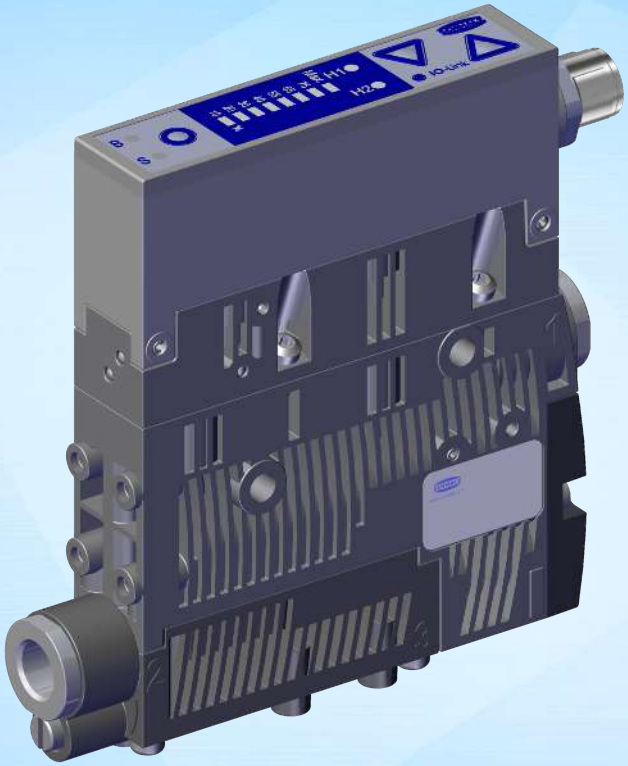


Operating Instructions

Compact Ejector SCPS

WWW.SCHMALZ.COM

EN-US · 30.30.00.00422 · 08 · 09/22

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.

Published by

Contact

J. Schmalz GmbH

Johannes-Schmalz-Str. 1

72293 Glatten, Germany

T: +49 7443 2403-0

schmalz@schmalz.de

www.schmalz.com

Contact information for Schmalz companies and trade partners worldwide can be found at:

www.schmalz.com/salesnetwork

Contents

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

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
- Coded date of manufacture
- Serial number

1.4 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 Intended Use

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

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.
- Installation, maintenance, and repairs must be carried out only by specialists or by persons who can prove that they have undergone appropriate training.

Valid 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 personnel must observe the pertinent 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
⚠ 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.

2.5 Residual Risks

⚠ 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 Ejector **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.

