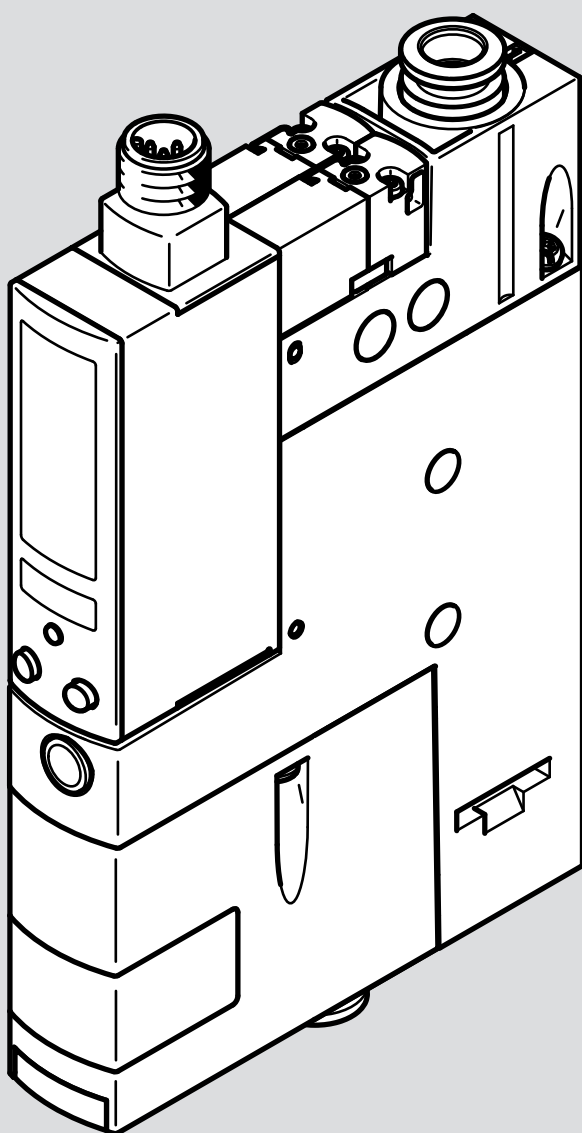


OVEM-...-LK
Vacuum generator

FESTO

Operating instructions



8243588

8243588
2025-08f
[8243590]

Original instructions

IO-Link is a registered trademark of its respective trademark holder in certain countries.

Table of contents

1	Applicable documents	6
2	Safety	6
2.1	Safety instructions	6
2.2	Intended use	6
2.3	Training of qualified personnel	6
2.4	Approval UL/CSA	6
2.5	Cyber security measures	7
3	Additional information	7
4	Product overview	7
4.1	Product design	7
4.2	Display elements	8
5	Function	10
5.1	Function	10
5.2	Switching functions	11
5.3	Valve controller	12
5.4	Air saving function	13
5.5	Monitoring and diagnostics	13
5.6	Measured variables	14
5.7	Teach function (teach-in)	14
5.8	Data storage	15
5.9	Block parameterisation	15
5.10	Operating statuses and menu structure	16
6	Mounting	19
6.1	Assembly information	19
6.2	Direct mounting on the side	19
6.3	Direct mounting on the back	20
6.4	DIN rail mounting	20
6.5	Mounting with mounting bracket	21
7	Installation	21
7.1	Installation, pneumatic	21
7.2	Installation, electrical	22
8	Commissioning	23
8.1	Commissioning the vacuum generator	23
8.2	Setting the intensity of the ejector pulse	24

9	Operation	24
9.1	Mechanical manual override	24
9.2	Electrical manual override	25
9.3	Activating security code	25
9.4	Restoring factory settings	25
10	Maintenance	26
10.1	Cleaning	26
10.2	Replacing air filter	26
11	Diagnostics	27
11.1	Overview	27
11.2	Diagnostics	27
11.3	Status messages	27
12	Malfunctions	28
12.1	Error messages and error codes	28
12.2	Fault clearance	28
13	Disassembly	29
14	Technical data	29
14.1	Technical data, general	29
14.2	Technical data for parameterisation interface	31
14.2.1	General informationIO-Link	31
14.2.2	Identification of parameters	31
14.2.3	Process data	32
14.2.4	Smart Sensor Profile Parameters (Smart Sensor Profile Parameters)	32
14.2.5	Device parameters	35
14.2.6	Observation parameters	36
14.2.7	Diagnostics (Diagnosis)	37
14.2.8	Device commands	38

1 Applicable documents



All available documents for the product → www.festo.com/sp.

Document	Product	Contents
Instruction manual	Manifold rail OABM-P	Assembly

Tab. 1: Applicable documents

2 Safety

2.1 Safety instructions

- Only use the product in its original condition without unauthorised modifications.
- Only use the product if it is in perfect technical condition.
- Use the product only inside buildings.
- Take into account the ambient conditions at the location of use.
- The product is intended for use in industrial environments. The product may generate high frequency interference, which may require interference suppression measures in residential areas.
- Observe the specifications on the product labelling.

2.2 Intended use

The vacuum generator is used to generate vacuum.

2.3 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers. The qualified personnel have skills and experience in dealing with pneumatic (open-loop) control technology.

2.4 Approval UL/CSA

In combination with the UL inspection mark on the product, the information in this section must also be observed in order to comply with the certification conditions of Underwriters Laboratories Inc. (UL) for USA and Canada.

Approval information UL/CSA	
Product category code	QUYX, QUYX7
File number	E322346
Considered standards	UL 61010-1 CAN/CSA C22.2 No. 61010-1
UL mark	

Tab. 2: Approval information UL/CSA

- If the equipment is used in a manner not specified by the manufacturer, the protection provided may be impaired.

⚠ WARNING

The unit shall be supplied by a power source which fulfils the requirements on a limited-energy circuit in accordance to IEC/EN/UL/CSA 61010-2-201 or on a Limited Power Source (LPS) in accordance to IEC/EN/UL/CSA 60950-1 or IEC/EN/UL/CSA 62368-1 or a Class 2 circuit in accordance to NEC or CEC.

2.5 Cyber security measures

The product has a protected service interface that uses the existing connection cables.

Accidental or improper execution of functions on the product can lead to failure or malfunction of the product and thus the entire connected system. In addition, unauthorised access to information stored on the product may be possible. The system operator must therefore take appropriate measures to prevent accidental or improper access to the product. Cyber security information
→ www.festo.com/psirt.

3 Additional information

- Contact the regional Festo contact if you have technical problems
→ www.festo.com.
- Accessories and spare parts → www.festo.com/catalogue.

4 Product overview

4.1 Product design

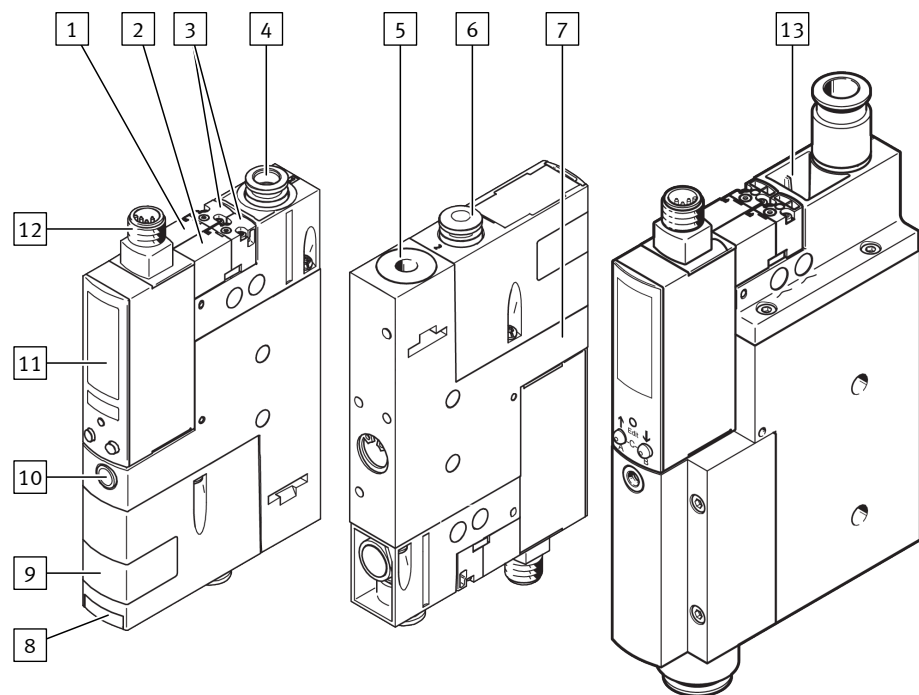


Fig. 1: Operating elements and connections

- | | |
|---|---|
| 1 Solenoid valve for ejector pulse (Eject) | 8 Slide for changing the filter |
| 2 Solenoid valve for vacuum | 9 For OVEM-...-B: Filter housing with display window |
| 3 Mechanical manual override of the solenoid valves | 10 Flow control screw for regulation of the ejector pulse |
| 4 Compressed air port (1) | 11 Vacuum sensor with LCD display and operating keys |
| 5 Exhaust port / silencer (3) | 12 electrical connection |
| 6 Vacuum port (6) | 13 Size OVEM-...-C |
| 7 Housing with mounting holes | |

