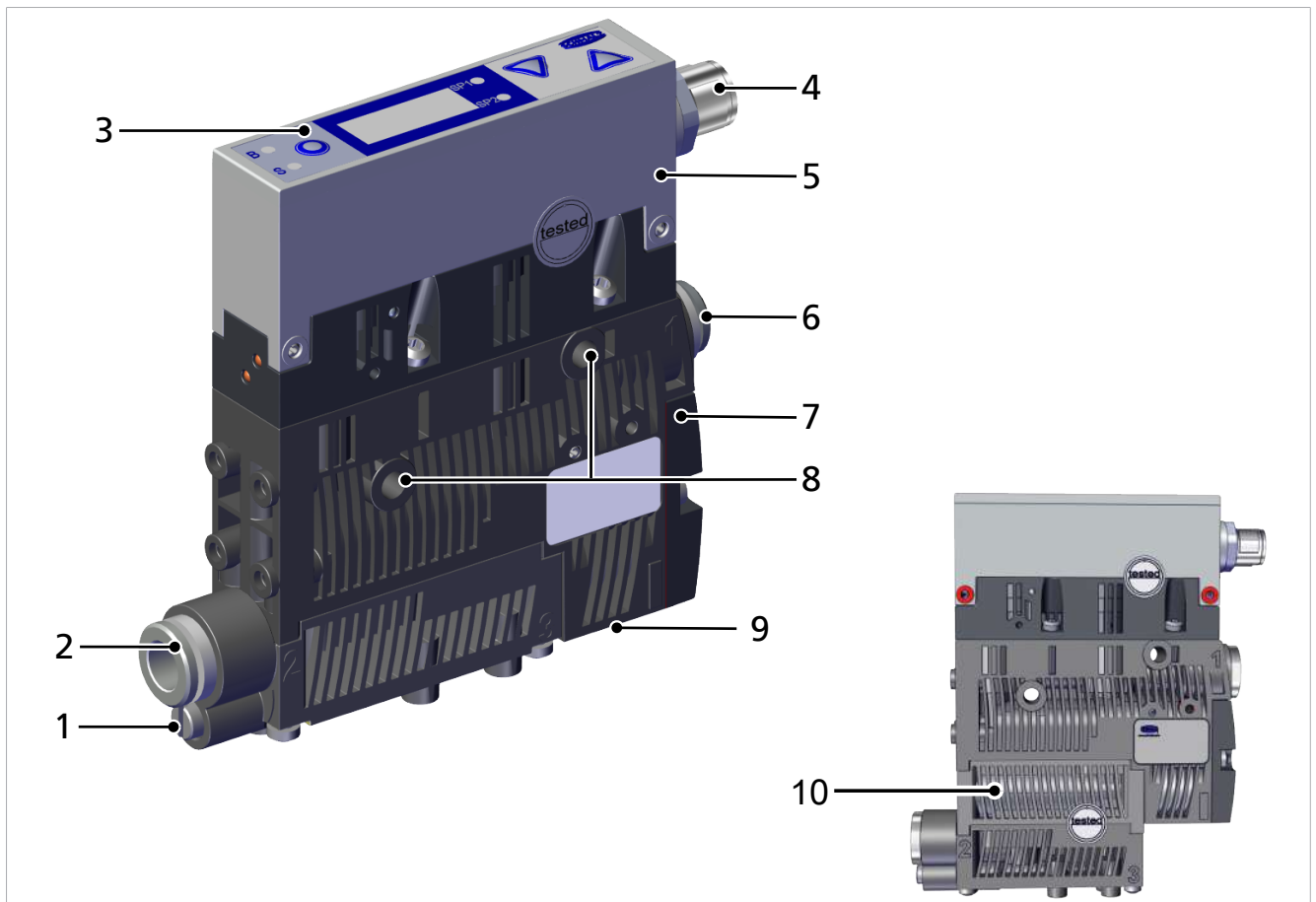
### 3.1 Ejector Designation

The breakdown of the item designation (e.g. SCPSc 10 M G02 NO M12-5 PNP) is as follows:

Property	Variants
Type of ejector	SCPSc
Performance class	07, 10, 15, 2-07, 2-09 and 2-14
Power blow off function	M, power blow-off BY (battery) <sup>1)</sup>
Pneumatic connection	G02 (G1/8" internal thread), S02 (push-in, 6/4 and 8/6 ) S04 (push-in, 6/4 2x)
Control	NO, normally open NC, normally closed
Electrical connection	M12 (1 x M12, 5-pin)
Signal inputs and outputs	NPN PNP

<sup>1)</sup> Variants with the designation BY are suitable for applications in battery production thanks to the use of special materials.

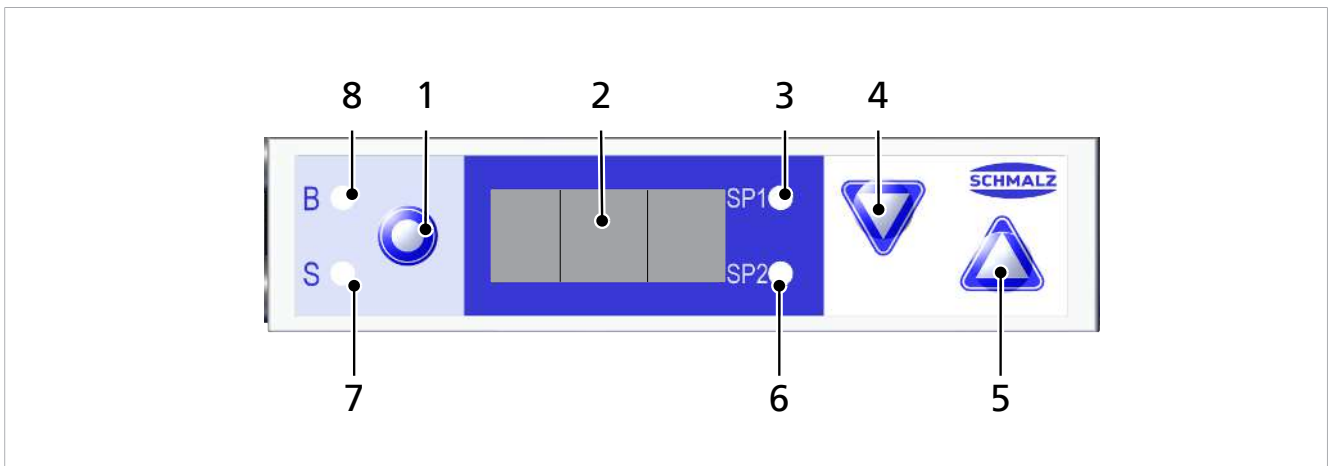
## 3.2 Ejector Structure



- |   |                                   |    |   |
|---|-----------------------------------|----|---|
| 1 | Blow off valve screw              | 6  | Compressed air connection (marking 1 [P]) |
| 2 | Vacuum connection (marking 2 [V]) | 7  | Silencer cover                            |
| 3 | Display and operating element     | 8  | Mounting hole (2x)                        |
| 4 | M12 electrical connection         | 9  | Exhaust outlet (marking 3)                |
| 5 | Control                           | 10 | Power blow-off module for variant M       |

### 3.3 Display and Operating Element in Detail

The ejector is fitted with 3 buttons, the 3-digit display and 4 LEDs for status information to ensure simple operation.



1	<b>MENU BUTTON</b>	5	<b>UP BUTTON</b>
2	Display	6	LED vacuum limit value SP2
3	LED vacuum limit value SP1	7	LED process state "suction"
4	<b>DOWN BUTTON</b>	8	LED process state "blow off"

#### Definition of the LED indicators

The "suction" and "blow off" process states are each assigned an LED.

Indicator		Ejector state
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;"><b>B</b> ○</div> <div><b>S</b> ○</div> </div>	LEDs are both off	No suction from ejector
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;"><b>B</b> ○</div> <div><b>S</b> ●</div> </div>	LED for the suction function is constantly lit	Ejector is applying suction or is in control mode
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;"><b>B</b> ●</div> <div><b>S</b> ○</div> </div>	LED for the blow off function is constantly lit	Ejector blows off




### Meaning of the Vacuum Limit Value LEDs

The LEDs for the switching points SP1 and SP2 (limit values) indicate the current level of the system vacuum relative to the limit values set for the parameters:

- SP1 → switching point 1
- SP2 → switching point 2
- rP1 → reset point 1
- rP2 → reset point 2

The display is independent of the switching function and the assignment of the output.

The table below explains the meanings of the LEDs:

Item	Limit value LEDs	Status
3 and 6		LEDs are both off Rising vacuum: Vacuum < SP2 Falling vacuum: Vacuum < rP2
3 and 6		SP2 LED continuously lit Rising vacuum: Vacuum > SP2 and < SP1 Falling vacuum: Vacuum > rP2 and < rP1
3 and 6		Both LEDs continuously lit Rising vacuum: Vacuum > SP1 Falling vacuum: Vacuum > rP1

## 4 Operating and Menu Concept

The device is operated using three buttons on the foil keypad:



MENU



DOWN



UP

The following information can be shown on the display:

- The current vacuum measurement value
- The selected menu item
- The settings
- Error messages in the form of error codes

The operating menu's home screen shows the currently measured vacuum level in the selected display unit. The measured value is displayed as positive compared to the ambient air pressure.

### 4.1 Button Assignments in Display Mode

#### 4.1.1 Displaying the Basic Settings (Slide Show)

When you press the **MENU** button from the home screen, the following parameters are automatically shown one after the other on the display (slide show):

- The vacuum unit
- The value of switching point SP1
- The value of reset point rP1
- The value of switching point SP2
- Current output and input type PNP or NPN
- The supply voltage US

Press the **MENU** button to interrupt the display cycle.




The slide show operates even when the keypad lock is activated.

#### 4.1.2 Locking the Keypad

The keypad lock function requires that the ejector is not in any menu.

**Activating the keypad lock:**

- ▶ Hold down the **MENU** button for 3 seconds.
  - ⇒  appears on the display.
  - ⇒ The keypad lock is activated.

### Deactivating the keypad lock:

- ▶ Hold down the **MENU** button for 3 seconds.
  - ⇒  $\text{LOCK}$  appears on the display.
- ⇒ The keypad lock is deactivated.



The slideshow operates even when the keypad lock is activated.

### 4.1.3 Opening the Menu

Pressing the **DOWN** button opens the main menu:

- ▶ Press the **DOWN** button briefly.
- ⇒ The main menu opens with the first parameter [ $\text{SP } 1$ ].

Opening the EF menu for extended functions:

1. Press the **DOWN** button several times until the parameter  $\text{EF}$  appears on the display.
  2. Press the **MENU** button to switch to the EF submenu for extended functions.
- ⇒ The EF menu opens with the first parameter [ $\text{EF } 1$ ].

Opening the INF menu:

1. Press the **DOWN** button several times until the parameter  $\text{INF}$  appears on the display.
  2. Press the **MENU** button to switch to the INF submenu for information.
- ⇒ The INF menu opens with the first parameter [ $\text{INF } 1$ ].

## 4.2 Main Menu

All settings for standard applications can be accessed and configured using the main menu.

