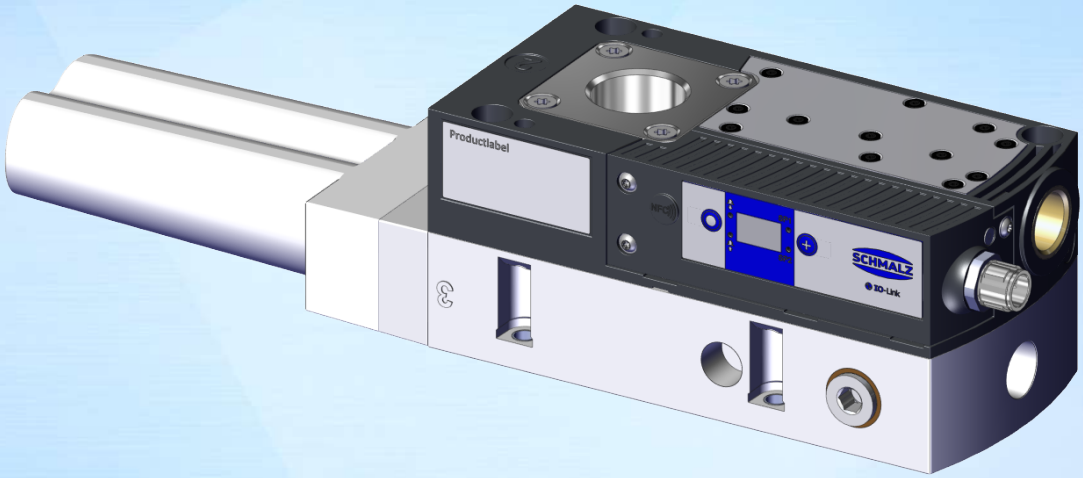

Operating instructions

Basic Ejector SCPLi

WWW.SCHMALZ.COM

EN-US · 30.30.01.04773 · 00 · 07/26
Translation of the original 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.

Published by

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1 Important Information

1.1 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

1.2 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 intended for:

- Operating personnel trained in the operation of the product
- 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

The displayed figures are only examples. Depending on the particular design, they can differ from the product.

1.3 Other Applicable Documents

- EU Declaration of Conformity, OI 30.30.01.04134

1.4 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 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 on hand.

1.5 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. It is operated via a controller using IO-Link.

Neutral gases in accordance with EN 983 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 does not accept any liability for any direct or indirect losses or damages that result from using the product. This applies, in particular, to any use of the product that is not in accordance with the intended purpose and to any use that is not described or mentioned in this documentation.

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

- Use in potentially explosive atmospheres
- Transport and through-suction of potentially explosive materials
- Direct contact with perishable goods/food products
- Use in medical applications
- Suction of aggressive gases or media such as acids, acid fumes, bases, biocides, disinfectants or detergents is not permitted.

2.3 Personnel Qualifications

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 instructions.
- The staff must be at least 18 years of age and physically and mentally capable.
- The product must be operated only by persons who have undergone appropriate training.
- Personnel must receive regular safety briefings (frequency as per country-specific regulations).
- Work on electrical equipment must be carried out only by qualified electrical specialists.

The following target groups are addressed in these instructions:

- Mechanical and electrical specialists who are responsible for installing, troubleshooting and maintaining the product.

The operator of the system must comply with country-specific regulations regarding the age, ability and training of the personnel.

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
⚠ 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

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/erect 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 Technical Condition / Manufacturer's Liability

If the product is operated while in a defective state, safety and function will be impaired.

- If the operating behavior changes, check the product for faults. Rectify faults immediately!
  If the fault cannot be rectified immediately, shut down the product and mark it as faulty.

Schmalz assumes no liability for consequences if the following points have not been complied with:

- The product must only be operated when in perfect technical working order – i.e., in its original condition.
- Follow the maintenance plan (> See ch. Maintenance).
- Only use original Schmalz spare parts and accessories.
- Unauthorized conversion or modification of the product is prohibited.
- Safety features must not be disabled under any circumstances.

3 Product Name

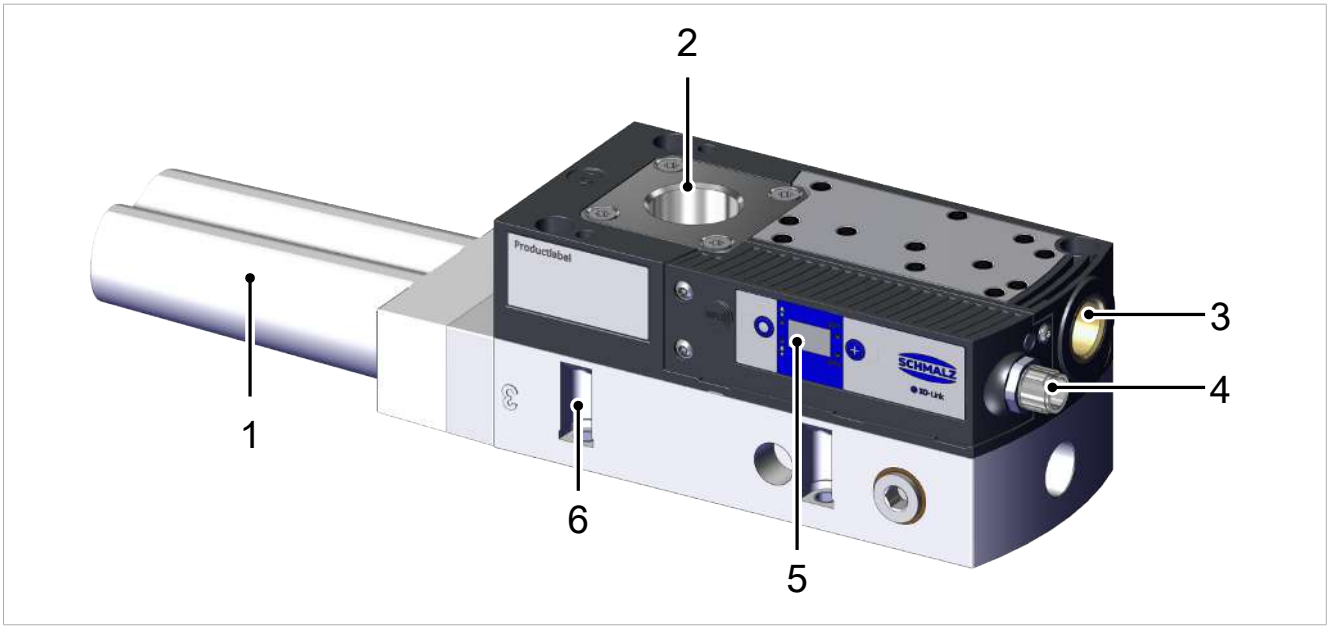
The breakdown of the item designation (e.g. SCPLc 100 HV NC ABC00001C) is as follows:

Property	Variants
Type	SCPL
Version	Basic: b Controlled: c Intelligent: i
Size	25, 50, 75, 100, 125 and 150
Shape	HV, High Vacuum HF, High Flow
Thread type	G, inch thread NPT, NPT thread
Shape	SA, silencer axial FA, flange, silencer axial FE, flange, exhaust duct EA, exhaust duct
Suction valve control	NO (normally open), sucks when no voltage is applied NC (normally closed), does not suck when no voltage is applied
Construction	PNP, PNP switching NPN, NPN switching
Individual configuration code	Unique 9-digit code (SCPLc 100 HV NC **ABC00001C**)

4 Product Design

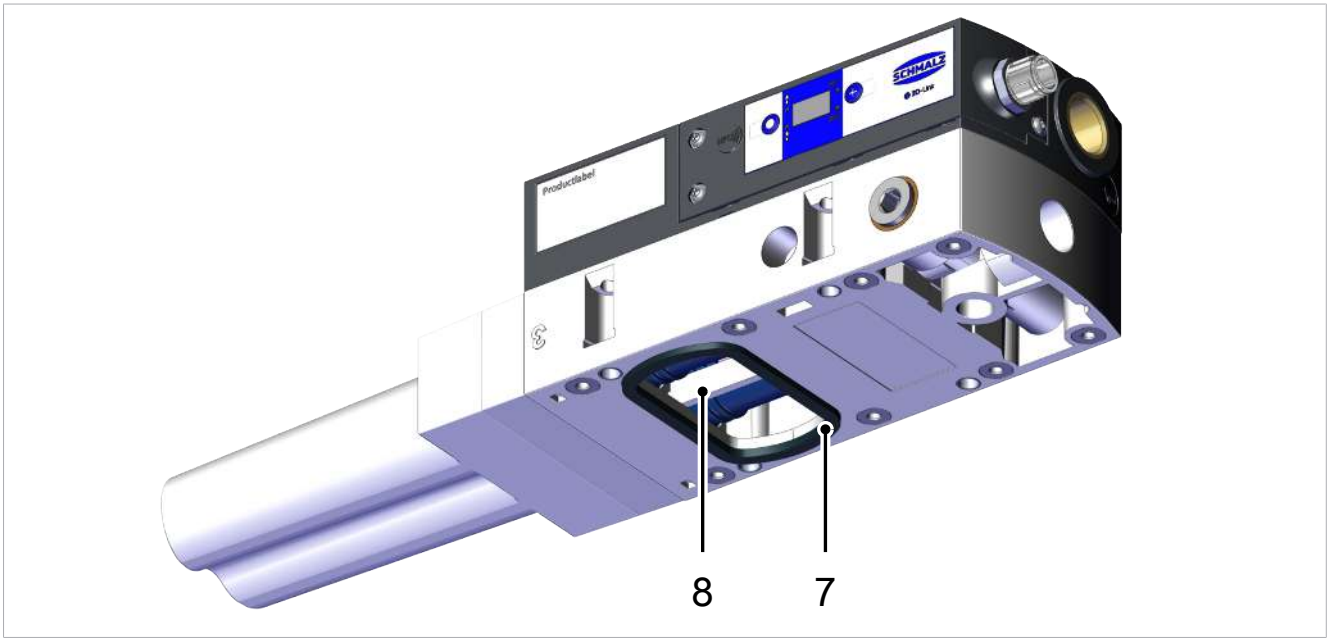
The illustrations shown below may deviate from the customer's version because they serve as examples of different versions of the product.

Variant SCPLi SA



1	Silencer	4	Electrical connection
2	Vacuum connection	5	Operating and display elements
3	Compressed air connection	6	Mounting holes, 4x

Variant SCPLi FA

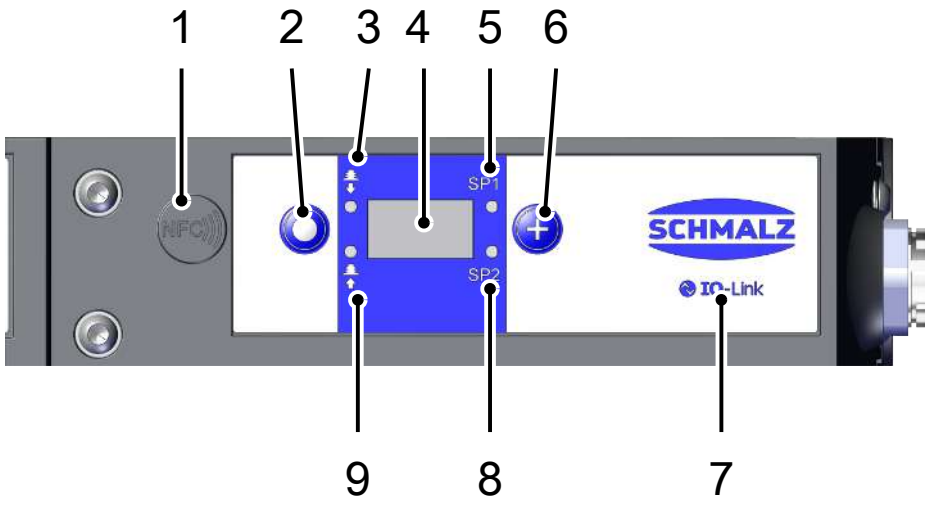


7	Sealing	8	Vacuum opening

5 Controls and Displays in Detail

The mini compact ejector is fitted with the following elements to ensure simple operation:

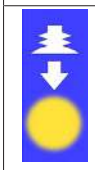
- 2 buttons on the foil keypad
- The 3-digit display
- 4 light-emitting diodes (LEDs) as status indicators



1	NFC symbol (product is equipped with an NFC interface)	6	**PLUS BUTTON**
2	**MENU BUTTON**	7	IO-Link symbol (product is equipped with an IO-Link interface)
3	LED for “Blow-off” process state	8	LED for switching point limit value SP2
4	Display	9	LED for “suction” process state
5	LED for switching point limit value SP1		

Definition of the LED displays

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

Item	Meaning	Status	Description
3	Blow-off LED	 OFF	Ejector not blowing off
		 Lit up	Ejector blows off
9	Suction LED	 OFF	No suction from ejector
		 Lit up	Suction from ejector

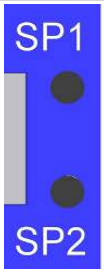
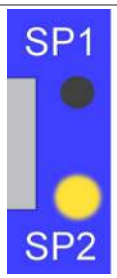
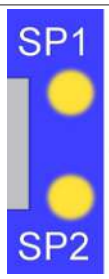
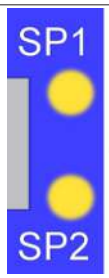
The LEDs for the switching points SP1 and SP2 (limit values) indicate the current level of the system vacuum relative to the limit values set for the parameters:

- 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
5 and 8		LEDs are both off	Rising vacuum: Vacuum < SP2 Falling vacuum: Vacuum < rP2
5 and 8		SP2 LED continuously lit	Rising vacuum: Vacuum > SP2 and < SP1 Falling vacuum: Vacuum > rP2 and < rP1
5 and 8		Both LEDs continuously lit	Rising vacuum: Vacuum > SP1 Falling vacuum: Vacuum > rP1
5 and 8		Both LEDs flashing	Manual control of the “Suction” and “Blow-off” ejector functions. The ejector is in manual mode or setting mode.

6 Technical Data

6.1 Display Parameters

Parameter	Value	Comment
Display	3-digit	Red 7-segment LED display
Solution	±1 mbar	--
Accuracy	±3% FS	T_{amb}= 25° C, based on FS (full-scale) final value
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

6.2 General parameters

Parameter	High vacuum HV	High flow HF
Max. vacuum	900 mbar	600 mbar
Working temperature	0° C to 55° C	
Optimum flow pressure	4.5 bar for SCPL 25 - 100 5.5 bar for SCPL 125 - 150	
Operating pressure	3 bar to 6 bar	
Degree of protection	IP54	
Operating medium on compressed air side	Filtered and oiled or unoiled compressed air or neutral gases according to class 3-3-3 of ISO 8573-1	
Operating medium on the vacuum side	Dry, non-abrasive gases	

6.3 Electrical Parameters

Supply voltage	24V DC ± 10% (PELV[1)])		
Polarity reversal protection	Yes		
Current consumption (at 24 V)	—	Typical current consumption	Max. current consumption
	NC	50 mA	70 mA
	NO	75 mA	115 mA
NFC	NFC forum tag type 4		
IO-Link	IO-Link 1.1, baud rate COM2 (38.4 Kbits/s)		

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

6.4 Performance Data

Standard Variant SA

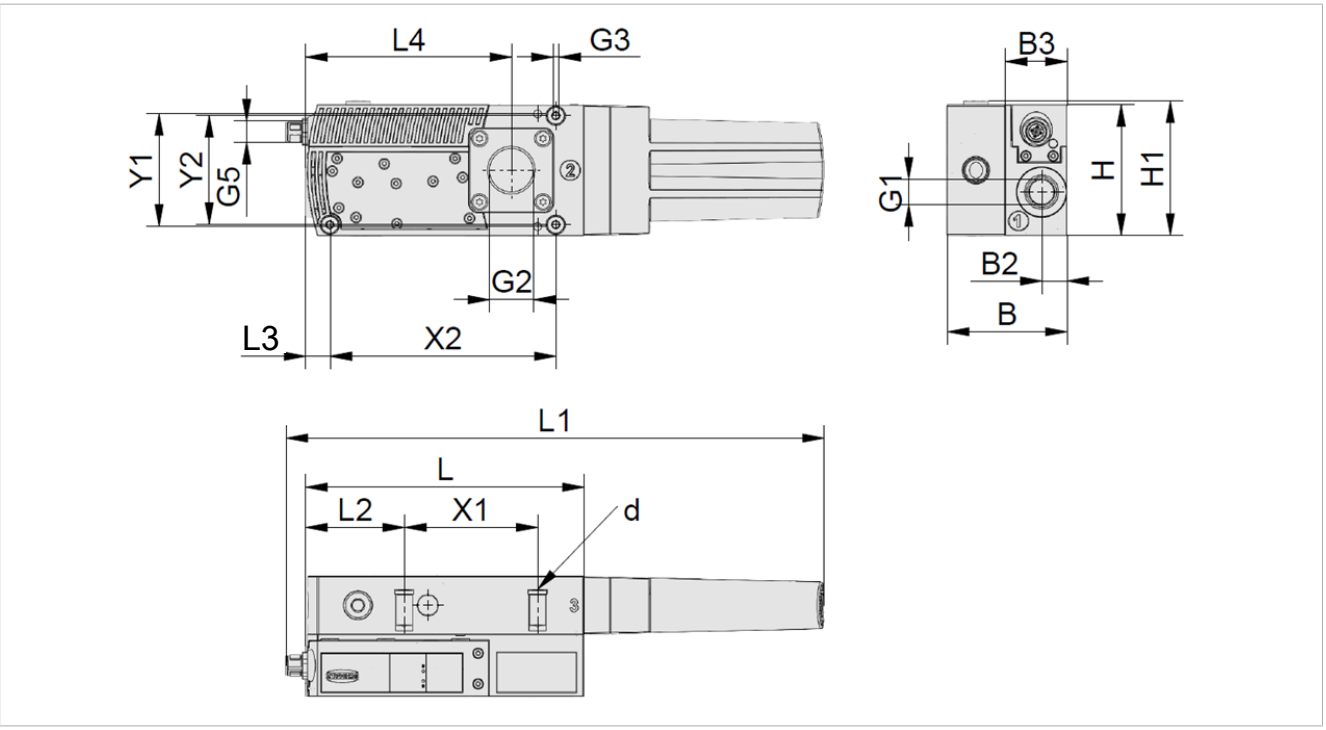
Type	Max. suction rate	Air consumption [1]	Max. blow-off air consumption [1]	Ideal operating pressure	Sound level Free	Sound level Picked up	Weight
SCPL 25 HV	300 l/min	105 l/min	120 sl/min	4.5 bar	65 dB	55 dB	0.83 kg
SCPL 25 HF	290 l/min	80 l/min			61 dB	54 dB	0.83 kg
SCPL 50 HV	510 l/min	210 l/min			66 dB	59 dB	0.85 kg
SCPL 50 HF	500 l/min	160 l/min			65 dB	55 dB	0.85 kg
SCPL 75 HV	720 l/min	305 l/min			68 dB	62 dB	1.23 kg
SCPL 75 HF	710 l/min	230 l/min			67 dB	57 dB	1.23 kg
SCPL 100 HV	870 l/min	395 l/min			70 dB	64 dB	1.25 kg
SCPL 100 HF	860 l/min	300 l/min			69 dB	58 dB	1.25 kg
SCPL 125 HV	1010 l/min	470 l/min		5.5 bar	72 dB	65 dB	1.65 kg
SCPL 125 HF	1010 l/min	370 l/min			70 dB	60 dB	1.65 kg
SCPL 150 HV	1140 l/min	545 l/min			73 dB	66 dB	1.67 kg
SCPL 150 HF	1120 l/min	435 l/min			71 dB	61 dB	1.67 kg

Variant FA

Type	Max. suction rate	Air consumption [1]	Max. blow-off air consumption [1]	Ideal operating pressure	Sound level Free	Sound level Picked up	Weight
SCPL 25 HV FA	300 l/min	105 l/min	120 sl/min	4.5 bar	65 dB	55 dB	0.83 kg
SCPL 25 HF FA	300 l/min	80 l/min			61 dB	54 dB	0.83 kg
SCPL 50 HV FA	530 l/min	210 l/min			66 dB	59 dB	0.85 kg
SCPL 50 HF FA	550 l/min	160 l/min			65 dB	55 dB	0.85 kg
SCPL 75 HV FA	800 l/min	305 l/min			68 dB	62 dB	1.23 kg
SCPL 75 HF FA	800 l/min	230 l/min			67 dB	57 dB	1.23 kg
SCPL 100 HV FA	1,000 l/min	395 l/min			70 dB	64 dB	1.25 kg
SCPL 100 HF FA	1,020 l/min	300 l/min			69 dB	58 dB	1.25 kg
SCPL 125 HV FA	1,300 l/min	470 l/min		5.5 bar	72 dB	65 dB	1.65 kg
SCPL 125 HF FA	1,300 l/min	370 l/min			70 dB	60 dB	1.65 kg
SCPL 150 HV FA	1,440 l/min	545 l/min			73 dB	66 dB	1.67 kg
SCPL 150 HF FA	1,460 l/min	435 l/min			71 dB	61 dB	1.67 kg

[1] At 4.5 bar

6.5 Dimensions



L	L1	L2	L3	L4	H	H1	X1	Y1	X2	Y2	B2	B3
153.5	297	54.5	13.5	113.5	72	74	73.5	62	124.5	60	13.8	34

Type	B	G1	G2	G3	G5	d
SCPL 25/50 HF/HV	66	G3/8" female thread	G3/4" female thread	M4 female thread	M12x1 male thread	5.5
SCPL 25/50 HF/HV NPT	66	NPT3/8" female thread	NPT3/4" female thread			
SCPL 75/100 HF/HV	97.8	G3/8" female thread	G1" female thread			
SCPL 75/100 HF/HV NPT	97.8	NPT3/8" female thread	NPT1" female thread			
SCPL 125/150 HF/HV	129	G3/8" female thread	G1" female thread			
SCPL 125/150 HF/HV NPT	129	NPT3/8" female thread	NPT1" female thread			
SCPL variant FA			No thread			

All length dimensions are in millimeters [mm].