4.2 Display elements

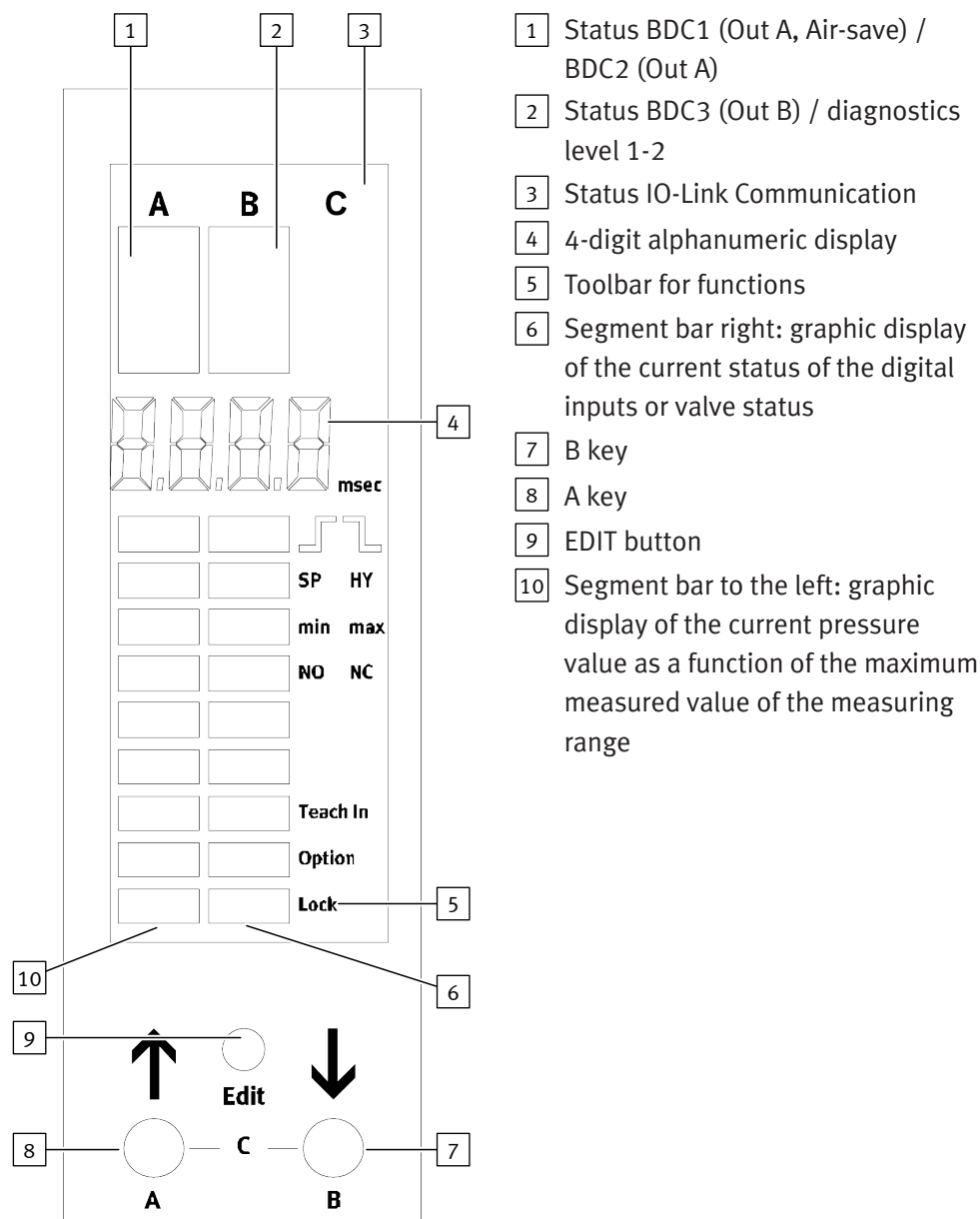
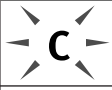
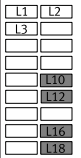
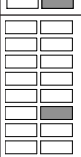


Fig. 2: LCD display and operating keys

Symbol	Description
	C flashes: IO-Linkmode active
	Threshold value comparator selected
{SP}	Switching point
	Window comparator selected
{SP} + {min}	Lower switching point
{SP} + {max}	Upper switching point
{HY}	Hysteresis
{NO}/{NC}	Switching logic N/O contact (normally open) / N/C contact (normally closed)
{TeachIn}	Teach function (teach-in) active
{Option}	Air saving function active
{Lock}	Security code active
<IOL> + {Lock}	Device access lock active The product can only be configured and parameterised in IO-Link operation.
	Segments of the graphic display of the current status of the digital inputs or valve status. - Segment L10: status of the vacuum solenoid valve. Valve is switched when the segment is lit. - Segment L12: status of the ejector pulse solenoid valve. Valve is switched when the segment is lit. - Segment L16: status of the digital switching input DI1 (suction). Switching input set when segment is lit. - Segment L18: status of the digital switching input DI2 (ejection). Switching input set when segment is lit.

Tab. 3: Symbols in the display

Display	Description	
	Segments L10 and L16 light up	Input signal active, vacuum not generated (Out A not reached)
	Display segments switching output Out A, Out B and Segment L16 light	Input signal active, vacuum generated (Out A reached)
	Segments L12 and L18 light up	Input signal not active, ejector pulse active (Autodrop not active)
	Segment L12 is lit	Input signal not active, ejector pulse as Auto-drop active (for set ejector pulse time)
	Segments L10, L12, L16, L18 lit and	Input signal and ejector pulse active/actuated

Display		Description
	Segment L17 + '[A]' lit and '[min]' flashing	Minimum pressure value display
	Segment L17 + '[A]' lit and '[max]' flashing	Maximum pressure value display
	Segment L18 + '[B]' lit and '[msec]' + '[]' flashing	Duration of ejector pulse
	Segments L1, L3, L4, L5 lit and '[msec]' + '[]' + '[min]' flashing	Diagnostics of evacuation and pressurisation times
	'[msec]' + '[]' + '[max]' flashing	Display of minimum evacuation time
	'[msec]' + '[]' + '[min]' flashing	Display of maximum evacuation time
	'[msec]' + '[]' + '[min]' flashing	Display of minimum pressurisation time
	'[msec]' + '[]' + '[max]' flashing	Display of maximum pressurisation time
	'[msec]' + '[]' + '[SP]' + '[max]' flashing	Display/setting of evacuation time critical limit value
	'[msec]' + '[]' + '[SP]' + '[max]' flashing	Display/setting of pressurisation time critical limit value
	Segments L1, L2, L5, L6 lit and display '<ON>' - '[Option]' flashing	Set air saving function (EDIT mode) '<ON>': air saving function active '<OFF>': air saving function not active
	Segments L1, L2, L5, L6 lit and '[Lock]' flashing	Setting the security code (1...9999) <OFF>: Security code is not active
	Segment L10 + '[B]' lit + display '<FORC>'	Additional function of the electrical manual override using operating keys Vacuum solenoid valve switched
	Segment L12 + '[B]' lit + display '<FORC>'	Additional function of the electrical manual override with operating keys Ejector pulse solenoid valve (Eject) switched

Tab. 4: Examples for additional displays of segment bars

5 Function

5.1 Function

The OVEM-...-LK is a vacuum generator with digital setpoint value and actual value transmission and also diagnostics and parameterisation options. Communication is in the IO-Link mode. SIO mode is supported.

- IO-Link Parameters and functions according to SmartSensor Profile
- 2 binary data channels for programming switching functions and switching response.