### 4.2.1 Functions in the Main Menu

The following table shows an overview of the display codes and parameters in the main menu:

Display code	Parameter	Explanation
SP1	Switching point 1	Deactivation value of control function (only active if [cEr] = [On])
rP1	Reset point 1	Reset value 1 for the control function
SP2	Switching point 2	Switching value for the "Part Present" check signal
rP2	Reset point 2	Reset value 2 for the "Parts Present" signal
tBL	Blow off time	Blow off time setting for time-controlled blow off (only active if value > 0)
cAL	Zero-point adjustment (calibration)	Calibrate vacuum sensor, zero point = ambient pressure
EF	Extended functions	Open the "Extended Functions" submenu
INF	Information	Open the "Information" submenu

### 4.2.2 Changing the Parameters of the Main menu

If you wish to change values, e.g. the switching points, you have to enter the new value digit by digit.

1. Use the **DOWN** button to select the desired parameter.
2. Confirm using the **MENU** button.
  - ⇒ The value that is currently set is displayed and the first digit flashes.
3. Use the **DOWN** and **UP** buttons to change the value. The value increases by 1 each time that the button is pressed.
4. Press the **MENU** button to save the changed value.
  - ⇒ The first digit is accepted and the second digit flashes.
5. Set the second value with the **DOWN** and **UP** buttons.
6. Press the **MENU** button to save the changed value.
  - ⇒ The second digit is accepted and the third digit flashes.
7. Set the third value with the **DOWN** and **UP** buttons.
8. Press the **MENU** button to save the changed value.
  - ⇒ If the entered value is within the permissible value range, it is accepted and the modified parameter is displayed.
  - ⇒ If the entered value is not within the permissible value range, this is briefly indicated on the display [ lrc ] and the new value is not accepted.

If input is interrupted for longer than 1 minute or if no input is made, the measurement screen is automatically displayed.



### 4.3 Extended Functions menu (EF)

An Extended Functions menu (EF) is available for applications with special requirements.

#### 4.3.1 Functions in the Extended Functions menu (EF)

The following table shows an overview of the display codes and parameters in the Extended Functions menu.

Display code	Parameter	Possible settings	Explanation
☐FF	Energy-saving function	☐FF ☐ON	Control function off Control active
-L-	Max. permissible leakage	Values configurable between ☐ and 999	Permissible leakage Unit: millibar per second
E-1	Max. permissible evacuation time	configurable between 0.01 and 9.99 seconds in steps of 0.01 ☐FF	Permissible evacuation time  No monitoring
☐n i	Vacuum unit	mBAR kPA inHg PSI	Define the displayed vacuum unit Vacuum level in millibar [mbar] Vacuum level in kilopascal [kPa] Vacuum value in inch of mercury [inHg] Vacuum value in pound-force per square inch [psi]
rES	Reset	no YES	The values remain unchanged Reset parameter values to factory settings

#### 4.3.2 Changing parameters in the Extended Functions menu

Depending on the parameter, there are two different methods for entering values in the EF menu.

When entering numerical values, you enter them digit by digit as in the main menu:

1. Use the **DOWN** button to select the desired parameter.
2. Confirm using the **MENU** button.
  - ⇒ The value that is currently set is displayed and the first digit flashes.
3. Use the **DOWN** and **UP** buttons to change the value. The value increases by 1 each time that the button is pressed.
4. Press the **MENU** button to save the changed value.
  - ⇒ The first digit is accepted and the second digit flashes.
5. Set the second value with the **DOWN** and **UP** buttons.
6. Press the **MENU** button to save the changed value.
  - ⇒ The second digit is accepted and the third digit flashes.
7. Set the third value with the **DOWN** and **UP** buttons.

8. Press the **MENU** button to save the changed value.
  - ⇒ If the entered value is within the permissible value range, it is accepted and the modified parameter is displayed.
  - ⇒ If the entered value is not within the permissible value range, this is briefly indicated on the display [ 100 ] and the new value is not accepted.

If input is interrupted for longer than 1 minute or if no input is made, the measurement screen is automatically displayed.

For other parameters, you can select from predefined settings:

1. Use the **DOWN** button to select the desired parameter.
2. Confirm using the **MENU** button.
  - ⇒ The current setting is displayed and flashes.
3. Use the **DOWN** button to switch to the next setting.
4. Press the **MENU** button to save the desired setting.
  - ⇒ The selected setting is briefly shown on the display.
  - ⇒ The display then automatically jumps to the parameter that was just set.

## 4.4 Info menu [INF]

The Info [INF] menu is provided for reading out system data such as counters, the software version, part numbers and serial numbers.

### 4.4.1 Functions in the Info menu

The following table shows an overview of the display codes and parameters in the Info menu:

Display code	Parameter	Explanation
CC 1	Counter 1	Counter for suction cycles (suction signal input)
CC 2	Counter 2	Counter for valve switching cycles
SO C	Software	Display firmware revision
PA E	Part number	Display the part number
SN R	Serial number	Display the serial number Information about the production period

### 4.4.2 How Data is Displayed in the Info Menu

Counter values or numbers with more than 3 digits are displayed in a special manner.

The data in the Info menu are multi-digit integers.

These numbers are divided into blocks of 3 numbers when shown on the display. Decimal points in the display help you to identify the different blocks of numbers.

The display starts with the 3 highest-value digits and can be scrolled through using the **DOWN** and **UP** buttons.

1. Use the **DOWN** button to select the desired parameter.
2. Confirm using the **MENU** button.

3. Use the **DOWN** and **UP** buttons to display or scroll through the blocks that make up the value.

#### 4.5 Overview of Display Codes

Display code	Parameter	Comment
SP 1	Switching point 1	Value at which the control function deactivates
rP 1	Reset point 1	Reset value 1 for the control function
SP2	Switching point 2	Activation value of "Parts control" signal output
rP2	Reset point 2	Reset value 2 for the "Parts control" signal
tBL	Blow off time	Set the blow-off time for "time blow off"
cAL	Zero-point adjustment	Calibrate the vacuum sensor
EF	Extended functions	Open the "Extended Functions" submenu
INF	Information	Open the "Info" submenu
cc 1	Counter 1	Counter for suction cycles (suction signal input)
cc 2	Counter 2	Counter for valve switching frequency
SoC	Software	Displays the software version
Snr	Serial number	Displays the serial number of the ejector
Art	Part number	Displays the part number of the ejector
un i	Vacuum unit	Vacuum unit in which the measurement and setting values are displayed
bAr	Vacuum level in mbar	The displayed vacuum level is shown in mbar.
PS i	Vacuum level in psi	The displayed vacuum level is shown in psi.
iHg	Vacuum level in inHg	The displayed vacuum is shown in inches of Hg.
kPa	Vacuum level in kPa	The displayed vacuum level is shown in kPa.
t- 1	Max. permissible evacuation time Evacuation time t1 exceeded	Set the maximum permitted evacuation time, or The measured evacuation time t1 exceeds the specified value; the display alternately shows t-1 and the vacuum level.
-L-	Max. permissible leakage Leakage L larger than -L-	Set the maximum permissible leakage in mbar/s, or The leakage L is greater than the set value -L-; the display will alternately show -L- and the vacuum level.
cEr	Control	Set the air saving function (control function)
rES	Reset	All adjustable values are reset to the factory settings.
InC	Inconsistent	The entered value is not within the permissible value range. This is an informational message that appears if incorrect information is entered.
QoR	Out of range	Input value invalid
LoC	The keypad lock is activated	The buttons are locked.
UnC	The keypad lock is deactivated	The buttons are not locked.
E03	Error 03	Zero-point adjustment of the vacuum sensor outside $\pm 3\%$ FS
E07	Error 07	Supply voltage is too low
E 17	Error 17	Supply voltage is too high

Display code	Parameter	Comment
FFF		Present vacuum exceeds the measurement range
-FF		Overpressure in vacuum circuit; this normally happens exclusively in blow off mode.

## 5 Technical Data

### 5.1 Display Parameters

Parameter	Value	Unit	Comment
Display	3	digit	Red 7-segment LED display
Solution	±1	mbar	—
Accuracy	±3	% FS	$T_{amb} = 25^{\circ} \text{C}$ , based on FS (full-scale) final value
Linearity error	±1	%	—
Offset error	±2	mbar	After zero-point adjustment, without vacuum
Temperature influence	±3	%	$0^{\circ} \text{C} < T_{amb} < 50^{\circ} \text{C}$
Display refresh rate	5	1/s	Only affects the 7-segment display
Idle time before the menu is exited	1	min	The display mode is accessed automatically when no settings are made in a menu

### 5.2 General Parameters

Parameter	Symbol	Limit value			Comment
		min.	typ.	max.	
Working temperature	$T_{amb}$	$0^{\circ} \text{C}$	—	$+50^{\circ} \text{C}$	
Storage temperature	$T_{sto}$	$-10^{\circ} \text{C}$	—	$60^{\circ} \text{C}$	---
Humidity	$H_{rel}$	10% r.h.	—	90 % r.h.	Free from condensation
Operating pressure (flow pressure)	P	3 bar	4.2 bar	6 bar	---
Max. vacuum p	850 mbar				
Precision of vacuum sensor	± 3% FS (full scale)				
Degree of protection	IP65				
Operating medium	Air or neutral gas, 5 µm filtered, with or without oil, class 3-3-3 compressed air quality in acc. with ISO 8573-1				

The Following applies for variant BY:

$H_{rel} < 1\%$  => for specific application by customers on a case by case basis.

Water is not a recipe component of the lubricant used.

However, the presence of impurities cannot be excluded. Depending on the application, we recommend a consultation if necessary.

The product is suitable for applications in battery production thanks to the use of special materials.

The aluminum used contains no lead and a significantly reduced proportion of copper.

### 5.3 Electrical Parameters

Parameter	Symbol	Limit values			Unit	Comment
		min.	typ.	max.		
Supply voltage	$U_{SA}$	19.2	24	26.4	V DC	PELV <sup>1)</sup>
Power consumption from $U_{S/A}$ 2) with NO variant	$I_{S/A}$	---	---	130	mA	$U_{S/A} = 24.0$ V
Power consumption from $U_{S/A}$ 2) with NC variant	$I_{S/A}$	---	---	90	mA	$U_{S/A} = 24.0$ V
Voltage of signal output (PNP)	$U_{OH}$	$U_{S/SA}-2$	---	$V_{S/SA}$	$V_{DC}$	$I_{OH} < 150$ mA
Voltage of signal output (NPN)	$U_{OL}$	0	--	2	$V_{DC}$	$I_{OL} < 150$ mA
Power consumption of signal output (PNP)	$I_{OH}$	---	--	150	mA	Short-circuit-proof <sup>3)</sup>
Power consumption of signal output (NPN)	$I_{OL}$	---	--	-150	mA	Short-circuit-proof <sup>3)</sup>
Voltage of signal input (PNP)	$U_{IH}$	15	--	$U_{A/SA}$	$V_{DC}$	In reference to $Gnd_{A/SA}$
Voltage of signal input (NPN)	$U_{IL}$	0	--	9	$V_{DC}$	In reference to $U_{A/SA}$
Current of signal input (PNP)	$I_{IH}$	--	5	--	mA	$U_{S/A} = 24.0$ V
Current of signal input (NPN)	$I_{IL}$	--	-5	--	mA	$U_{S/A} = 24.0$ V
Response time of signal inputs	$t_i$	--	3	--	ms	--
Response time of signal outputs	$t_o$	--	2	--	ms	--

1) The power supply must correspond to the regulations in accordance with EN60204 (protected extra-low voltage). The signal inputs and outputs are all protected against reverse polarity.