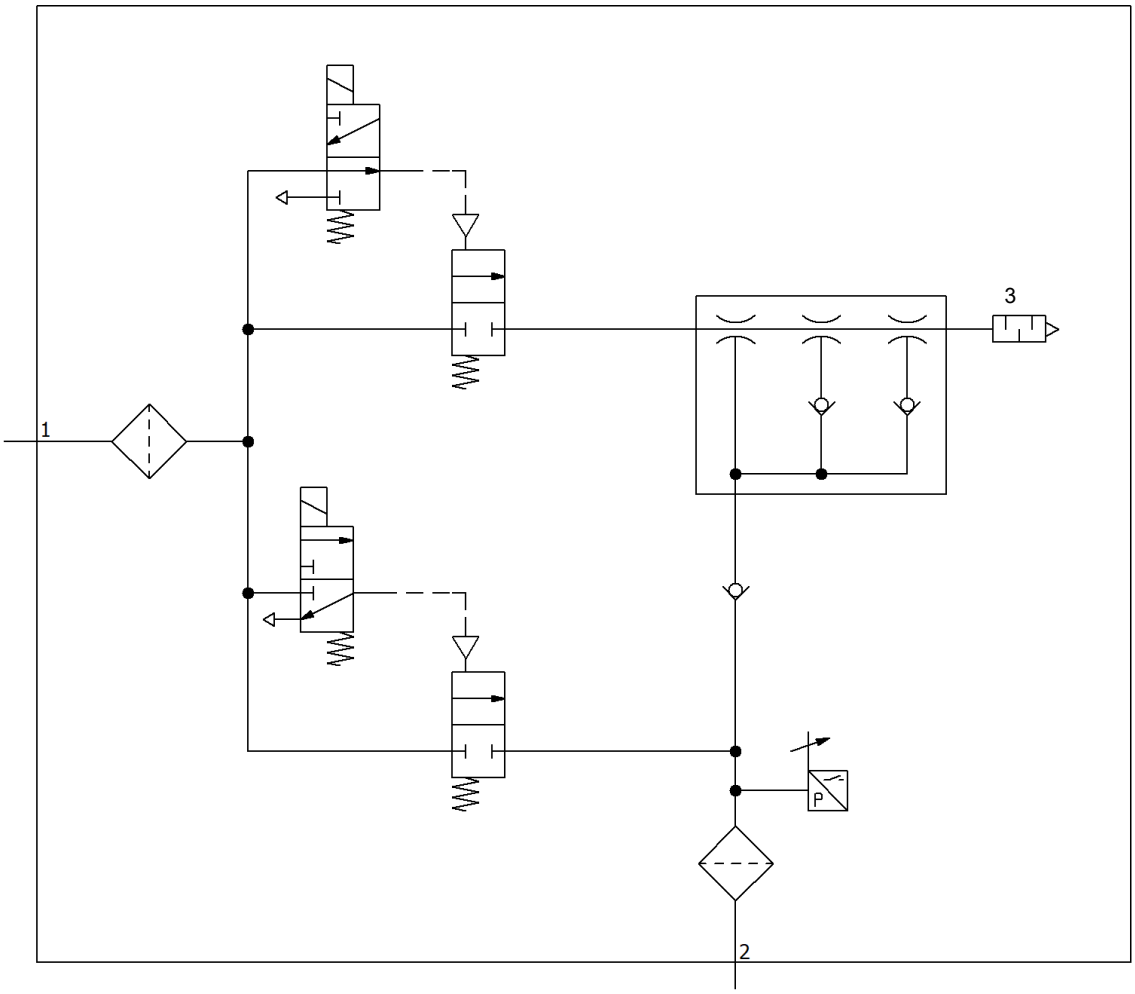
6.6 Factory Settings

Code	Parameter	Value of the factory setting
SP 1	Switching point SP1	750 mbar
rP 1	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	2000 ms
-L-	Leakage value	250 mbar/s
un 1	Vacuum unit	Vacuum unit in mbar = bAr

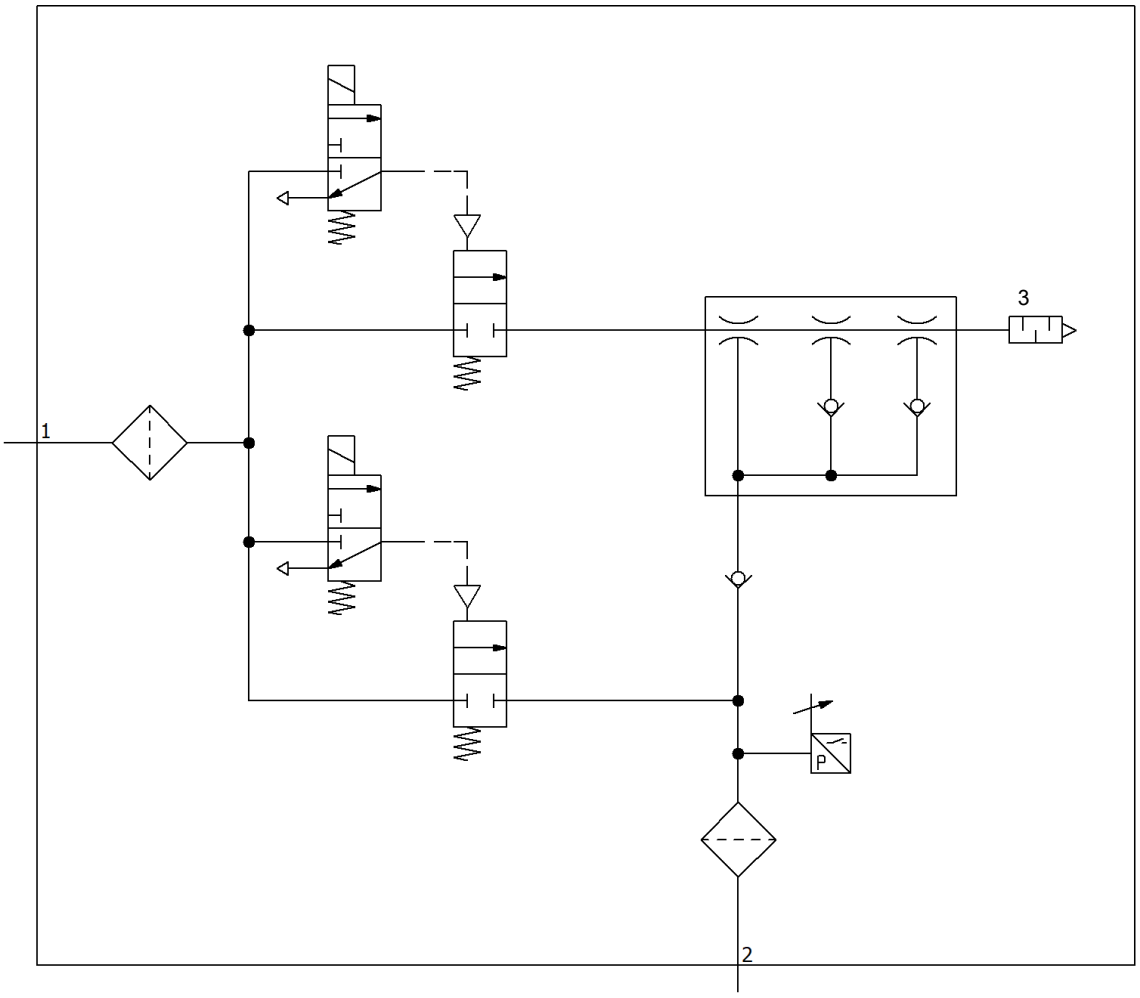
6.7 Pneumatic Circuit Plans

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

NO version



NC version



7 Operating and Menu Concept

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

 **MENU BUTTON**

 **PLUS BUTTON**

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.

7.1 Button Assignments in Display Mode

7.1.1 Opening the Menu

Press the **PLUS BUTTON** to open the following menus:

- ▸ Press the **PLUS** button briefly.
- ⇨ The main menu opens with the first parameter [SP 1].

Opening the [EF] menu for extended functions:

1. Press the **PLUS** button several times until the parameter [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 [ctr].

Opening the [INF] menu:

1. Press the **PLUS** button several times until the parameter 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 [cc 1].

7.1.2 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 current operating mode (S IO or IOL)
- The currently activated production setup profile (P-0 to P-3)
- The value of switching point SP1
- The value of reset point rP1
- The value of switching point SP2

- The value of reset point rP2
- The supply voltage US

The display cycle returns to the vacuum display after a complete cycle or can be canceled at any time by pressing any button.

7.2 Main Menu

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

7.2.1 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
SP 1	Switching point 1	Deactivation value of control function (only active if [ctr] = [on])
rP 1	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

7.2.2 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 **PLUS** 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 **PLUS** button to change the value. The value increases by 1 each time that the button is pressed. After 9, the counter goes back to 0 when the **PLUS** button is pressed.
4. Press the **MENU** button to save the changed value.
   ⇨ The first digit is accepted and the second digit flashes.
5. You can use the **PLUS** button to set the second digit.
6. Press the **MENU** button to save the changed value.
   ⇨ The second digit is accepted and the third digit flashes.
7. You can use the **PLUS** button to set the third digit.
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 [Inc] 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.

7.3 Extended Functions [EF] Menu

An Extended Functions menu [EF] is available for applications with special requirements.

7.3.1 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
ctr	Energy-saving function	oFF on onS	Control function off Control active Control with leak monitoring active
dcS	Deactivate auto. control shutoff	no YES	Suppresses the automatic valve protection function when set to YES. Cannot be activated when ctr = oFF.
t- 1	Max. permissible evacuation time	configurable between 0.01 and 9.99 seconds in steps of 0.01 oFF	Permissible evacuation time No monitoring
-L-	Max. permissible leakage	Values configurable between 0 and 999	Permissible leakage Unit: millibar per second
bLo	Blow-off function	-E- I-t E-t	Externally controlled Internally controlled (triggered internally, time can be set) Externally controlled (triggered externally, time can be set)
Ou2	Output function	no nc	Normally open contact [no] (normally open) Normally closed contact [nc] (normally closed)
P-n	Output type	 PnP nPn	Output PNP switching NPN switch
dLY	Switching signal delay	Values configurable between 0 and 999	Delay between switching signals SP1 and SP2 in milliseconds
un i	Vacuum unit	 bAr kPA inH9 PSi	Define the displayed vacuum unit Vacuum level in millibar [mbar] Vacuum level in kilopascal [kPa] Vacuum level in Inch Mercury [inHg] Vacuum level in Pound-force per square inch [psi]
d IS	Display rotation	 Std rEd	Display configuration Standard Rotated 180°
Eco	Display in Eco mode	 oFF Lo on	Configure the display Eco mode is deactivated – the display remains on The brightness is reduced by 50 percent.

Display code	Parameter	Possible settings	Explanation
			Eco mode activated – if no buttons are pressed, the display turns off after one minute.
PIn	PIN code	Value from 001 to 999	Specify the PIN, lock the menus If the PIN is 000, then the device is not locked.
nFc	NFC lock	on diS Loc	NFC lock: NFC active Completely switched off Write-protected
rES	Reset	no YES	The values remain unchanged Reset parameter values to factory settings (The reset corresponds to the IO-Link “Application Reset” command.)

7.3.2 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 **PLUS** 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 **PLUS** button to change the value. The value increases by 1 each time that the button is pressed. After 9, the counter goes back to 0 when the **PLUS** button is pressed.
4. Press the **MENU** button to save the changed value.
   ⇨ The first digit is accepted and the second digit flashes.
5. You can use the **PLUS** button to set the second digit.
6. Press the **MENU** button to save the changed value.
   ⇨ The second digit is accepted and the third digit flashes.
7. You can use the **PLUS** button to set the third digit.
8. Press the **MENU** button to save the changed value.

⇨ The value is accepted and the modified parameter is displayed.

For other parameters, you can select from predefined settings:

1. Use the **PLUS** button to select the desired parameter.
2. Confirm using the **MENU** button.
   ⇨ The current setting is displayed and flashes.
3. Use the **PLUS** 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.

7.4 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.

7.4.1 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)
cc2	Counter 2	Valve switching cycles
cc3	Counter 3	CM counter
ct 1	Erasable counter 1	Counter for suction cycles (suction signal input)
ct2	Erasable counter 2	Valve switching cycles
ct3	Erasable counter 3	CM counter
rct	Reset erasable counters	All erasable counters reset to zero
Soc	Software	Indicates the software version
Art	Part number	Part number displayed
Snr	Serial number	Serial no. displayed, provides information about the production period

7.4.2 How Data is Displayed in the Info Menu

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

Counter values and serial numbers are 9-digit whole numbers. These numbers are divided into 3 blocks of 3 numbers when shown on the display. Each time a decimal point is displayed to indicate if it is the highest, middle or lowest block. The display starts with the 3 highest-value digits and can be scrolled through using the **PLUS** button.

1. Use the **PLUS** button to select the desired parameter.
2. Confirm using the **MENU** button.
3. Use the **PLUS** button to display or scroll through the blocks that make up the value.

8 Control Interfaces

8.1 Basic Principles of IO-Link Communication

Abbreviations:

ISDU: Indexed service data unit, parameter data acyclically queried between the controller and the IO-Link device

IODD: IO Device Description, device description file

The component is operated via IO-Link to enable intelligent communication with a controller.

IO-Link is a communication system for connecting intelligent sensors and actuators to an automation system and is described in the standard IEC 61131-9. The standard contains both the electrical connection data as well as a digital communication protocol via which sensors and actuators exchange data with the automation system.

An IO-Link system consists of an IO-Link master and one or more IO-Link enabled sensors or actuators. The IO-Link master provides the interface to the higher level controller (PLC) and controls the communication with the connected IO-Link devices. An IO-Link master can have one or more IO-Link ports, however only one IO-Link device can be connected to each port.

IO-Link devices have parameters that can be read or written via the IO-Link protocol. Parameters can therefore be changed by the higher-level controller during operation. Since the sensor and actuator parameters are device-specific, parameter information is available for each device in the form of an IODD (IO Device Description).

The IO-Link communication takes place using cyclical process data and acyclical ISDU parameters.

IO-Link mode allows the product to be parameterized remotely via the controller of the higher-level machine (not externally).

8.2 Process Data

The cyclical process data is used to control the ejectors and receive current information reported from the ejector. There is a difference between the input data (Prozess Data In) and the controlling output data (Prozess Data Out):

The input data Prozess Data In is used to report the following information cyclically:

- The limit values SP1 and SP2
- The status of SP3
- The ejector device status in the form of a status traffic light
- Warnings issued by the ejector
- CM autoset acknowledged
- Current vacuum, high-byte und low-byte

The output data Prozess Data Out is used to control the ejector cyclically:

- Vacuum on/off
- Blow-off active
- Setup mode
- CM Autoset
- Switching production setup profiles P0–P3
- Inlet pressure in 0.1 bar (measured value from external pressure sensor, 0 = function inactive)

The exact meaning of the data and functions is described in more detail in the “Description of Functions” chapter. A detailed description of the process data can be found in the data dictionary.

The corresponding device description file (IODD) is available for integration into a higher-level control unit.

8.3 ISDU Parameter Data

The acyclical communication channel can be used to retrieve what are known as ISDU (Index Service Data Unit) parameters, which contain further information on the system status.

The ISDU channel can also be used to read or overwrite all the settings, e.g. the limit values, additional leakage, etc. Further information on the identity of the product, such as the part number and serial number, can be retrieved using the IO-Link. The product also provides space for saving user-specific information here, such as the installation and storage location.

The exact meaning of the data and functions is described in more detail in the “Description of Functions” chapter.

You can find a detailed diagram of the process data in the data dictionary and IODD.

In order for a control unit to access the ISDU parameters, the necessary system functions must be purchased from the manufacturer of the control unit and used.

8.4 Near Field Communication (NFC)

NFC (Near Field Communication) refers to a standard for wireless data transfer between different devices over short distances.

The ejector functions as a passive NFC tag that can be read or written by a read or write device which has NFC activated, such as a smartphone or tablet. Access to the ejector parameters via NFC also works when the supply voltage is not connected.

There are two options for communicating via NFC:

- Read access only can be obtained via a website viewed in a browser. For this, no additional app is needed. The reading device requires only that NFC and the internet connection are enabled.
- Another option for communication is the “Schmalz ControlRoom” control and service app. This permits not only read access, but also active reconfiguration of the parameters via NFC. The Schmalz ControlRoom app is available at the Google Play Store.

For the best data connection, place the reading device on the NFC symbol in the middle of the ejector.

The reading distance is very short for NFC applications. Determine the position of the NFC antenna in the reading device used. If parameters of the device are modified via IO-Link or NFC, then the power supply must subsequently remain stable for at least three seconds to prevent data loss (error E01).

9 Description of Functions

9.1 Information Relating to Switching Logic

The vacuum is activated and deactivated using the suction command:

- In the NO variant (normally open), the vacuum 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 variant (normally closed), the vacuum is activated when the suction signal is received.
  (This means that if there is a power failure or if there is no control signal, no vacuum is generated.)

If communication with the higher-level bus system is interrupted, the ejector retains its last activated state: suction, neutral position or blow-off.

9.2 Applying Suction to the Workpiece/Part (Vacuum Generation)

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.

9.3 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/part to be deposited quickly.

During blow-off, [-FF] is shown on the display.

The device provides three blow-off modes that can be selected using the [bLo] “Blow-Off mode” parameter (0x0045):

- Externally controlled blow-off (Externally controlled blow-off [-E-])
- Internally time-controlled blow-off (Internally controlled blow-off – time-dependent [I-t])
- Externally time-controlled blow-off (Externally controlled blow-off – time-dependent [E-t])

Info: In IO-Link mode, the set input process data bit “SP3 Ejector” (part detached) provides you with information about whether a picked-up part has been deposited (see also “Monitoring System Vacuum and Defining Switching Points”).

9.3.1 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.

In this mode, the blow-off function is set to [-E-].

9.3.2 Internally time-controlled blow-off

In this mode, the blow-off function is set to [I-t].

The “blow-off” valve is automatically activated for the configured time period as soon as the ejector leaves “suction” mode. The blow-off time can be set with the parameter [tbL] in the main menu.

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

9.3.3 Externally Time-Controlled Blow-Off

In this mode, the blow-off function is set to [E-t].

The blow-off pulse is triggered externally by the "Blow-off" signal/command. The "Blow-off" valve is activated for the specified time [tbL]. A longer input signal does not increase the blow-off duration.

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

The blow-off time can be set with the parameter [tbL] in the main menu.

9.4 Operating Modes

9.4.1 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.

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.

9.4.2 Manual Mode

⚠ CAUTION

Changing the output signals in manual mode

Personal injury or damage to property!

- Electrical connection and manual operation may be performed only by a qualified specialist who can predict the effects that signal changes will have on the entire system.

In manual mode, the suction and blow-off functions can be controlled independently of the higher-level controller using the buttons on the foil keypad of the operating element. 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

⚠ CAUTION

External signals may change manual mode

Personal injury or property damage due to unforeseen work steps!

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

NOTE

It is not possible to activate manual mode.

Access to manual mode is locked by the controller. This status is indicated by the code E90 on the display.

- ▸ Unlock manual mode using the controller.

✓ The ejector is shown on the measurement screen.