SIO mode: local configuration with the operating keys. In SIO mode, the OVEM has the function of a 2P variant (1 switching input, 2 switching outputs).



Backwards compatibility

OVEM-...-LK was developed in accordance with IO-Link Specification V1.1.2. The IO-Link Standard V1.1 is fulfilled.

OVEM-...-LK from revision REV08 is not backwards compatible with Standard V1.0 and cannot communicate with V1.0 masters, revision number
→ Rating plate on the product.

- Controlling the compressed air supply with 2 valve functions → 5.3 Valve controller
- Auto-Drop function: generation of an automatic ejector pulse/power ejector pulse for accelerated vacuum purging and safe set-down → 5.3 Valve controller
- Air saving function → 5.4 Air saving function
- Electrical and mechanical manual override
 - → 9.1 Mechanical manual override
 - → 9.2 Electrical manual override
- Monitoring of vacuum build-up by integrated pressure sensor. If the setpoint value is reached, or if it is not reached due to malfunctions (e.g. leakage, dropped workpiece), the vacuum generator sends an electrical signal and a status message.
- Internal check valve prevents vacuum purging if vacuum generation is interrupted.
- Data storage and expanded monitoring function.

5.2 Switching functions

The binary outputs can be configured via the switching functions. The switching status information is thereby made available at the electrical connection as a process value or binary signal.

- IO-Link® mode: 3 BDC (binary data channels), bit 0: BDC1 or BDC2, bit 1: BDC3
→ 14.2.3 Process data

- SIO mode: 2 switching outputs Out A and Out B

The switching logic of the binary outputs can be configured as normally open (N/O contact) or normally closed (N/C contact). The switching mode of the binary outputs can be specified as threshold value or window comparators.

Threshold value comparator	Normally open contact (N/O)	Normally closed contact (N/C)
Switching function: – 1 Switching point (SP1) Teach mode ¹⁾ : – 2 teach points (TP1, TP2) – $SP1 = \frac{1}{2} (TP1 + TP2)$		

1) TP1 = minimum pressure value, TP2 = maximum pressure value, independent of the teach-in sequence

Tab. 5: Threshold value comparator: setting of switching point SP1 and hysteresis HY

Window comparator	Normally open contact (N/O)	Normally closed contact (N/C)
Switching function: – 2 switching points (SP1, SP2) Teach mode ¹⁾ : – 2 teach points (TP1, TP2)		

1) TP1 = minimum pressure value, TP2 = maximum pressure value, independent of the teach-in sequence

Tab. 6: Window comparator: setting of switching points SP1, SP2 and hysteresis HY

5.3 Valve controller

The vacuum solenoid valve or the ejector pulse solenoid valve is controlled as defined by the input signal.

- IO-Link mode: 2 BCS (binary control signals), bit 0: BCS1, bit 1: BCS2 → 14.2.3 Process data
- SIO mode: 1 switching input DI1 ($\triangleq$ BCS1). Switch input positive switching (PNP)
- Auto-drop function: the ejector pulse is generated after the signal change “Suction” (BCS1). The pulse length can be set by the Auto-Drop time parameter → Tab. 26 Device parameters

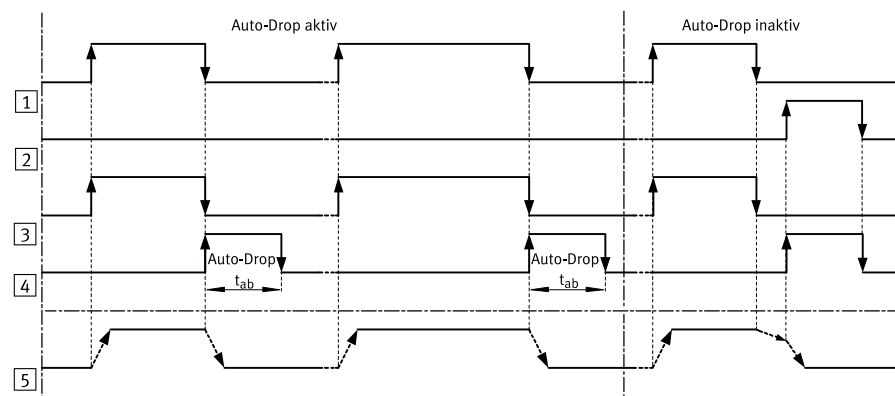


Destruction of vacuum sensor by overpressure (-OVEM-...-CPE/-OPE)

The exhaust duct is tightly sealed during the power ejector pulse. This can create excess pressure at the vacuum port and destroy the vacuum sensor.

- Use power ejector pulse only in open vacuum systems.

Ventilfunktion OVEM-...-CE/-CPE



Ventilfunktion OVEM-...-OE/-OPE

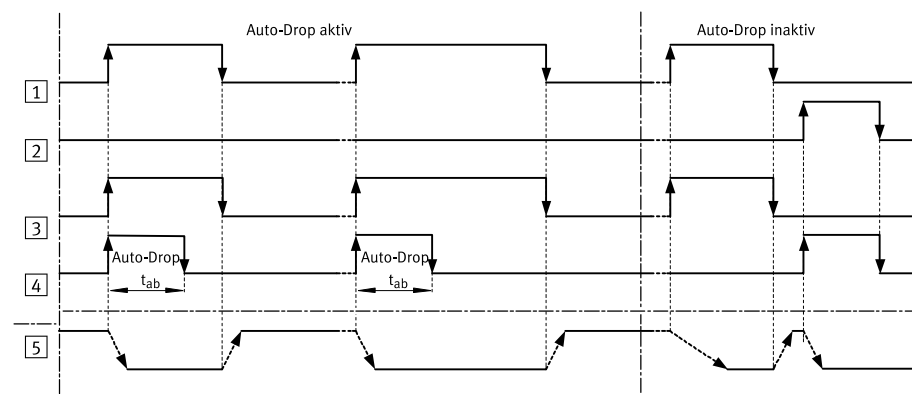


Fig. 3: Valve controller switching response

- | | |
|---|--|
| 1 Control signal BCS1 / switching input DI1 | 4 Switching position of ejector pulse solenoid valve |
| 2 Control signal BCS2 | 5 Vacuum port (2) |
| 3 Switching position of vacuum solenoid valve | t_{ab} Duration of ejector pulse |

5.4 Air saving function

The air saving function reduces air consumption during the evacuation phase.

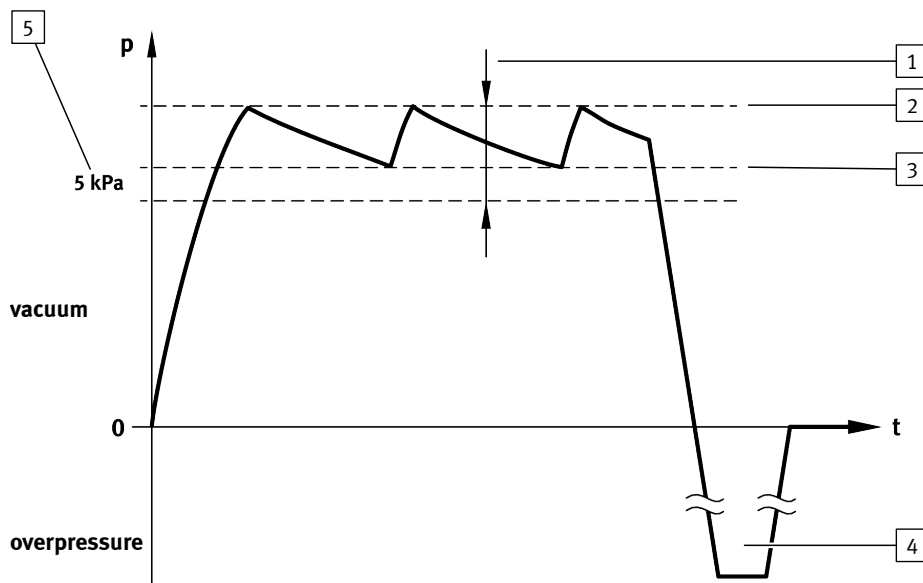


Fig. 4: Mode of operation of the air saving function

- 1 Hysteresis
- 2 Threshold value "Switch off suction" = switching point SP_{A1}
- 3 Threshold value "Switch on suction"
- 4 Ejector pulse
- 5 Functional reserve

If the pressure value has reached switching point SP1 [2], vacuum generation is deactivated. An internal check valve prevents collapse of the vacuum. Vacuum can still be reduced slowly due to leakage in the overall system (e.g. due to rough workpiece surfaces). To reduce power consumption, vacuum generation is not switched on until it falls below the lower threshold value [3].