2) Plus the output currents

3) The signal output is protected against short circuits. However, the signal output is not protected against overloading. Constant load currents  $> 0.15$  A may lead to impermissible heating and therefore the destruction of the ejector.

### 5.4 Performance Data

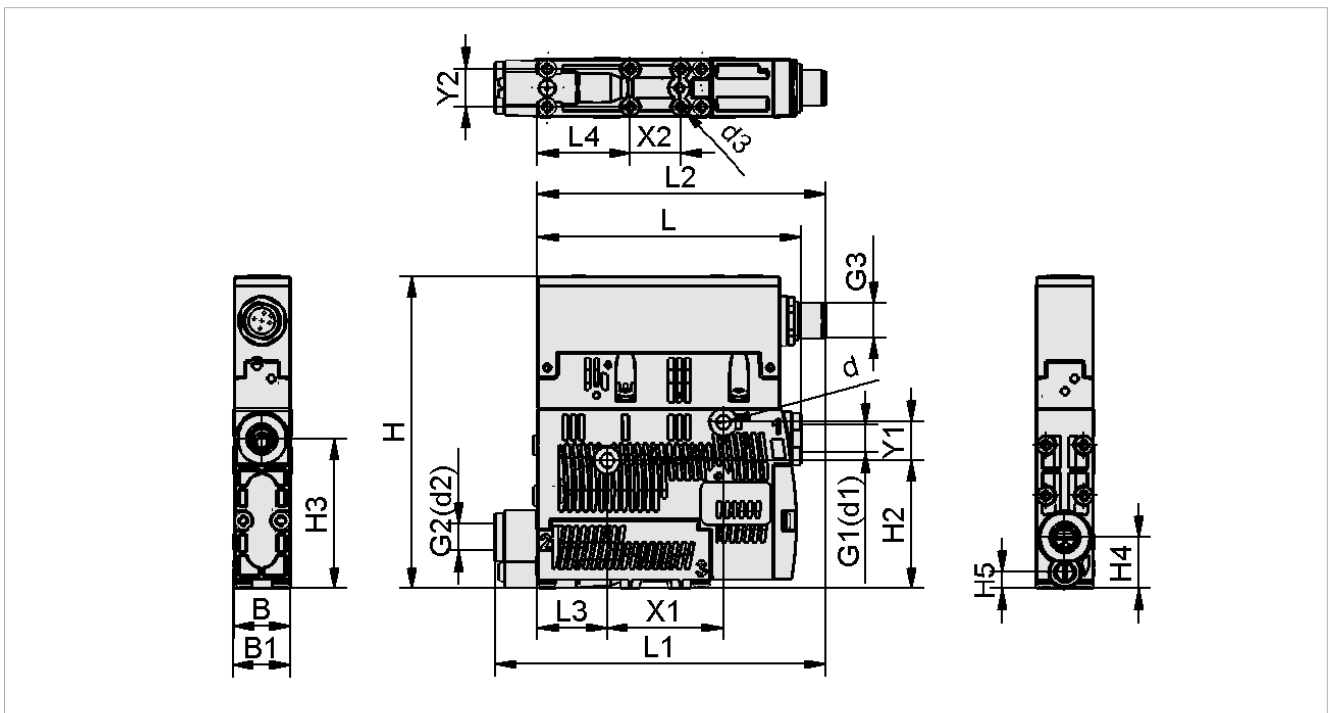
Type	SCPSi-07	SCPSi-10	SCPSi-15
Nozzle size [mm]	0.7	1.0	1.5
Max. vacuum <sup>1</sup> [mbar]	850		
Suction rate <sup>1</sup> [l/min]	16	34	63
Max. blow off capacity <sup>1</sup> [l/min]	120		
Air consumption <sup>1</sup> (suction) [l/min]	25	42	95
Sound level <sup>1</sup> , unobstructed suction [dB(A)]	63	75	77
Sound level <sup>1</sup> , suction [dB(A)]	58	61	65
Weight [kg]	0.195		
Weight of variant with power blow off module [kg]	0.213		

Type	SCPSi-2-07	SCPSi-2-9	SCPSi-2-14
Nozzle size [mm]	0.7	0.9	1.4
Max. vacuum <sup>1</sup> [mbar]		850	
Suction rate <sup>1</sup> [l/min]	37	49	71
Max. blow off capacity <sup>1</sup> [l/min]		120	
Air consumption <sup>1</sup> (suction) [l/min]	22	40.5	82
Sound level <sup>1</sup> , unobstructed suction [dB(A)]	63	73	75
Sound level <sup>1</sup> , suction [dB(A)]	58	62	70
Weight [kg]		0.195	

<sup>1)</sup> At 4.0 bar

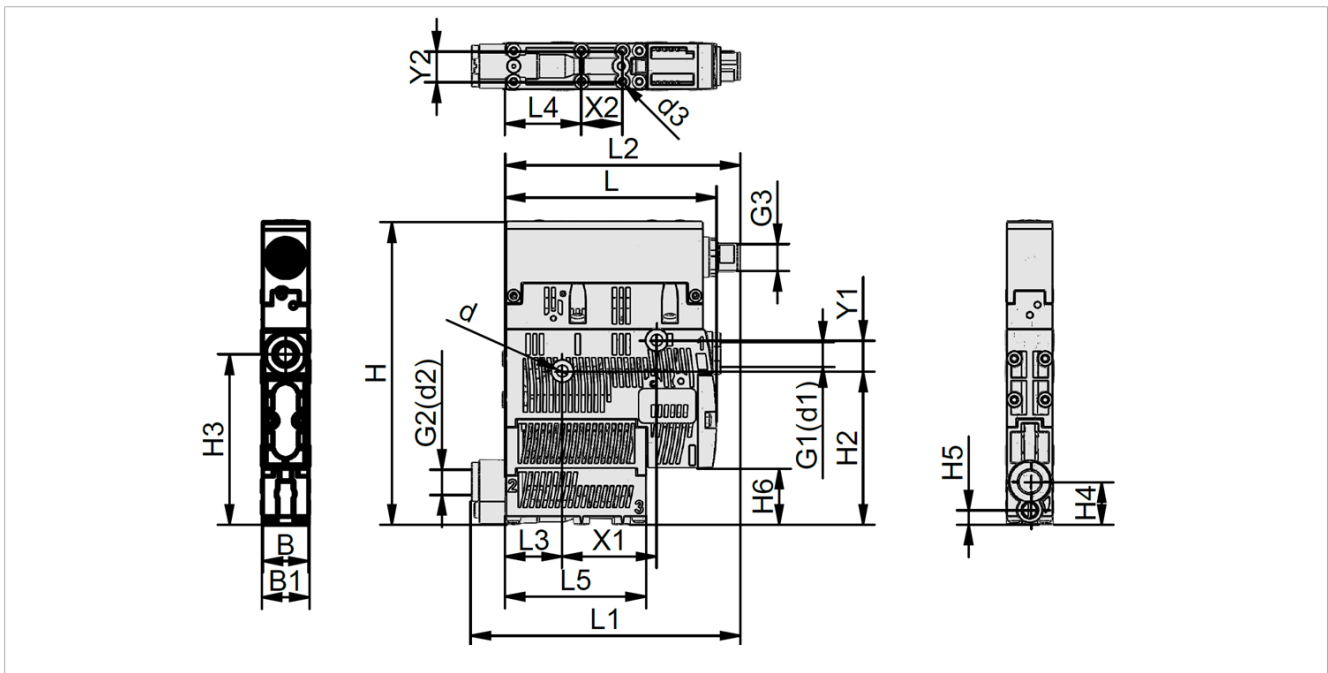
## 5.5 Dimensions

Version without power blow-off



B	B1	d	(d1) <sup>1</sup>	(d2) <sup>1</sup>	d3	G1	G2	G3	H	H2	H3
18	18.6	4.4	6 / 8	6 / 8	2.6	1/8" internal thread	1/8" internal thread	M12x 1 ex- ternal thread	99	40.8	47.5
H4	H5	L	L1	L2	L3	L4	X1	X2	Y1	Y2	
16.5	5.5	83.8	105	91.5	22	29.5	36.9	16	12	12	

Version with power blow-off (M)



B	B1	d	(d1) <sup>1</sup>	(d2) <sup>1</sup>	d3	G1	G2	G3	H	H2	H3	
18	18.6	4.4	6 / 8	6 / 8	2.6	1/8" internal thread	1/8" internal thread	M12x1 external thread	117.8	59.6	66.35	
H4	H5	H6	L	L1	L2	L3	L4	L5	X1	X2	Y1	Y2
16.5	5.5	21.8	83.8	105	91.5	22	29.5	54.8	36.9	16	12	12

<sup>1)</sup> Depending on the design of the push-in connection.

All specifications are in mm

### 5.6 Factory Settings

Code	Parameter	Value of the factory setting
SP1	Switching point SP1	750 mbar
rP1	Reset point rP1	600 mbar
SP2	Switching point SP2	550 mbar
rP2	Reset point rP2	540 mbar
tBL	Blow off time	0 s
ctr	Control	Activated = ON
t-1	Evacuation time	0 s
-L-	Leakage value	0 mbar/s
u n i	Vacuum unit	Vacuum unit in mbar = BAR



## 5.7 Pneumatic Circuit Plans

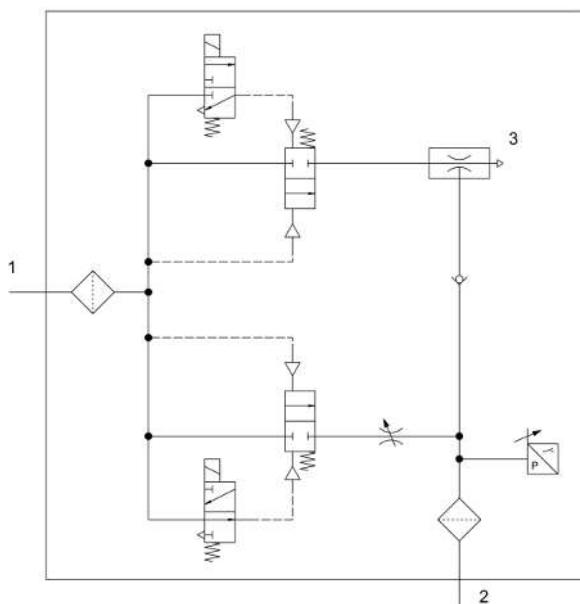
The pneumatic circuit diagrams are shown in simplified form. No sieve is installed in variants with a push-in connection.