▸ Press and hold the **MENU** and **PLUS** buttons simultaneously for at least 3 seconds.

⇨ The “SP1” and “SP2” LEDs flash.

Deactivating Manual Mode

✓ The ejector is in “manual mode”.

▸ Briefly press the **MENU** and **PLUS** buttons at the same time.

⇨ The “SP1” and “SP2” LEDs cease to flash.

The device also exits manual mode when the status of the external signals changes.

When the ejector receives an external signal, it switches to automatic mode.

Activating and Deactivating Manual Suction

Activating manual suction

✓ The ejector is in “manual mode”. The “SP1” and “SP2” LEDs flash.

▸ Press the **MENU** button to activate “suction” mode.

⇨ The suction LED lights up.

⇨ The ejector begins to suck.

Deactivating manual suction

✓ The ejector is in “suction” mode.

▸ Press the **MENU** button again.

⇨ The suction process is deactivated.

▸ Alternatively, press the **PLUS** button.

⇨ The ejector changes to the “blow-off” state for as long as you hold the button down.

If the controller is on [ctr] = [on] it uses the configured limit values in “manual” mode as well.

Activating and Deactivating Manual Blow-off

✓ The ejector is in “manual mode”.

▸ Press and hold the **PLUS** button.

⇨ The blow-off LED lights up.

⇨ The ejector blows off for as long as you keep the button pressed down.

▸ Release the **PLUS** button to end the blow-off.

⇨ The blow-off process is deactivated.

⇨ The blow-off LED is no longer lit.

9.4.3 Setting Mode

Setting mode is used for locating and eliminating leakages in the vacuum circuit. Since the valve protection function is deactivated and the control is not deactivated, even at increased control frequencies.

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

Setting Mode Activated and Deactivated

▸ Set the corresponding value using bit 2 in the output process data byte (PDO).

A change to bit 0 or bit 1 (suction or blow-off) in the PDO also causes the ejector to exit setting mode.

This function is only available in IO-Link mode.

9.5 Monitoring the System Vacuum and Defining Limit Values

The ejector has integrated sensors for measuring the vacuum.

The current vacuum and pressure levels are shown on the display and can be read out via IO-Link.

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

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

Limit value SP3, “Part deposited” [PDIN0] cannot be set using the main menu. It is fixed at 20 mbar. Signal SP3 is issued when the vacuum reaches < 20 mbar (providing the vacuum has already reached SP2 once). By issuing this signal, the ejector tells the control system that the part has been deposited successfully. The signal is reset by issuing a new Suction ON command.

Overview of the limit values:

ISDU [Hex]	Limit value parameter	Description
P-0: 0x0064	SP1	Vacuum control value Vacuum switching point
P-0: 0x0065	rP1	Vacuum hysteresis Vacuum reset point
P-0: 0x0066	SP2	Activation value of “part present” check signal output
P-0: 0x0067	rP2	Deactivation value of “part present” check signal output
—	SP3	Part deposited (vacuum < 20 mbar)

System vacuum evaluation:

Once the system vacuum reaches the value for SP2, the following responses are triggered:

- The process data bit for SP2 is set (see Data Dictionary).
- In SIO mode, the SIO output OUT2 (part present) is activated according to the PNP/NPN configuration in parameter “Signal type: SIO outputs of the device” 0x0049.

Once the system vacuum reaches the value for SP1, the following responses are triggered:

- When the control function is activated, vacuum generation is interrupted
- The process data bit for SP1 is set (see Data Dictionary).

9.6 System Commands

System commands are predefined processes for triggering specific functions and are described below. They are controlled by writing parameter “System command” 0x0002 with a predefined value.

Selected system commands can also be performed using the menu functions on the ejector.

9.6.1 Replacement of the Device with a Parameterization Server

The IO-Link protocol provides an automated process for transferring data when a device is replaced. For this Data storage mechanism, the IO-Link master mirrors all setting parameters for the device in a separate non-volatile memory. When a device is swapped for a new one of the same type, the setting parameters for the old device are automatically saved in the new device by the master.

✓ The device is operated on a master with IO-Link revision 1.1 or higher.

✓ The Data storage feature in the configuration of the IO-Link port is activated.

▸ Ensure that the new device is restored to the factory settings **before** it is connected to the IO-Link master. If necessary, reset the device to the factory settings.

⇨ The device parameters are automatically mirrored in the master when the device is configured using an IO-Link configuration tool.

Changes to the parameters made by a PLC program using a function module are **not** automatically mirrored in the master.

▸ Manually mirroring data: After changing all required parameters, execute ISDU write access to the System Command parameter (Index 2) using the Force upload of parameter data into the master command (numerical value 0x05) (> See ch. (see Data Dictionary in the appendix)).

Use the Parameterization server function of the IO-Link master to ensure that no data is lost when switching the device.

9.6.2 Resetting the Application

The function can be executed using the parameter rES in the Extended Functions [EF] menu or via IO-Link.

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 **PLUS** button to select the parameter [rES].
2. Confirm using the **MENU** button.

3. Use the **PLUS** button to select [YES] for the parameter value.
4. Confirm using the **MENU** button.

⇨ The ejector is reset to the factory settings.

⇨ The display flashes for a number of seconds and then returns to display mode.

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

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

Only the technology-specific application parameters are reset by this function.

System command “Reset application” 0x81 is used to reset all the parameters except for “Device Localization-Parameter” (see “Data Dictionary”) to their factory settings.

Except for:

- “Device Localization Parameter”
- Counter readings
- The maximum and minimum values of the measurements
- “Device access locks” and “Extended device access locks”
- The zero-point adjustment of the sensor

Only the technology-specific application parameters are reset by this function.

System command “Reset application” 0x81 is used to reset all the parameters except for “Device Localization-Parameter” (see “Data Dictionary”) to their factory settings.

Except for:

- “Device Localization Parameter”
- Counter readings
- The maximum and minimum values of the measurements
- “Device access locks” and “Extended device access locks”
- The zero-point adjustment of the sensor

Any IO-Link communication is not stopped in doing so.

The device must be restarted by interrupting the supply voltage.

9.6.3 Resetting the Device to the Factory Settings

⚠ WARNING

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

Personal injury

- Avoid possible danger zone.
- Remain vigilant.

This function resets all the device configurations for the initial setup and the settings of the active production setup profile to the factory settings.

The “Back to box” system command 0x83 is used to reset the switching points and the signal output configuration to the factory settings.

Except for:

- Counter readings
- The zero-point adjustment of the sensor

Any IO-Link communication is stopped in doing so.

The device must be restarted by interrupting **the supply voltage**.

9.6.4 Calibrating the Vacuum Sensor

Since the sensor integrated in the ejector is subject to variation due to the manufacturing process, we recommend calibrating the sensor after installation. In order to calibrate the ejector, the system's pneumatic circuits must be open to the atmosphere.

A zero offset is only possible in the range of ±3 percent of the end value of the measuring range.

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

The function for zero-point adjustment of the sensor is performed in the basic menu under the parameter cAL or using IO-Link.

Calibrating from the Main Menu:

1. To adjust the zero point, press the **PLUS** button several times until [cAL] appears on the display.
2. Confirm using the **MENU** button.
3. Use the **PLUS** button to choose between [**NO**] and [YES] (vacuum sensor calibration).
4. Confirm using the **MENU** button.

⇨ The sensor is calibrated.

9.6.5 Resetting Counters

Via IO-Link, the system command to delete the two counters is executed using the value 0xA7 "Reset erasable counters".

9.6.6 Resetting Maximum and Minimum Values for the Supply Voltage

System command 0xA8 "Reset voltages min/max" is used to delete the minimum and maximum values for the sensor supply voltage.

9.6.7 Resetting Maximum and Minimum Values for the Vacuum

System command 0xA9 "Reset vacuum min/max" is used to delete the minimum and maximum values for the vacuum.

9.7 Control Functions

The ejector allows you to conserve compressed air or prevent a vacuum that is too powerful 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 chapters below explain the control function operating modes. They can be configured under the [ctr] parameter using the Extended Functions [EF] menu or via IO-Link.

P-0 is controlled via IO-Link by the parameter "Air saving function" 0x0044.

The **permitted leakage** can be set in mbar/s using the [-L-] parameter in the Extended Functions [EF] menu. The leakage is measured from the point when the control function interrupts suction after reaching switching point SP1.

9.7.1 No Control (Continuous Suction)

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

For this operating mode, the control function setting is [ctr] = [oFF] or 0 = not active.

This setting can only be adjusted when the control shutoff is deactivated [dcS] = [no].

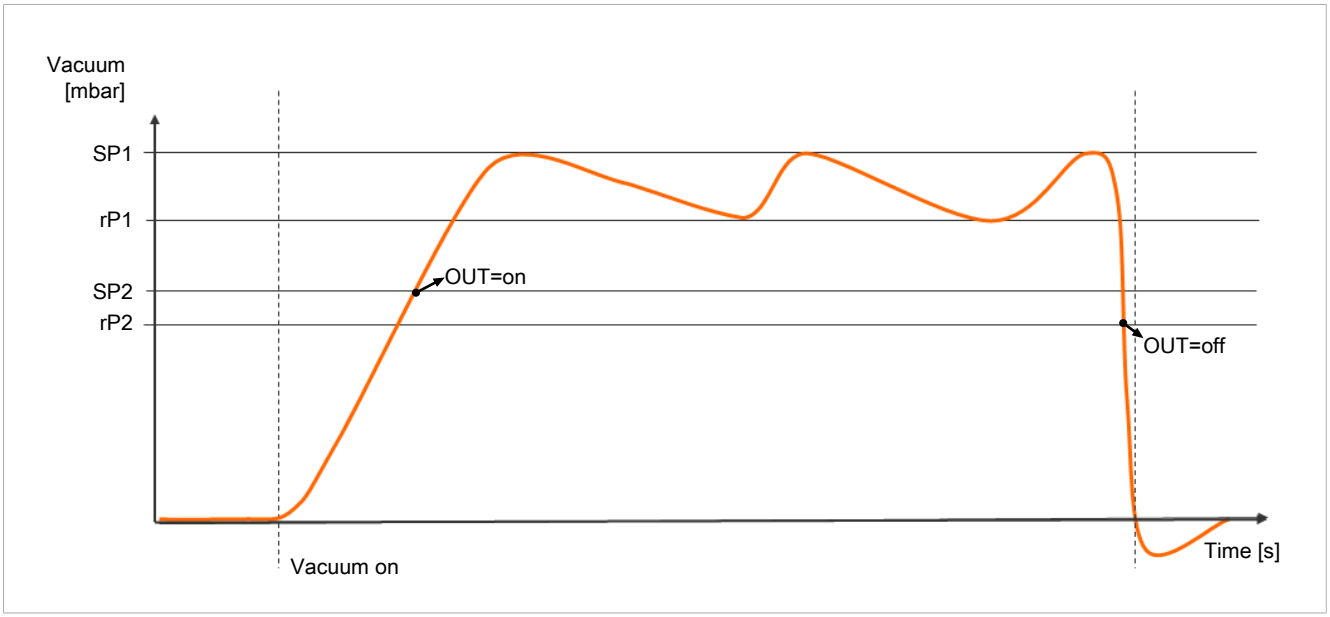
9.7.2 Control

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 operating mode, the control function setting is [ctr] = [on] or it is set to 1 = active via IO-Link.

An integrated sensor records the vacuum generated by the venturi nozzle. The exact vacuum level is shown on the display and can be read from the IO-Link process data.

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 that the user sets 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.

To protect the ejector, valve switching frequency monitoring is activated in this operating mode.

If the readjustment is too fast, the control function is deactivated and the device switches to continuous suction.

The control shutoff function [dCS] can deactivate the automatic control shutoff.

The function can be set under the [dCS] menu item in the Extended Functions [EF] menu or via IO-Link. If the [dCS = oFF] function is selected, the ejector switches to the "Continuous suction" operating mode when there is excessively high leakage and the valve switches too frequently. With the [dCS = on] setting, continuous suction is deactivated, and the ejector continues in control mode despite a high leakage rate or control frequency greater than 6 times per 3 s.

When the control shutoff is deactivated, the suction valve makes frequent adjustments, for example, if there is a leak. The component may be destroyed.

In the event of undervoltage or a power failure, the NO ejector version reacts with continuous suction even though continuous suction is deactivated with [dCS = on].

9.7.3 Control with Leak Monitoring

This operating mode is the same as the previous mode, with the addition that the leakage rate within the system is measured and compared to the configurable limit value for permissible leakage -L-.

For this operating mode, the control function setting is [Ctr] = [onS] or it is set to 2 = active with supervision via IO-Link.

If the actual leakage rate exceeds the limit value more than twice in succession, the control function is then deactivated and the ejector switches to continuous suction.

9.7.4 Control Shutoff

This function deactivates the automatic control shutoff.

The function can be set using the parameter [dCS] in the EF menu or via IO-Link [P-0: 0x004E]:

Parameter	Setting value	Explanation
dCS	[no]	If excessive leakage is detected and the valve is switching too often (> 6 times in 3 seconds), the ejector switches to "continuous suction" mode
	[YES]	Continuous suction is deactivated and the ejector continues controlling in spite of the high leakage or having a switching frequency of > 6 times in 3 seconds. Continuous suction will not be activated if the valve frequency is exceeded.

When the control shutoff is deactivated, the suction valve makes frequent adjustments, for example, if there is a leak. The component may be destroyed.

9.8 Output Function

The signal output can be switched between [no] (normally open) and [nc] (normally closed) contact.

You switch this setting using the [Ou2] menu item in the Extended Functions menu or via IO-Link with 0x0047.

The function of the switching threshold SP2/rP2 (component check) is assigned to the Ou2 signal output.

9.9 Output Type

The output type can be used to switch between PNP and NPN.

You switch this setting using the [P-n] menu item in the [EF] menu or via IO-Link with 0x0049.

9.10 Selecting the Display Unit

The unit of the displayed vacuum level can be selected using this function.

The function can be configured with the parameter [uni] in the [EF] menu or via IO-Link with 0x004A.

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 [inHG].
psi	The vacuum level is displayed in psi. The setting for this unit is [PSI].

Selection of the unit only affects the display. The units of the parameters that can be accessed via IO-Link are not affected by this setting.

9.11 Switch-Off Delay

You can use this function to set a switch-off delay for the signals SP1 and SP2. This can be used to handle short drops in the vacuum circuit.

The duration of the switch-off delay can be set with the parameter [dLY] in the [EF] menu or via IO-Link with 0x004B.

Select a value in the range from 0 to 999 ms. To deactivate this function, enter the value [000] (= off).

The switch-off delay affects the process data bits in IO-Link and the SP1 and SP2 status indicators.

9.12 ECO Mode

The ejector offers the option of switching off the display or dimming it to save energy. If ECO mode is activated, the display is switched off to reduce system power consumption after 1 minute if no buttons are pressed.

ECO mode can be enabled and disabled with the parameter [Eco] in the [EF] menu or via IO-Link with 0x004C.

Three different settings are available:

- [oFF]: Energy-saving mode is disabled.
- [Lo]: The brightness of the display is reduced by 50 percent (after 1 minute if set via the buttons on the device).
- [on]: The display is switched off (after 1 minute if set via the buttons on the device).

In order to signal that the ejector is working properly, the left-hand decimal point is still displayed when the display is switched off.

The display is reactivated by pressing any button or by an error message.

If you activate ECO mode using IO-Link, the display will immediately enter energy-saving mode.

9.13 Rotating the Display

To allow different installation positions, the orientation of the display can be rotated by 180° by changing the parameter [dPY] in the [EF] menu or via IO-Link with 0x004F.

The factory setting is [Std]. This corresponds to the standard configuration.

To rotate the display by 180°, select the parameter setting [rot].

The **MENU** and **PLUS** buttons still work as usual when the display has been rotated.
The decimal points of the display are shown on the top edge of the screen.

9.14 Locking and Unlocking the Menus

The menus can be protected from unwanted access by means of a PIN code [P In] or in the IO-Link using Device Access Locks. The current settings are still displayed.

The PIN is set to 000 on delivery. The menus are not protected.

Changes to parameter settings affect the response of the product and can have serious consequences.
The use of a PIN code is recommended to prevent unintentional and unauthorized changes.

9.14.1 PIN code

To enable the lock, a valid PIN code (with a value above 0) must be entered in the [P In] parameter in the [EF] menu or using the "Pin-Code display" parameter 0x004D in IO-Link.

If you attempt to change a parameter while the lock is active, [Loc] briefly flashes on the display and you are asked to enter your PIN code.

Below is a description of how to set a PIN code using the operating and display element:

✓ In the [EF] menu, select the parameter [P In].

1. Press the **MENU** button.
   ⇨ The current PIN code is displayed, and the digit on the right flashes.
2. Use the **PLUS** button to enter the first digit of the PIN code.
3. Use the **MENU** button to confirm and go to enter the second digit.
4. Enter the remaining digits in the same way.
5. Press the **MENU** button to save the PIN code.

⇨ The menus are now locked.

If write protection is activated, the desired parameters can be changed within one minute after the correct code is entered. If no changes are made within one minute, write protection is automatically reactivated.

The PIN code "000" must be set for permanent deactivation of the lock.

Full access to the device is still possible via IO-Link even if a PIN code is enabled. The current PIN code can also be read out, changed or deleted (PIN code = 000) via IO-Link.

9.14.2 Unlocking the Menus

Menus can be protected against unauthorized access by defining a PIN code [P In] in the [EF] menu. If you attempt to change a parameter while the lock is active, [Loc] briefly flashes on the display and you are asked to enter your PIN code.

The menus can be unlocked as follows:

1. Use the **PLUS** button to enter the first digit of the PIN code.
2. Use the **MENU** button to confirm the first digit and switch to enter the second digit.
3. Repeat this process to enter all the digits of the PIN code.

⇨ When a valid PIN is entered, the message [Unc] is displayed.

⇨ When an invalid PIN is entered, the message [Loc] is displayed and the menus remain locked.

⇨ Once the PIN has been entered successfully, you will have one minute to edit the parameter in question.

The PIN code in the [P In] parameter must be set to 000 in order to permanently deactivate the lock.

The PIN is set to 000 on delivery. The menus are not protected.

9.15 NFC PIN Code

Configuration via NFC can be protected against unintentional access by means of a PIN code.

The PIN code can be set with the ControlRoom app under Device settings > PIN code for NFC or via the IO-Link parameter “PIN code NFC” 0x005B.

When delivered, the PIN code is **000** and a lock is therefore not active.

The NFC PIN code can be changed only using this parameter.

When a PIN code is set between 001 and 999, the valid PIN must be entered for every subsequent write process using a mobile NFC device so that the device accepts the changes.

9.16 Restricting Access with Device Access Locks

In IO-Link mode, the “Device Access Locks” default parameter 0x000C is available to prevent changes to parameter values using the operating element of the ejector.

A menu lock using the Device Access Locks parameter has a higher priority than the menu PIN. In other words, this lock cannot be bypassed by entering a PIN, and remains in place.

It can only be canceled via IO-Link, not on the ejector itself.

9.17 Restricting Access with Extended Device Access Locks

Extended device functions can be disabled via the parameter “Extended device access locks” 0x005A. For example, there is an option to completely restrict NFC access or limit it to a read-only function.

The following options are available via the Extended device access locks IO-Link parameter 0x005A:

Bit	Meaning
0	NFC write lock (Parameter changes via NFC are blocked)
1	NFC disable (NFC deactivated. The device cannot be recognized by an NFC reader.)
3	local user interface locked (Manual mode locked)
4	IO-Link event lock (IO-Link events are disabled in IO-Link mode)

The NFC lock using “Extended Device Access Locks” has a higher priority than the NFC PIN. That means that this lock cannot be bypassed by entering a PIN.

9.18 Counters

The ejector has three internal, non-erasable counters and three erasable counters.

Counters 1 [cc I] and [ct I] increase with every valid “Suction” signal pulse, and thus count the ejector's suction cycles.

Counters 2 [cc2] and [ct2] count the suction valve's switching cycles, and counters 3 [cc3] and [ct3] count the CM events.

The average switching frequency can be determined using the difference between counters 1 and 2.

ISDU [Hex]	Display code/ parame-ter	Function	Description
0x008C	cc 1	Counter 1	Counter for suction cycles (suction signal)
0x008D	cc2	Counter 2	Counter for suction valve switching fre-quency
0x008E	cc3	Counter 3	Counter for condition monitoring events
0x008F	ct 1	Counter 1, erasable	Counter for suction cycles (Suction signal) – erasable
0x0090	ct2	Counter 2, erasable	Counter for suction valve switching fre-quency – erasable
0x0091	ct3	Counter 3, erasable	Counter for condition monitoring events – erasable

The counters can be displayed or read out from the [INF] menu using the parameters listed in the table or via IO-Link.