The air saving function is factory-activated.

If air-permeable workpieces are transported, the vacuum is reduced more quickly, which would cause the vacuum generation to switch unnecessarily often. In this case, it makes sense to deactivate the air saving function .

5.5 Monitoring and diagnostics

The vacuum generator has monitoring functions that enable early detection of malfunctions or faults during operation.

- Monitoring of process parameters (pressure value at the vacuum port, switching points, switching outputs and switching inputs, evacuation time t_E , pressurisation time t_B and critical limit values)
- Diagnostic messages → 11.2 Diagnostics
- Fault detection and diagnostic messages → 12.2 Fault clearance

The monitoring functions are activated at the factory (except for monitoring of the evacuation and pressurisation times). The time monitoring can be activated through setting of the critical limit values SP1 (evacuation time) and SP2 (pressurisation time) in BDC4 → Tab. 25 Smart Sensor Profile Parameters



The switching status information of the BDC4 is not included in the process input data (Process data IN).

5.6 Measured variables

Pressure value (vacuum) The pressure value (vacuum) between the vacuum port and filter is continuously measured.



In the OVEM-...-20/30-C, the pressure value (vacuum) between the filter and the check valve is continuously monitored.

The minimum and maximum measured pressure values are saved. If the operating voltage of the vacuum generator is switched off, these values are reset.

Cycle time

A cycle covers the time from the start of evacuation through ejection to the start of the new evacuation.

Evacuation time and pressurisation time

The evacuation time t_E is measured from the start of evacuation until the switching point SP1 of BDC1 or BDC2 is reached.

The ventilation time t_B is measured from the start of ventilation until the time at which the pressure value (vacuum) falls below -50 mbar.

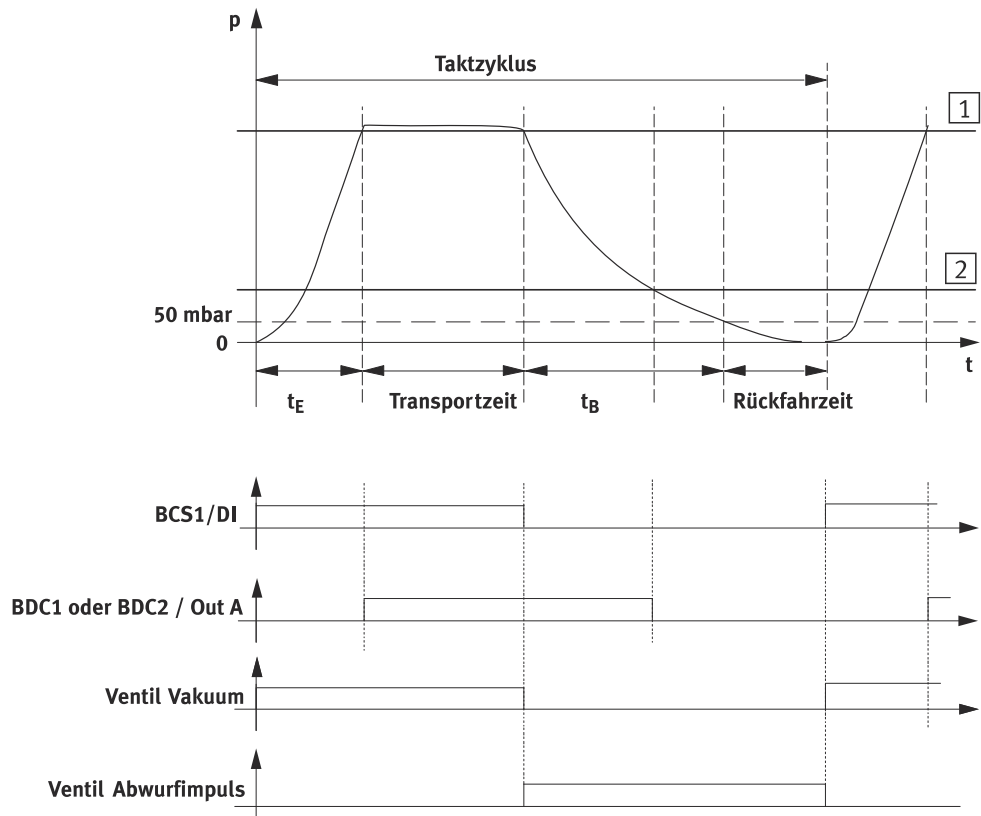


Fig. 5: Cycle time - example for Out A (air save)

- 1 Switching point SP1 (BDC1 or BDC2)
- 2 Reset point RSP1 (BDC1 or BDC2)

- t_E Evacuation time
- t_B Pressurisation time

5.7 Teach function (teach-in)

The Teach function enables configuration of the switching points and time monitoring during runtime.

Static teach-in

Depending on the Teach command, one switching point (SP) or 2 switching points (SP1, SP2) are determined from 2 teach points. The switching points are determined statically, that is, the measurement value remains constant during the entire teach-in procedure. The air saving function is deactivated during execution of the teach-in procedure.

- Teach commands → Tab. 31 Configuration short code (Command Code)
- Simplified Teach commands “BDCx Start” (Start Teach), “BDCx Stop” (Stop Teach) can be used independently of the switching function. The sequence of the teach points need not be considered.
- For all commands, the desired channel must first be selected.

Dynamic teach-in

Setpoint values are calculated during the teach-in procedure from a time period. The procedure is used to determine evacuation and air supply times → Fig. 6. After the start of the teach-in, time t_E and t_B are measured at every cycle. The times are averaged over multiple cycle times. At the end of the teach-in, a functional reserve of 100% is added to the averaged values.

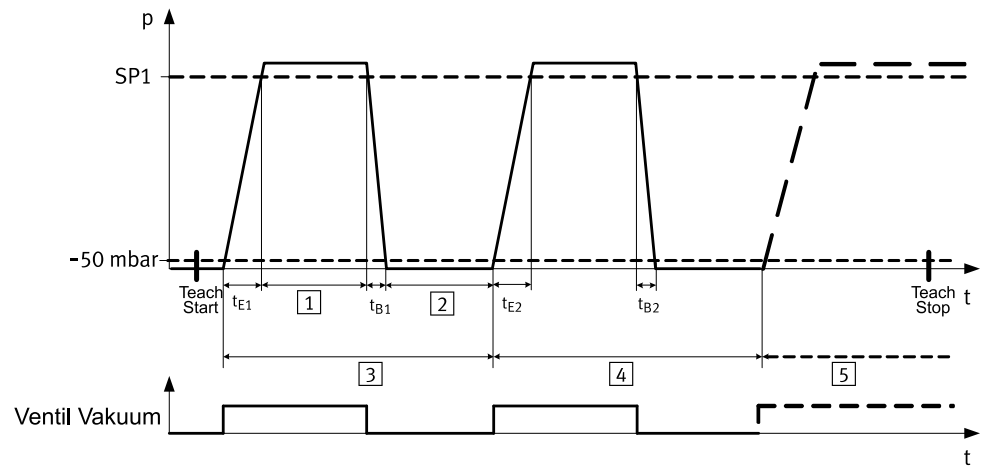


Fig. 6: Dynamic teach-in mode of operation

- | | |
|------------------|----------------|
| 1 Transport time | 4 Cycle time 2 |
| 2 Return time | 5 Cycle time N |
| 3 Cycle time 1 | |

5.8 Data storage

The data storage mechanism (DS) permits consistent and updated saving of device parameters to higher levels, such as PLC programs or fieldbuses. The vacuum generator sends changes to the parameters to the IO-Link Master, which receives the parameter, saves it in a higher-order system and can make it available to the new device if the vacuum generator is replaced.

- Parameters that can be saved → 14.2 Technical data for parameterisation interface
- The data storage mechanism is supported at the device, but is administered by the application (IO-Link Master).

5.9 Block parameterisation

Block parameterisation permits uniform access to parameters over multiple indexes or subindexes as well as transfer of entire parameter sets.

- Transfer of block parameters by start and end commands → Tab. 31 Configuration short code (Command Code)
- Parameter changes (e.g. by teach-in) are blocked during the transfer.
- In case of an invalid parameter set, the changed parameters are discarded and the previous parameter set is reactivated.

