SCPSb-UHV-HD Compact Ejector

Operating Instructions

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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Contents

1 Important Information

1.1 Note on Using this Document

J. Schmalz GmbH is generally referred to as Schmalz in these Operating instructions.

These Operating instructions contain 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 Operating instructions describe the product at the time of delivery by Schmalz.

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

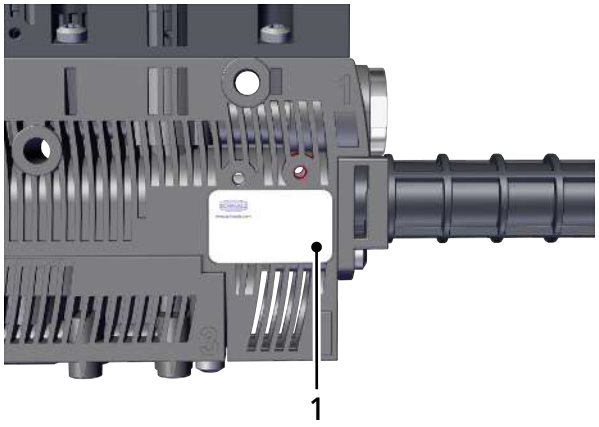
1.3 Type Plate

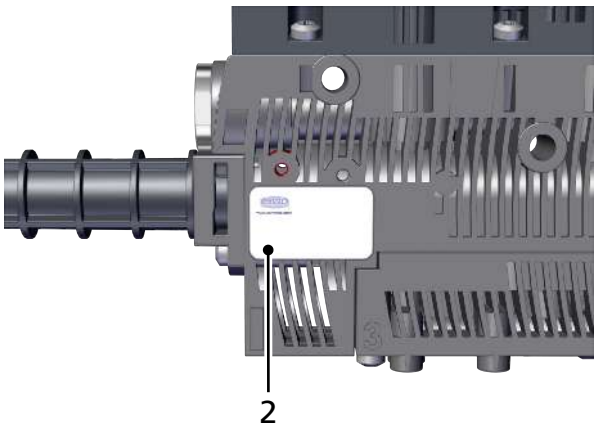
The type plates (1) and (2) are permanently attached to the product and must always be clearly legible.
Type plate (1) contains the following information:

- EAC label
- Pneumatic symbol
- Part sales designation/type
- Part number
- Permitted pressure range

Type plate (2) contains the following information:

- CE label
- EAC label
- QR code
- Customer part number
- Coded date of manufacture
- Serial number





1.4 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
WARNING	Indicates a medium-risk hazard that could result in death or serious injury if not avoided.
CAUTION	Indicates a low-risk hazard that could result in minor or moderate injury if not avoided.
NOTE	Indicates a danger that leads to property damage.

1.5 Symbol

This symbol indicates useful and important information.

✓ This symbol represents a prerequisite that must be met prior to an operational step.

▸ 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 Safety

The ejector emits noise due to its use of compressed air.

⚠ 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

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

Serious injury

- ▸ Ensure that the valves and ejectors 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

2.2 Intended Use

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 ejector is designed to generate a vacuum for gripping and transporting objects when used in conjunction with suction cups. It is operated by a controller via discrete 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 intended for industrial use.

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

2.3 Non-Intended Use

⚠ 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.

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

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

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

2.4 Personnel Qualifications

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

1. Task only qualified personnel to perform the tasks described in these Operating instructions.
2. The product must be operated only by persons who have undergone appropriate training.

These Operating instructions are intended for fitters who are trained in handling the product and who can operate and install it.