Calling up the Counter Values

- ✓ Select the counter you wish to see in the [INF] menu.
- ▸ Confirm the parameter by pressing the **MENU** button.
- ⇨ The first three decimal places of the counter total will be displayed (the digits x 10^6). This corresponds to the three-digit block with the highest value.

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

The counter total is comprised of three blocks of digits:

Displayed section	10^6	10^3	10^0
Digit block	048	618	593

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

Clearing the Counters

There are two different ways of resetting the erasable counters Ct1, Ct2 and Ct3 to 0:

- Using system command 0x0002 via IO-Link or
- Using the control panel:

- ✓ The [INF] menu is open.

1. Use the **PLUS** button to select the [rct] parameter.
2. Confirm using the **MENU** button.
3. Use the **PLUS** button to select [YES] for the parameter value.

4. Confirm using the **MENU** button.

⇨ The erasable counters Ct1, Ct2 and Ct3 are set to 0.

9.19 Displaying the Software Version

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

The system firmware can be updated using the "Firmware Update" profile defined by IO-Link. If necessary, this will also update the firmware for the valve module. The PD bit In Byte 1.2 signals when a more recent version is available in the supply module.

Using the control panel:

✓ The Info menu is open.

1. Use the **PLUS** button to select the [SOC] parameter.
2. Confirm using the **MENU** button.
   ⇨ The software ID is displayed.

▸ To exit the function, press the **MENU** button.

9.20 Displaying the Part Number

The part number of the ejector is printed on the label and also stored electronically. It can be read out via the operating and display element or via IO-Link 0x00FA.

✓ The ejector is in the INF menu.

1. Use the **PLUS** button to select the part number parameter ArT.
2. Use the **MENU** button to confirm the part number parameter ArT.
   ⇨ The first two digits of the part number are displayed.
3. Press the **PLUS** 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	02.0	2.00	383

The part number in this example is 10.02.02.00383.

▸ To exit the function, press the **MENU** button.

9.21 Displaying the Serial Number

The serial number indicates the production period of the ejector.
The serial number can be read out via the operating and display element or via IO-Link 0x0015.

✓ The ejector is in the Info menu INF

1. Use the **PLUS** button to select the serial number parameter SNr.

2. Use the **MENU** button to confirm the serial number parameter SNr.
   ⇨ The first three decimal places of the serial number are displayed (the digits x 10^6). This corresponds to the three-digit block with the highest value.
3. Press the **PLUS** 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	00.0	000

In this example, the serial number is: 900000000

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

9.22 Device Data

The ejector provides a range of identification data that can be used to uniquely identify a device.

The following parameters can be queried via IO-Link or NFC:

- Manufacturer's name and slogan (Vendor name 0x0010 / Vendor text 0x0011)
- Product name and product text (Product name 0x0012 / Product text 0x0014)
- Product variant name (Produkt ID 0x0013)
- Serial number (Serial number 0x0015)
- Version status of the hardware and firmware (Hardware revision 0x0016 / Firmware revision 0x0017)
- Device ID (Application specific tag 0x0018, Function tag 0x0019, Location tag 0x001A)
- Hardware identification key (Hardware Identification Key 0x43BE)
- Unique device ID and device characteristics (Unique Device ID 0x00F0)
- Web link for NFC app and device description file (NFC Web Link 0x00F8)
- Storage ID (Storage location 0x00F9)
- Part number and development status (Article number 0x00FA / Article revision 0x00FB)
- Date of manufacture (Production date 0x00FC)
- Installation date (Installation date 0x00FD)

The NFC web link parameter is a special case. This parameter must include a valid web address beginning with http:// or https:// and is automatically used as a web address for NFC read access operations. As a result, read access operations from smartphones or tablets are rerouted e.g. to an address in the company's own intranet or on a local server.

9.23 Process Data Monitoring

IO-Link provides the current measurements for the following parameters, plus the lowest and highest values measured since switching on:

- For the vacuum [0x0040]
- For the compressed air supply [0x0041]
- For the supply voltage [0x0042]

The maximum and minimum values can be reset using the appropriate system command [0x0002].

The ejector is not a calibrated measuring device. However, the values may be used as a reference and for comparison measurements.

9.24 Production Setup Profiles

In IO-Link mode, the product can store up to four different Production Setup-Profiles (P0 to P3). This means that the process settings can be adapted to different application conditions.

The following process settings are stored:

- Control function (Air-Saving function)
- Deactivate continuous suction (Disable continous sucking)
- Switching point 1 (SP1)
- Reset point (RrP1)
- Switching point 2 (SP2)
- Reset point (rP2)
- Duration of automatic blow-off (Duration automatic blow)
- Permitted evacuation time (Permissible evacuation time)
- Permitted leakage rate (Permissible leakage rate)
- Profile name (Profile name, can only be defined via IO-Link)

The respective profile is selected using the output process data byte 0 or the selected profile can be read back using the parameter “Active profile” 0x0113.

The currently selected data set is displayed in the parameter data under “Production Setup.” This data set corresponds to the current parameters the ejector is working with, which can be viewed using the menu.

You can view the parameter data set (P-0 to P-3) that is currently in use in the slide show by pressing the **MENU** button on the home screen.

The production setup profile P-0 is selected as the default setting.

Control panel menus can only ever be used to adjust the profile that is currently selected via IO-Link.

Also see Data Dictionary in the Appendix.

9.25 Device Status

Status information is available in IO-Link mode:

- Error count (0x0020), number of errors since the last activation
- Device Status (0x0024) (parameter data) in the form of a status traffic light
- Detailed device status (0x0025), event list
- Active errors Ejector (0x0082)
- IO-Link Events

Any condition monitoring events that occur during the suction cycle cause the system status light to immediately switch from green to yellow/orange. The specific event that caused this switch can be seen in the IO-Link parameter "Condition monitoring" 0x0092.

Device status parameter 0x0024

The device status provides basic status information for the device in the form of a status traffic light:

Parameter 0x0024	Status	Description
Device status	Green (0)	Device is operating without any errors (Device is operating properly)
	Yellow (1)	Maintenance or adaptation of settings required (Maintenance required)
	Orange (2)	Device is operating outside the permissible specification (Out of Spec)
	Red (4)	Error – safe operation within the operating limits is no longer ensured (Error)

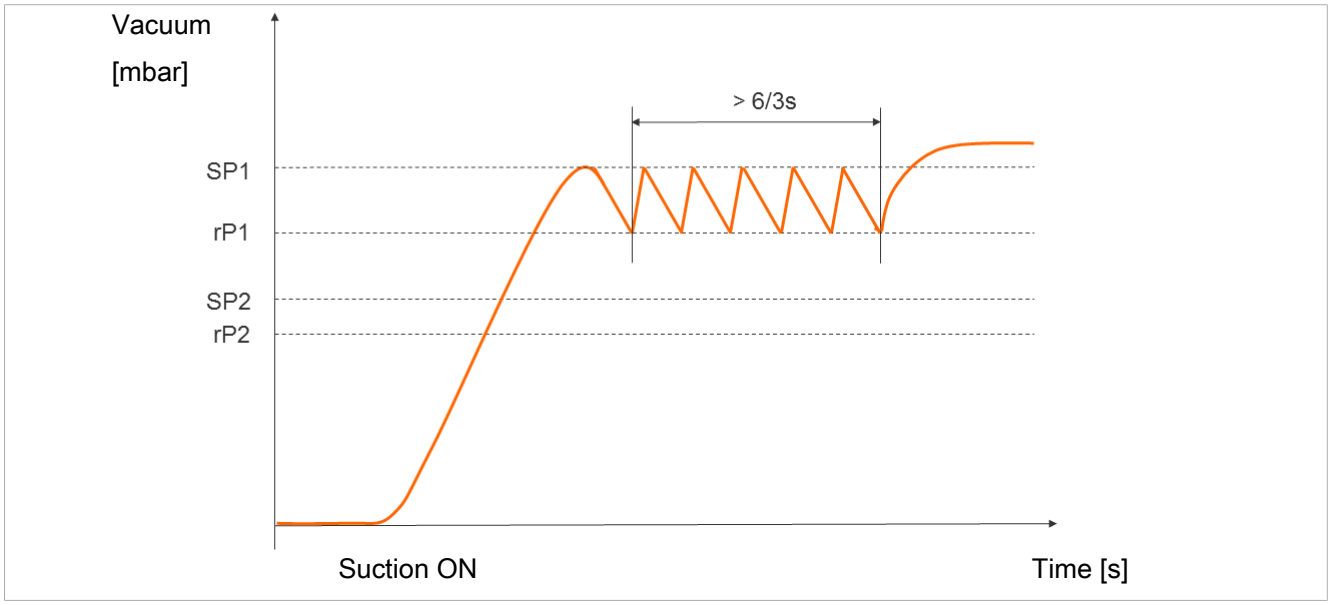
9.26 Energy and Process Control (EPC)

In IO-Link mode, the energy and process control (EPC) function is available. It is subdivided into three modules:

- Condition monitoring (CM): Condition monitoring to increase system availability
- Energy monitoring (EM): Energy monitoring to optimize the vacuum system's energy consumption
- Predictive maintenance (PM): Predictive maintenance to increase the performance and quality of the gripping systems.

9.26.1 Condition Monitoring (CM)

Monitoring the Valve Switching Frequency

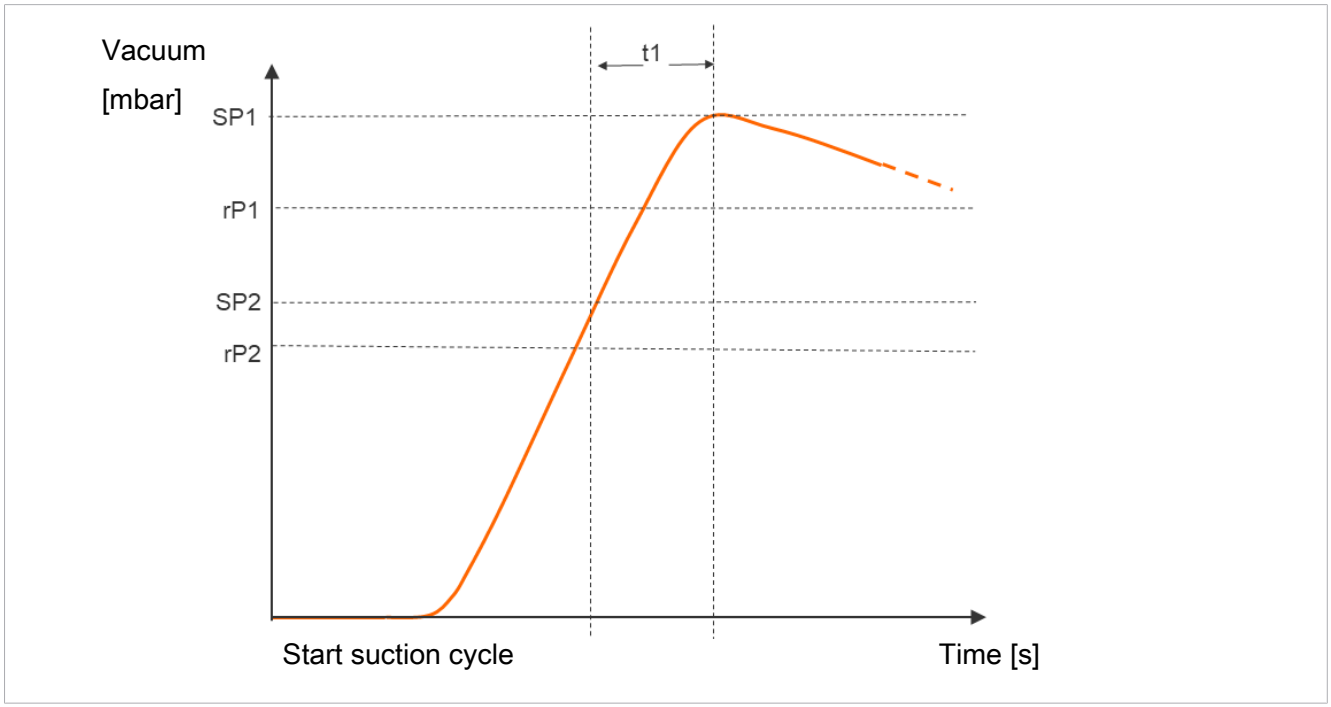


When the air saving function is activated and there is a high leakage level in the gripping system, the component switches between the Suction and Suction off states very frequently. The number of pilot valve switching operations therefore increases rapidly within a short period of time.

To protect the component and increase its service life, the component automatically deactivates the air saving function and switches to continuous suction if the switching frequency > 6/3 s (more than 6 switching operations within 3 seconds). The component then remains in suction mode.

It also issues a warning and sets the corresponding condition monitoring bit.

Monitor Evacuation Time



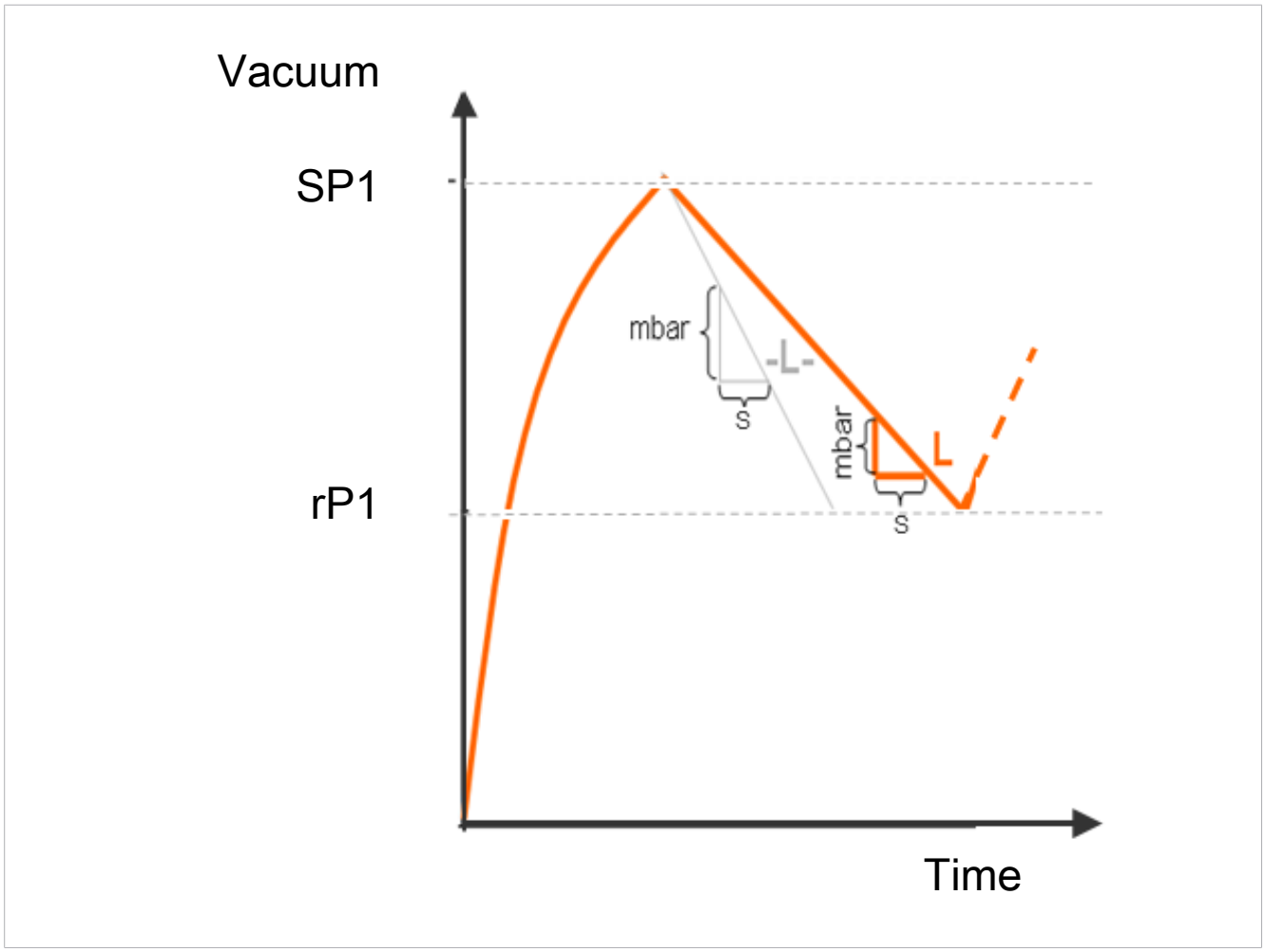
Measuring the evacuation time t1:

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

If the measured evacuation time t1 (from SP2 to SP1) exceeds the specified value, the “Evacuation time longer than t-1” condition monitoring warning is triggered and the system status light switches to yellow.

The specified value for the max. permitted evacuation time t1 can be set in the [EF] menu with the parameter [t- I] or via IO-Link parameter 0x006B. Setting the value to [000] (= off) deactivates monitoring. The maximum permitted evacuation time setting is 9.99 s.

Leakage monitoring



Measuring the leakage:

In control mode ([ctr] = [onS] or [on]), the vacuum drop/leakage over a certain period of time is measured (as vacuum drop per time unit in mbar/s) after the air saving function has interrupted suction because switching point H1 has been reached.

The measured leakage value "L" in mbar/s can be queried via IO-Link.

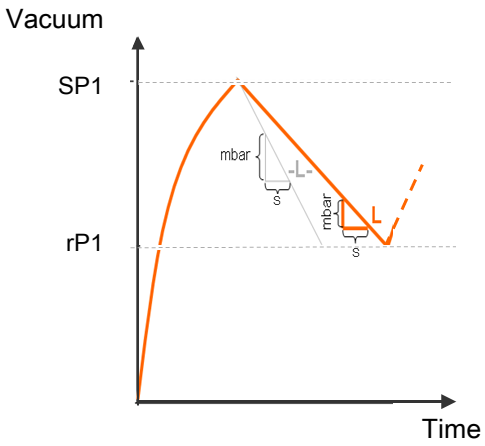
Evaluating the Leakage Level

In control mode ([ctr] = [ons]), the loss of vacuum within a certain period is monitored (mbar/s).

The evaluation of the leakage level differentiates between two statuses:

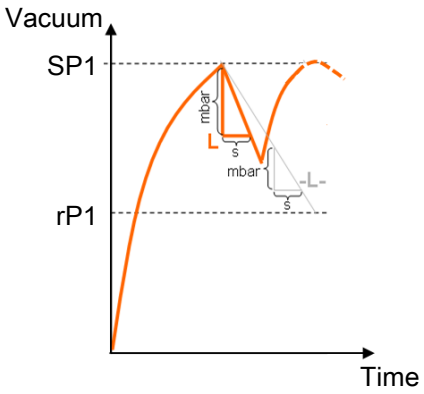
Leakage L < permitted value -L-

- The vacuum continues to decrease until it reaches the reset point rP1
- The ejector begins suction again (normal control mode)



Leakage L > permitted value -L-

- The ejector immediately begins to correct it
- A condition monitoring warning is activated
- The system status indicator light turns yellow



The specified value for the max. permitted leakage -L- is set in the EF menu using the parameter [-L-] or via IO-Link parameter 0x006C. The maximum leakage that can be set is 999 mbar/second.

Control Threshold Monitoring

If the switching point SP1 is never reached during the suction cycle, the “SP1 not reached in suction cycle” condition monitoring warning is triggered and the system status light switches to orange.

This warning is available at the end of the current suction phase and remains active until the next suction cycle.

Monitor Dynamic Pressure

If possible, a dynamic pressure measurement is taken at the start of every suction cycle (vacuum during unobstructed suction). The result of this measurement is compared to the limit values set for SP1 and SP2.

If the dynamic pressure is greater than the value of rP2 but less than SP1, the corresponding condition monitoring warning is triggered and the status light switches to orange.

Monitoring the Supply Voltages

The ejector is not a voltage meter! However, the measured values and the system responses derived from them provide a helpful diagnostics tool for condition monitoring.

The ejector measures the supply voltages U_S. The measured value can be read from the parameter data.

If the voltages are outside the valid range, the following status messages change:

- Device status
- Condition monitoring parameter
- An IO-Link event is generated

Condition Monitoring Events and Status Display

Any condition monitoring events that occur during the suction cycle cause the system status indicator light to immediately switch from green to yellow/orange. The event that caused this switch can be seen in the “Condition monitoring” IO-Link parameter 0x0092.