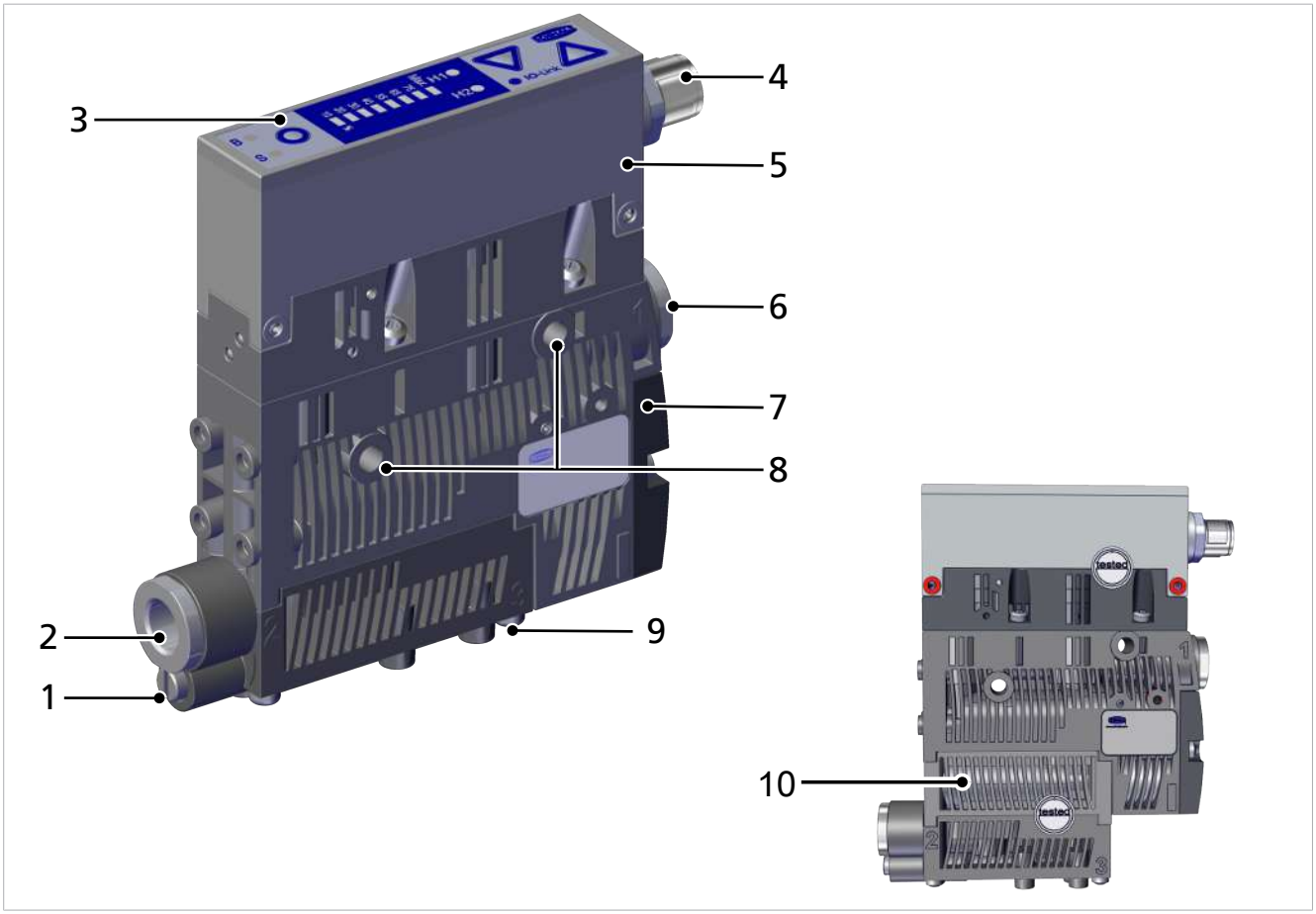
3 Product Description

3.1 Ejector Designation

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

Property	Variants
Type of ejector	SCPS
Performance class	07, 10, 15
Power blow-off function	M
Pneumatic connection	G02 (1/8" internal thread)
Control unit	Normally open (NO) Normally closed (NC)
Electrical connection	M12 (1 x M12, 5-pin)
Signal inputs and outputs	NPN, PNP

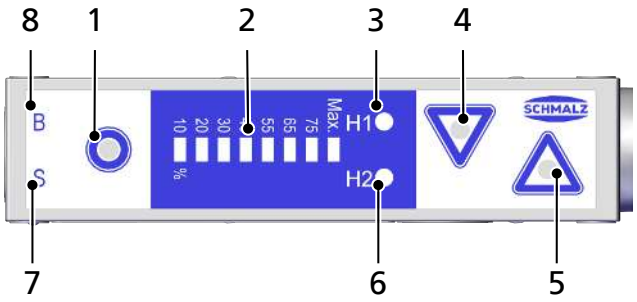
3.2 Ejector Structure



1	Blow off valve screw	6	1/8" compressed air connection (marking 1 [P])
2	1/8" 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 unit	10	Power blow-off module for variant M

3.3 Display and Operating Element in Detail

Simple ejector operation is ensured with 3 buttons, the bar display and 4 LEDs for status information. The current system vacuum is always displayed in the 8-digit LED bar display.



1	**MENU BUTTON**	5	**UP BUTTON**
2	LED bar display	6	H2 limit value LED
3	H1 limit value LED	7	LED process state “suction”
4	**DOWN BUTTON**	8	LED process state “blow off”

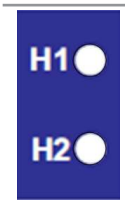
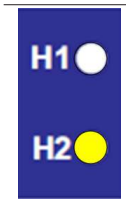
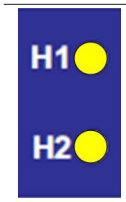
Definition of the LED indicators

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

Display		Ejector state
B ○ S ○	LEDs are both off	No suction from ejector
B ○ S ●	LED for the suction function is constantly lit	Ejector sucks or is under control
B ● S ○	LED for the blow off function is constantly lit	Ejector blowing off

Meaning of the Vacuum Limit Value LEDs

The LEDs for the vacuum limit values H1 and H2 indicate the current level of the system vacuum relative to the configured limit values. The display is independent of the switching function and the assignment of the output.

Display		Ejector state
	LEDs are both off	Rising vacuum: Vacuum < H2 Falling vacuum: Vacuum < (H2-h2)
	H2 LED lit steadily	Rising vacuum: Vacuum > H2 and < H1 Falling vacuum: Vacuum > (H2-h2) and < (H1-h1)
	Both LEDs continuously lit	Rising vacuum: Vacuum > H1 Falling vacuum: Vacuum > (H1-h1)

Additional Display Functions on the LED Bar Display

The current system vacuum is always displayed in the 8-digit LED bar display.

LED bar display	Meaning
Max. LED lights up briefly	Supply pressure present, otherwise no LED is active
Entire LED bar lights up Max. LED flashes rapidly	Vacuum > permitted range
Max. LED flashes rapidly	Voltage supply > permitted range
10% LED flashes rapidly	Vacuum < permitted range (for example, during blow off)

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	---	---	---	IP65	---	---
Operating pressure (flow pressure)	P	3	4.2	6	bar	---
Max. vacuum	p	---	---	-850	mbar	---
Precision of vacuum sensor	---					± 3% FS (full scale)
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

Parameter	Symbol	Limit values			Unit	Comment
		min.	typ.	max.		
Supply voltage	U_{SA}	19.2	24	26.4	V DC	PELV[1]
Power consumption from $U_{S/A}$ [2] with NO variant	$I_{S/A}$	–—	—	110	mA	$U_{S/A}$ = 24.0 V
Power consumption from $U_{S/A}$ [2] with NC variant	$I_{S/A}$	–—	—	70	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 [3]
Power consumption of signal output (NPN)	I_{OL}	–—	—	-150	mA	Short-circuit-proof [3]
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	Adjustable

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.