2.5 Modifications to the Ejector

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

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

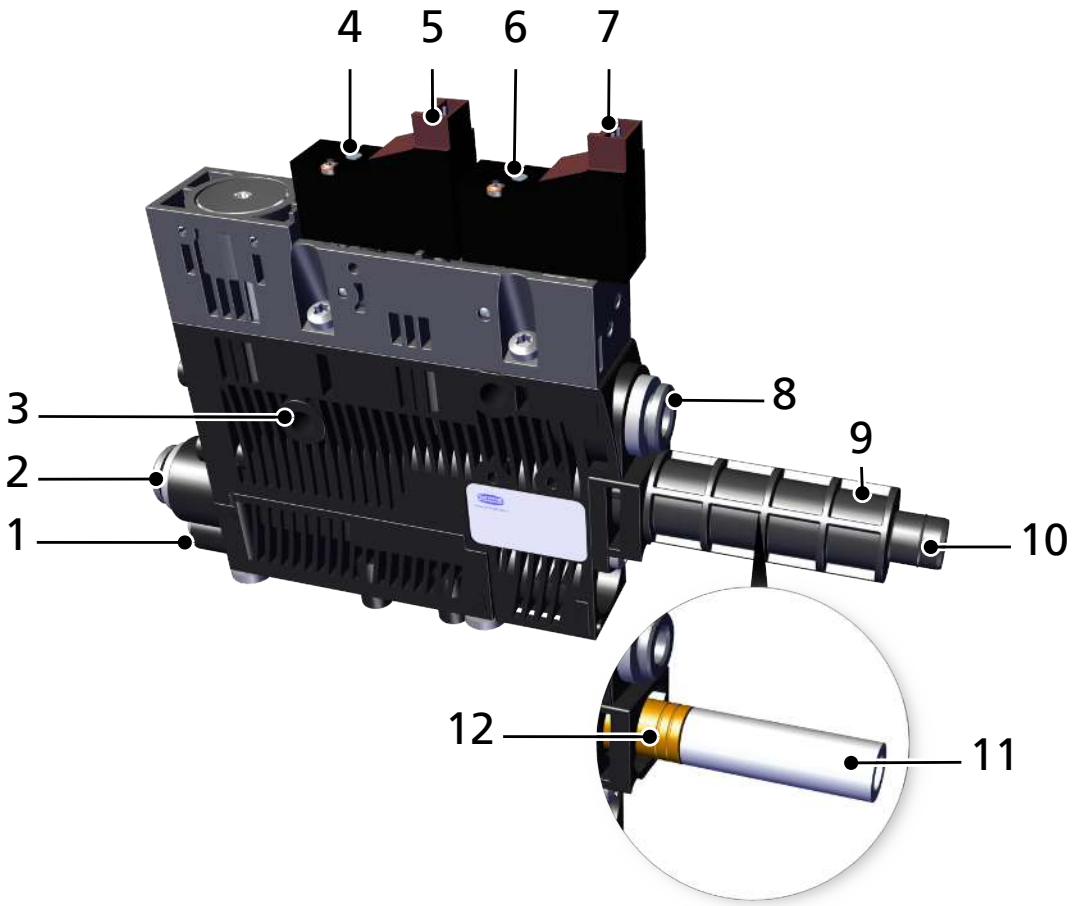
3 Product Description

3.1 Ejector Designation

The breakdown of the item designation (e.g. SCPSb-UHV-HD 16 S02 NO) is as follows:

Property	Variants
Type of ejector	SCPSb-UHV-HD (Ultra High Vacuum-Heavy Duty)
Nozzle size	0.7 mm; 1.1 mm; 1.6 mm
Connection	S02 (plug-in screw unions for pneumatic hose: compressed air 6/4, vacuum 8/6) S04 (plug-in screw unions for pneumatic hose: compressed air and vacuum 6/4)
Valve control	NO (normally open), sucks when no voltage is applied NC (normally closed), does not suck when no voltage is applied

3.2 Ejector Structure



1	Blow off valve screw	2	Vacuum connection, marking 2 [V]
3	Mounting hole (2x)	4	Button for operating the “suction” EMV manually
5	“Suction” EMV	6	Button for operating the “blow off” EMV manually
7	“Blow off” EMV	8	1/8" compressed air connector (marking 1 [P])
9	Silencer cover with twist-and-lock closure	10	Exhaust outlet
11	Silencer insert	12	Nozzle

4 Technical Data

4.1 General Parameters

Parameter	Symbol	Limit value			Unit	Comment
		min.	typ.	max.		
Working temperature	T_{amb}	0	---	50	° C	---
Storage temperature	T_{Sto}	-10	---	60	° C	---
Humidity	H_{rel}	10	---	90	% r.h.	Free from condensation
Degree of protection	---	---	---	IP40	---	---
Operating pressure (flow pressure)	P	2	4.2	6	bar	---
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					

4.2 Electrical Parameters

Supply voltage	DC 24 V ± 10% (PELV[1)])		
Polarity reversal protection	Yes		
Current consumption (at 24 V)	—	Typical current consumption	Max. current consumption
	SCPSb – xx – NC	50 mA	70 mA
	SCPSb – xx – NO	75 mA	115 mA