### Key:

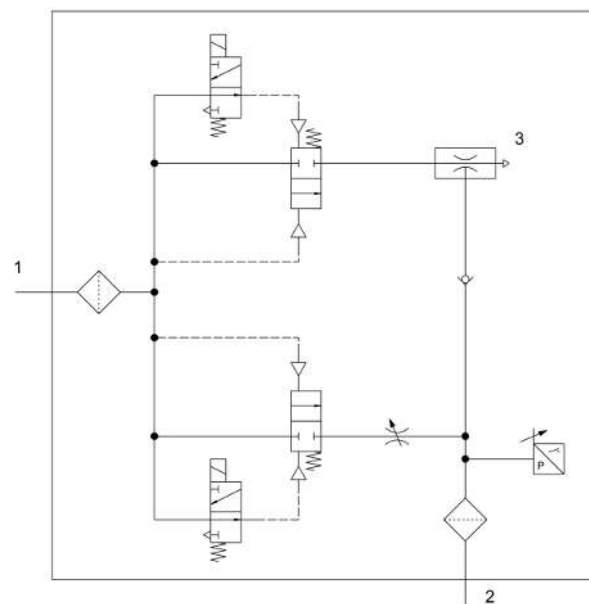
NC	Normally closed
NO	Normally open
M	Power blow off
1	Compressed air connection
2	Vacuum connection
3	Exhaust outlet

### Single-stage variants

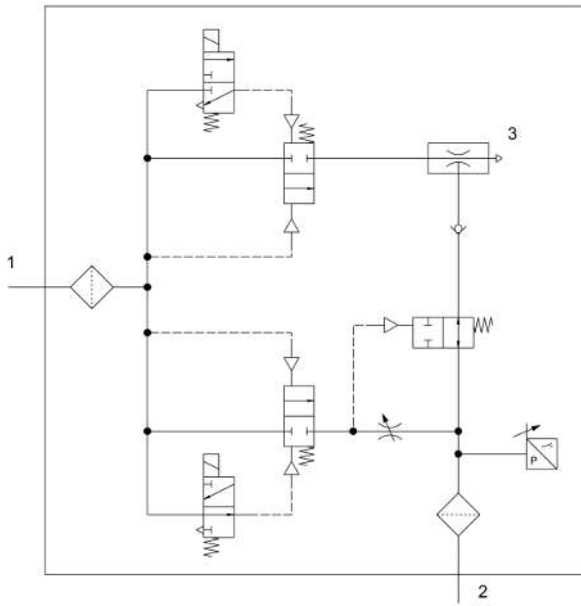
...NO...



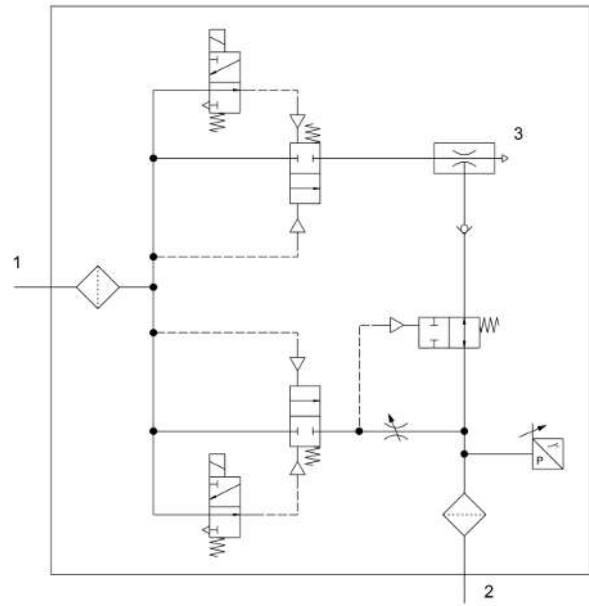
...NC...



M...NO...

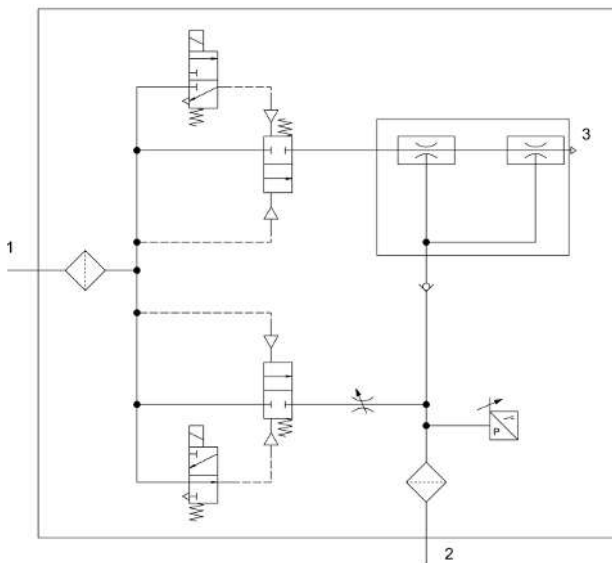


M...NC...

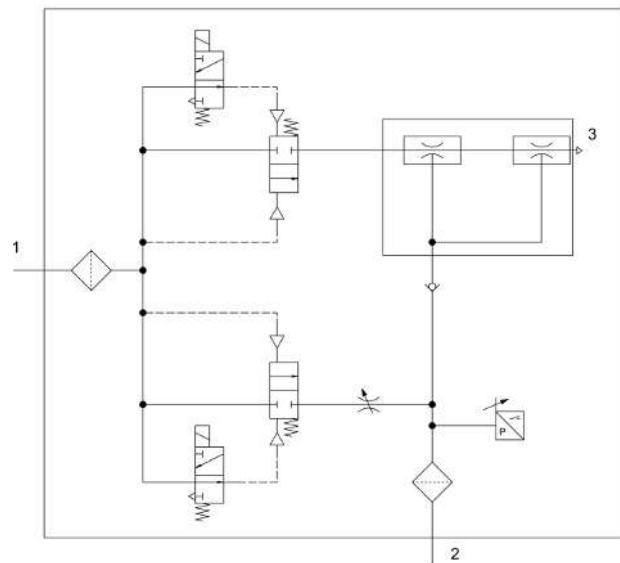


Two-stage variants

...NO...



...NC...



## 6 Description of Functions

### 6.1 Applying Suction to the Workpiece/Part (Vacuum Generation)



#### ⚠ WARNING

#### The Compressed Air Supply of the Vacuum Generator Fails During Operation.

Danger of falling parts because the vacuum for the vacuum gripper collapses quickly.

- ▶ Ensure that the compressed air supply does not fail during operation.
- ▶ Carry out a risk assessment for each application.

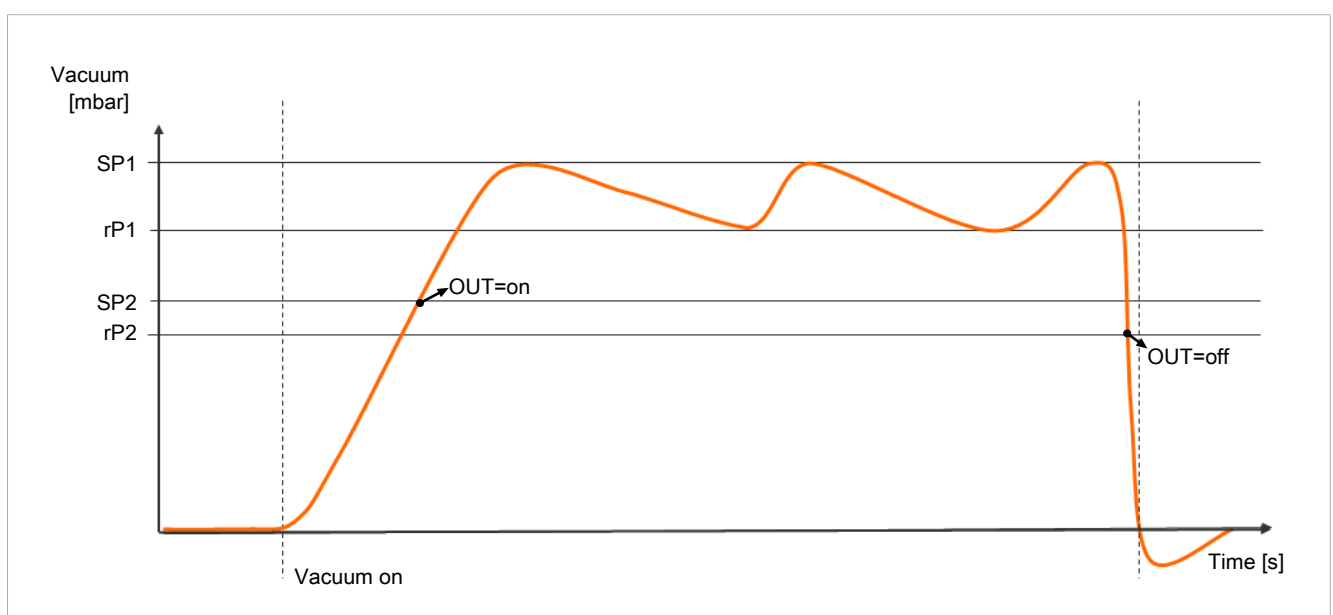
The ejector is designed for handling and holding workpieces by means of a vacuum in combination with suction systems. The vacuum is generated in a nozzle according to the venturi principle, using suction generated by the flow of accelerated compressed air. Compressed air is channeled into the ejector and flows through the nozzle. A vacuum is generated immediately downstream of the motive nozzle; this causes the air to be sucked through the vacuum connection. The air and compressed air that have been removed by the suction exit together via the silencer.

The venturi nozzle on the ejector is activated and deactivated using the suction command:

- In the NO (normally open) version, vacuum generation is deactivated when the suction signal is received.  
(This means that if the power fails or if no control signal is present, vacuum is constantly generated (continuous suction).)
- In the NC (normally closed) version, vacuum generation is activated when the suction signal is received.  
(This means that if the power fails or if no control signal is present, no vacuum is generated.)

An integrated sensor records the vacuum generated by the venturi nozzle. The exact vacuum value is shown on the display.

The diagram below shows the vacuum curve for when the air saving function is activated:



The ejector has an integrated air saving function and automatically regulates the vacuum in suction mode:

- The electronics switch the Venturi nozzle off as soon as the vacuum limit value set for switching point SP1 is reached.
- When objects with airtight surfaces are picked up, the integrated non-return valve prevents the vacuum from dropping.
- If leakages cause the system vacuum to drop below the limit value configured for the switching point rP1, the venturi nozzle is switched back on.
- The OUT output is set once a workpiece is picked up securely, based on the vacuum value. This enables the further handling process.

## 6.2 Depositing the Workpiece/Part (Blowing Off)

In blow off mode, the vacuum circuit of the ejector is supplied with compressed air. This ensures that the vacuum drops quickly, allowing the workpiece to be deposited quickly.

The ejector provides two blow off modes for selection:

- **Externally controlled blow off:** The “blow off” valve is controlled directly by the “blow off” signal input. The ejector switches to blow off mode for as long as the signal is present.
  - **Internally time-controlled blow off:** The “blow off” valve is automatically activated for the configured time period as soon as the ejector leaves “suction” mode. This function makes it possible to save an output on the controller.
- ▶ The internal time-controlled blow off is activated by setting a value greater than zero for the blow off time.