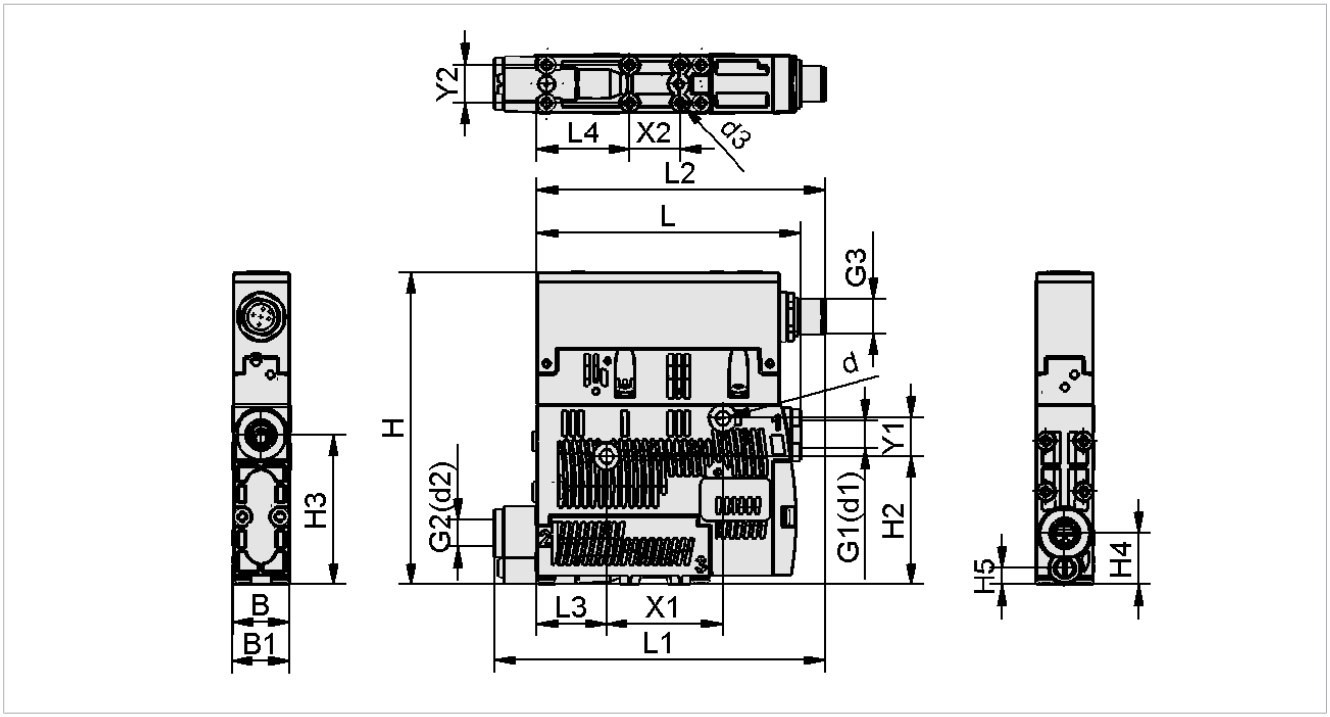
4.3 Performance Data

Type	SCPS-07	SCPS-10	SCPS-15
Nozzle size [mm]	0.7	1.0	1.5
Max. vacuum[1] [%]		85	
Suction rate[1] [l/min]	16	34	63
Max. blow off capacity [1] [l/min]		120	
Air consumption [1] (suction) (l/min]	25	42	95
Sound level[1], unobstructed suction [dB(A)]	63	75	77
Sound level[1], suction [dB(A)]	58	61	65
Weight [kg]		0.195	
Weight of version with power blow-off module [kg]		0.212	