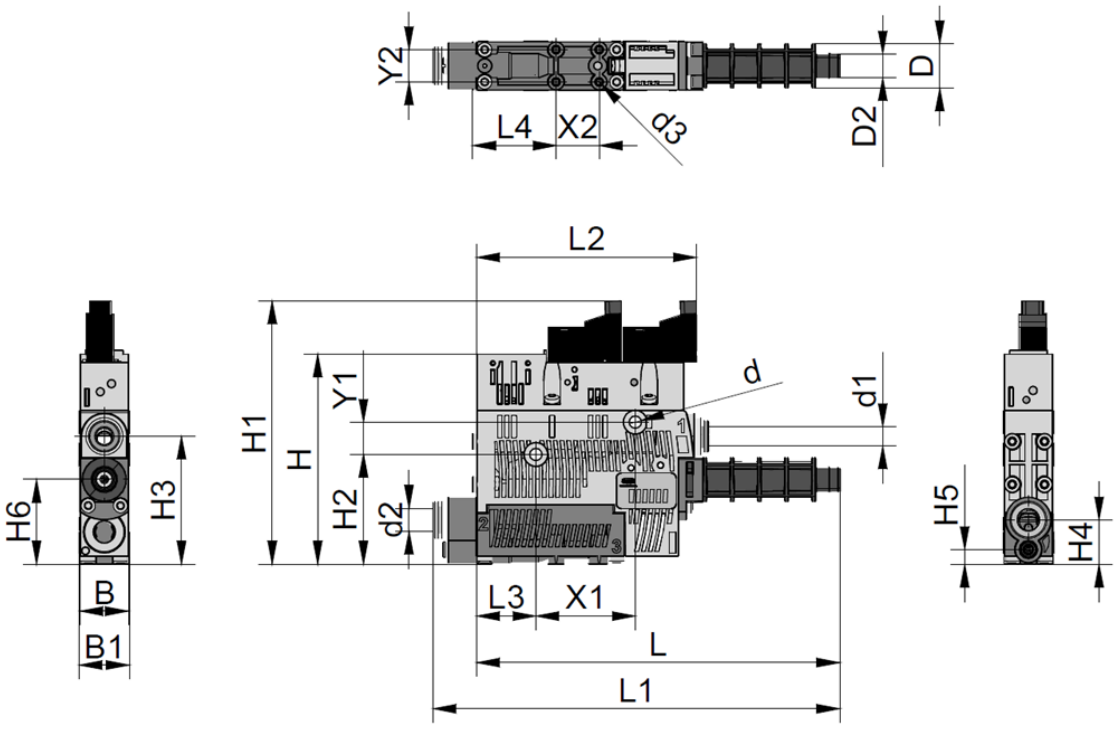
[1)] The power supply must correspond to the regulations in accordance with EN60204 (protected extra-low voltage).

4.3 Performance Data

Type	SCPS UHV HD 07	SCPS UHV HD 11	SCPS UHV HD 16
Nozzle size [mm]	0.7	1.1	1.6
Max. vacuum[1] [%]	91		
Suction rate[1] [l/min]	13	27.8	53.2
Max. blow off capacity [1] [l/min]	120		
Air consumption [1] (suction) (l/min]	17.2	37.5	105.6
Sound level[1], unobstructed suction [dB(A)]	62	68	75
Sound level[1], suction [dB(A)]	64	75	77
Weight [kg]	0.21		