The ejector also has a manual mode. In this mode, the ejector can be controlled using the buttons on the ejector’s foil keypad. See the “Manual mode” section for more details.

## 6.3 Operating Modes

### 6.3.1 Automatic Operation

Once the product is connected to the power supply, it is ready for operation and enters automatic mode. This is the normal operating mode, in which the product is operated by the system control unit.

The operating mode may be changed from automatic operation to manual operation using the buttons. Parameterization always takes place in automatic operation.

### 6.3.2 Manual Operating Mode



#### ⚠ WARNING

Through an external signal, manual operation is exited, external signals are evaluated and system parts move.

Personal injury or damage to property due to collisions

- ▶ Ensure that the danger zone of the system is clear of people during operation.
- ▶ Wear the required personal protective equipment (PPE) when working in the danger zone.



#### ⚠ WARNING

Falling objects due to incorrect operation in manual mode

Risk of injury

- ▶ Higher level of attention
- ▶ Ensure that there are no persons within the danger zones of the machine/system

In manual mode, the "Suction" and "Blow-off" functions can be controlled independently of the higher-level controller using the buttons on the operating panel. Among other things, this function is used to detect and eliminate leakages in the vacuum circuit.

In this operating mode, the "SP1" and "SP2" LEDs both flash.

#### Activating manual mode

- ✓ The device is on the measurement screen.
- ▶ Press and hold the **DOWN** and **UP** buttons simultaneously for at least 3 seconds.
- ⇒ The SP1 and SP2 LEDs flash.

#### Manual suction

- ✓ The device is in manual mode. The SP1 and SP2 LEDs flash.
- 1. Press the **UP** button to activate "suction" mode.
  - ⇒ The suction LED lights up and the ejector starts to suck.
- 2. Press the **DOWN** or **UP** button to exit "suction" mode again.
  - ⇒ The suction process is deactivated.



If the controller is on [C E r] = [□□] it uses the configured limit values in "manual" mode as well.

### Manual blow off

- ✓ The device is in manual mode. The SP1 and SP2 LEDs flash.
  - ▶ Press and hold the **DOWN** button to activate “blow off” on the ejector.
- ⇒ The blow-off LED lights up.
- ⇒ The ejector blows off for as long as you keep the button pressed down.
- ▶ Release the **DOWN** button to end the blow-off.
  - ⇒ The blow-off process is deactivated.
  - ⇒ The SP1 and SP2 LEDs flash.

### Deactivating manual mode

- ✓ The device is in manual mode. The SP1 and SP2 LEDs flash.
  - ▶ Briefly press the **DOWN** and **UP** buttons at the same time.
- ⇒ The SP1 and SP2 LEDs stop flashing.

The device exits manual mode when the status of the external signals changes. When the device receives an external signal, it switches to automatic mode.

## 6.4 Monitoring the system vacuum and defining limit values

The ejector has integrated sensors for measuring the vacuum.

The current vacuum level is shown on the display.

The limit values are set in the main menu using the parameters [SP 1], [rP 1], [SP2] and [rP2].

Limit values SP1 and rP1 are used by the control function to control the vacuum.

Overview of the limit values:

Limit value parameter	Description
SP1	Switching point for air-saving regulation
rP1	Reset point for air-saving regulation
SP2	Activation value of “Part Present” signal output
rP2	Deactivation value of “Part Present” signal output

## 6.5 Calibrating the sensor

Since the production conditions for the integrated vacuum sensor can vary, we recommend calibrating the sensor once it is installed. To calibrate the vacuum sensor, the system’s vacuum circuit must be open to the atmosphere.



A zero offset is only possible in the range of  $\pm 3\%$  from the end value of the measurement range.

If the permissible limit of  $\pm 3\%$  is exceeded, error code [E03] will appear on the display.

The zero-point adjustment function is executed in the main menu using the parameter [cAL].

1. To adjust the zero point, press the **DOWN** button several times until [cAL] appears on the display.

2. Confirm using the **MENU** button.
  3. Use the **DOWN** button to choose between [NO] and [YES] (vacuum sensor calibration).
  4. Confirm using the **MENU** button.
- ⇒ The sensor is calibrated.

## 6.6 Control functions

The ejector allows you to conserve compressed air or prevent a too powerful vacuum from being generated. Vacuum generation is interrupted once the configured switching point SP1 is reached. If leakage causes the vacuum to fall below the reset point rP1, vacuum generation resumes.

The following operating modes can be set for the control function using the [CF] parameter in the Extended Functions menu.

### 6.6.1 No Control (Continuous Suction)

The ejector produces continuous suction with maximum power. This setting is recommended for non-air-tight workpieces, which would otherwise cause vacuum generation to switch on and off continuously due to the high rate of leakage.

For this mode, the control function is set to [CF] = [FF].

### 6.6.2 Control

The ejector switches off vacuum generation when the switching point SP1 is reached and switches it back on when the vacuum falls below the reset point rP1. The switching point evaluation for SP1 follows the control function. This setting is particularly recommended for airtight workpieces.

For this mode, the control function is set to [CF] = [0].

## 6.7 Blow off modes

### 6.7.1 Externally Controlled Blow-Off

The "blow off" valve is controlled directly by the "blow off" command. The ejector switches to blow off mode for as long as the "blow off" signal is present.

The "blow off" signal is given priority over the "suction" signal.

### 6.7.2 Internally Time-Controlled Blow-Off

The function is activated by setting a blow off time using the [BL] parameter in the main menu.

The "blow off" valve is automatically activated for the configured time period as soon as the ejector leaves "suction" mode.

The "blow off" signal overrides the "suction" signal, even if the specified blow off time is very long.

### 6.7.3 Setting the blow off time

The blow off time can be set using the [BL] parameter in the main menu.

The value displayed indicates the blow off time in seconds. The blow off time can be set between 0.01 and 9.99 seconds.

Set the time for time-controlled blow off (only active if value > 0). If you set the value to 0, the ejector is automatically in “externally controlled blow off” mode.

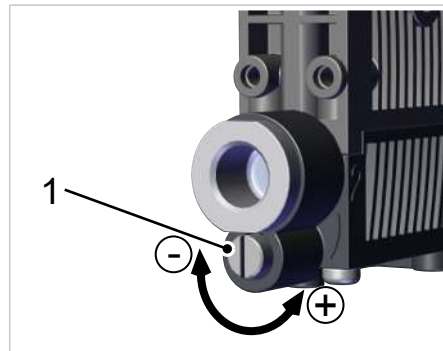
## 6.8 Changing the Blow-Off Flow Rate on the Ejector



Do not overwind past the stop on the valve screw. A minimum flow rate of approx. 10% is always necessary for technical reasons. The blow off volume flow can be set between 10% and 100%.

The figure shows the position of the valve screw (1) for adjusting the blow off flow rate. The valve screw is equipped with a stop on both sides.

- Rotate the valve screw (1) clockwise to reduce the flow rate.
- Rotate the valve screw (1) counterclockwise to increase the flow rate.



## 6.9 Selecting the display unit

This function determines the unit in which the vacuum level is displayed.

You can set the function using the [U7 1] parameter in the EF menu.

The following units are available:

Unit	Explanation
bar	The vacuum level is displayed in mbar. The setting for this unit is [bAR].
Pascal	The vacuum level is displayed in kPa. The setting for this unit is [kPA].
Inch of Hg	The vacuum level is displayed in inHg. The setting for this unit is [iHG].
psi	The vacuum level is displayed in psi. The setting for this unit is [PS 1].

## 6.10 Reset to factory settings

The ejector can be reset to its factory settings using the following function:

- The configuration of the ejector
- The initial setup

This function is executed using the parameter [rES] in the EF menu.

The factory settings for the ejector are listed in the Technical Data section.





## ⚠ WARNING

By activating/deactivating the product, output signals lead to an action in the production process!

Personal injury

- ▶ Avoid possible danger zone.
- ▶ Remain vigilant.

A description of how to reset the ejector to factory settings using the display and operating element follows:

- ✓ The EF menu is open.
  - 1. Use the **DOWN** button to select the parameter [rE5].
  - 2. Confirm using the **MENU** button.
  - 3. Use the **DOWN** button to select [yE5] for the parameter value.
  - 4. Confirm using the **MENU** button.
- ⇒ The ejector is reset to the factory settings.

The reset to factory settings function does not affect the following elements:

- The counter readings
- The zero-point adjustment of the sensor.

## 6.11 Counters

The ejector has two internal counters, [cc 1] and [cc 2], which cannot be erased:

Counter 1 increases with each valid pulse at the "suction" signal input, meaning that it counts all the suction cycles during the ejector's service life.

Counter 2 increases each time the "suction" valve is switched on. As a result, the average switching frequency of the air saving function can be determined using the difference between counters 1 and 2.

Description	Display parameter	Description
Counter 1	[cc 1]	Counter for suction cycles ("suction" signal input)
Counter 2	[cc 2]	Counter for the "suction valve" switching frequency

### Calling up the counter values

- ✓ Select the counter you wish to see in the system menu.
  - ▶ Confirm your selection of the counter 1 [cc 1] or counter 2 [cc 2] parameter using the **MENU** button.
- ⇒ The first three decimal places of the counter total will be displayed (the digits x 10<sup>6</sup>). This corresponds to the three-digit block with the highest value.

Use the **DOWN** button to display the remaining decimal places of the counter total, in order of descending value. The decimal points indicate which 3-digit block of the counter total is shown in the display.

The counter total is comprised of 3 blocks of digits:

Displayed section	$10^6$	$10^3$	$10^0$
Digit block	0.48	6 18	593

The current counter total in this example is 48 618 593.

## 6.12 Displaying the Software Version

The software version indicates the software currently running on the internal controller.

Using the control panel:

- ✓ The Info menu  $\text{INF}$  is open.
- 1. Use the **DOWN** button to select the  $\text{[50C]}$  parameter.
- 2. Confirm using the **MENU** button.
  - ⇒ The software ID is displayed.
- ▶ To exit the function, press the **MENU** button.

## 6.13 Displaying the part number

The part number of the ejector is printed on the label and also stored electronically.

- ✓ The ejector is in the Info menu.
- 1. Select the part number  $\text{PRT}$  parameter.
- 2. Use the **MENU** button to confirm the part number parameter  $\text{PRT}$ .
  - ⇒ The first two digits of the part number are displayed.
- 3. Press the **DOWN** button again several times.
  - ⇒ The remaining digits of the part number are displayed. The decimal points shown are part of the part number.

The part number consists of 4 blocks with a total of 11 digits.

Displayed section	1	2	3	4
Digit block	10	020	200	383

The part number in this example is 10.02.02.00383.

- ▶ To exit the function, press the **MENU** button.

## 6.14 Displaying the serial number

The serial number indicates the production period of the ejector.

- ✓ The ejector is in the Info menu  $\text{INF}$
- 1. Select the serial number  $\text{SRR}$  parameter.

2. Use the **MENU** button to confirm the serial number parameter  $\Sigma$ nr.
- ⇒ The first three decimal places of the serial number are displayed (the digits  $\times 10^6$ ). This corresponds to the three-digit block with the highest value.
3. Press the **DOWN** button again several times.
- ⇒ The remaining digits of the serial number are displayed. The decimal points show which 3-digit block of the serial number is shown in the display.