The table below explains the coding of the condition monitoring warnings:

Bit	Event	Update
0	Valve protection function activated	Cyclic
1	Set limit value t-1 for evacuation time exceeded	Cyclic
2	Set leakage limit value -L- exceeded	Cyclic
3	Limit value SP1 was not reached	Cyclic
4	Dynamic pressure > rP2 and < SP1	As soon as a corresponding dynamic pressure value has been determined
5	Supply voltage U_S outside the operating range	Constant
8	Input pressure outside the operating range	Constant

Bits 0 to 3 describe events that can only occur once per suction cycle. They are reset at the start of every suction cycle and remain stable until it has ended.

Bit number 4, which describes dynamic overpressure, is initially deleted when the device is switched on and is updated when a dynamic pressure value is detected.

Bits 5 and 8 are regularly updated independently of the suction cycle, and reflect the current values for the supply voltage and system pressure.

The values measured by the condition monitoring system, namely the evacuation times t_0 and t_1 and the leakage value L, are reset at the beginning of the suction process and updated once they have been measured.

9.26.2 Energy Monitoring (EM)

In order to optimize the efficiency of vacuum gripping systems, the ejector provides a function for measuring and displaying the energy and air consumption. The IO-Link parameters Air consumption of last suction-cycle 0x009C and Energy consumption of last suction-cycle 0x009D are provided for this purpose.

When measuring air consumption as a percentage, the ejector calculates the air consumption from the last suction cycle as a percentage. This value corresponds to the ratio for the full duration of the suction cycle and the active suction and blow-off times.

An externally recorded pressure value can be supplied using the IO-Link process data. If this value is available, an absolute air consumption measurement can be performed in addition to the percentage-based air consumption measurement. The actual air consumption of a suction cycle is calculated taking the system pressure and nozzle size into account, and specified in standard liters [NL]. The measured value is reset at the beginning of the suction cycle and constantly updated during the running cycle. As such, no further changes can occur once blow-off is complete.

The electrical energy consumed by the device and by the valve coils during a suction cycle is measured and given in watt-seconds (Ws).

For determining the electrical energy consumption, the neutral phase of the suction cycle must also be considered. Therefore the measured values can be updated only when the next suction cycle begins. During the entire cycle, they represent the results from the previous cycle.

The ejector is not a calibrated measuring device. However, the values may be used as a reference and for comparison measurements.

9.26.3 Predictive Maintenance (PM)

Overview of Predictive Maintenance (PM)

In order to allow early detection of wear and other impairments to the vacuum gripping system, the ejector provides functions for recognizing trends in the quality and performance of the system. This is accomplished using the measured values for leakage and dynamic pressure.

The measurement value for the leakage rate and the related quality assessment in percent are reset at the start of every suction cycle and constantly updated during the cycle as moving averages. The values therefore remain stable until after the suction cycle is complete.

Measurement of Leakage

The control function interrupts suction as soon as it reaches the limit value SP1. Then the leakage is measured as the vacuum decrease over time (in mbar/s).

Dynamic Pressure Measurement

This measures the system vacuum achieved during unobstructed suction. The measurement length is approx. 1 s. Thus evaluation of a valid dynamic pressure value requires at least one second of unobstructed suction after the suction cycle has commenced. The suction point must not be occupied by a component at this time.

Measured values below 5 mbar or above the limit value SP1 are not regarded as valid dynamic pressure measurements and are discarded. The result of the last valid measurement is retained.

Measured values that are below the limit value SP1 but simultaneously above the limit value SP2 – rP2 result in a condition monitoring event.

The dynamic pressure and the percentage performance value based on it are initially unknown when the ejector is switched on. As soon as a dynamic pressure measurement can be performed, the dynamic pressure and the performance evaluation are updated and retain their values until the next dynamic pressure measurement.

Quality Assessment [0x00A2]

In order to evaluate the entire gripping system, the ejector calculates a quality rating based on the measured system leakage.

The greater the leakage in the system, the worse the quality rating of the gripping system. Conversely, low leakage results in a high quality rating.

Performance Calculation [0x00A3]

The performance calculation helps in evaluating the system status. The performance of the gripping system can be assessed based on the measurement of the dynamic pressure.

Optimal configuration of gripping systems leads to low dynamic pressure and thus to high performance. Conversely, badly configured systems achieve low performance.

Dynamic pressure events that exceed the limit value (SP2 – rP2) always result in a performance rating of zero percent. A dynamic pressure value of 0 mbar (which indicates that no valid measurement value could be obtained) also results in a performance rating of zero percent.

10 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.

11 Installation

11.1 Installation Instructions

⚠ 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 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.

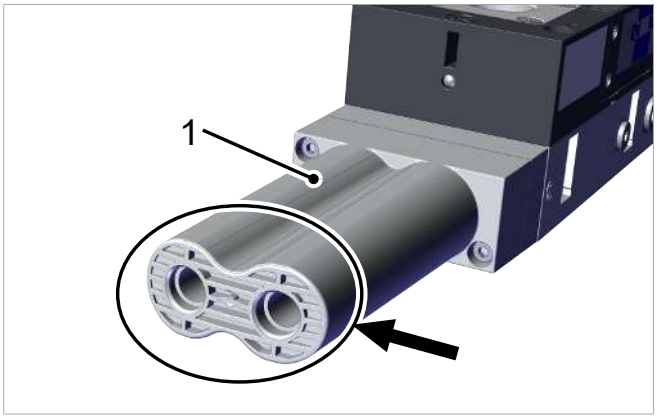
For safe installation, the following instructions must be observed:

1. Use only the connectors, mounting holes and attachment materials that have been provided.
2. Mounting and removal must be performed only when the device is unpressurized and disconnected from the mains.
3. Hose lines must be laid without bends or crimps.
4. Shorten the hoses and pipelines as much as possible to keep the response times as short as possible.
5. Remove any dirt particles or foreign bodies in the product's connections or in the hoses or pipelines because they can lead to malfunctions or failure.

11.2 Mounting

The illustrations shown below may deviate from the customer's version because they serve as examples of different versions of the product.

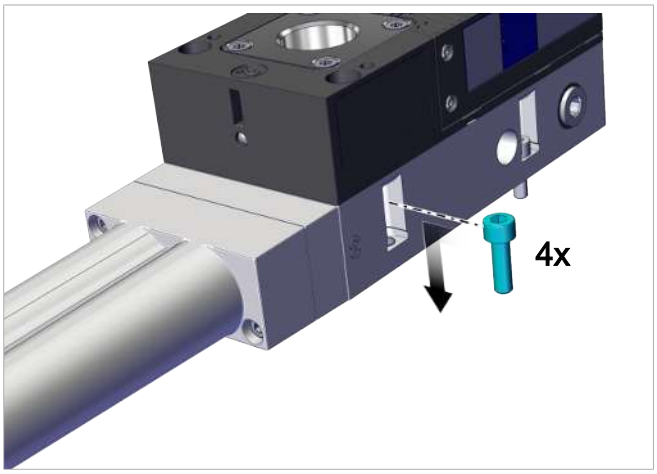
The product can be mounted in any position.



- When installing the ejector, make sure that the area around the exhaust air opening (1) remains unobstructed to ensure the unimpeded discharge of the escaping air.

11.2.1 Mounting the Standard Variant SA

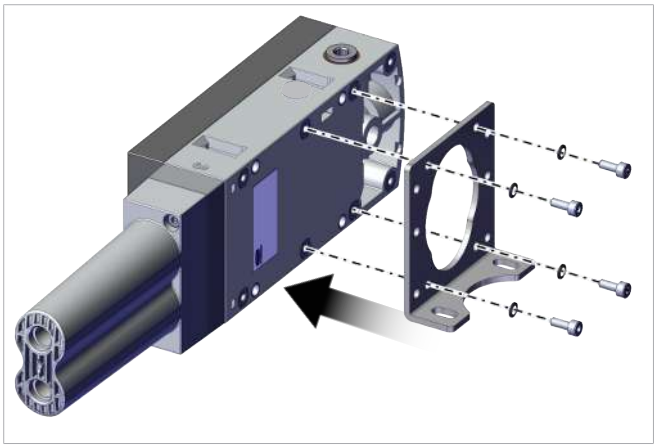
The ejector is usually mounted through the holes on the side using the four supplied screws.



- Use the supplied M5 screws (4x) to secure the ejector to a suitable mounting with a max. tightening torque of 5 Nm.

Alternative attachment with mounting bracket

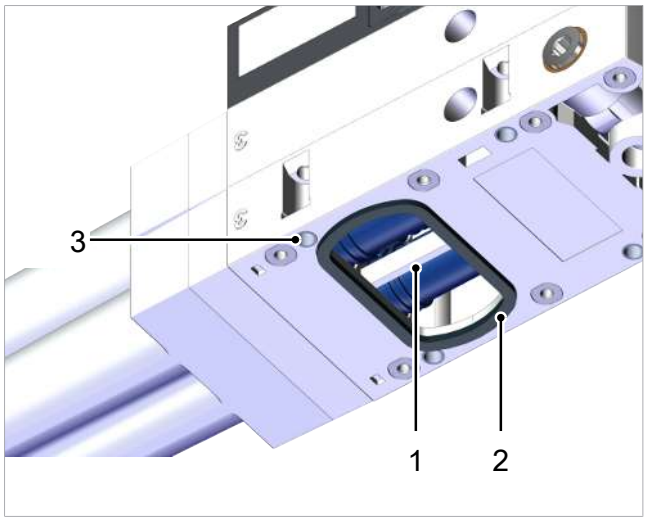
For an alternative mounting, the product is designed with M4 threaded inserts.



- Attach the mounting bracket (see the chapter “Accessories”) to the ejector using the supplied M4 screws (4x), with a max. tightening torque of 2.5 Nm.

11.2.2 Mounting the Flange Variant FA

In the flange variant, the vacuum is connected via the opening (1) or the interface with the seal (2). Four holes (3) for mounting are also available in the housing here.



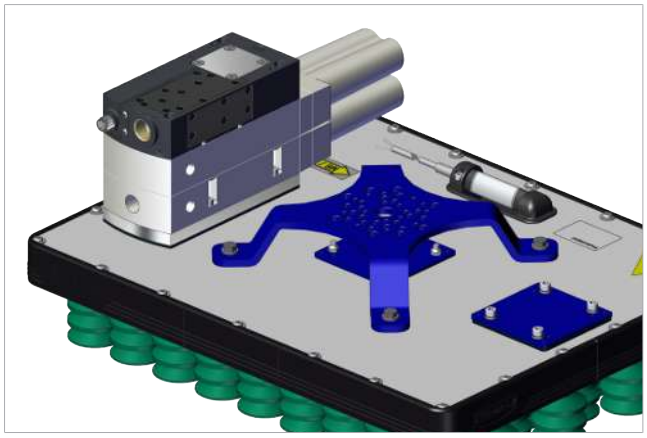
The operator must ensure a leak-free connection.
When attaching the ejector to the operator's vacuum system, the requirements for continuous and dynamic stress must be observed, among others.

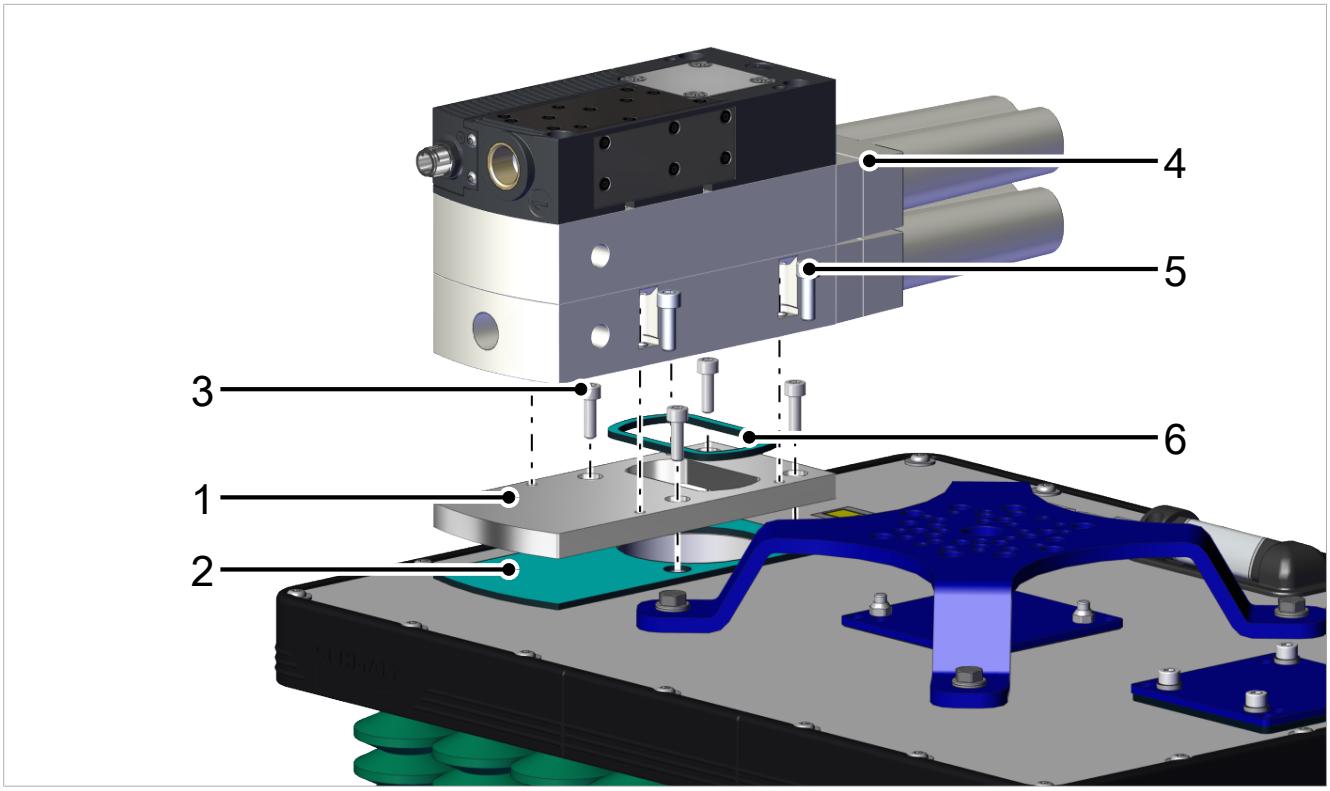
Exampling using the Schmalz adapter plate

The illustrations shown below may deviate from the customer's version because they serve as examples of different versions of the product.

The figure shows a Schmalz area gripper with:

- Bellows suction cups
- Vacuum switch
- Flange
- Vacuum generator SCPL



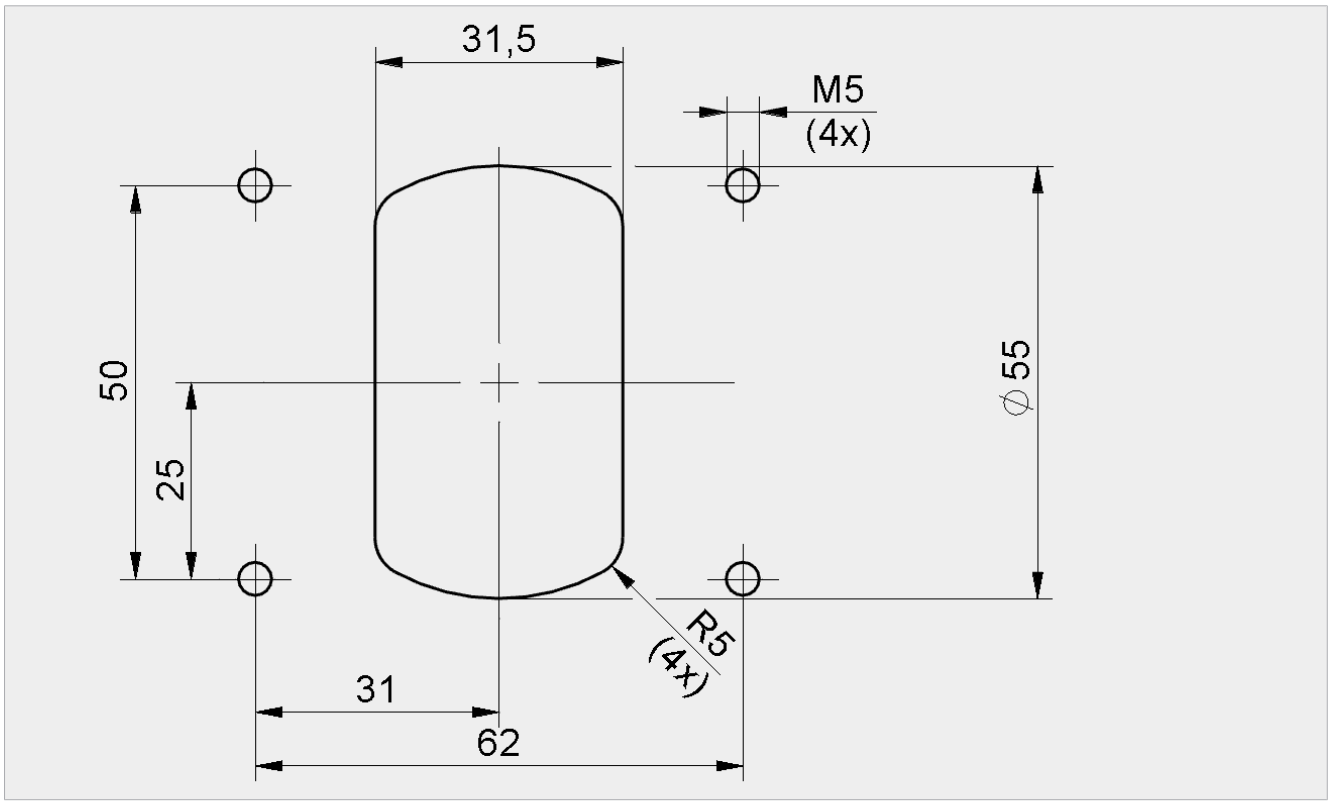


The adapter plate (1) is used for mounting the SCPL (4) on the area gripper. Diese ist zum Führen des Vakuums mit einer Öffnung in Form der Vakuum-Öffnung am Ejektor und mit vier Gewinden (5) zur Befestigung des Ejektors an der Adapterplatte (1) ausgeführt. The seal (6) that is included in delivery seals the SCPL (4) to the adapter plate (1).
In addition, the adapter plate (1) is designed with mounting holes for mounting on the area gripper (3). For sealing, a customer-specific seal (2) has to be provided between the adapter plate (1) and the vacuum gripping system.

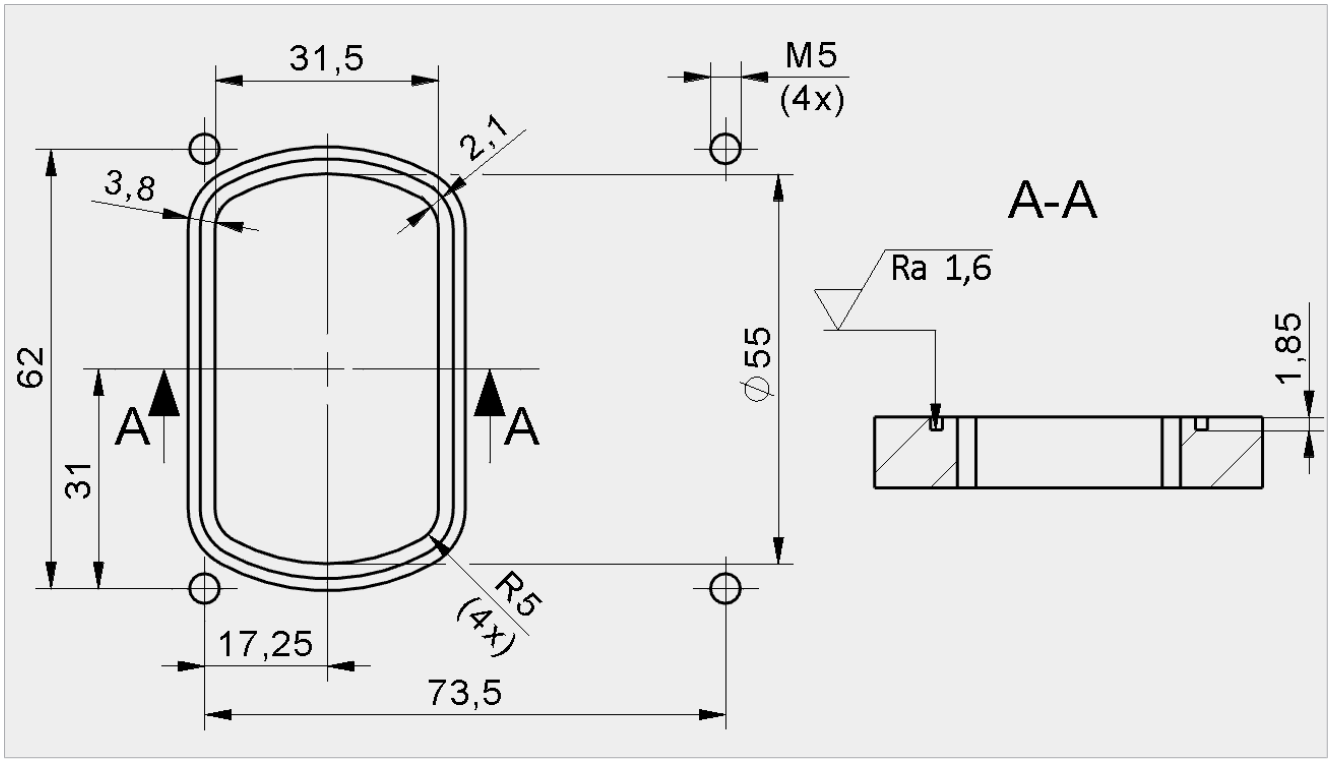
The design of the adapter plate (1) and seal (2) up to the vacuum gripping system is always the responsibility of the operator.