[1)] at 4.5 bar

4.4 Dimensions

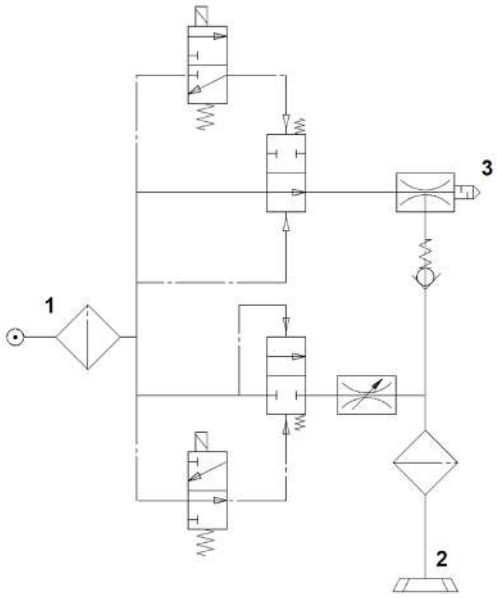


B	B1	L	L1	L2	L3	L4	H	H1	H2	H3	H4
18	18.6	135	151	81.6	22	31	78	98.8	40.8	47.5	16.5

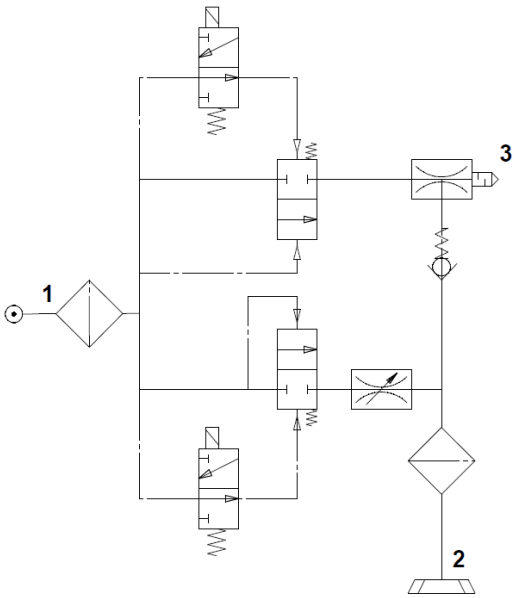
H5	H6	d	d1	d2	d3	X1	Y1	X2	Y2	D	D2
5.5	31.5	4.4	6	6 / 8	2.6	36.9	12	16	12	16.5	9

4.5 Pneumatic Circuit Plans

SCPSb...NO...



SCPSb...NC...



5 General Description of Functions

5.1 Picking up the Workpiece (Vacuum Generation)

The ejector is designed for vacuum handling of airtight parts 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 or exhaust air channel.

The “Suction” pilot valve is controlled directly.

- In the NO (normally open) variant, the venturi nozzle is deactivated when the suction signal is received.
- In the NC (normally closed) variant, the venturi nozzle is activated when the suction signal is received.

When objects with airtight surfaces are picked up, the integrated non-return valve prevents the vacuum from dropping.

5.2 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.

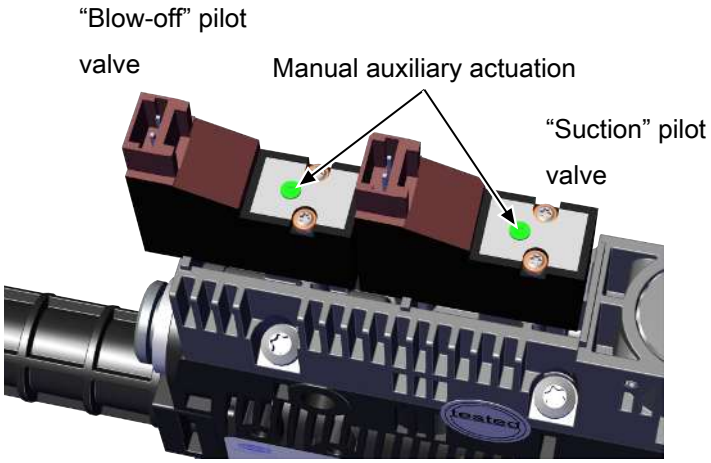
The “Blow-off” pilot valve is controlled directly. The ejector switches to blow off mode for as long as the signal is present.

5.3 Restricted Mode

The “Blow-off” and “Suction” pilot valves have a button for manual operation.

This can be used to actuate the valve manually without a power supply.

✓ The compressed air supply is connected.

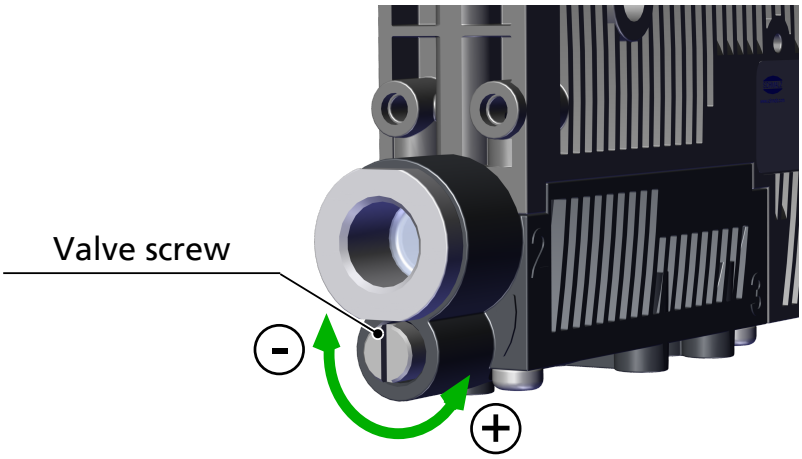


▸ To activate the valve in question, trigger the manual auxiliary actuation using an implement such as a ballpoint pen.

5.4 Changing the Blow-Off Flow Rate on the Ejector

Do not overwind the stop on the valve screw. A minimum flow rate of approx. 15 % is always necessary for technical reasons. The blow-off volume flow can be set between 15 % and 100 %.

There is a valve screw below the vacuum connection that can be used to adjust the blow-off flow rate. The valve screw is equipped with a stop on both sides.



1. Turn the valve screw clockwise to reduce the flow rate.
2. Turn the valve screw counterclockwise to increase the flow rate.

6 Transport and Storage

6.1 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.