[1)] At 4.0 bar

4.4 Dimensions

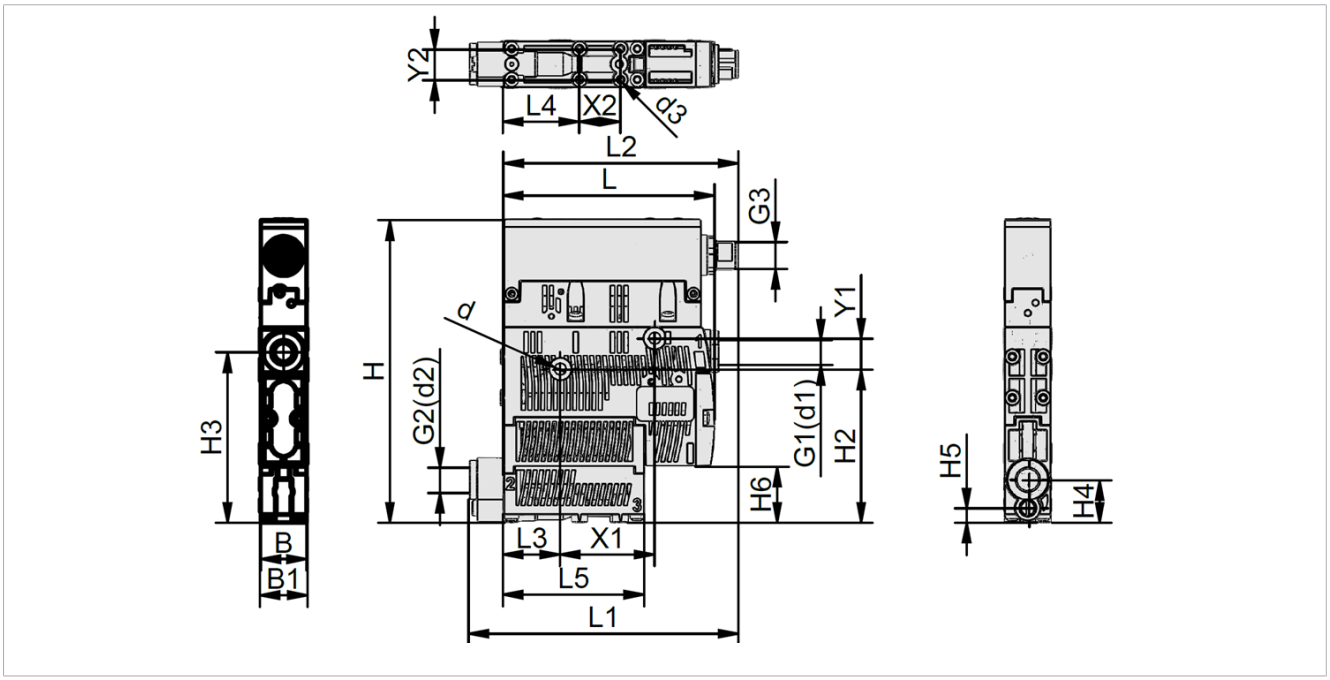
Version without power blow-off



B	B1	d	(d1) [1]	(d2) [1]	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	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)[1]	(d2) [1]	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

[1)] Depending on the design of the push-in connection.

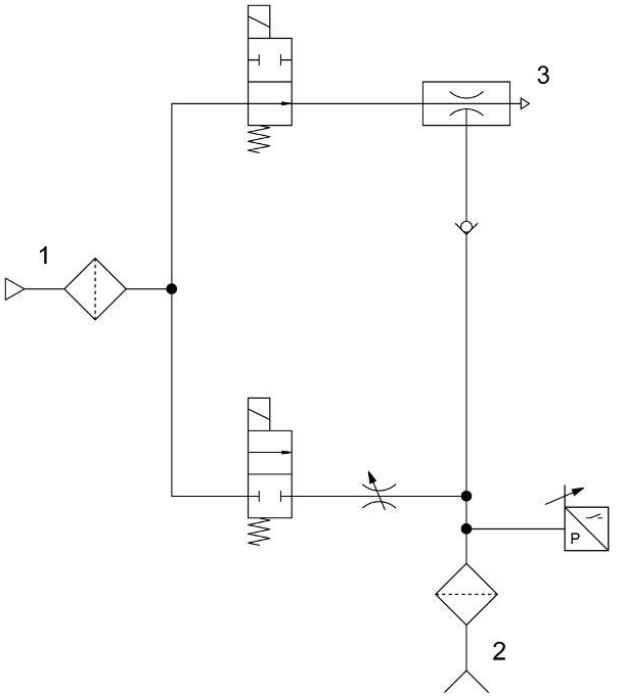
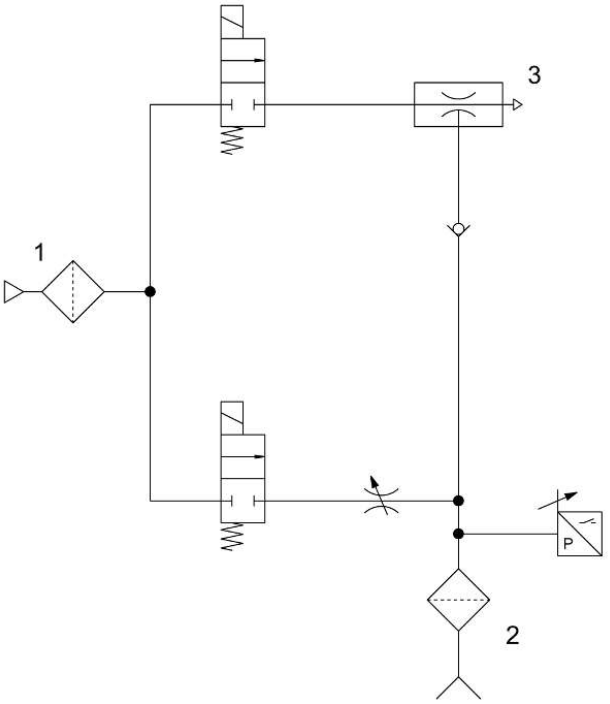
All specifications are in mm

4.5 Pneumatic Circuit Plans

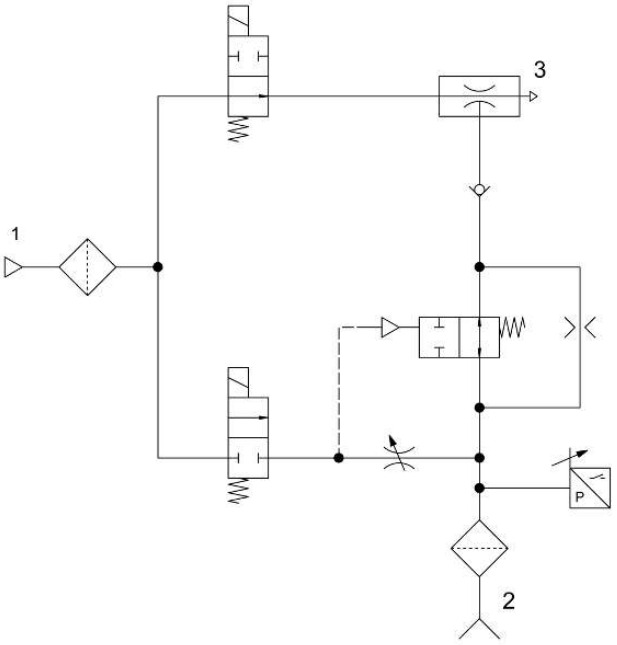
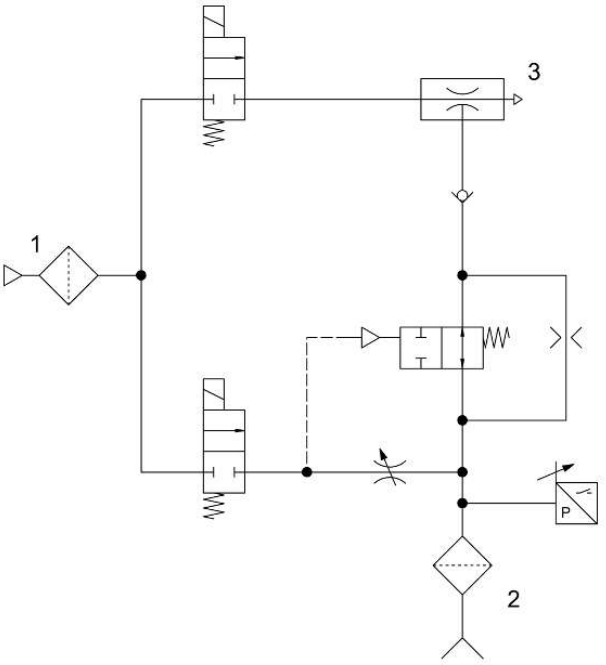
The pneumatic circuit diagrams are shown in simplified form.