The following sketches show two possible designs for the interface with the ejector.

Drilling template for the variant without a slot



Drilling template for the variant with a slot (the slot is required to mount a filter screen (accessory part).)



11.2.3 Optional: Mounting with Schmalz adapter plate, including screen

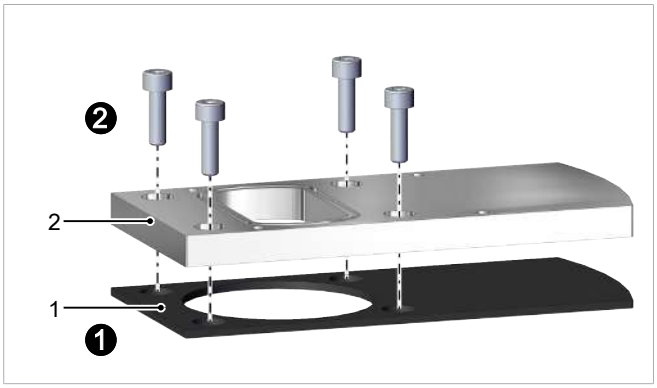
The process of mounting the ejector variant FA using the Schmalz adapter plate is described below.

The set with part number 10.02.01.02194 includes:

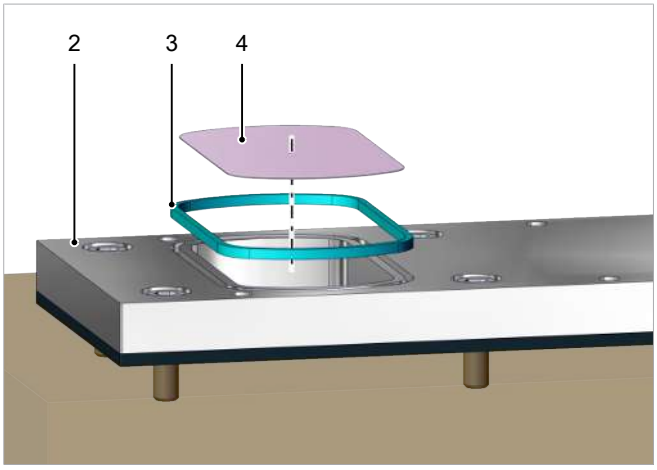
- Adapter plate
- Sealing
- Screen
- Sealing plate
- Machine screws

✓ The vacuum consumer is designed for the use of the adapter plate based on the drilling pattern.

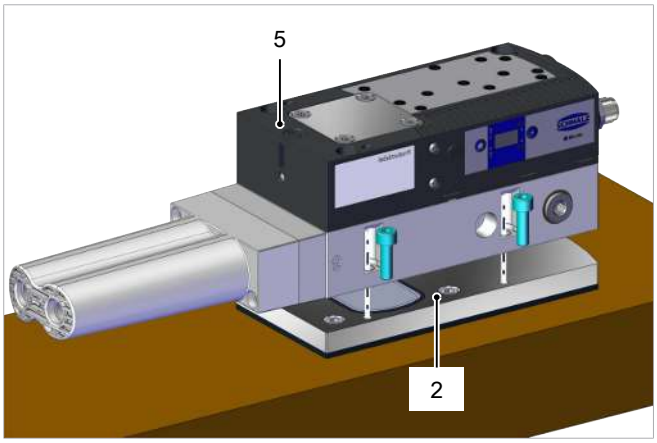
1. Correctly position the sealing plate (1) at the defined point on the vacuum consumer (not shown) ❶ and mount the adapter plate (2) on the vacuum consumer ❷.



2. Insert the seal (3) into the adapter plate slot (2) and the screen (4).



3. Secure the ejector (5) in the correct position on the adapter plate (2) (> See ch. 11.2.1 Mounting the Standard Variant SA, p. 56).



11.3 Pneumatic Connection

11.3.1 Instructions for the Pneumatic Connection

1. Ensure that you make all connections correctly and never close them off – danger of bursting!
2. To ensure problem-free operation and a long service life for the product, only use adequately maintained compressed air.
3. Use only pipes or hoses with the recommended inner diameter to connect the product:

Type	Recommended hose diameter	
	Compressed air	Vacuum (Standard variant)
SCPL 25	6	20
SCPL 50	6	25
SCPL 75	9	32
SCPL 100	9	32
SCPL 125	11	32
SCPL 150	11	32

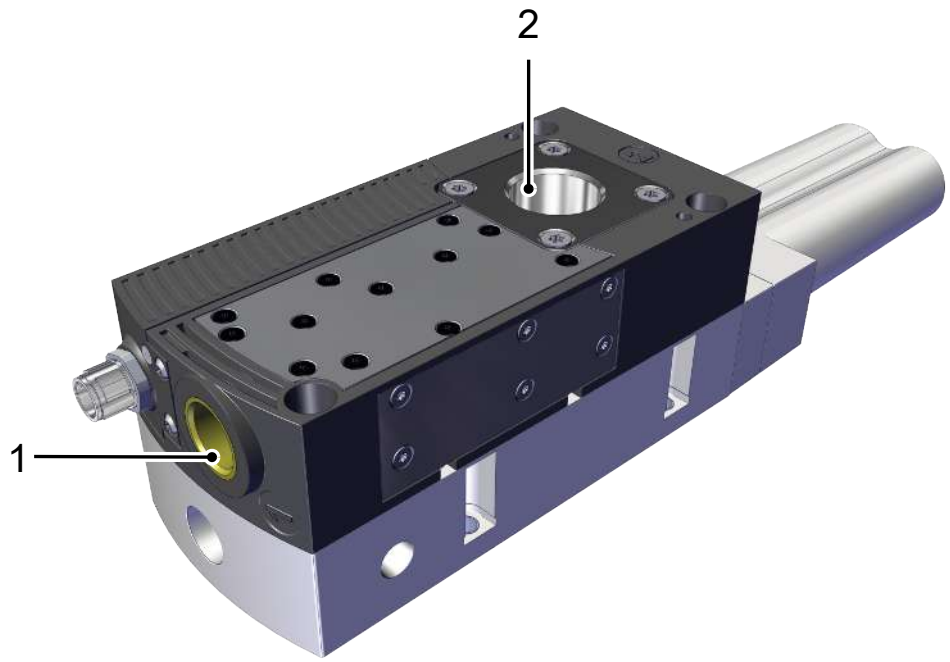
Internal Diameters Are Based on a Maximum Hose Length of 2 m.

If a hose or pipe with an internal diameter that is too small is used on the compressed air side, the product will not receive enough compressed air to operate at optimal capacity.

If a hose or pipe with an internal diameter that is too small is used on the vacuum side, this will cause the flow resistance along the wall of the hose to be too high and have a negative effect on the suction capacity of the device and on evacuation times as a result. However, the hose diameters should not be arbitrarily large, as the increased volume would extend evacuation times.

11.3.2 Connecting the Compressed Air and Vacuum

Standard Variant SA



1	Compressed air connection (marking 1)	2	Vacuum connection (marking 2)

✓ The connectors required for the hose connections are fitted by the customer.

1. Attach the connector to the compressed air connection. Maximum tightening torque = 10 Nm
2. Connect the compressed air hose to the ejector.
3. Attach the connector to the vacuum connection. Maximum tightening torque = 20 Nm.
4. Connect the vacuum hose.

Flange Variant FA

✓ The connectors required for the connections are provided by the customer.

1. Attach the connector to the compressed air connection. Maximum tightening torque = 10 Nm
2. Connect the compressed air hose to the ejector.
3. The vacuum is connected through the vacuum opening and is connected to the ejector attachment (> See ch. 11.2.2 Mounting the Flange Variant FA, p. 57).

11.4 Electrical Connection

⚠ CAUTION

Changing output signals when the product is switched on or plug is connected

Personal injury or damage to property!

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

⚠ WARNING

Electric shock

Risk of injury

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

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 EN 60204.
- Do not connect or disconnect the connector under tension and/or when electrical voltage is applied.

11.4.1 Mounting the Connection Cable

The electrical connection supplies the product with power and communicates with the controller of the higher-level machine using defined outputs or via IO-Link.

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

✓ Ensure that no electrical voltage is applied to the device.

✓ Prepare an M12 5-pin connection cable with a socket (supplied by the customer).

- Attach the connection cable (not included in delivery) to the electrical connection (1) (with max. tightening torque = hand-tight).

Direct connection to the control unit of the higher-level machine

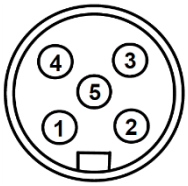
In IO-Link mode, ensure that the electrical cable does not exceed the maximum length of 20 meters.

To directly connect the ejector to the control unit, a Schmalz connection cable can be used, for example:

- Ejector with 5-pin M12 connector: M12-5 connection cable with open end, 5 m, part no. 21.04.05.00080

Further connection cables or connection distributors are available on request.

11.4.2 PIN Assignment for 5-Pin M12 Connector

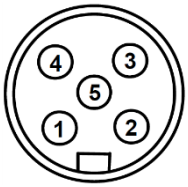
M12 plug	PIN	Symbol	Wire color[1)]	Function in standard I/O mode (SIO)
	1	$U_{S/A}$	Brown	Supply voltage for sensors/actuators
	2	IN1	White	"Suction" signal input[2)]
	3	$GND_{S/A}$	Blue	Ground for sensors/actuators
	4	OUT	Black	"Part present check" signal output
	5	IN2	Gray	"Blow off" signal input [3)]

[1)] when using Schmalz connection cable part number 21.04.05.00080

[2)] NO version: Suction OFF, NC version: Suction ON

[3)] NO/NC version: Blow-off ON/OFF

11.4.3 Pin Assignments of M12 Connector for IO-Link Class A

M12 plug	Pin	Symbol	Wire color [1)]	Function
	1	U	Brown	Supply voltage
	2	NC	White	Not connected
	3	GND	Blue	Ground
	4	C/Q	Black	IO-Link communication
	5	NC	Gray	Not connected

[1)] When using a Schmalz connection cable.

12 Start of Operations

12.1 General Preparations

⚠ 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.

Always carry out the following tasks before activating the device:

1. Check the product for visible damage and deal with any problems immediately (or notify the supervisor).
2. Ensure that the safety features of the machine or system are in perfect condition and check that they are functioning correctly.
3. Make sure all pneumatic connections are occupied and all screws are tight.
4. Ensure that only authorized persons are present in the working area of the machine or system in order to prevent any hazard from switching on the machine.

12.2 Activating the Product

You can supply the device with compressed air once all pneumatic and electrical connections have been made.

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.

13 Troubleshooting

13.1 Help with Faults

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
	IODD connection does not work	▸ Check the IODD
No NFC communication	NFC connection between ejector and reader (e.g. smartphone) not correct	▸ Hold the reader at the intended position on the ejector
	NFC function on reader (e.g. smartphone) not activated	▸ Activate NFC function on reader
	NFC deactivated on ejector	▸ Activate NFC function on ejector
	Write operation canceled	▸ Hold the reader at the intended position on the ejector
No parameters can be changed using NFC	PIN code for NFC write protection activated	▸ Enable NFC write permissions
Ejector 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 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	Vacuum level too low	▸ Increase the control range for the air saving function
	Suction cup too small	▸ Select a larger suction cup
No display on the screen	ECO mode activated	▸ Press any button or deactivate ECO mode
	Faulty electrical connection	▸ Check electrical connection and pin assignment
Display shows error code	See "Error codes" table	▸ See "Error Codes" table in the following chapter
Warning message/IO-Link warning message "Leakage too high" although 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.

Fault	Possible cause	Solution
Warning message/IO-Link warning message "Leakage too high" does not appear although 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.

13.2 Error Codes, Causes and Solutions

The condition monitoring functions output events that can be used to draw conclusions with regard to the process. If a known error occurs, it is transmitted via the IO-Link ISDU parameter [0x0082] in the form of an error number.

The system status is automatically refreshed on the NFC tag every 5 minutes at the latest. That means that an error may be displayed via NFC even though it has already disappeared.

Error code/Display code	Fault	Possible cause	Solution
E01	Internal error Electronics	Operating voltage was disconnected too quickly after a parameter change, saving process was not complete.	1. Clear the error by restoring the factory setting with the [rES] function or parameter. 2. Use engineering tool to import a valid dataset. 3. If error [E01] occurs again after restarting the supply voltages: Replacement by Schmalz
E03	Zero-point error/ calibration error on vacuum sensor	Zero-point adjustment for vacuum sensor is outside of the tolerance 3% FS. Calibration was canceled when measurement value was too high or too low.	1. Ventilate the vacuum circuit. 2. Perform calibration.
E07	Undervoltage U_S	Sensor supply voltage is too low.	1. Check power supply unit and power load 2. Increase supply voltage
E08	IO-Link error	Connection to master interrupted.	1. Check connection line. 2. Repeat the power up process.
E 17	Overvoltage U_S	Sensor supply voltage is too high.	1. Check power supply unit. 2. Reduce supply voltage
FFF	Vacuum range	Measured vacuum level too high, sensor defective	1. Check and adjust supply pressure. 2. Replacement by Schmalz
-FF	Overpressure in vacuum system	Ejector in “Blow-off” mode	No error! Overpressure display
E 12	Short circuit at OUT2 (short circuit at OUT2)	Power load too high, short circuit	▸ Check cabling and power consumption for the connected consumers

13.3 System condition monitoring (CM)

The overall status of the ejector system is displayed as a status traffic light using 2 bits in Process Data Input Byte 0. All warnings and errors are taken into account when defining the status of the display.

This basic display provides immediate information about the status of the ejector.

The table below shows the various traffic light statuses and explains what they mean:

Displayed System status	Description of the status
Green	System is working perfectly with optimal operating parameters
Yellow	Warning – Condition monitoring warnings in place; ejector system not functioning perfectly Check operating parameters
Orange	Warning – Serious condition monitoring warnings in place; ejector system not functioning perfectly Check operating parameters
Red	Error – Error code provided in parameter error; safe operation of the ejector within the operating limits is no longer ensured • Cease operation • Check the system

13.4 Warnings and Error Messages in IO-Link Mode

In IO-Link mode, status information is available in addition to the error messages displayed in SIO mode.

More details on this can be found in the final section of the enclosed Data Dictionary, "Coding of Extended Device Status (ISDU 138) and IO-Link Events".

Any condition monitoring events that occur during the suction cycle cause the system status light to immediately switch from green to yellow/orange. The specific event that caused this switch can be seen in the "Condition monitoring" IO-Link parameter.

14 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.

15 Maintenance and Cleaning

15.1 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 that the product is functioning properly after all maintenance and troubleshooting.

⚠ CAUTION

Blowing off or cleaning the product with compressed air

Risk of injury and damage to the product

- Never blow off the product with compressed air.

⚠ CAUTION

Use of Cleaners Containing Solvents

Damage to the product (seals, insulation, coatings and other surfaces may be damaged by cleaners that contain solvents) and potentially damage to health

- Use a chemically and biologically neutral cleaning agent.
- Use cleaning agent that is rated as non-harmful to health.
- The use of the following cleaning agents is strictly prohibited:
  — Acetone
  — white spirit
  — cellulose thinner/turpentine oil (solvents)

15.2 Cleaning the Product

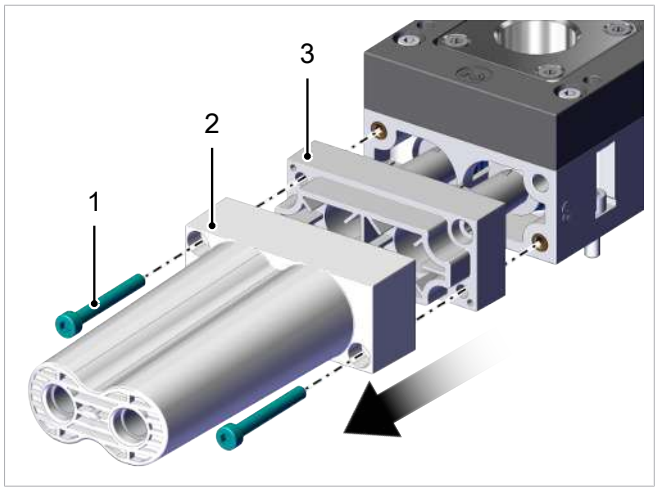
1. For cleaning, do **not** use aggressive cleaning agents such as industrial alcohol, white spirit or thinners.
   Only use cleaning agents with pH 7–12.
2. Remove dirt on the exterior of the device with a soft cloth and soap suds at a maximum temperature of 60° C. Make sure that the silencer is not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

15.3 Cleaning or Replacing the Ejector Module

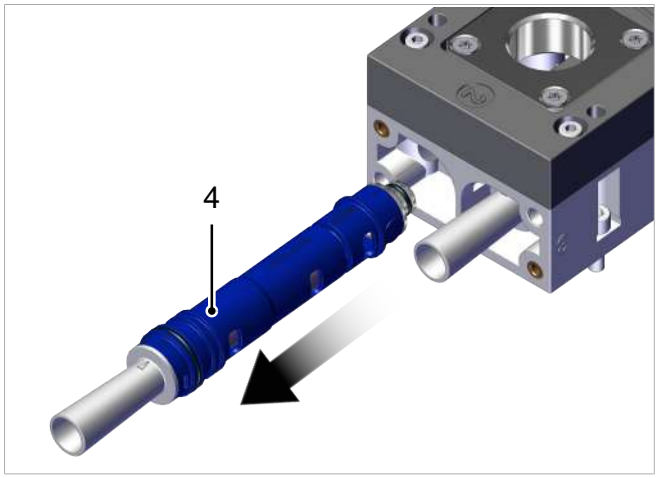
The illustrations shown below may deviate from the customer's version because they serve as examples of different versions of the product.