5.10 Operating statuses and menu structure

Meaning of symbols for representing the menu structure

Symbol	Meaning
	Automatic return to the RUN mode when the monitoring time has expired (here 80 seconds)
	Press and hold the EDIT button for 3 seconds: manual return to RUN mode
	Symbol on the display flashes (here display segment for switching output Out A)
	Input blocked/not blocked
	Press single key (here A key)
	Press A or B key, set value
	Press keys simultaneously (here: B key and EDIT button)
	Press the EDIT button
	Branching
	Error display
	Reset values
	Cycle
	Vacuum solenoid valve switched
	Ejector pulse solenoid valve switched
	Teach point is adopted
	Special menu (SPEC) is active (setting air saving function, security code, max. evacuation and max. pressurisation time)

Tab. 7: Meaning of symbols for representing the menu structure

RUN mode

- Basic status after the operating voltage is applied
- Display of the current measured value (relative pressure)
- Display of the signal statuses of the solenoid valves
- Display of the selected inputs and outputs

SHOW mode

- Display of the current settings
- Display and delete minimum and maximum pressure values
- Display and delete minimum and maximum evacuation and pressurisation time
- Display of diagnostic messages

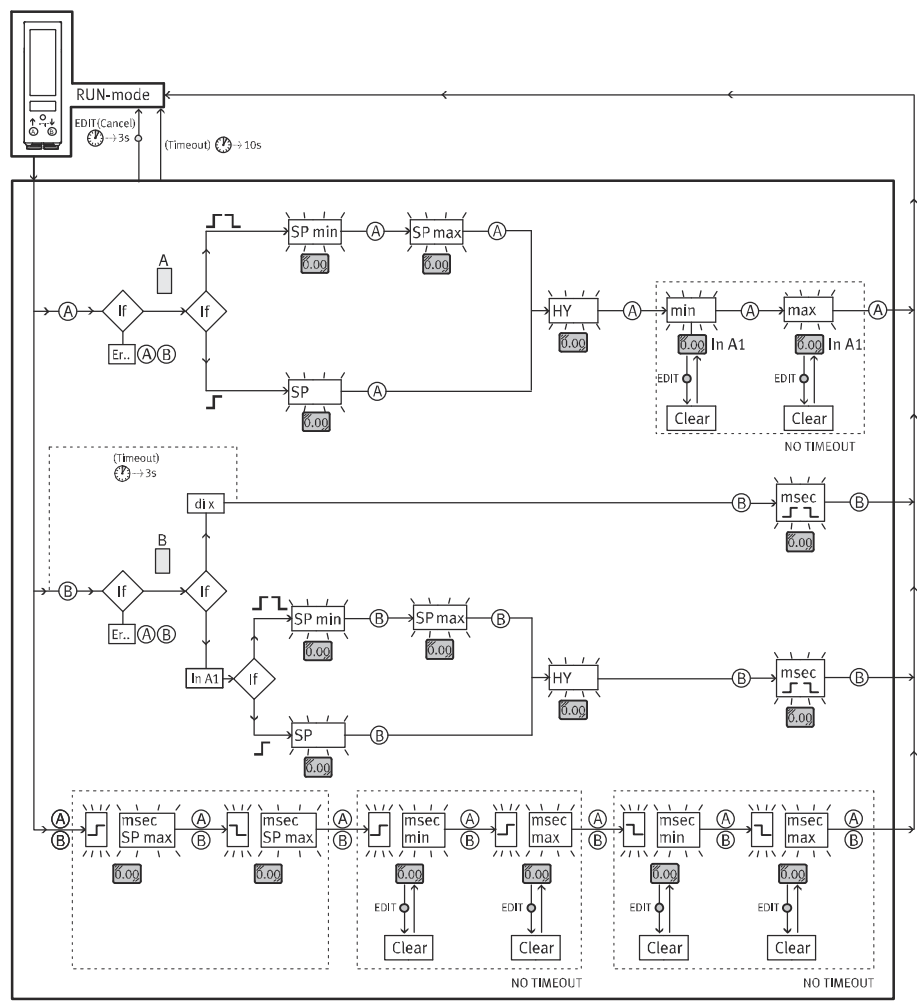
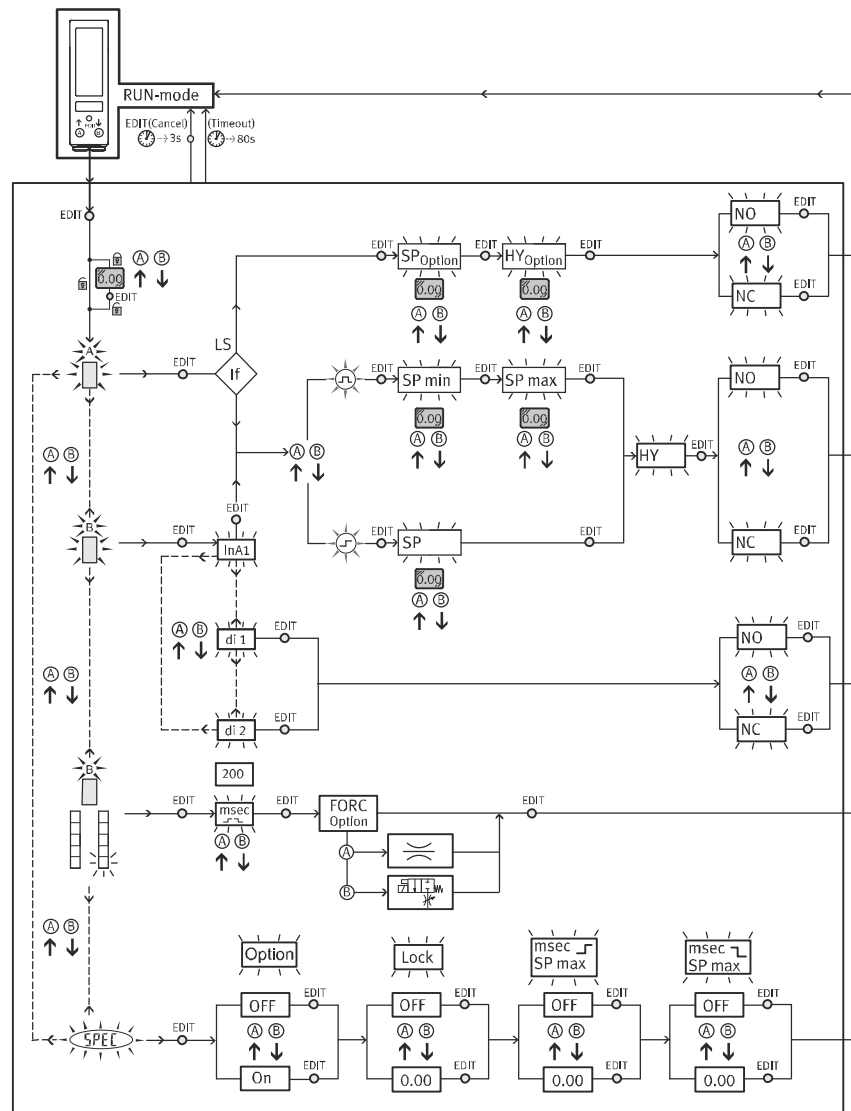


Fig. 7: Menu structure for SHOW mode in SIO mode

EDIT mode

- Setting of parameters
- Operation of the electrical manual override (FORC)