7 Installation

7.1 Installation Instructions

⚠ CAUTION

Improper installation or maintenance

Personal injury or damage to property

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

For safe installation, the following instructions must be observed:

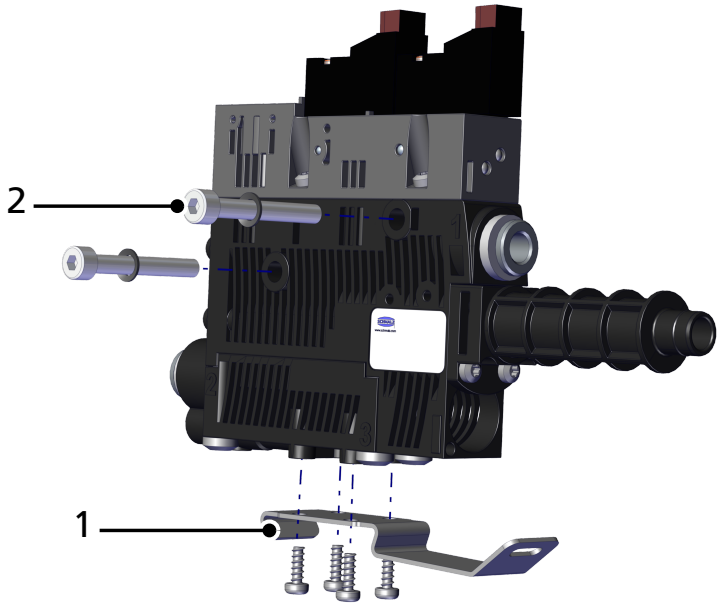
1. Use only the connections, mounting holes and attachment materials that have been provided.
2. Carry out mounting and removal only when the device is in an idle, depressurized state.
3. Pneumatic and electrical line connections must be securely connected and attached to the ejector.

7.2 Mounting

The ejector may 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

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 control 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.

7.3 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, e.g. suction cups

⚠ CAUTION

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

Hearing damage

- Correct installation.
- Wear ear protectors.

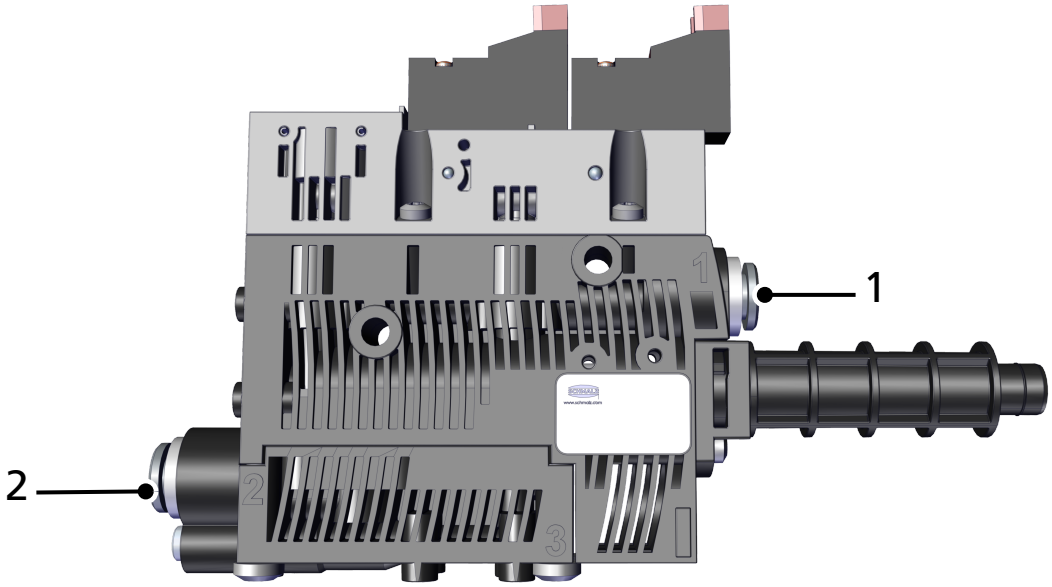
7.3.1 Connecting the Compressed Air and Vacuum

⚠ WARNING

Activating the compressed air causes the ejector module to be forced out of the hole.