Key:	
NC	Normally closed
NO	Normally open
1	Compressed air connection
2	Vacuum connection
3	Exhaust outlet

Pneumatic circuit diagrams for the standard version

...NO...	...NC...
	

Pneumatic circuit diagrams for the version with power blow-off module

...NO...	...NC...
	

5 General Description of Functions

5.1 Applying Suction to the Workpiece/Part

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 variant NO (normally open), 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.

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 set vacuum limit value (switching point H1) is reached.
- When objects with airtight surfaces are picked up, the integrated non-return valve prevents the vacuum from dropping.
- If the system vacuum drops below the limit value switching point H1-h1 due to leaks, the venturi nozzle is switched back on.
- Depending on the vacuum, the H2 process data bit is set once a workpiece is picked up safely. This enables the further handling process.

If small volumes are to be evacuated, the set switching point H1 may be exceeded considerably before the vacuum is switched off. This system behavior does not constitute an error.

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 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.

5.3 Operating Modes

If the ejector is connected to the supply voltage, it is in automatic mode and ready for operation. This is the normal operating mode, in which the ejector is operated by the system controller.

In addition to automatic operation, you can also use the keys on the ejector to change the operating state and switch to manual mode.

The ejector is always parameterized in automatic mode.

5.3.1 Operation and Settings

The three keys on the foil keypad are used for operation and setting the parameters. If no parameters are set, the ejector is in display mode. The current vacuum is displayed.

If settings are changed, undefined states of the system may occur for a short time (for approx. 50 ms).

5.3.2 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, a higher level of attention is advisable because incorrect operation may cause gripped parts to fall, resulting in injuries.

In manual mode, the “suction” and “blow off” ejector functions can be controlled independently of the higher-level controller using the buttons on the operating panel. In this operating mode, the “H1” and “H2” LEDs both flash.

Activating the operating mode

- Press and hold the **DOWN** and **UP** button for more than 3 seconds.

Manual suction

1. Press the **UP** button to activate “suction” on the ejector.
2. The **DOWN** or **UP** button exits “suction” mode again.

When the air saving function is switched on, it is also active in the “Manual Operation” operating mode.

Manual blow off

- Press the **DOWN** button to activate "blow off" on the ejector for as long as the button is pressed.

⇨ The H1 and H2 LEDs light up simultaneously.

Deactivating the operating mode

- By pressing the **MENU** button or through an external state change by signal inputs.

5.4 Viewing and Setting Parameters

The following parameters can be set for the ejector:

- Vacuum limit value H1 for the control
- Vacuum limit value H2 for the signal output
- Blow off duration for time-controlled blow off

The hystereses for the vacuum limit values are pre-defined. The hysteresis h2 is always 10 mbar.

The following tables show the various setting options with the corresponding parameter sets. A parameter set is selected using the ejector buttons and is described in the next section.

Parameter sets

For H1, the hysteresis h1 is always 20% of the H1 value.

LED bar display	H1	h1	H2	h2	Blow off time
0%	—	—	—	—	External
10%	—	—	100 mbar	10 mbar	20 ms
20%	200 mbar	40 mbar	200 mbar	10 mbar	50 ms
30%	300 mbar	60 mbar	300 mbar	10 mbar	100 ms
40%	400 mbar	80 mbar	400 mbar	10 mbar	250 ms
55%	550 mbar	110 mbar	550 mbar	10 mbar	500 ms
65%	650 mbar	130/75 mbar [1)]	650 mbar	10 mbar	750 ms
75%	750 mbar	150/75 mbar [1)]	750 mbar	10 mbar	1000 ms
Max.	Control function deactivated		—	—	1500 ms

[1)] If a value > (H1-h1) is selected for H2, the hysteresis h1 is dynamically adjusted so that (H1-h1) is 25 mbar above H2.

With manual setting, the value set for H1 must always be greater than the value set for H2. Only settings that meet this specification can be made.

Setting Parameters

The LEDs assigned to the parameters flash to indicate which value is currently being displayed or changed.