TEACH mode

– Acceptance of the current measured value to determine switching points

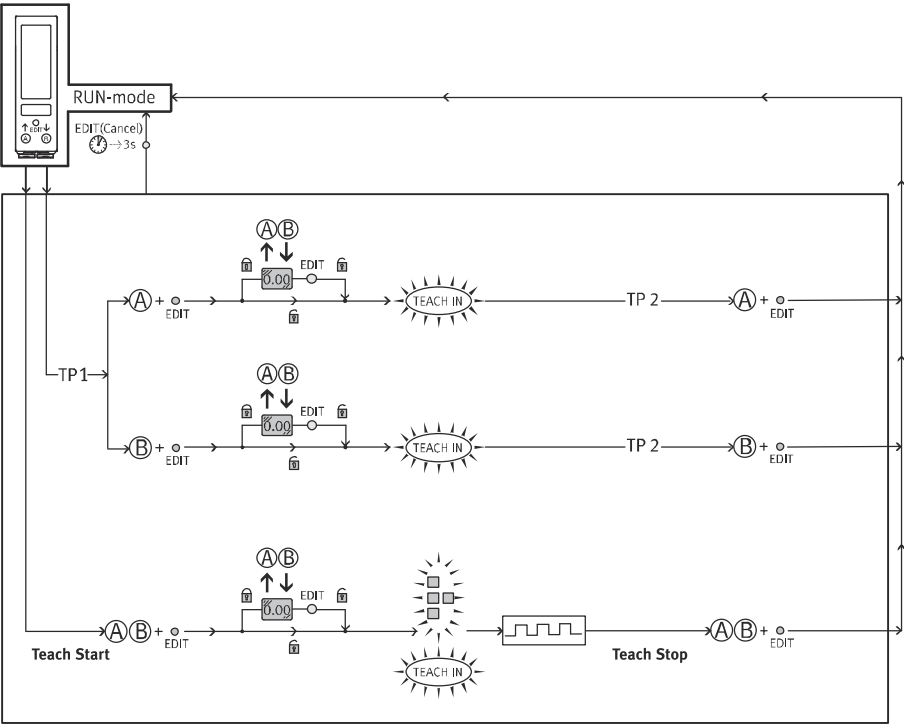


Fig. 9: Menu structure for TEACH-IN mode in SIO mode

6 Mounting

6.1 Assembly information



- An unfavourable mounting position may impair the function of the product.
- Avoid condensate accumulation in the device through a suitable mounting position.
 - Exhaust air must be able to flow out unhindered.

6.2 Direct mounting on the side

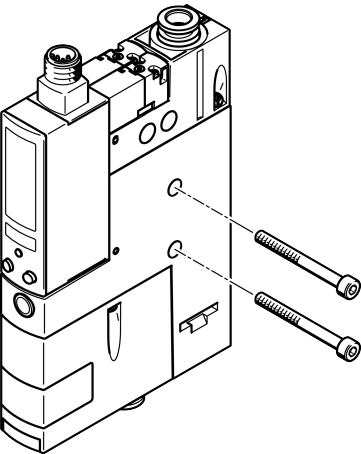


Fig. 10: Direct mounting on the side

Variant	Screws	Tightening torque
OVEM-...-05/-07/-10-...-B	M5	max. 2.5 Nm
OVEM-...-14/-20-...-B	M4	max. 2.5 Nm
OVEM-...-20/-30-...-C	M6	max. 2.5 Nm

Tab. 8: Size and tightening torque of the screws for direct mounting on the side

6.3 Direct mounting on the back

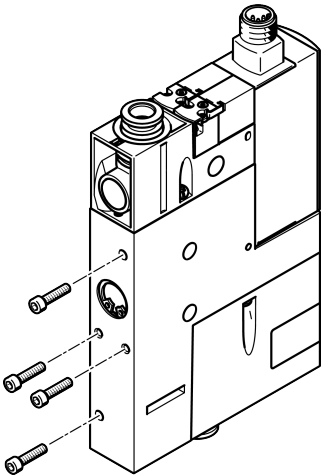


Fig. 11: Direct mounting on the back

Variant	Screw	Tightening torque
OVEM-...-05/-07/-10/-14/-20-...-B	M3	max. 0.8 Nm
OVEM-...-20/-30-...-C	M4	max. 0.8 Nm

Tab. 9: Size and tightening torque of the screws with direct mounting on the back

6.4 DIN rail mounting



Type of mounting permissible only for sizes OVEM-...-05/-07/-10/-14/-20-...-B

DIN rail mounting accessories → www.festo.com/catalogue

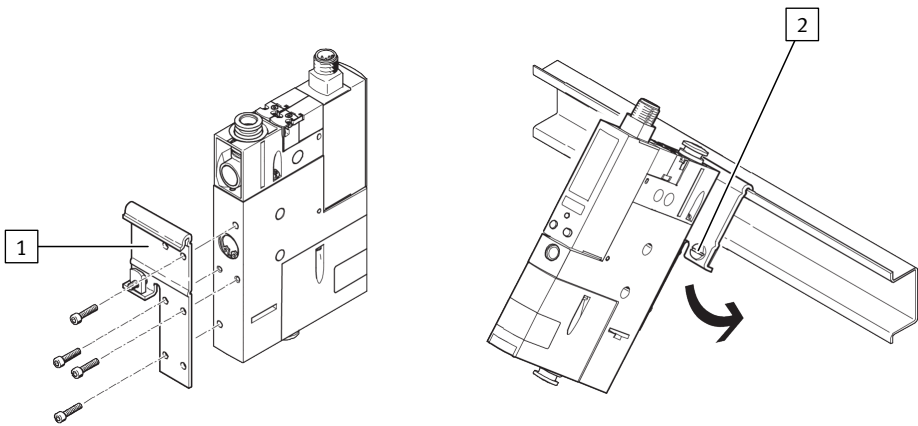


Fig. 12: DIN rail mounting

1 DIN rail mounting

2 Screw

1. Attach mounting plate on DIN rail mounting [1].
2. Attach the OVEM with DIN rail mounting to the DIN rail, press in the direction of the arrow.
3. Attach to the DIN rail with screw [2].

6.5 Mounting with mounting bracket



Type of mounting permissible only for sizes OVEM-...-05/-07/-10/-14/-20-...-B

Accessories for mounting bracket → www.festo.com/catalogue

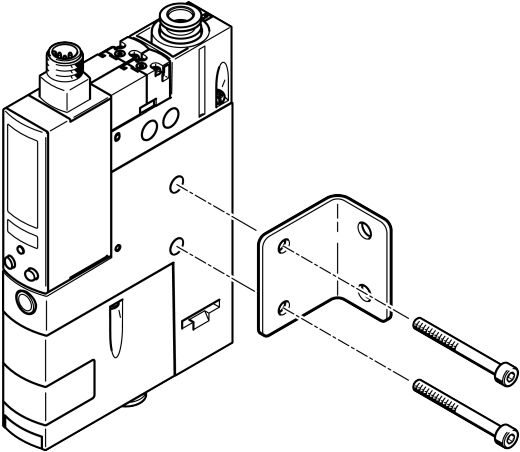


Fig. 13: Mounting with mounting bracket

Variant	Screws	Tightening torque
OVEM-...-05/-07/-10-...-B	M5	max. 2.5 Nm
OVEM-...-14/-20-...-B	M4	max. 2.5 Nm

Tab. 10: Size and tightening torque of the screws for mounting with mounting bracket

Mounting on common supply manifold

OVEM-...-B: can be mounted on a common supply manifold with a maximum of 8 positions.
OVEM-...-C: Mounting on a common supply manifold with a maximum of 4 positions is possible.
Assembly instructions for common supply manifold OABM-P → www.festo.com/sp

7 Installation

7.1 Installation, pneumatic

Variant	Circuit symbol	Variant	Circuit symbol
OVEM-...-QO-CE OVEM-...-GO-CE		OVEM-...-QO-OE OVEM-...-GO-OE	
OVEM-...-QO-CPE OVEM-...-GO-CPE		OVEM-...-QO-OPE OVEM-...-GO-OPE	

Variant	Circuit symbol	Variant	Circuit symbol
OVEM-...-QS-CE OVEM-...-GN-CE		OVEM-...-QS-OE OVEM-...-GN-OE	
OVEM-...-QS-CPE OVEM-...-GN-CPE		OVEM-...-QS-OPE OVEM-...-GN-OPE	

Tab. 11: Circuit symbols, pneumatic

OVEM-...	-05-...-GN		-07-...-GN		-10-...-GN		-14-...-GN		-20-...-GN		-30-...-GN	
	-05-...-GO		-07-...-GO		-10-...-GO		-14-...-GO		-20-...-GO		-30-...-GO	
Tube length [m]	< 0.5	< 2	< 0.5	< 2	< 0.5	< 2	< 0.5	< 2	< 0.5	< 2	< 0.5	< 2
Min. internal diameter of tubing [mm]												
- Supply port	1	2	1.5	2	2	3	3	4	4	5	6	7
- Vacuum port	2	3	3	4	4	5	5.5	6	6	7	9	11
- Exhaust port	2	3	3	4	4	5	5.5	6	6	7	9	11

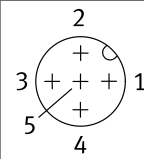
Tab. 12: Minimum inside diameter of the connection tubes for connections with G-female thread

Notes on the pneumatic connection

- Maximum permissible tube length 2 m
- OVEM-...-GN/-GO: minimum inside diameter of the connection tubes → Tab. 12
Minimum inside diameter of the connection tubes for connections with G-female thread.
- Do not seal exhaust port.
- OVEM-...-07/-10/-14/-20/-30: If necessary, lengthen silencers with a silencer extension → www.festo.com/catalogue.
- Recommendation: Use type PUN tubes → www.festo.com/catalogue.