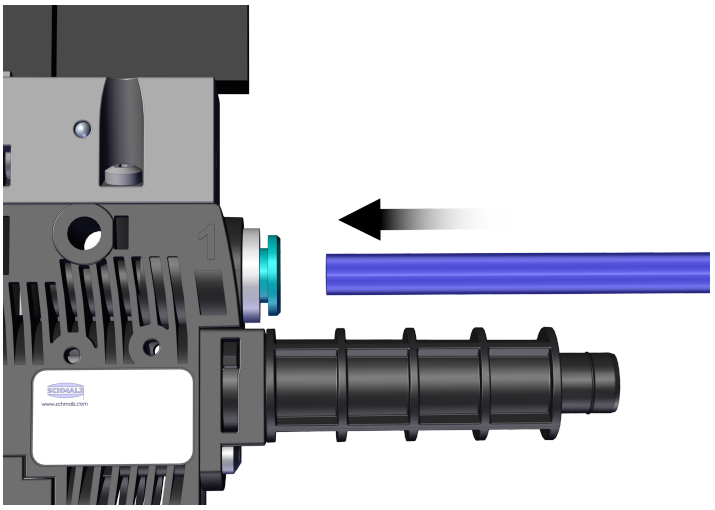
Serious personal injury

- Before activating the compressed air supply, make sure that the ejector module is fixed in place by the holder cap.
- Wear eye protection



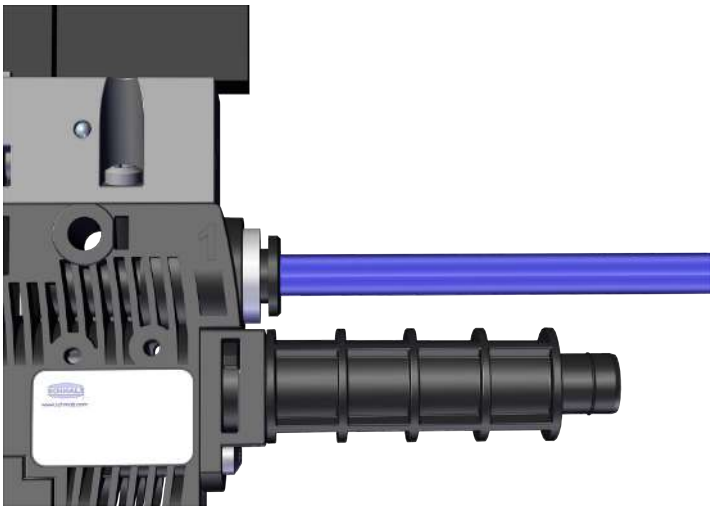
1	Compressed air connection	2	Vacuum connection

✓ The corresponding pneumatic hose is handy.



- The compressed air connection is marked with the number 1 on the ejector (Shown here in the image as an example.).
  The vacuum connection is marked with the number 2 on the ejector.
  Press the corresponding pneumatic hoses (compressed air supply and suction cup connection) as far as possible into the plug-in screw unions.

⇨ The pneumatic hoses fit tightly in the plug-in screw unions.



7.4 Electrical Connection

NOTE

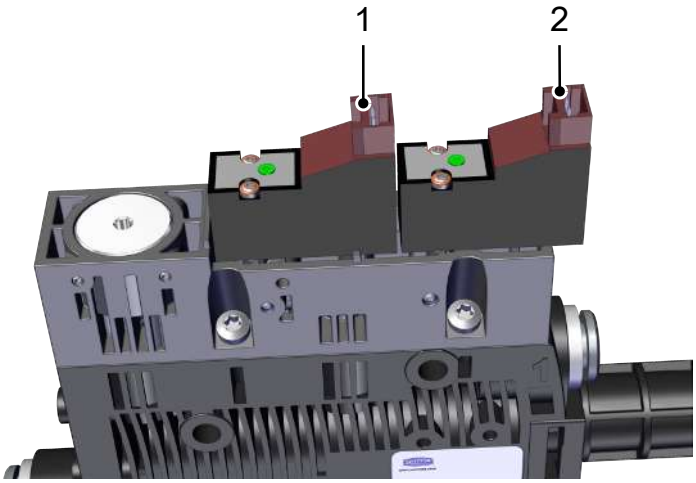
Incorrect power supply

Destruction of the integrated electronics

- Operate the product using a power supply unit with protected extra-low voltage (PELV).
- The system must incorporate safe electrical cut-off of the power supply in compliance with EN60204.
- Do not connect or disconnect the connector under tension and/or when voltage is applied.

The electrical connection is established directly via the connection plugs of the valves. The connection of the valves is independent of the polarity.

✓ Provide connection cable (for example, 2x item no.: 21.04.06.00086)



- Insert the connection cables into the electrical connections (1 and 2) until they click into place.

8 Operation

8.1 Safety Instructions for Operation

⚠ 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

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.

⚠ WARNING

Suspended load

Risk of serious injury

- Do not walk, stand or work under suspended loads.

⚠ 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.

⚠ 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.

8.2 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.