Removing the ejector module

1. Release the screws (1) and remove the silencer (2) and the silencer holder (3).

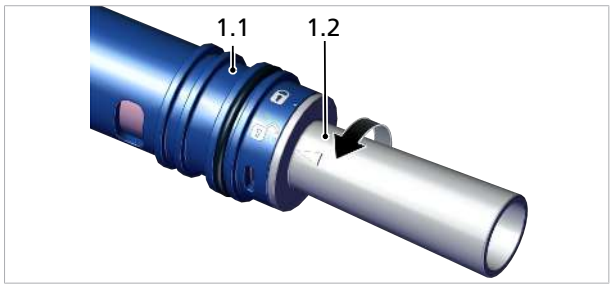


2. Pull the ejector module (4) out of the bore-hole.

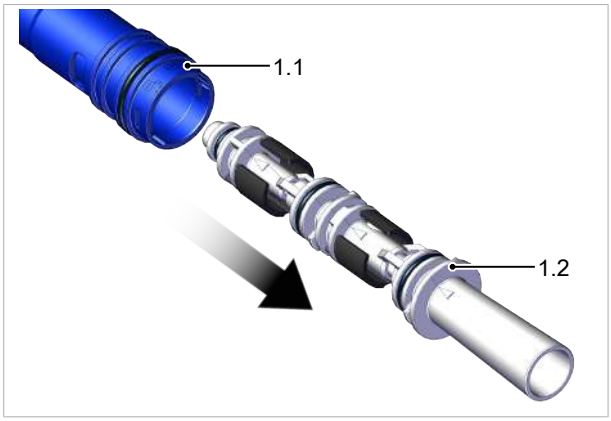


Opening and cleaning the ejector module

1. Turn the nozzle fitting (1.2) relative to the main body (1.1) to the "unlocked" position.

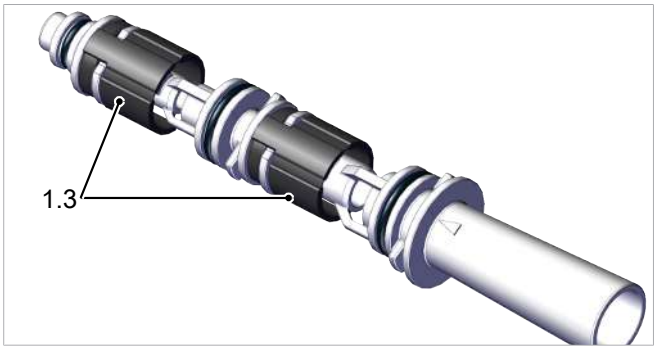


2. Pull the nozzle fitting (1.2) out of the main body (1.1), pulling only in the axial direction.

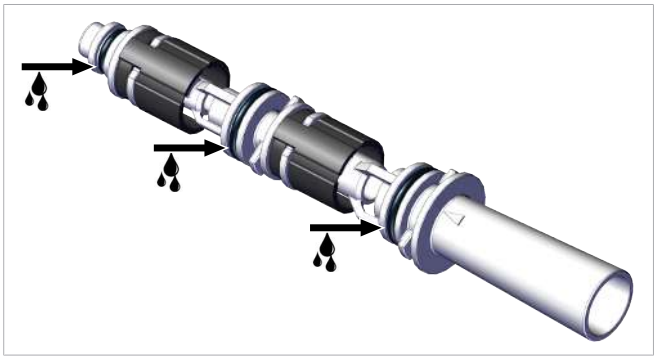


3. Blow off the components with compressed air or clean them under running water.

4. After cleaning, check the non-return valves (1.3) for wear and replace them if necessary.

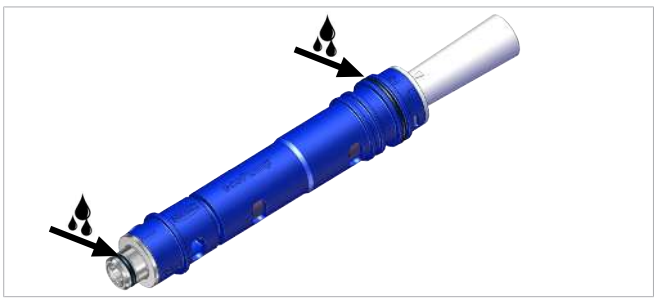


5. Grease the O-rings slightly before mounting the ejector module.

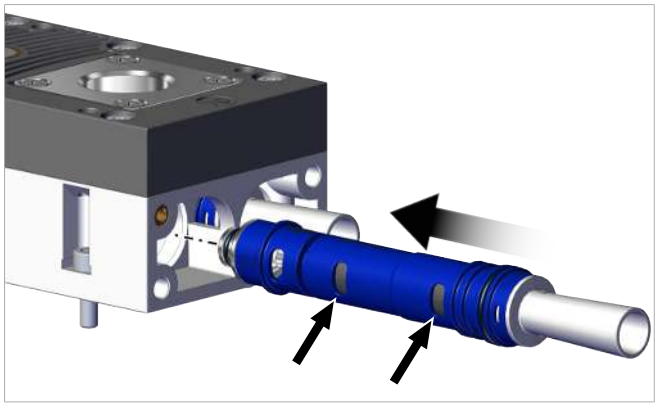


Assembling a new or cleaned ejector module

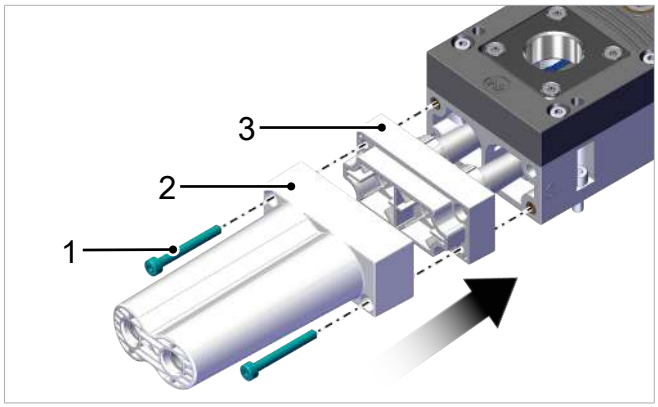
1. Lightly grease the ejector module O-rings (4) before mounting.



2. Ensure that the ejector module (4) is in the correct position and push it into the opening until it stops, with the suction openings of the ejector module (4) as shown.



3. Attach the silencer holder (3) and the silencer (2) using the two screws (1) with a tightening torque of 2 Nm.



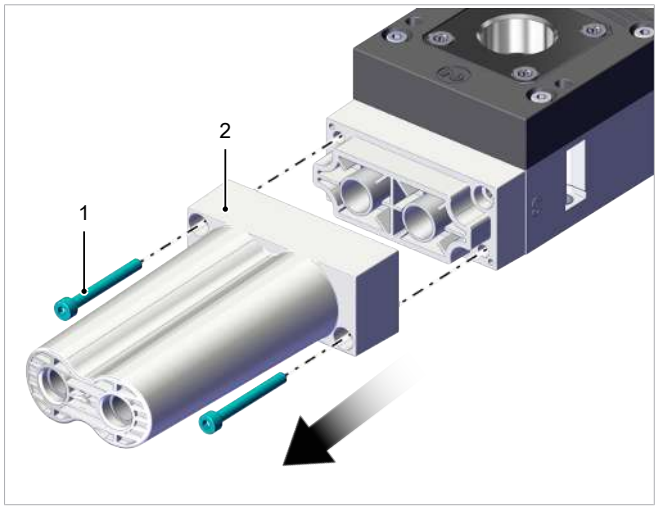
15.4 Replacing the Silencer

Heavy infiltration of dust, oil, etc. may contaminate the silencer 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:

- ✓ The relevant spare parts set is made available by the customer.
- ✓ The device has been disconnected from the compressed air supply.

1. Release the screws (1) and remove the silencer (2).



2. Fasten the new silencer with the two new screws using a tightening torque of 2 Nm.

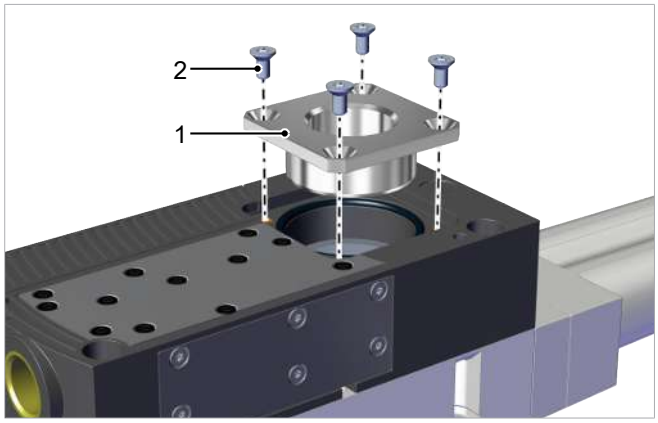
15.5 Cleaning or Replacing the Screen in the Vacuum Connection

The vacuum connection contains a screen in which dust, chippings and other solid materials may accumulate over time. If there is a noticeable reduction in performance, simply clean or replace the screen.

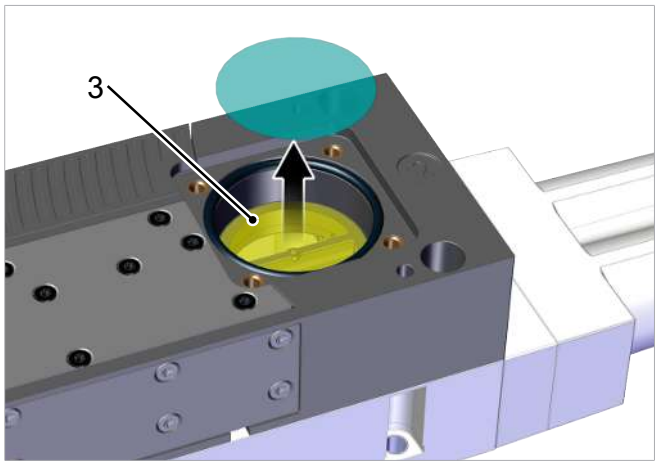
The following applies to the standard variant.

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

1. Remove the four screws (2) and lift the vacuum connection (1) out of the housing.

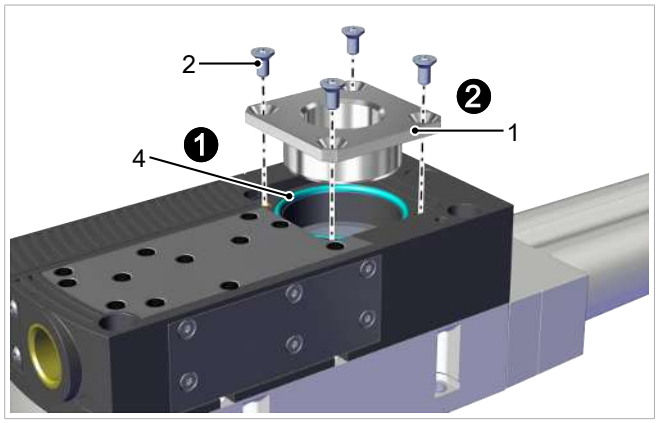


2. Remove the screen (3) from the vacuum connection and clean it. If the contamination is excessive, replace the screen.



3. Insert the cleaned or new screen into the vacuum connection.

4. Check that the O-ring (4) is fitted ❶.



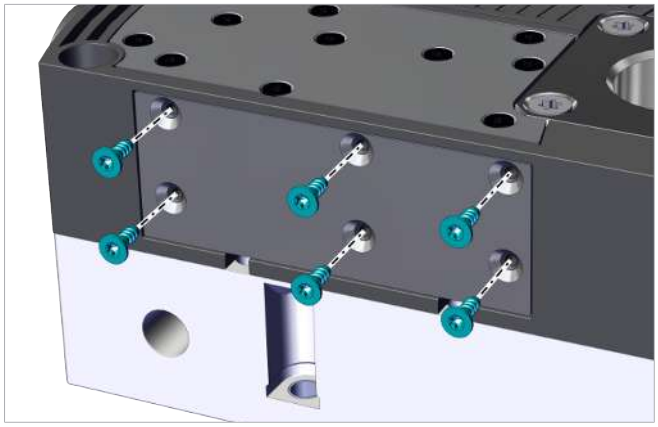
5. Insert the vacuum connection (1) into the housing and secure with the 4 screws (2) with a tightening torque of 2.5 Nm each ❷.

15.6 Replacing the Valve

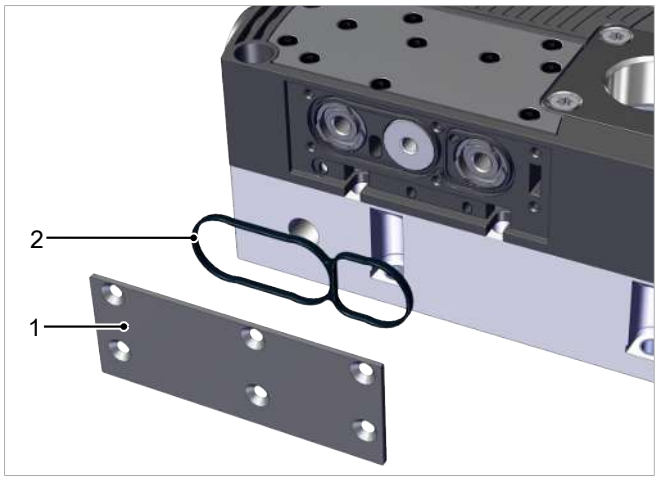
A faulty valve can be replaced as described below.

- ✓ The spare part set with part no. 10.02.02.07698 (two valves and one sealing) is provided by the customer.
- ✓ The product has been disconnected from all supply lines.

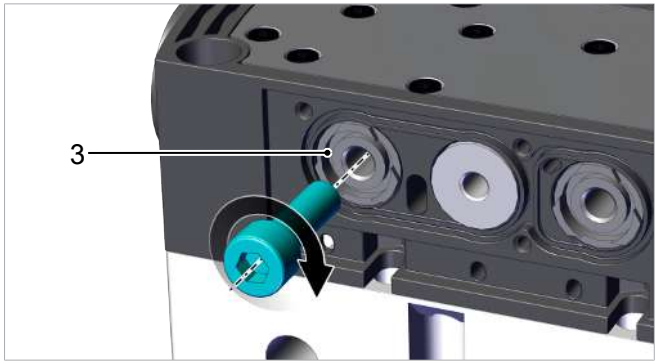
1. Loosen and remove the screws on the sealing plate.



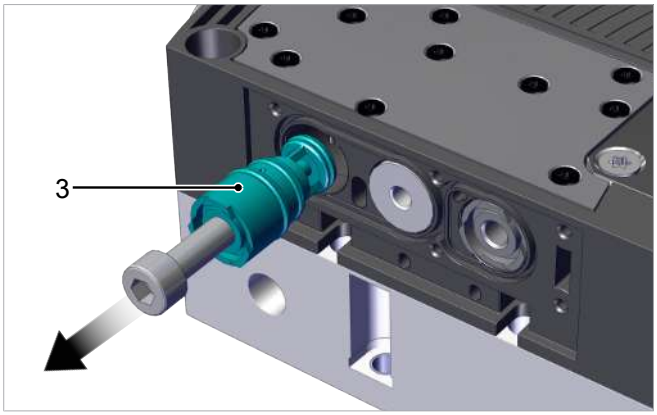
2. Remove the sealing plate (1) and sealing (2).



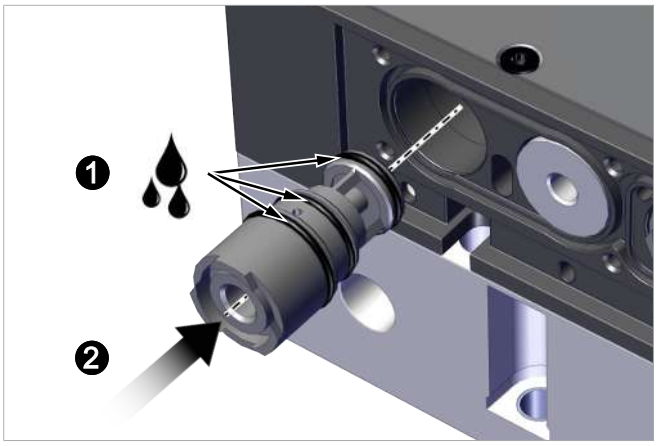
3. Screw a screw with an M5 thread into the central thread of the valve (3) to be replaced (at least 5 threads).



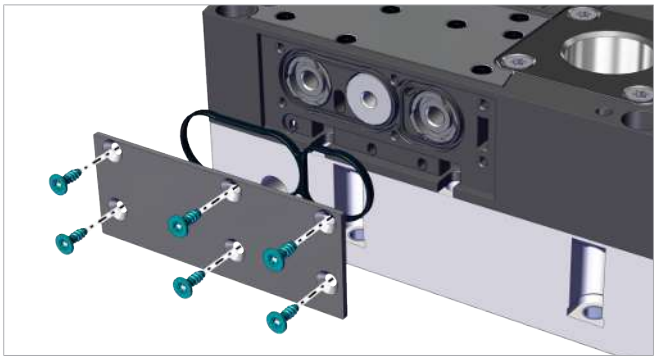
4. Pull the valve (3) out of the hole by pulling on the screw.



5. Apply pneumatic grease to the O-rings of the new valve ❶ and press the valve into the hole until it stops. ❷.



6. Insert the new sealing in the correct position and fit the sealing plate, tightening the screws to a maximum torque of 0.75 Nm.



7. Connect the product to all necessary lines.
8. Before starting the handling process, check to ensure the device is installed and functioning correctly.

16 Spare and Wearing Parts

The product must be maintained only by qualified mechanics.

Personnel must have read and understood the operating instructions.

Designation	Type	Part no.
Silencer	SD 102x71x33 SBPL/SCPL	10.02.01.01585
Ejector module HF	SEP HF 3 13 22	10.02.01.01996
Multi-stage nozzle in compact design HV	SEP HV 3 16 22	10.02.01.01991
Sealing frame	DI-RA 112.5x34.8 NBR-55	10.02.01.01541
O-ring	O-RING 10x2.5 NBR-70	10.07.08.00002
Round screen	SIEB 36.2x0.2 A2 400 0.4/0.22	10.02.02.07119
Set of spare parts for non-return flap	ERS SEP-22 6xRUE-KLAP	10.02.01.01450

17 Accessories

Depending on the output module, the items listed in the following table are required for an upgrade.

The **installation information** required for the conversion is stored with the relevant **retrofit kit** at **www.schmalz.de**.

For standard variants:

Upgrade	Ejector	Sealing plug
SCPL 25 to 50	10.02.01.01996 (HF) or 10.02.01.01991 (HV)	Remove 10.02.01.01687!
SCPL 75 to 100	10.02.01.01996 (HF) or 10.02.01.01991 (HV)	Remove 10.02.01.01687!
SCPL 125 to 150	10.02.01.01996 (HF) or 10.02.01.01991 (HV)	Remove 10.02.01.01687!

For flange variants:

Upgrade	Ejector	Sealing plug
SCPL 25 to 50	10.02.01.01409 (HF) or 10.02.01.01411 (HV)	Remove 10.02.01.01687!
SCPL 75 to 100	10.02.01.01409 (HF) or 10.02.01.01411 (HV)	Remove 10.02.01.01687!
SCPL 125 to 150	10.02.01.01409 (HF) or 10.02.01.01411 (HV)	Remove 10.02.01.01687!

Designation	Type	Part no.	Note	Hose clamp
Connection cable	ASK B-M12-5 5000 K-5P	21.04.05.00080	All SCPL	—
Connection cable	ASK B-M12-5 1000 S-M12-5	21.04.05.00158	All SCPL	—
Connection cable	ASK B-M12-5 2000 S-M12-5	21.04.05.00211	All SCPL	—
Connection cable	ASK WB-M12-5 5000 K-5P	21.04.05.00830	All SCPLs	—
Mounting bracket	BEF-WIN 25x77x72 3 SBPL	10.02.01.01705	All SCPLs	—
Vacuum gauge	VAM 40 V H	10.07.02.00035	SCPLb	—
Vacuum gauge (electric)	VAM-D 30x30 VP10 G1/8-AG	10.07.02.00055	SCPLb	—
Hose sleeve for SBPL/ SCPL 25	ST 20 AL-EL	10.02.01.01679	for rated hose Ø 20	10.07.10.00086
Hose sleeve for SBPL/ SCPL 50	ST 25 AL-EL	10.02.01.01680	for rated hose Ø 25	10.07.10.00087
Hose sleeve for SBPL/ SCPL >50	ST 32 AL-EL	10.02.01.01681	for rated hose Ø 32	10.07.10.00018
Exhaust air set	ABL-SET SBPL M	10.02.01.01939	All SCPLs	—

Designation	Type	Part no.	Note	Hose clamp
Exhaust air set	ABL-SET SBPL L	10.02.01.01940	Only for SCPL up to 100	—
Vacuum cup filter	VFT G1/2-IG 80	10.07.01.00125	SCPL25	—
Vacuum cup filter	VFT G3/4-IG 80	10.07.01.00128	SCPL50	—
Dust filter	STF G3/4-IG N	10.07.01.00007	SCPL75	—
Dust filter	STF G1-1/4-IG N	10.07.01.00008	From SCPL100	—
Multi-stage nozzle	SEP HV 3 16 22	10.02.01.01996 (HF)	For standard	
Multi-stage nozzle	SEP HF 3 13 22	10.02.01.01991 (HV)	For standard	
Ejector adapter	ADP-EJ 153x71x33.8 SBPL/ SCPL	10.02.01.02194	For variant FA Sheet, screen, sealing frame and sealing plate for layer gripper	
Basic set	SET SBPL/SCPL	10.02.01.02195	For variant FA Screen, sealing frame	
Multi-stage nozzle	SEP HV 3 16 22 S	10.02.01.01411	For variant FA	
Multi-stage nozzle	SEP HF 3 13 22 S	10.02.01.01409	For variant FA	

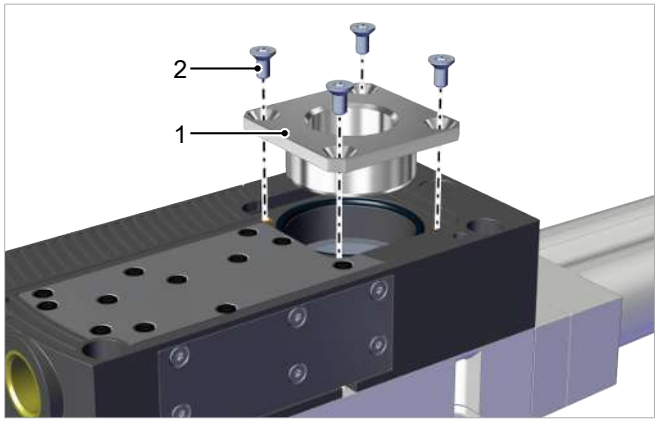
17.1 Converting the Vacuum Connection on the Standard Variant to a Hose Sleeve

The vacuum connection can be converted to a connection using a hose sleeve. For the corresponding sizes, the part numbers of the appropriate hose sleeves are listed in the accessories.