The serial number consists of 3 blocks with a total of 9 digits:

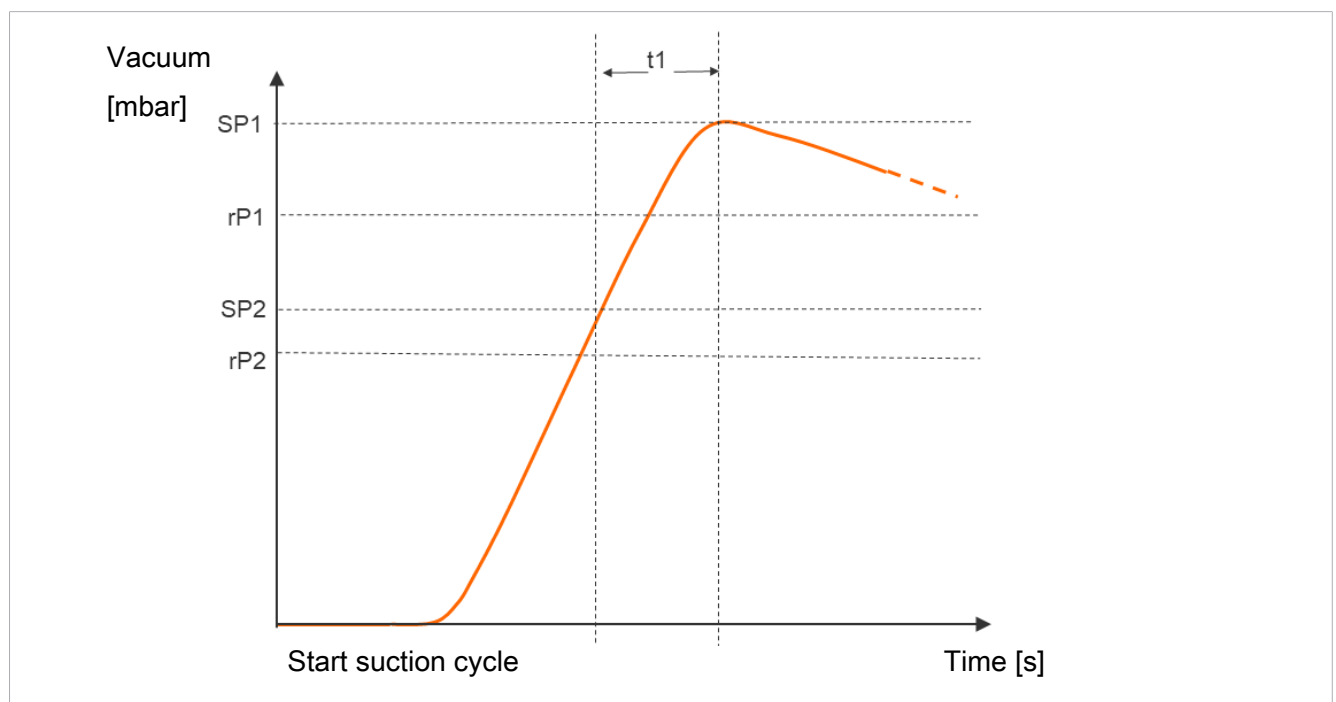
Displayed section	$10^6$	$10^3$	$10^0$
Digit block	9.00	000	000

In this example, the serial number is: 900000000

- ▶ To exit the Info menu, press the **MENU** button.

## 6.15 Condition Monitoring (CM)

### 6.15.1 Evacuation Time Monitoring



Measuring the evacuation time  $t_1$ :

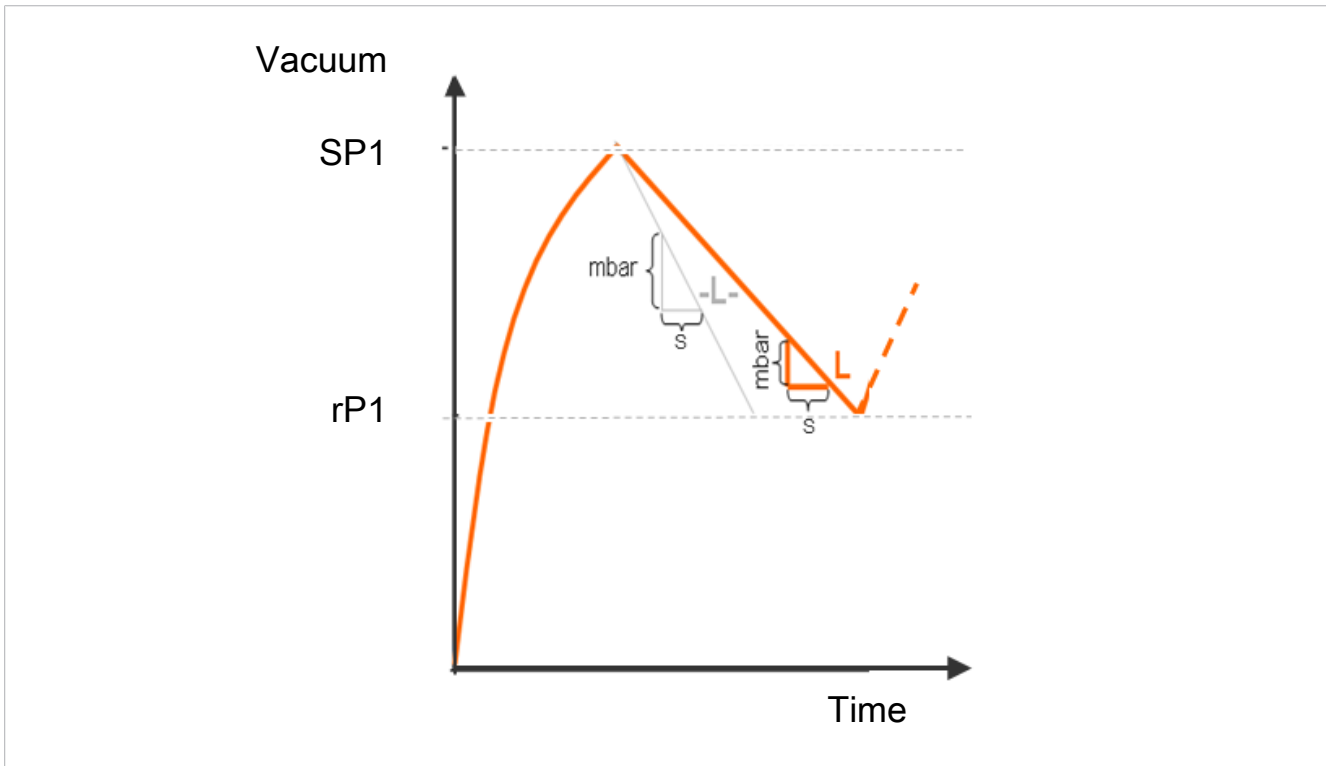
The interval between reaching the switching points SP2 and SP1 is measured (in ms).

The specified value for the max. permitted evacuation time can be set in the Extended Functions menu with the parameter [E - I]. Setting the value to [000] (= off) deactivates monitoring. The maximum permitted evacuation time setting is 9.99 s.

If the measured evacuation time  $t_1$  exceeds the specified value ( $>000$ ), the display alternately shows E - I and the vacuum level.

After 5 correctly measured evacuation times, the error message  $L$  is reset. The message is also immediately deleted if you set the permissible evacuation time to the value  $000$ .

### 6.15.2 Leakage monitoring



Measuring the leakage:

In control mode ( $[L] = [0]$ ), the vacuum drop/leakage over a certain period of time is measured (as vacuum drop per unit time in mbar/s) from the point when the air saving function interrupts suction after reaching switching point SP1.

The specified value for the max. permitted leakage  $L$  can be set in the Extended Functions menu with the parameter  $[L]$ . Setting the value to  $000$  (= off) deactivates monitoring. The maximum leakage that can be set is 999 mbar/second.

If the leakage  $L$  is greater than the set value  $L$ , the display will alternately show  $L$  and the vacuum level.

The  $L$  error message is reset after 5 airtight suction cycles (measured leakage value < specified value). The message is also immediately deleted if you set the permissible leakage to the value  $000$ .

## 7 Checking the Delivery

The scope of delivery can be found in the order confirmation. The weights and dimensions are listed in the delivery notes.

1. Compare the entire delivery with the supplied delivery notes to make sure nothing is missing.
2. Damage caused by defective packaging or occurring in transit must be reported immediately to the carrier and J. Schmalz GmbH.

## 8 Installation

### 8.1 Installation Instructions



#### **⚠ CAUTION**

##### **Improper installation or maintenance**

Injury to persons or damage to property

- ▶ During installation and maintenance, make sure that the product is disconnected and depressurized and that it cannot be switched on again without authorization.
- 

To ensure safe installation, the following instructions must be observed:

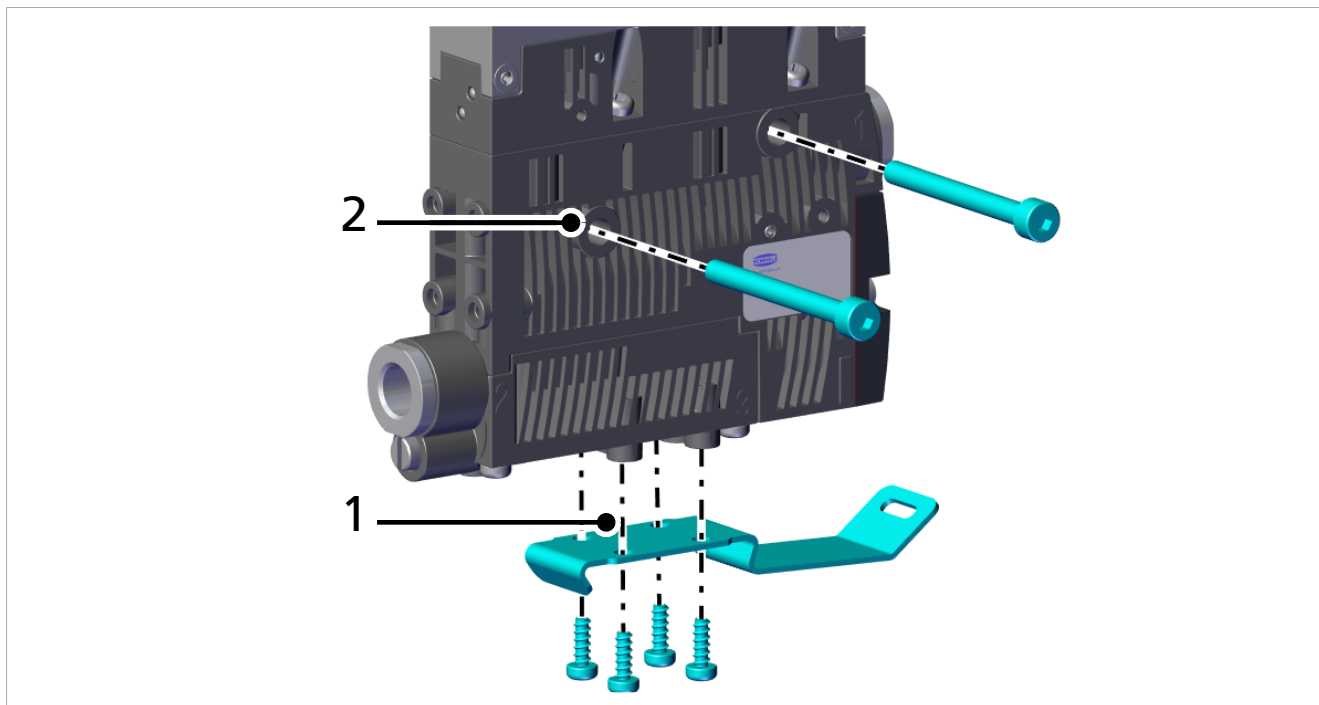
- Use only the connectors, mounting holes and attachment materials that have been provided.
- Mounting and removal must be performed only when the device is unpressurized and disconnected from the mains.
- Pneumatic and electrical line connections must be securely connected and attached to the product.
- Note the connection symbols and designations on the product.