1. Press the **MENU** button to select the parameter to be changed:
   Press once => first parameter "Vacuum limit value H1"
   Press twice => second parameter "Vacuum limit value H2"
   Press three times => third parameter "Blow off time"
   ⇨ The LED for the selected parameter flashes.
2. Change the selected parameter by pressing the **DOWN** or **UP** button.
   ⇨ The bar display LED increases or decreases.

3. Press the **MENU** button to leave adjustment mode.
   ⇨ The value will flash briefly to indicate that a changed parameter is being applied.

5.5 Locking the Keypad

✓ The ejector is not in any menu.

▸ Pressing the **MENU** and **DOWN** buttons at the same time locks the buttons.

▸ Pressing both buttons again unlocks the keypad.

5.6 Vacuum Monitoring

The ejector has an integrated sensor for monitoring the current system vacuum. The vacuum level provides information about the process and has an effect on the following signals and parameters:

- The limit value LED H1
- The limit value LED H2
- The signal output H2

5.7 Control Function

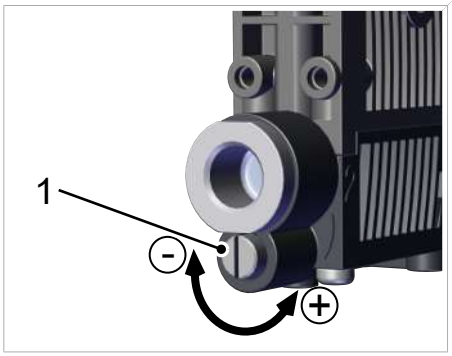
The ejector allows you to conserve compressed air or prevent an excessive vacuum from being generated. Vacuum generation is interrupted when the set limit value H1 is reached. If leakage causes the vacuum to fall below the hysteresis limit value (H1-h1), vacuum generation resumes.

The control function can be deactivated by setting the limit value for H1 to “Max.”

5.8 Changing the Blow-Off Flow Rate on the Ejector

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.



5.9 Supply Voltage Display

In operating modes in which no LEDs are activated, the “Max” LED lights up briefly. This indicates a supply voltage.

5.10 Signal Output

The ejector has a signal output.

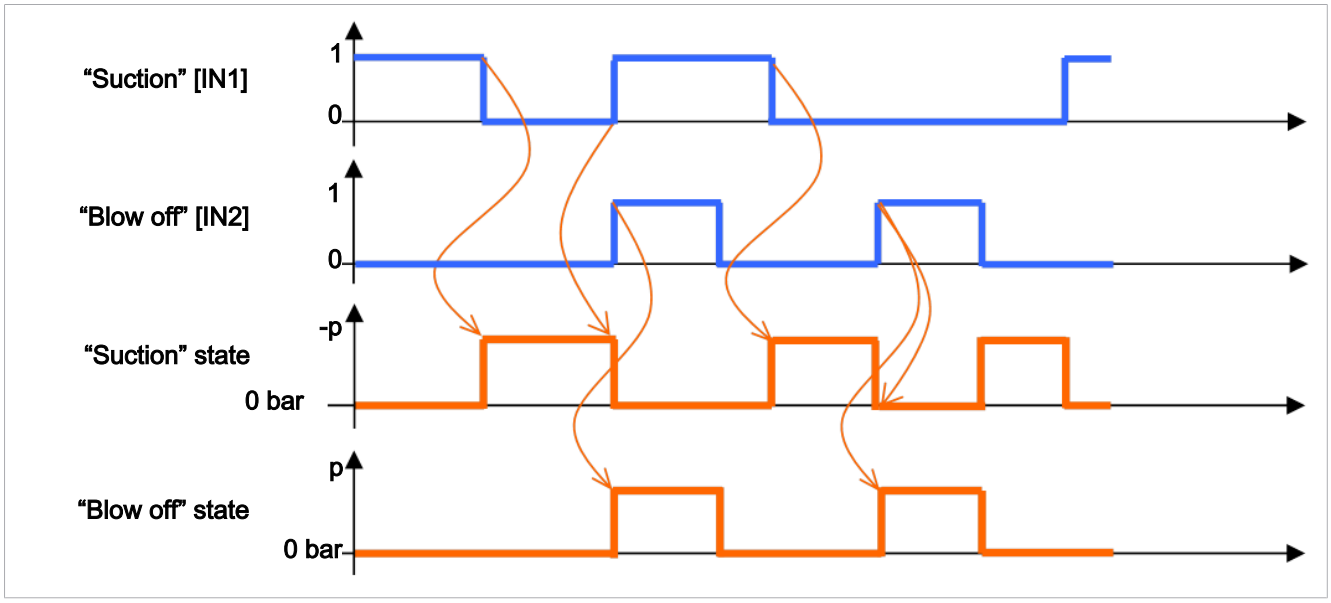
The signal output is a normally open (NO) contact and cannot be changed.

The signal output is switched on or off when the system vacuum is higher or lower than the relevant limit value.