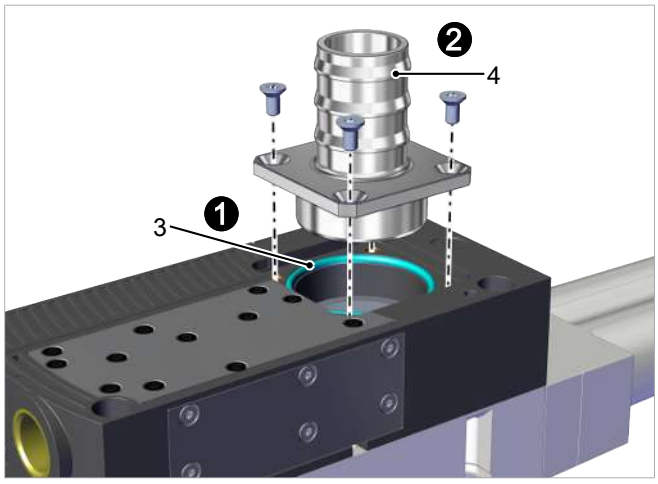
The illustrations shown below may deviate from the customer's version because they serve as examples of different versions of the product.

- ✓ The ejector is deactivated and disconnected from the supply lines.
- ✓ The customer has the correct hose sleeve for the ejector.

1. Remove the four screws (2) and lift the vacuum connection (1) out of the housing.



2. Check that the O-ring (3) is fitted ❶. Insert the vacuum connection with the hose sleeve (4) into the housing and secure using the 4 screws with a tightening torque of 2.5 Nm each ❷.



18 Decommissioning and Disposal

18.1 Disposing of the Product

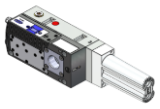
The components may only be prepared for disposal by qualified specialists.

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

18.2 Materials Used

The table below shows the materials used:

Component	Material
Main body	Fiberglass-reinforced plastics
Vacuum connection	Aluminum alloy
Inner components	Aluminum alloy, brass, NBR
Screws	Galvanized steel, stainless steel
Sealing	Nitrile rubber (NBR)
Lubrication	Silicone-free



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IO-Link Implementation

Vendor ID		234 (0x00EA)
Device ID		100248 (0x018798)
SIO-Mode		Yes
IO-Link Revision		1.1
IO-Link Bitrate		38.4 kBit/sec (COM2)
Minimum Cycle Time		3.4 ms
Process Data Input		4 bytes
Process Data Output		2 bytes

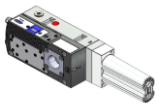
Process Data

Process Data Input	Name	Bits	Data Type	Access	Special Values	Remark
PD In Byte 0	Signal SP2 (part present)	0	Boolean	ro		Vacuum is over SP2 & not yet under rP2
	Signal SP1 (air saving function)	1	Boolean	ro		Vacuum is over SP1 & not yet under rP1
	reserved	2	Boolean	ro		not used
	CM autoset acknowledged	3	Boolean	ro		Acknowledge that the Autoset function has been completed
	reserved	4	Boolean	ro		Reserved
	Signal SP3 (part detached)	5	Boolean	ro		The part has been detached after a suction cycle
	Device status	7 … 6	2 bit integer	ro		00 - [green] Device is working optimally 01 - [yellow] Device is working but there are warnings 10 - [orange] Device is working but there are severe warnings 11 - [red] Device is not working properly
PD In Byte 1	Warnings	7… 0	8 bit integer	ro		ISDU 146, bits 0-7
PD In Byte 2	Current vacuum, high-byte	7… 0	16 bit integer	ro		Unit: 1mbar
PD In Byte 3	Current vacuum, low-byte	7… 0				

Process Data Out	Name	Bit		Access	Availability	Special Values	Remark
PD Out Byte 0	Vacuum	0	Boolean		wo		Vacuum on/off
	Blow-off	1	Boolean		wo		Activate Blow-off
	Setting mode	2	Boolean		wo		Vacuum on/off with continuous suction disabled (regardless of dCS parameter)
	CM autoset	3	Boolean		wo		Perform CM Autoset function (teach permissible leakage and permissible evacuation time)
	Reserved 0	4	Boolean		wo		Reserved
	Reserved 1	5	Boolean		wo		
	Profile-set 0	6	Boolean		wo		Select Production Profile (2-bit binary coded) (see ISDU parameter areas P0 to P3)
	Profile-set 1	7	Boolean		wo		
PD Out Byte 1	Input pressure	7… 0	8 bit integer		wo		Pressure value from external sensor (unit: 0.1 bar)

ISDU Parameters

ISDU Index dec	ISDU Index hex	Subindex dec	Display Appearance	Parameter	Size	Value Range	Access	Default Value / Example	Remark
Identification									
16	0x0010	0		Vendor name	1...32 bytes		ro	J. Schmalz GmbH	Manufacturer designation
17	0x0011	0		Vendor text	1...32 bytes		ro	Beyond Gravity	Vendor text
18	0x0012	0		Product name	1...32 bytes		ro	SCPLi	Product name
19	0x0013	0		Product ID	1...32 bytes		ro	SCPLi	Product variant name
20	0x0014	0		Product text	1...32 bytes		ro	SCPLi *	Order-code
21	0x0015	0	Snr	Serial number	9 bytes		ro	000000001	Serial number
22	0x0016	0		Hardware revision	2 bytes		ro	03	Hardware revison
23	0x0017	0	SoC	Firmware revision	4 bytes		ro	0.0D	Firmware revision
24	0x0018	0		Application specific tag	1...32 bytes		rw	***	User string to store location or tooling information
25	0x0019	0		Function tag	1...32 bytes		rw	***	User string to store location or tooling information
26	0x001A	0		Location tag	1...32 bytes		rw	***	User string to store location or tooling information
17342	0x43BE	0		Hardware Identification Key	5 bytes		ro		Identifies the hardware for compatibility check with the firmware to be installed.
240	0x00F0	0		Unique device identification	9 bytes		ro		Unique device identification number
248	0x00F8	0		NFC web link	1…64 bytes	http://… https://…	rw	https://myproduct.schmalz.com/#/	Web link to NFC app (base URL for NFC tag)
249	0x00F9	0		Storage location	1…32 bytes		rw	***	User string to store storage location
250	0x00FA	0	Art	Article number	14 bytes		ro	10.02.02.*	Order-number
251	0x00FB	0		Article revision	2 bytes		ro	00	Article revision
252	0x00FC	0		Production date	3 bytes		ro	B26	Date code of production (month+year, month is letter coded, e.g. F18 = July 2018)
253	0x00FD	0		Installation date	1…16 bytes		rw	***	User string to store date of installation
Parameter									
Service Functions									
2	0x0002	0		System command	1 byte	5, 129, 131, 165, 167, 168, 169	wo		0x05 (dec 5): Force upload of parameter data into the master 0x81 (dec 129): Reset application 0x83 (dec 131): Back to box 0xA5 (dec 165): Calibrate vacuum sensor 0xA7 (dec 167): Reset erasable counters ct1, ct2, ct3 0xA8 (dec 168): Reset voltages HI/LO 0xA9 (dec 169): Reset vacuum/pressure HI/LO
Access Locks									
12	0x000C	0		Device access locks	2 bytes	0, 4	rw	0	Bit 0-1: reserved Bit 2: Local parameterization lock (lock menu editing) Blt 3-15: reserved
90	0x005A	0	nFc	Extended device access locks	1 byte		rw	0	Bit 0: NFC write lock Bit 1: NFC disable Bit 2: Not used Bit 3: local user interface locked (manual mode locked) Bit 4: IO-Link event lock (suppress sending IO-Link events) Bit 5-7: Not used



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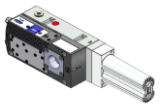
77	0x004D	0	Pin	Pin-code display	2 bytes	0 - 999	rw	0	0 = Menu editing unlocked >0 = Menu editing locked with pin-code
91	0x005B	0		Pin-code NFC	2 bytes	0 - 999	rw	0	Pin-code for NFC write
				Initial Setup					
69	0x0045	0	bLo	Blow-off mode	1 byte	0 - 2	rw	0	0 = Externally controlled blow-off (-E-) 1 = Internally controlled blow-off – time-dependent (I-t) 2 = Externally controlled blow-off – time-dependent (E-t)
71	0x0047	0	Ou2	Output 2 function	1 byte	0 - 1	rw	0	0 = NO 1 = NC
73	0x0049	0	P-n	Signal type	1 byte	0 - 1	rw	0	0 = PNP 1 = NPN
74	0x004A	0	uni	Display unit	1 byte	0 - 3	rw	0	0 = mbar 1 = kPa 2 = inHg 3 = psi
75	0x004B	0	dLY	Output filter	2 byte	0 - 999	rw	10	Unit: 1 ms
76	0x004C	0	Eco	Eco-Mode	1 byte	0 - 2	rw	0	0 = off 1 = on (full eco mode with display switching off completely) 2 = Lo (medium eco mode with display dimmed to 50%)
79	0x004F	0	dIS	Display rotation	1 byte	0 - 1	rw	0	0 = standard 1 = rotated
				Process Settings					
275	0x0113	0	P-n	Number of active profile	1 byte	0-3	ro		Number of the active profile: 0 - 3
				Production Setup - Profile P0					
68	0x0044	0	Ctr	Air saving function	1 byte	0 - 2	rw	1	0 = not active (off) 1 = active (on) 2 = active with supervision (onS)
78	0x004E	0	dCS	Disable continuous suction	1 byte	0 - 1	rw	0	0 = off 1 = on
100	0x0064	0	SP1	Switchpoint 1 (SP1)	2 bytes	999 > SP1 > rP1	rw	750	Unit: 1 mbar
101	0x0065	0	rP1	Resetpoint 1 (rP1)	2 bytes	SP1 > rP1 > SP2	rw	600	Unit: 1 mbar
102	0x0066	0	SP2	Switchpoint 2 (SP2)	2 bytes	rP1 > SP2 > rP2	rw	550	Unit: 1 mbar
103	0x0067	0	rP2	Reset Point 2 (rP2)	2 bytes	SP2 > rP2 >= 10	rw	540	Unit: 1 mbar
106	0x006A	0	tbl	Duration automatic blow	2 bytes	10 - 9999	rw	200	Unit: 1 ms
107	0x006B	0	t-1	Permissible evacuation time	2 bytes	0 - 9999	rw	2000	Unit: 1 ms. No t-1 Warning if set to 0
108	0x006C	0	-L-	Permissible leakage rate	2 bytes	0 - 999	rw	250	Unit: 1 mbar/sec. No -L- Warning if set to 0
119	0x0077	0		Profile name	1...32 bytes		rw	***	
				Production Setup - Profile P1					
180	0x00B4	0		Air saving function	1 byte	0 - 2	rw	1	Profile P-1 (selected by PD Out 0 - Profile-Set = 1)
181	0x00B5	0		Disable continuous suction	1 byte	0 - 1	rw	0	
182	0x00B6	0		Switchpoint 1 (SP1)	2 bytes	999 > SP1 > rP1	rw	750	
183	0x00B7	0		Resetpoint 1 (rP1)	2 bytes	SP1 > rP1 > SP2	rw	600	
184	0x00B8	0		Switchpoint 2 (SP2)	2 bytes	rP1 > SP2 > rP2	rw	550	
185	0x00B9	0		Reset Point 2 (rP2)	2 bytes	SP2 > rP2 >= 10	rw	540	
186	0x00BA	0		Duration automatic blow	2 bytes	10 - 9999	rw	200	
187	0x00BB	0		Permissible evacuation time	2 bytes	0 - 9999	rw	2000	
188	0x00BC	0		Permissible leakage rate	2 bytes	0 - 999	rw	250	
199	0x00C7	0		Profile name	1...32 bytes		rw	***	
				Production Setup - Profile P2					
200	0x00C8	0		Air saving function	1 byte	0 - 2	rw	1	Profile P-2 (selected by PD Out 0 - Profile-Set = 2)
201	0x00C9	0		Disable continuous suction	1 byte	0 - 1	rw	0	
202	0x00CA	0		Switchpoint 1 (SP1)	2 bytes	999 > SP1 > rP1	rw	750	
203	0x00CB	0		Resetpoint 1 (rP1)	2 bytes	SP1 > rP1 > SP2	rw	600	
204	0x00CC	0		Switchpoint 2 (SP2)	2 bytes	rP1 > SP2 > rP2	rw	550	
205	0x00CD	0		Reset Point 2 (rP2)	2 bytes	SP2 > rP2 >= 10	rw	540	
206	0x00CE	0		Duration automatic blow	2 bytes	10 - 9999	rw	200	
207	0x00CF	0		Permissible evacuation time	2 bytes	0 - 9999	rw	2000	
208	0x00D0	0		Permissible leakage rate	2 bytes	0 - 999	rw	250	
219	0x00DB	0		Profile name	1...32 bytes		rw	***	
				Production Setup - Profile P3					
220	0x00DC	0		Air saving function	1 byte	0 - 2	rw	1	Profile P-3 (selected by PD Out 0 - Profile-Set = 3)
221	0x00DD	0		Disable continuous suction	1 byte	0 - 1	rw	0	
222	0x00DE	0		Switchpoint 1 (SP1)	2 bytes	999 > SP1 > rP1	rw	750	
223	0x00DF	0		Resetpoint 1 (rP1)	2 bytes	SP1 > rP1 > SP2	rw	600	
224	0x00E0	0		Switchpoint 2 (SP2)	2 bytes	rP1 > SP2 > rP2	rw	550	
225	0x00E1	0		Reset Point 2 (rP2)	2 bytes	SP2 > rP2 >= 10	rw	540	
226	0x00E2	0		Duration automatic blow	2 bytes	10 - 9999	rw	200	
227	0x00E3	0		Permissible evacuation time	2 bytes	0 - 9999	rw	2000	
228	0x00E4	0		Permissible leakage rate	2 bytes	0 - 999	rw	250	
239	0x00EF	0		Profile name	1...32 bytes		rw	***	
				Observation					
				Monitoring					
64	0x0040	1		System vacuum live	2 bytes		ro		Unit: 1mbar
64	0x0040	2		System vacuum min	2 bytes		ro		Unit: 1mbar
64	0x0040	3		System vacuum max	2 bytes		ro		Unit: 1mbar
65	0x0041	1		Input pressure live	2 bytes		ro		Unit: 1mbar
65	0x0041	2		Input pressure min	2 bytes		ro		Unit: 1mbar
65	0x0041	3		Input pressure max	2 bytes		ro		Unit: 1mbar
66	0x0042	1		Primary supply voltage live	2 bytes		ro		Unit: 0.1V
66	0x0042	2		Primary supply voltage min	2 bytes		ro		Unit: 0.1V
66	0x0042	3		Primary supply voltage max	2 bytes		ro		Unit: 0.1V
148	0x0094	0		Evacuation time t0 of last suction-cycle	2 bytes		ro		Unit: 1ms Time from suction start to reaching SP2
149	0x0095	0		Evacuation time t1 of last suction-cycle	2 bytes		ro		Unit: 1ms Time from reaching SP2 to reaching SP1
160	0x00A0	0		Leakage rate of last suction-cycle	2 bytes		ro		Unit: 1mbar/sec
161	0x00A1	0		Free-flow vacuum	2 bytes		ro		Unit: 1mbar
164	0x00A4	0		Max reached vacuum of last suction-cycle	2 bytes		ro		Unit: 1mbar



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165	0x00A5	0		Min reached input pressure	2 bytes		ro		Unit: 1mbar
		Counters							
140	0x008C	0	cc1	Vacuum on counter	4 bytes		ro		Counter for Vacuum on (non-erasable, stored every 1000 counts)
141	0x008D	0	cc2	Valve operating counter	4 bytes		ro		Counter for valve operating (non-erasable, stored every 1000 counts)
142	0x008E	0	cc3	Condition monitoring counter	4 bytes		ro		Counter for condition monitorings (non-erasable, stored every 1000 counts)
143	0x008F	0	ct1	Vacuum on counter	4 bytes		ro		Counter for Vacuum on (erasable, stored every 1000 counts)
144	0x0090	0	ct2	Valve operating counter	4 bytes		ro		Counter for valve operating (erasable, stored every 1000 counts)
145	0x0091	0	ct3	Condition monitoring	4 bytes		ro		Counter for condition monitorings (erasable, stored every 1000 counts)
		Diagnosis							
		Device Status							
32	0x0020	0		Error count	2 bytes		ro		Number of errors since last power-up
36	0x0024	0		Device status	1 byte		ro		0 = Device is operating properly 1 = Maintenance required 2 = Out of specification 3 = Functional check 4 = Failure
37	0x0025	0		Detailed device status	96 bytes		ro		Information about currently pending events (Event-List) Byte 0 = Type of Event 1 Byte 1…2 = ID of Event 1 Byte 3 = Type of Event 2 Byte 4…5 = ID of Event 2 etc.
130	0x0082	0		Active errors	2 bytes		ro		Bit 00: Internal error: data corruption (E01) Bit 01: reserved Bit 02: Primary voltage too low (E07) Bit 03: Primary voltage too high (E17) Bit 04-07: reserved Bit 08: short circuit at OUT2 (E12) Bit 09-10: reserved Bit 11: Measurement range overrun (FFF) Bit 12-14: reserved Bit 15: IO-Link communication interruption (E08)
		Condition Monitoring [CM]							
146	0x0092	0		Condition monitoring	2 bytes		ro		Bit 0: Valve protection active Bit 1: Evacuation time t1 above limit [t-1] Bit 2: Leakage rate above limit [-L-] Bit 3: SP1 not reached in suction cycle Bit 4: Free-flow vacuum > rP2 but < SP1 Bit 5: Primary voltage US outside of optimal range Bit 6: reserved Bit 7: reserved Bit 8: Input pressure outside of operating range Bit 9-15: reserved
		Energy Monitoring [EM]							
156	0x009C	0		Air consumption of last suction-cycle	2 bytes		ro		Unit: 0.1L std.
157	0x009D	0		Energy consumption of last suction-cycle	2 bytes		ro		Unit: 1 Ws
		Predictive Maintenance [PM]							
162	0x00A2	0		Quality of last suction-cycle	1 byte		ro		Unit: 1 %
163	0x00A3	0		Performance of last suction-cycle	1 byte		ro		Unit: 1 %

IO-Link Events

Extended Device Status ID (= IO-Link Event Code)		IO-Link Event Type	Display Code	Event name	Remark
dec	hex				
0	0x0000	(no IOL event)		Everything OK	Device is working optimally
6161	0x1811	Error	E01	Data Corruption	Internal error, user data corrupted
35872	0x8C20	Error	FFF	Measurement range overrun	Measured vacuum value too high, sensor fault
2457	0x0999	(no IOL event)	E08	IO-Link communication interruption	IO-Link communication is interrupted (readable via NFC)
20736	0x5100	Error	E07	General power supply fault	Primary supply voltage (US) too low
20752	0x5110	Warning	E17	Primary supply voltage over-run	Primary supply voltage (US) too high
6146	0x1802	Warning		Supply pressure fault	Input pressure too high or too low
6156	0x180C	Warning		Primary supply voltage out of optimal range	Condition Monitoring: primary supply voltage US outside of operating range
6151	0x1807	Warning		CM: Valve protection active	Condition Monitoring: valve has switched too fast, continuous suction activated
6152	0x1808	Warning		CM: evacuation time above limit	Condition Monitoring: evacuation time t1 is above limit [t-1]
6153	0x1809	Warning		CM: leakage rate above limit	Condition Monitoring: leakage rate is above limit [-L-]
6154	0x180A	Warning		CM: SP1 not reached	Condition Monitoring: vacuum level SP1 was never reached during suction cycle
6155	0x180B	Warning		CM: free flow vacuum too high	Condition Monitoring: free flow vacuum above SP2
35841	0x8C01	Warning		Simulation active	Manual mode is active
6144	0x1800	Notification		Vacuum calibration OK	Calibration offset 0 set successfully
6145	0x1801	Notification	E03	Vacuum calibration failed	Sensor value too high or too low, offset not changed
6167	0x1817	Notification		Autoset completed successfully	Permissible leakage and permissible evacuation time have been set automatically for the active profile
6168	0x1818	Notification		Handling Cycle Completed	Handling of the part is complete (neutral state of vacuum system reached or new suction phase begun)
30480	0x7710	Error	E12	short circuit at OUT2	output is connect with counterpotential

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