7.2 Installation, electrical**⚠ WARNING****Risk of injury due to electric shock.**

- Use exclusively PELV circuits in accordance with IEC 60204-1/EN 60204-1 for the electrical power supply (Protective Extra-Low Voltage, PELV).
- Observe the general requirements of IEC 60204-1/EN 60204-1 for PELV circuits.
- Use exclusively voltage sources that guarantee reliable electrical isolation from mains power in accordance with IEC 60204-1/EN 60204-1.
- Connect the vacuum generator to the electrical connection.
 - 5-pin plug, M12x1, port type A
 - Maximum tightening torque of M12 plug: 0.5 Nm
 - Maximum permissible cable length: 20 m

Plug	Pin	Wire colour ¹⁾	Function	
	1	Brown (BN)	L+	+24 V
	2	White (WH)	DO2	digital output Out B (PNP)
	3	Blue (BU)	L-	0 V
	4	Black (BK)	C/Q	IO-Link-Communication or digital output Out A (PNP) ²⁾
	5	Grey (GY)	DI1	Not assigned or digital input (PNP)(PNP) ³⁾

1) When using the connecting cable as per Accessories

2) After a fallback or in SIO mode, this pin has the configuration of a digital switching output

3) This pin is not assigned in the IO-Link mode. After a fallback or in the SIO-mode, this pin has the configuration of a digital input

Tab. 13: Pin allocation

8 Commissioning



Commissioning by qualified personnel.

8.1 Commissioning the vacuum generator

At initial commissioning, the vacuum generator is placed in operation with the factory settings .

Requirement

Vacuum generator is fully mounted and connected .

Checking operating conditions

- Check operating conditions and critical limits → 14.1 Technical data, general.

Commissioning the vacuum generator OVEM-...-OE/-OPE

1. Apply operating pressure to the compressed air port (1).
⇒ Negative pressure is generated at the vacuum port (2).
2. Switch on operating voltage.
⇒ The current pressure is displayed and the vacuum generator is ready for operation.

Commissioning the vacuum generator OVEM-...-CE/-CPE

1. Apply operating pressure to the compressed air port (1).
2. Switch on operating voltage.
3. Activate suction cup with connector: apply input signal to pin 5.
⇒ Negative pressure is generated at the vacuum port (2). The current pressure is displayed and the vacuum generator is ready for operation.

Changing the operating pressure changes the power of the negative pressure at the vacuum port. This adjusts the vacuum at the suction gripper.

Functions and parameters can be specified:

- in IO-Link operation → EDIT mode
- manually at the device → EDIT mode
- by teach-in → TEACH mode

8.2 Setting the intensity of the ejector pulse

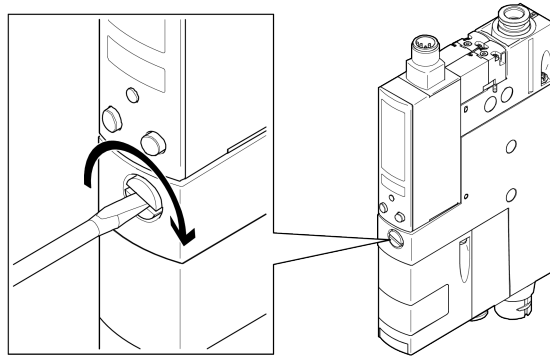


Fig. 14: Set the intensity of the ejector pulse

Requirement

- Vacuum generator is in operation

Procedure

1. Completely screw in flow control screw for regulation of the ejector pulse.
2. Switch on vacuum generation.
⇒ Negative pressure is generated at the vacuum port (2).
3. Switch off vacuum generation.
4. Switch on solenoid valve for ejector pulse.
⇒ An ejector pulse is not generated.
5. Switch off solenoid valve for ejector pulse.
6. Slightly unscrew the flow control screw for regulation of the ejector pulse.
7. Switch on solenoid valve for ejector pulse.
⇒ An ejector pulse is generated.
8. Repeat steps 1 to 7 until the required intensity of the ejector pulse is set.



When using large suction grippers, a device-independent vacuum may be built up for physical reasons. The result is that the workpiece may not be released from the suction gripper, even if the ejector pulse is set to a sufficiently long duration.

9 Operation

Communication is in the IO-Link mode. SIO mode is supported.

- Parameter description IO-Link Mode → 14.2 Technical data for parameterisation interface
- Meaning of the displays → 4.2 Display elements
- Menu structure in SIO mode → TEACH mode

9.1 Mechanical manual override

Both solenoid valves can be manually switched with the manual override.

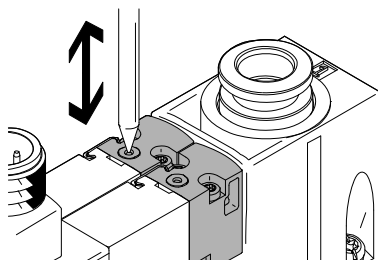


Fig. 15: Manual override

1. Push in the plunger of the manual override with a blunt pin.
⇒ The solenoid valve switches.
2. Remove pin.
⇒ The manual override plunger is automatically reset. The solenoid valve returns to the initial position.

9.2 Electrical manual override

The electrical manual override is actuated using the operating buttons. (Submenu FORC → Fig. 8)

9.3 Activating security code

A security code can be set up and activated to prevent changes to parameter settings and configurations from being made locally on the device by unauthorised persons.

- The security code protects against local input with the operating keys on the product. IO-Link parameterisation is not affected.
- Factory setting: "OFF"
- The security code is reset when factory settings are restored.
- Input and activation in Edit mode → EDIT mode

9.4 Restoring factory settings

Restoring the factory settings resets the parameters, configuration and security code to the delivery status. → Tab. 14 Factory settings

- The current settings are lost.
- The parameters and configurations that can be restored are marked in the parameter description with "FR" (factory reset) → 14.2 Technical data for parameterisation interface

Reset with IO-Link command

Execute system command "Restore factory settings" → Tab. 31 Configuration short code (Command Code)

Reset with operating keys on the device

1. Switch off operating voltage.
2. Press and hold the A key + B key + EDIT button simultaneously.
3. Switch on operating voltage.
4. Release A key + B key + EDIT button.
⇒ LCD display shows [CLEAR]
⇒ The factory settings are restored.

Parameters			OVEM-...-H	OVEM-...-L
Switching mode of the electrical output			Threshold value comparator	
Switching logic of the electrical output			N/O (Normally Open)	
Air saving function			active	
Security code			OFF	
BDC1 - Out A (air-save)	SP1	[bar]	-0.7	-0.4
	Hysteresis	[bar]	0.25	
BDC2 - Out A	SP1	[bar]	-0.7	-0.4
	SP2	[bar]	-0.97	-0.67
	Hysteresis	[bar]	0.25	0.1
BDC3 - Out B	SP1	[bar]	-0.5	-0.2
	SP2	[bar]	-0.71	-0.41
	Hysteresis	[bar]	0.2	0.1
Duration of ejector pulse		[ms]	200	

Tab. 14: Factory settings

10 Maintenance

10.1 Cleaning

1. Switch off energy sources:
 - Operating voltage
 - Compressed air
2. Clean device with non-abrasive cleaning agents.
3. Check air filter for contamination through the inspection window.