9 Troubleshooting

9.1 Help with Malfunctions

Fault	Possible cause	Solution
Power supply disrupted	Electrical connection	▸ Make sure device is properly connected to power
Ejector does not respond	No power supply	▸ Check electrical connection
	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 the silencer
	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	Suction cup too small	▸ Select a larger suction cup
	Vacuum level too low	▸ Increase operating pressure (observe max. permissible limits)

10 Maintenance

10.1 Safety

Maintenance work may only be carried out by qualified personnel.

⚠ 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 supply voltage before carrying out any maintenance work.
- ▸ Secure before switching back on.
- ▸ The ejector must only be operated with a silencer.

- ▸ Before carrying out any work on the system, ensure that the ejector's compressed air circuit is vented to atmospheric pressure!

10.2 Cleaning the Ejector

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.

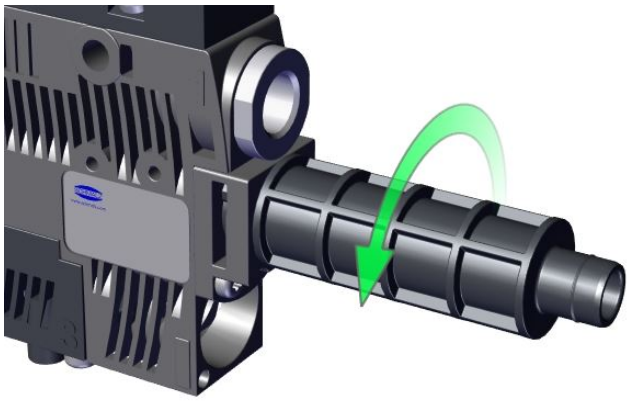
10.3 Replacing the Silencer Insert

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

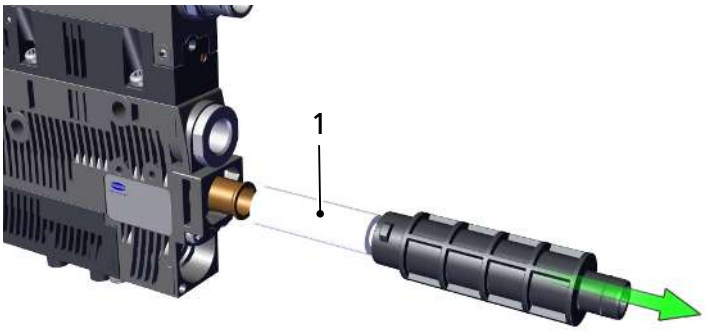
If the suction capacity decreases, replace the silencer insert:

✓ Deactivate the ejector and disconnect it from the supply lines.

1. Unlock the silencer cover by turning the bayonet fastener 90°.



2. Remove the silencer cover.



3. Replace the silencer insert (1).

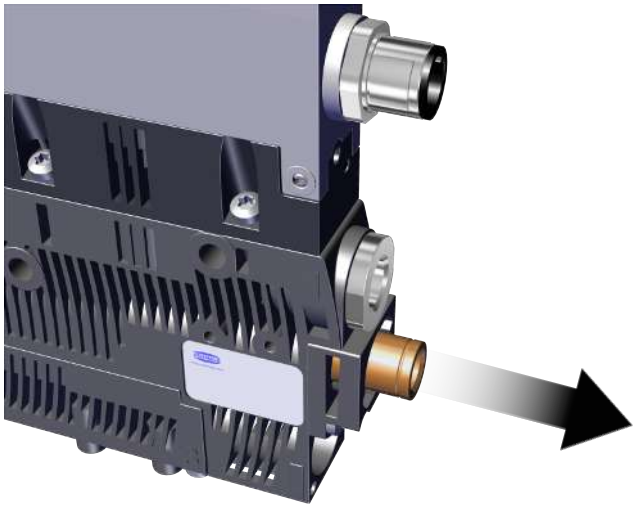
10.4 Cleaning or Changing the Nozzle

The easy access to the silencer insert and nozzle provided by the silencer cover with bayonet fastener ensures that the nozzle is easy to clean and replace.