## 8.2 Mounting

The ejector can be installed in any position.

There are two 4.4 mm mounting holes for mounting the ejector.

A DIN rail mount for DIN rail TS35 can be used as a mounting option.



1 DIN rail mount for TS35 DIN rail, incl. plastic tapping screws  
Max. tightening torque 0.5 Nm

2 2x M4 fastening screws with washers  
Max. tightening torque 2 Nm

When mounting with fastening screws, use M4 washers (2 Nm max. tightening torque).

For the start of operations, the ejector must be connected to the controller via the connection plug with a connection cable. The compressed air required to generate the vacuum is connected via the compressed air connection. The compressed air supply must be supplied by the higher-level machine.

The vacuum circuit is connected to the vacuum connection.

The installation process is described and explained in detail below.

## 8.3 Pneumatic Connection



### CAUTION

**Compressed air or vacuum in direct contact with the eye**

Severe eye injury

- ▶ Wear eye protection
- ▶ Do not look into compressed air openings
- ▶ Do not look into the silencer air stream
- ▶ Do not look into vacuum openings such as suction cups, suction lines and hoses.



## ⚠ CAUTION

### Noise pollution due to incorrect installation of the pressure and vacuum connections

Hearing damage!

- ▶ Correct installation.
- ▶ Wear ear protectors.



## NOTE

### Operating pressure above the recommended maximum pressure

Product damage

- ▶ Only use the Ejector within the nominal pressure range.

### 8.3.1 Connecting the Compressed Air and Vacuum

The compressed air connection is marked with the number 1 on the ejector.

- ▶ Connect the compressed air hose. The max. tightening torque is 4 Nm.

The vacuum connection is marked with the number 2 on the ejector.

- ▶ Connect the vacuum hose. The max. tightening torque is 4 Nm.

### 8.3.2 Instructions for the Pneumatic Connection

Use only screw unions with cylindrical G-threads for the compressed air and vacuum connection!

To ensure problem-free operation and a long service life for the product, only use adequately maintained compressed air and take the following requirements into account:

- Use of air or neutral gas in accordance with EN 983, filtered 5 µm, oiled or unoiled.
  - Dirt particles or foreign bodies in the product connections, hoses or pipelines can lead to partial or complete malfunction.
1. Shorten the hoses and pipelines as much as possible.
  2. Keep hose lines free of bends and crimps.
  3. Only use a hose or pipe with the recommended internal diameter to connect the product; otherwise, use the next largest diameter.
    - On the compressed air side, ensure that the internal diameter has the dimensions required for the product to achieve its performance data.
    - On the vacuum side, ensure that the internal diameters have the necessary dimensions for preventing high flow resistance. If the selected internal diameter is too small, the flow restrictor and the evacuation times increase and the blow off times are extended.



The following table shows the recommended line cross-sections (internal diameter):

Performance class	Line cross-section (internal diameter) in mm <sup>1)</sup>	
	Pressure side	Vacuum side
07	4	4
10	4	4
15	4	6
2-07	4	4
2-09	4	4
2-14	4	6

<sup>1)</sup>Based on a maximum hose length of 2 m.

- ▶ For longer hose lengths, the cross-sections must also be larger.

## 8.4 Electrical connection



### ⚠ WARNING

#### Electric shock

Risk of injury

- ▶ Operate the product using a power supply unit with protected extra-low voltage (PELV).



### ⚠ WARNING

By activating/deactivating the product, output signals lead to an action in the production process!

Personal injury

- ▶ Avoid possible danger zone.
- ▶ Remain vigilant.



### NOTE

#### Power load too high

Destruction of the vacuum switch, as there is no protection against overloading!

- ▶ Prevent constant load currents > 0.1 A.

The electrical connection is established using a 5-pin M12 connector that supplies the device with voltage, and contains the two input signals and the output signal. The inputs and outputs are not electrically isolated from one another.

The ejector can:

- be connected directly to the controller, for example, using connection cable part no. 21.04.05.00080, or
- use an IN/OUT box.

Ensure that:

- The electrical supply cable does not exceed the maximum length of 20 meters and
- the connection cable does not exert any force on the connection.

Establish the ejector's electrical connection using plug connector 1 as shown in the figure.



1 Electrical connection plug, M12, 5-pin

- ✓ Prepare a connection cable with an M12 5-pin connector (supplied by the customer).
- ▶ Attach the connection cable to the electrical connection (1) on the ejector (max. tightening torque = hand-tight).

### 8.4.1 PIN Assignment

PIN assignment for 5-pin M12 connector

M12 connector	PIN	Symbol	Function
	1	US	24 V supply voltage
	2	IN1	"Suction" signal input
	3	GND	Ground
	4	OUT	"Parts control" output (SP2)
	5	IN2	"Blow off" signal input

### 8.5 Process Data

During operation of the device, all input and output signals are connected to a controller, either directly or using intelligent terminal boxes.

For this purpose, not only the supply voltage but also two input signals and one output signal should be connected to allow the device to communicate with the controller.

The basic device functions such as suction, blow off and feedback are used with these signals.

In detail, they are:

#### Process data INPUT

Signal	Symbol	Parameter
0	OUT1	Vacuum limit value SP2 ("Part Present" check)

#### Process data OUTPUT

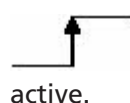
Signal	Symbol	Parameter
0	IN1	Suction ON/OFF
1	IN2	Blow off ON/OFF

## 8.6 Start of Operations

A typical handling cycle is divided into the following three phases: suction, drop-off and idle.

To check whether sufficient vacuum has built up, the limit value SP2 is monitored by an integrated vacuum sensor during suction and output to the higher-level controller via OUT.

Phase	Switching step	NC variant			NO variant		
		Signal		Status	Signal		Status
1	1		IN1	Suction ON		IN1	Suction ON
	2		OUT	Vacuum > SP2		OUT	Vacuum > SP2
2	3		IN1	Suction OFF		IN1	Suction OFF
	4		IN2	Blow off ON		IN2	Blow off ON
3	5		OUT	Vacuum < (rP2)		OUT	Vacuum < (rP2)
	6		IN2	Blow off OFF		IN2	Blow off OFF



Signal status changes from inactive to active.



Signal status changes from active to inactive.

## 9 Operation

### 9.1 Safety Instructions for Operation



#### **⚠ WARNING**

##### **Change of output signals when product is switched on or plug is connected**

Risk of injury to persons and damage to property due to uncontrolled movements of the higher-level machine/system!

- ▶ The electrical connection must be performed only by specialists who can evaluate the effects of signal changes on the overall system.



#### **⚠ CAUTION**

**When the system is started in automatic operation, components move without advanced warning.**

Risk of injury

- ▶ Ensure that the danger zone of the machine or system is free of persons during automatic operation.

### 9.2 General Preparations

Always carry out the following tasks before activating the system:

1. Before each start of operations, check that the safety features are in perfect condition.
2. Check the ejector for visible damage and deal with any problems immediately (or notify your supervisor).
3. Ensure that only authorized personnel are present in the working area of the machine or system and that no other personnel are put in danger by switching on the machine.

There must be no people in the system danger area while it is in operation.

## 10 Troubleshooting

### 10.1 Help with Malfunctions

Fault	Possible cause	Solution
Power supply disrupted	Electrical connection	▶ Make sure device is properly connected to power
No communication	Incorrect electrical connection	▶ Check electrical connection and pin assignment
	Higher-level controller not correctly configured	▶ Check the controller configuration
Product does not respond	No power supply	▶ Check electrical connection and pin assignment
	No compressed air supply	▶ Check the compressed air supply
Vacuum level is not reached or vacuum is built up too slowly	Silencer is dirty	▶ Replace silencer insert
	Leakage in hose line	▶ Check hose connections
	Leakage at suction cup	▶ Check suction cup
	Operating pressure too low	▶ Increase operating pressure. Note the maximum limits!
	Internal diameter of hose line too small	▶ Observe recommendations for hose diameter
Load cannot be held.	Vacuum level too low	▶ Increase the control range for the air saving function
	Suction cup too small	▶ Select a larger suction cup
The buttons do not respond and the display does not show [L □ C]	The keypad lock is activated	▶ Deactivate the keypad lock
No display on the screen	Faulty electrical connection	▶ Check electrical connection and pin assignment
Display shows error code	See the "Error codes" table	▶ See "Error Codes" table in the following chapter
Warning message "Leakage too high" even though handling cycle is working optimally	Limit value -L- (permissible leakage per second) set too low	▶ Determine typical leakage values in a good handling cycle and set as limit value
	Limit values SP1 and rP1 for leakage measurement set too low	▶ Set limit values in such a way that there is a clear differentiation between the neutral and suction system states.
Warning message "Leakage too high" does not appear even though there is high leakage in the system	Limit value -L- (permissible leakage per second) set too high	▶ Determine typical leakage values in a good handling cycle and set as limit value
	Limit values SP1 and rP1 for leakage measurement set too high.	▶ Set limit values in such a way that there is a clear differentiation between the neutral and suction system states.

## 10.2 Error messages

If an error occurs, it appears on the display in the form of an error code ("E number"). The ejector's response to an error depends on the type of error.

Display code	Error description
E03	Zero-point adjustment outside $\pm 3\%$ FS (full scale)
E07	Supply voltage is too low
E17	Supply voltage is too high
FFF	Present vacuum exceeds the measurement range
-FF	Overpressure in vacuum circuit; this normally happens only in blow-off mode.
t-1	The measured evacuation time t1 exceeds the specified value; the display alternately shows t-1 and the vacuum level
-L-	The leakage L is greater than the set value -L-; the display alternately shows -L- and the vacuum level

## 11 Maintenance

### 11.1 Safety Instructions

Maintenance work may only be carried out by qualified personnel.

- ▶ Create atmospheric pressure in the ejector's compressed air circuit before working on the system!



#### WARNING

Failure to follow the instructions in these **Operating instructions** may result in injuries!

- ▶ Read the Operating instructions carefully and observe the contents.



#### WARNING

**Risk of injury due to incorrect maintenance or troubleshooting**

- ▶ Check the proper functioning of the product, especially the safety features, after every maintenance or troubleshooting operation.