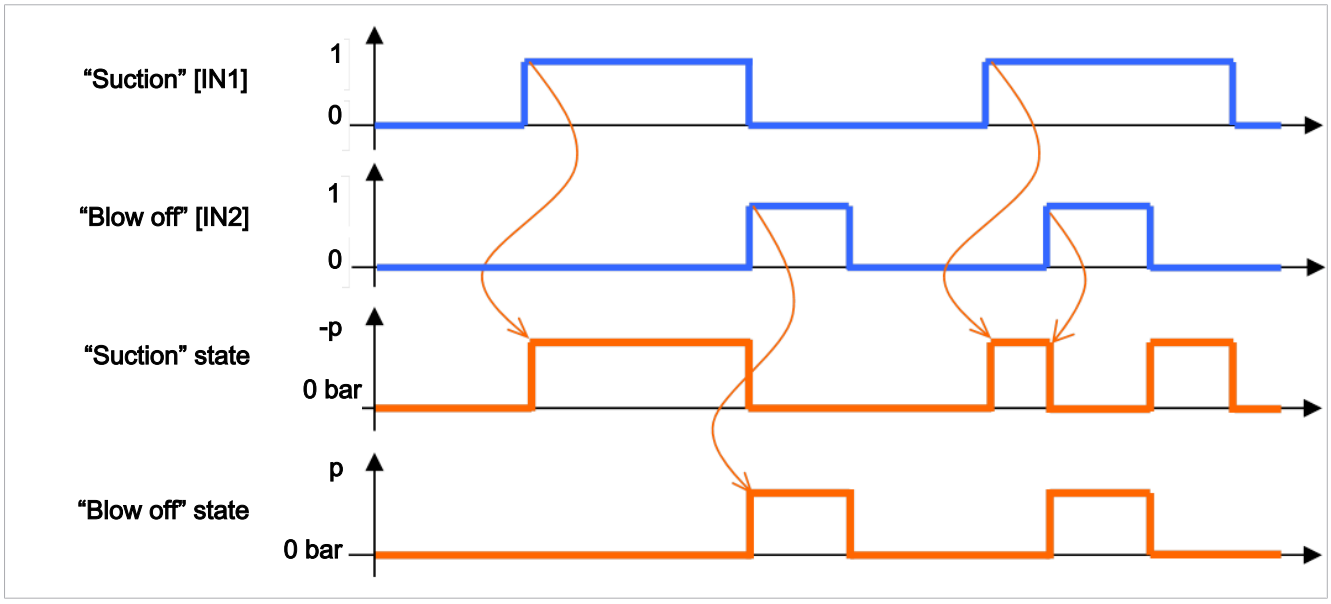
5.11 Signal Type

The signal type, or the ejector switching behavior (PNP or NPN) of the electrical signal inputs and the signal output, is permanently set on the device and is therefore dependent on the ejector version.

5.12 Control Concept for NO Ejectors



5.13 Control Concept for NC Ejectors



5.14 Vacuum unit

The vacuum level in the LED bar is shown as a percentage of the maximum possible vacuum.

If the vacuum is outside the permitted range, the LED next to this bar flashes rapidly. That means the LED flashes "10%" when overpressure is applied.

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 product is disconnected and depressurized and that it cannot be switched on again without authorization.

For safe installation, the following instructions must be observed:

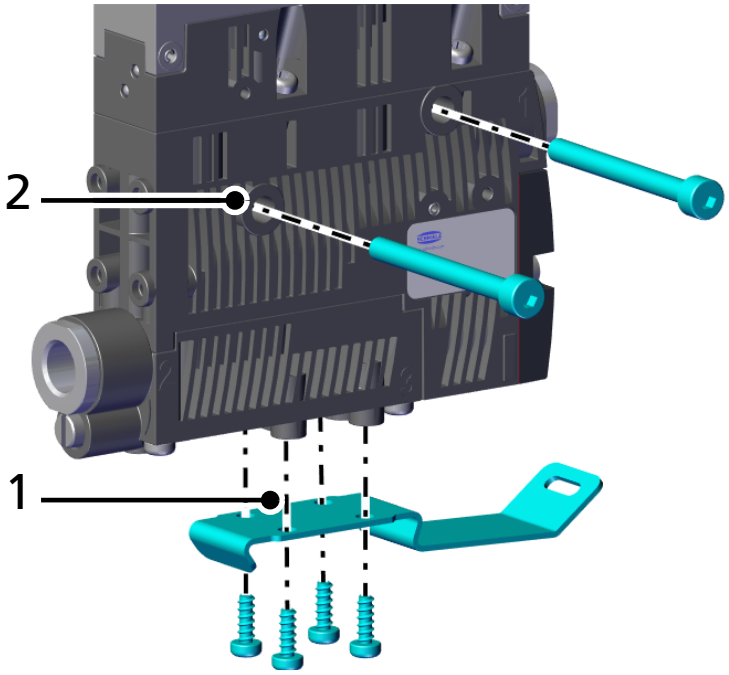
- Use only the connectors, mounting holes and attachment materials that have been provided.
- Mounting and removal must be performed only when the device is unpressurized and disconnected from the mains.
- Pneumatic and electrical line connections must be securely connected and attached to the product.

7.2 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

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.

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

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.

7.3.2 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 of the ejector, only use adequately maintained compressed air and consider the following requirements:

- Use of air or neutral gas in accordance with EN 983, filtered 20 µm, oiled or unoiled.
- Dirt particles or foreign bodies in the ejector connections, hoses or pipelines can lead to partial or complete ejector 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 ejector, otherwise use the next largest diameter.
   - On the compressed air side, ensure that the internal diameter has the dimensions required for the ejector 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 resistance 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[1)]	
	Pressure side	Vacuum side
07	4	4
10	4	4
15	4	6

[1)] Based on a maximum hose length of 2 m.

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

7.4 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

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.