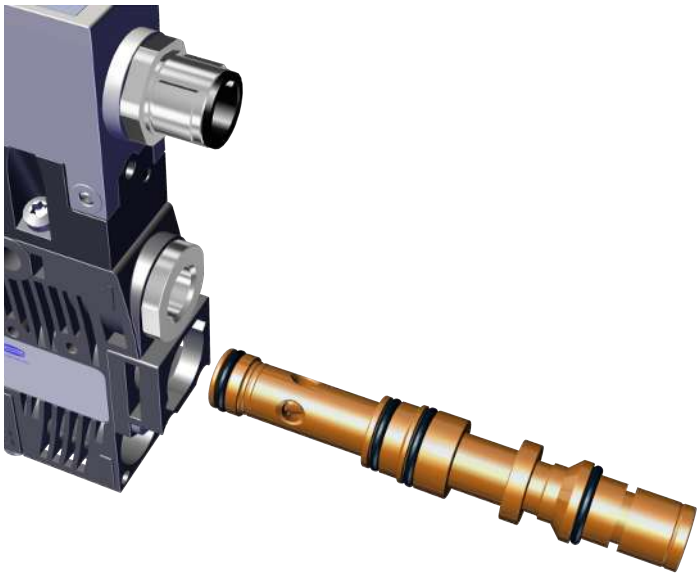
✓ The ejector is deactivated and disconnected from the supply lines.

✓ The silencer cover and silencer insert are removed (*(> See ch. Replacing the Silencer Insert, Page 16)*).

1. Pull the nozzle out of the holder.

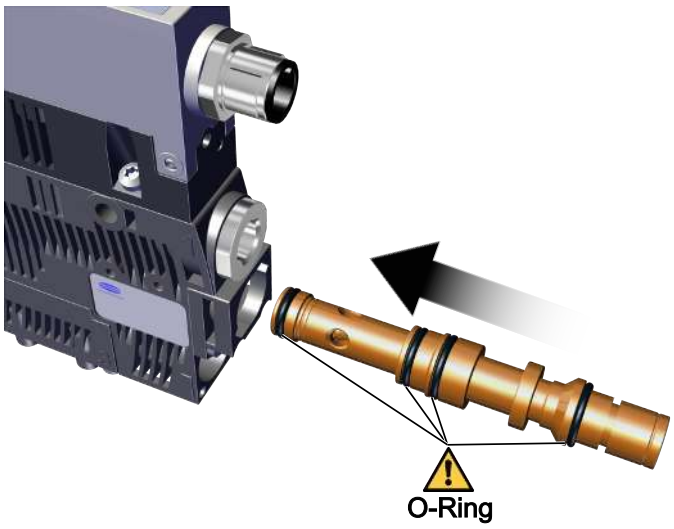


⇨ The nozzle is removed together with the O-ring.



2. Check the nozzle and clean or replace it if necessary.

3. Install any cleaned or new nozzle in the correct position. Ensure that the O-ring is fitted.



11 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.

12 Spare and Wearing Parts, Accessories

12.1 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.

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.
- Ejector must be operated only with a silencer and press-in screens.

The following list contains the primary spare and wearing parts.

Part no.	Designation	Legend
10.02.02.05030	Silencer insert	W
10.02.02.05094	Silencer (round) SD 16.5x51 SCPS for UHV-HD	S
10.02.02.06259	Ejector vacuum kit (assembled); nozzle set (size 07) VACU-SET 07 12.80x76.60 SCPS	S
10.02.02.06279	Ejector vacuum kit (assembled); nozzle set (size 11) VACU-SET 11 12.80x76.60 SCPS	S
10.02.02.05052	Ejector vacuum kit (assembled); nozzle set (size 16) VACU-SET 16 12.80x76.60 SCPS	S
10.02.02.06343	Ejector maintenance kit WART SCPS/SCPSi-O-Ring-SET	S

Legend:

- **W**earing part = **W**
- **S**pare part = **S**

12.2 Accessories

Part no.	Designation	Note
21.04.06.00086	ASK B-MIC10 3000 K-2P	Connection cable
10.02.02.04149	HUT-SN-KL SCPS	DIN rail mount cpl., leaf springs with mounting screws
10.07.01.00241	VFI CN6/4 50	Vacuum filter for SCPS…07/11
10.07.01.00328	VFI 6/4 50	Vacuum filter for SCPS…07/11
10.07.01.00245	VFI CN8/6 50	Vacuum filter for SCPS…16
10.07.01.00119	VFT, 1/4" internal thread, 80	Vacuum filter for SCPS…16

13 Decommissioning and Recycling

13.1 Disposing of the Ejector

1. Dispose of the product properly after replacement or decommissioning.
2. Observe the country-specific guidelines and legal obligations for waste prevention and disposal.

13.2 Materials Used

Component	Material
Housing	PA6-GF
Inner components	Aluminum alloy, anodized aluminum alloy, brass, galvanized steel, stainless-steel, PU, POM
Silencer insert	Porous PE
Screws	Galvanized steel
Seals	Nitrile rubber (NBR)
Lubrication	Silicone-free

14 EC Conformity

EU Conformity Declaration

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 61000-6-3+A1+AC	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN 61000-6-2+AC	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for 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 instructions.