#### NOTE

**Incorrect maintenance work**

Damage to the ejector!

- ▶ Always switch off the supply voltage before carrying out maintenance work.
- ▶ Secure it so that it cannot be switched back on.
- ▶ The ejector must be operated only with a silencer and press-in screen(s).

### 11.2 Cleaning the Product

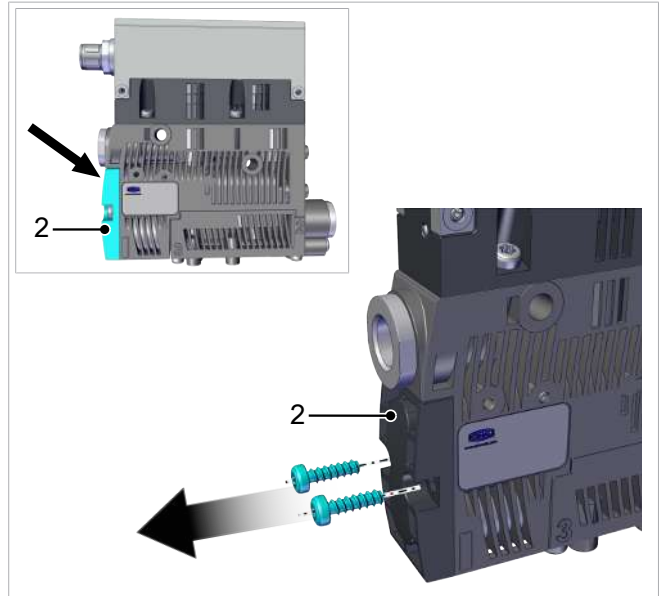
1. For cleaning, do **not** use aggressive cleaning agents such as industrial alcohol, white spirit or thinners.  
Only use cleaning agents with pH 7–12.
2. Remove dirt on the exterior of the device with a soft cloth and soap suds at a maximum temperature of 60° C. Make sure that the silencer is not soaked in soapy water.
3. Ensure that no moisture can reach the electrical connection or other electrical components.

### 11.3 Replacing the Silencer

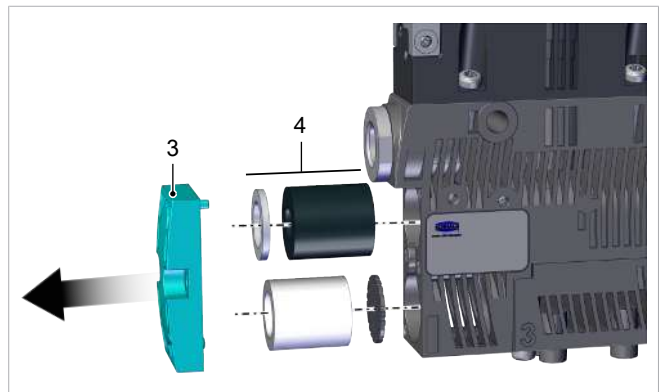
Heavy infiltration of dust, oil, and so on, may contaminate the silencer (2) and reduce the suction capacity. Cleaning the silencer is not recommended due to the capillary effect of the porous material.

If the suction capacity decreases, replace the silencer (2):

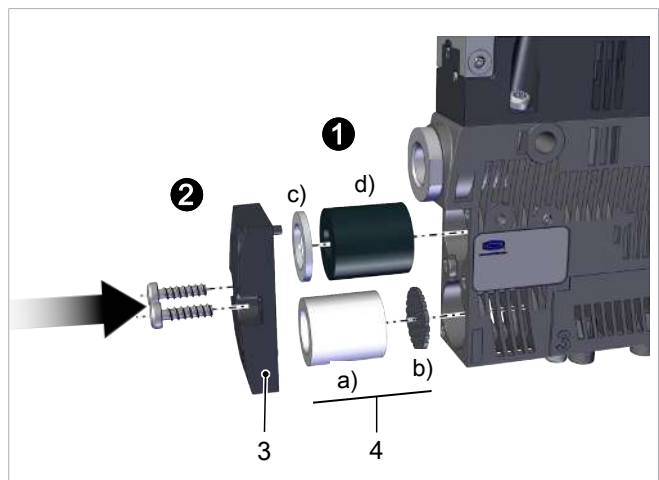
1. Loosen and remove the fastening screws on the silencer (2).



2. Pull off the cover (3) and the silencer elements (4).



3. The new silencer elements (4)
  - a) 10.02.02.04141 Silencer insert
  - Only with single-stage version:
  - b) 25.03.02.00006 Perforated disk
  - c) 10.07.08.00020 Sealing ring
  - d) 10.02.02.04152 Slide the insulating plate into the ejector body ❶.
 Put on the cover and fasten with two screws – tightening torque of 0.75 to 0.85 Nm ❷.



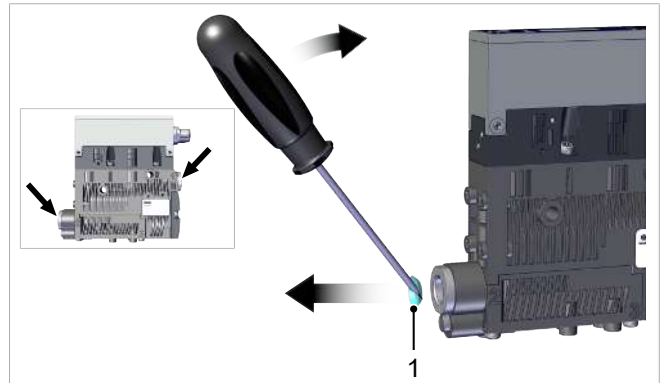


## 11.4 Replacing the Press-In Screens

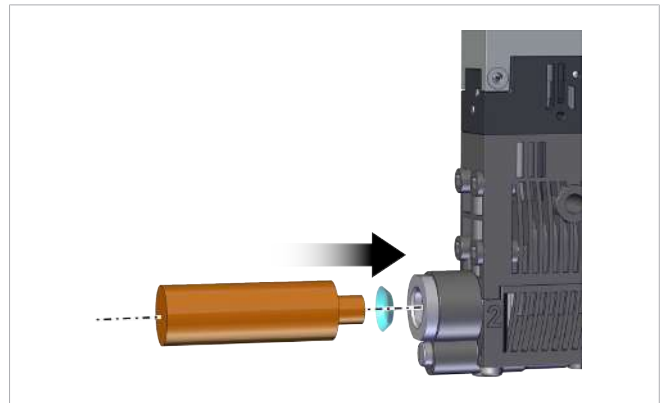
The **vacuum and compressed air connections** of the ejectors contain press-in screens in the **threaded** version. Dust, chippings and other solid materials may be deposited in the screens over time.

If there is a noticeable reduction in the performance of the ejectors, replace the filter screens (part no. 10.02.02.04404):

1. **NOTE! When removing the filter screen, do not damage the internal thread of the connector.**  
Remove the filter screens at connectors 1 and 2 using a screwdriver.  
Pierce filter screens to make them unusable!



2. Press in the new filter screens (1) as far as they will go using a suitable tool or mandrel.



## 12 Warranty

This system is guaranteed in accordance with our general terms of trade and delivery. The same applies to spare parts, provided that these are original parts supplied by us.

We are not liable for any damage resulting from the use of non-original spare parts or accessories.

The exclusive use of original spare parts is a prerequisite for the proper functioning of the ejector and for the validity of the warranty.

Wearing parts are not covered by the warranty.

Opening the ejector will damage the "tested" labels. This voids the warranty.

## 13 Spare and wearing parts

Maintenance work may only be carried out by qualified personnel.

- ▶ **WARNING! Risk of injury due to improper maintenance!** After performing any maintenance or repair work, check that the system is functioning correctly, particularly the safety features.

The following list contains the primary spare parts.

Part no.	Designation	Part type
10.02.02.04737	VST SCPS single-stage silencer Wearing part set for ejector Screens, silencer insert, non-return valve, pistons, springs and sealing	Spare part
10.02.02.04738	VST SCPS two-stage silencer Wearing part set for two-stage ejector Screens, silencer insert, non-return valve, pistons, springs and sealing	Spare part

## 14 Accessories

Part no.	Designation	Note
21.04.05.00080	Connection cable	M12, 5-pin, with open end, 5 m
21.04.05.00086	Connection cable	Socket to 2-pin cable, 3 m
21.04.05.00158	Connection cable	5-pin M12 socket, to 5-pin M12 connector, 1 m
21.04.05.00211	Connection cable	5-pin M12 socket, to 5-pin M12 connector, 2 m
10.02.02.03490	Connection distributor	M12, 5-pin, to 2xM12, 4-pin
10.02.02.04149	DIN rail mount	for DIN rail TS35
10.07.01.00241	Vacuum Filter	with replaceable filter cartridge, VFI CN6/4 50
10.07.01.00245	Vacuum Filter	with replaceable filter cartridge, VFI CN8/6 50
10.02.02.04338	Compressed-air distributor	GP 4 SCPS 07..15 G2
10.02.02.04884	Compressed-air distributor	GP 3 SCPS 07..15 G2
10.02.02.04858	Compressed-air distributor	GP 5 SCPS 07..15 G2
10.02.02.04837	Compressed-air distributor	GP 6 SCPS 07..15 G2
10.02.02.04343	Mounting kit	SET SCPS
10.02.02.04216	Exhaust air set	ABL-SET SCPS, single-stage
10.02.02.04667	Exhaust air set	Exhaust air set, ABL-SET SCPS two-stage

## 15 Disposing of the Product

The components may only be prepared for disposal by qualified specialists.

- ✓ The product is out of operation.
- ▶ Disassemble the components of the product and dispose of the materials appropriately.



For proper disposal, please contact a company specializing in the disposal of technical goods and instruct the company to observe the applicable disposal and environmental regulations. Schmalz is happy to assist you in finding a suitable company.

## 16 Declarations of Conformity

### 16.1 EC Conformity

#### EU Declaration of Conformity

The manufacturer Schmalz confirms that the product Ejector described in these Operating instructions fulfills the following applicable EU directives:

2014/30/EU	Electromagnetic Compatibility
2011/65/EU	RoHS Directive

The following harmonized standards were applied:

EN ISO 12100	Safety of machinery — General principles for design — Risk assessment and risk reduction
EN 61000-6-2+AC	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-3+A1+AC	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN IEC 63000	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances



The EU Declaration of Conformity valid at the time of product delivery is delivered with product or made available online. The standards and directives cited here reflect the status at the time of publication of the operating and assembly instructions.

### 16.2 UKCA Conformity

The manufacturer Schmalz confirms that the product described in these operating instructions fulfills the following applicable UK regulations:

2016	Electromagnetic Compatibility Regulations
2012	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations

The following designated standards were applied:

EN ISO 12100	Safety of machinery — General principles for design — Risk assessment and risk reduction
EN 61000-6-2+AC	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-3+A1+AC	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN IEC 63000	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances



The Declaration of Conformity (UKCA) valid at the time of product delivery is delivered with the product or made available online. The standards and directives cited here reflect the status at the time of publication of the operating and assembly instructions.



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