NOTE

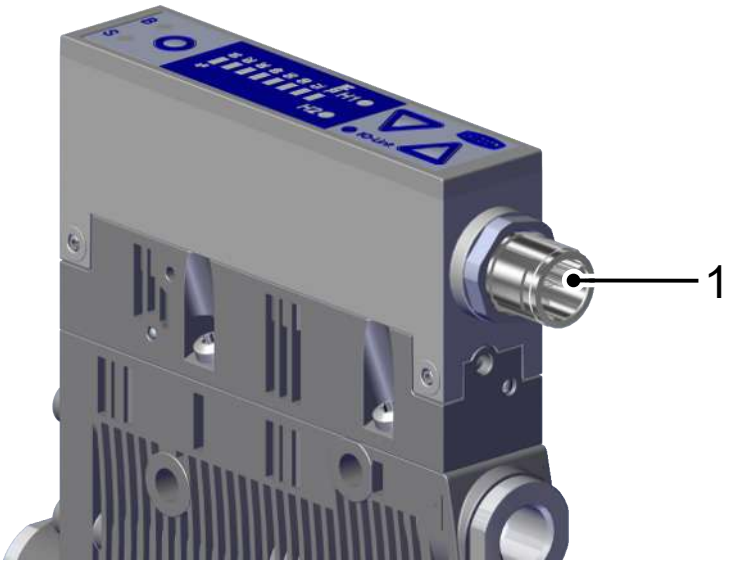
Power load too high

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.

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



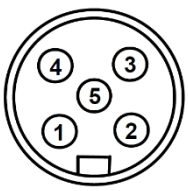
1	Electrical connection plug, M12, 5-pin

✓ 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).

7.4.1 PIN Assignment

PIN assignment, M12 5-pin connector

M12 connector	Pin	Wire color[1)]	Symbol	Function
	1	Brown	$U_{S/A}$	Supply voltage for sensors/actuators
	2	White	IN1	"Suction" signal input
	3	Blue	$GND_{S/A}$	Ground for sensors/actuators
	4	Black	OUT	"Part Present" check signal output (H2/ h2)
	5	Gray	IN2	"Blow off" signal input

[1)] When using Schmalz connection cable part no. 21.04.05.00080

7.5 Process Data

During operation of the ejector, 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 ejector to communicate with the controller.

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

In detail, they are:

Process data INPUT

Signal	Symbol	Parameter
0	OUT 1	Vacuum limit value H2 (“Part Present” check)

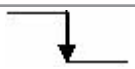
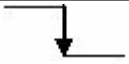
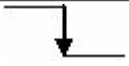
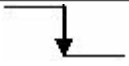
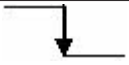
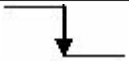
Process data OUTPUT

Signal	Symbol	Parameter
0	IN 1	Suction ON/OFF
1	IN 2	Blow off ON/OFF

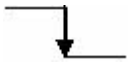
7.6 Start of Operations

A typical handling cycle is divided into the following three phases: pickup, blowoff and idle.

To check whether sufficient vacuum has built up, the limit value H2 is monitored by an integrated vacuum sensor during suction and output to the higher-level controller via OUT.

Phase	Switching step	NC version			NO version		
		Signal		Status	Signal		Status
1	1		IN1	Suction ON		IN1	Suction ON
	2		OUT	Vacuum > H2		OUT	Vacuum > H2
2	3		IN1	Suction OFF		IN1	Suction OFF
	4		IN2	Blow off ON		IN2	Blow off ON
3	5		OUT	Vacuum < (H2-h2)		OUT	Vacuum < (H2-h2)
	6		IN2	Blow off OFF		IN2	Blow off OFF

Signal status changes from inactive to active.



Signal status changes from active to inactive.

8 Operation

8.1 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.

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 Help with Faults

Fault	Cause	Solution
Ejector does not respond	No actuator supply voltage	▸ Check electrical connection and pin assignment
	No compressed air supply	▸ Check the compressed air supply.
	Ejector is faulty.	▸ Check the ejector and contact Schmalz Service if necessary.
Vacuum level is not reached or vacuum is created too slowly	Press-in screen in contaminated	▸ Replace screen
	Silencer is dirty	▸ Replace silencer insert
	Hose or screw unions are leaking	▸ Replace or seal components
	Leakage at suction cup	▸ Eliminate leakage from suction cup
	Operating pressure too low	▸ Increase operating pressure, observe maximum limits
	Internal diameter of hose line too small	▸ Observe recommendations for hose diameter
Load cannot be held	Vacuum level too low	1. Increase the control range for the air saving function 2. Increase operating pressure, observe maximum limits
	Suction cup too small	▸ Select a larger suction cup

10 Maintenance

10.1 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).

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 the suction capacity. Cleaning the silencer insert is not recommended due to the capillary effect of the porous material.

10.4 Replacing the Press-In Screens

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

- If you notice that the performance of the ejectors has declined, replace the screens.

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

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 most important spare and wearing parts.

Part no.	Designation	Legend
10.02.02.04141	Silencer insert	Wearing part
10.02.02.03376	Screen	Spare part
10.02.02.04152	Insulating plate	Wearing part

When tightening the fastening screws on the silencer module, observe a maximum tightening torque of 0.5 Nm.

When you replace the silencer insert, we recommend that you also replace the insulating plate.

13 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

14 Decommissioning and Recycling

14.1 Disposing of the Product

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

14.2 Materials Used

Component	Material
Housing	PA6-GF, PC-ABS
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

15 Declarations of Conformity

15.1 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.

15.2 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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J. Schmalz GmbH
Johannes-Schmalz-Str. 1
72293 Glatten, Germany
T: +49 (0) 7443 2403-0
schmalz@schmalz.de
WWW.SCHMALZ.COM