10.2 Replacing air filter



The air filter cannot be replaced in the vacuum generator OVEM-...-20/-30-C

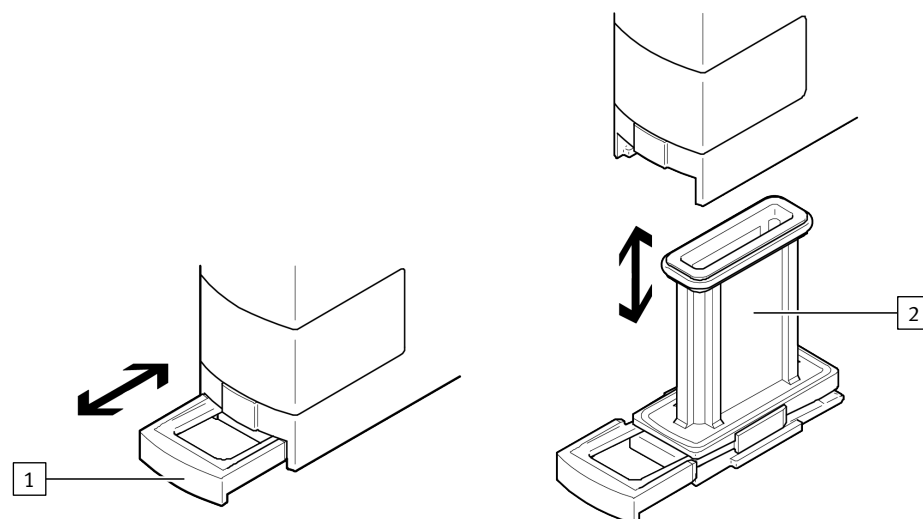


Fig. 16: Removing/installing air filter

1 Slide

2 Filter

1. Exhaust the vacuum generator.
2. Carefully pull slide [1] out to the first detent. The slide must stay in this position on the filter.
3. Pull filter [2] out. Clean with white spirit if necessary.

4. Push filter into the housing.
5. Push in slide.
⇒ The gate valve pushes the filter into the vacuum generator.

11 Diagnostics

11.1 Overview

The diagnostic messages are shown as event code in the IO-Link mode and as error code in the display. Diagnostic messages can also be signalled via switching output Out B. A wide range of diagnostic and monitoring functions is available in the IO-Link mode.

11.2 Diagnostics

There are 4 diagnostic levels. The red backlight of the display lights up for messages of the diagnostic levels 1 to 3.

The vacuum generator has an additional diagnostic option in the form of a diagnostic message channel. This can be set with the configuration of pin 2 → EDIT mode

Configuration options for Pin 2:

- Definition as switching output (In A1)
- Diagnostic signalling channel 1 (di1)
- Diagnostic signalling channel 2 (di2)

The diagnostic signalling channel can be configured as N/O contact (NO) or normally closed contact (NC).

Diagnostic level	Diagnostic message channel	Description
0	No message	Device is OK.
1	Logical duct dl 1 is active	No restriction in function yet, but operating parameters are deteriorating.
2	Logical duct dl 1 or dl 2 is active	Function still ensured, but with restrictions (e.g. higher power consumption). Emergency operation, maintenance urgently required.
3	Logical duct dl 1 or dl 2 is active	Function no longer ensured. All controllable outputs of the device are inactive.

Tab. 15: Diagnostic levels for switching output Out B and display

11.3 Status messages

Status	Type	Definition
0	Device is OK	
1	Notification	Check required
2	Warning	Outside the specification
3	Error	Malfunction

Tab. 16: Status messages for IO-Link diagnostics

12 Malfunctions

12.1 Error messages and error codes

Display	Diagnostic level	Description	Remedy
Er01	3	Hardware errors in device	– Replace device.
Er17	3	Supply voltage is too high or too low (error)	– Check supply voltage.
Er20	2	permissible device temperature exceeded	– Keep device away from heat sources.
Er21	2	Short-circuit Out A	– Check output for overload. – Check installation.
Er32	2	OVEM-...-1PD: Vacuum solenoid valve does not switch or does not switch correctly	– Press mechanical manual override several times. – Check supply voltage. – Replace device.
Er33	2	except for OVEM-...-1PD: Solenoid valve does not switch or does not switch correctly. Plunger does not move; current through solenoid coil is too low; short circuit in solenoid coil	– Press mechanical manual override several times. – Check supply voltage. – Replace device.
		OVEM-...-1PD: Ejector pulse solenoid valve does not switch or does not switch correctly	
Er34	1	Evacuation time exceeded in 2 of 5 cycles	– Check for leakage.
Er35	2	Evacuation time exceeded by a factor of two in 2 of 5 cycles	
Er36	1	Air supply time exceeded in 2 of 5 cycles	– Check for leakage.
Er37	2	Air supply time exceeded in 2 of 5 cycles	– Extend air supply time. – Check throttle setting.
Er38	2	Switching frequency of air saving function > 1 Hz (warning)	– Check for leakage.
Er39	2	SP1 for Out A not reached after 10 s	– Check for leakage. – Check compressed air supply.
		Switch-back threshold below specification (active air saving function and threshold value comparator)	– Check switching thresholds. – Check settings for Out A. – Check compressed air supply.
		upper trigger level above or lower trigger level below specification (window comparator)	
Er40	2	Supply voltage too high (warning)	– Check supply voltage.
Er41	2	Supply voltage too low (warning)	

Tab. 17: Error messages, error codes, diagnostic levels and error description

12.2 Fault clearance

Malfunction	Possible cause	Remedy
Workpiece is not released by the suction gripper	Device-independent vacuum between workpiece and suction gripper, ejector pulse not activated or sufficiently dimensioned	– Activate ejector pulse when lifting the suction gripper. – Increase duration and intensity of ejector pulse.
	Tubing dimensioned incorrectly	– Replace tubing (tubing dimensions → 7.1 Installation, pneumatic).
	Flow control screw closed	– Open flow control screw.

Malfunction	Possible cause	Remedy
Switching output does not respond in accordance with the settings	Short circuit or overload at output	– Eliminate short circuit or overload.
	Device faulty	– Replace device.
	Incorrect switching point taught (e.g. at 0 bar)	Repeat teach procedure
No display	Operating voltage faulty	– Apply permissible operating voltage → 7.2 Installation, electrical.
	Electrical connections swapped	– Connect device correctly → 7.1 Installation, pneumatic.
	No control signal	Check controller
	Device faulty	– Replace device.
Incomplete display	Display faulty	– Replace device.
Pressure indicator incorrect	Pneumatic ports swapped	– Connect device correctly → 7.1 Installation, pneumatic.
Settings cannot be edited, '[Lock]' is displayed	Security code is active	– Enter security code → 9.3 Activating security code.
'[min]' + '[max]' flashing simultaneously	Diagnostic level 1 active	– → 11 Diagnostics
Display + '[min]' + '[max]' flashing simultaneously	Diagnostic level 2 active	– → 11 Diagnostics
Display flashes and error code appears	Diagnostic level 3 active	– → 11 Diagnostics
'[Option]' flashing	Teach-in faulty	– Set hysteresis larger, repeat teach-in

Tab. 18: Malfunctions

13 Disassembly

1. Switch off energy sources:
 - Operating voltage
 - Compressed air
2. Disconnect pneumatic and electrical connections from the device.
3. Loosen mountings and remove device.

14 Technical data

14.1 Technical data, general

OVEM-...	-05	-07/-10	-14/-20-B/-BN	-20/-30-C
General				
Certificates, declaration of conformity	➔ www.festo.com/sp			
Characteristic values				
Operating pressure [bar] OVEM-...-QS/-GN/-PL	2 ... 6			
Operating pressure [bar] OVEM-...-QO/-GO/-PO	2 ... 8			
Pressure measuring range [bar]	-1 ... 0			
Overload pressure at vacuum port [bar]	≤ 5			
Ready-state delay [ms]	≤ 500			
Dead time (evacuation and ejection) [ms]	< 10	≤ 20	≤ 35	≤ 60

OVEM-...		-05	-07/-10	-14/-20-B/-BN	-20/-30-C
Electronics					
Nominal operating voltage	[V DC]	24 ± 15 %			
Max. output current (per switching output)	[mA]	100			
Voltage drop (for all switching outputs)	[V]	≤ 1.8			
No-load current	[mA]	< 70			
Coil characteristics 24 V DC low current phase	[W]	0.3			
Coil characteristics 24 V DC high current phase	[W]	2.55			
Time until current reduction	[ms]	80			
Capacitive load maximum DC	[nF]	≤ 100			
Overload protection		Present			
Inductive protective circuit		Adapted to MZ, MY, ME coils			
Insulation voltage	[V]	50			
Surge resistance	[kV]	0.8			
Max. current consumption	[mA]	150 ¹⁾			
Accuracy	[% FS]	± 3			
Short circuit current rating		Yes			
Reverse polarity protection		For all electrical connections			
Display/operation					
Threshold value setting range	[bar]	−0.999 ... 0			
Hysteresis setting range	[bar]	−0.9 ... 0			
Setting range ejector pulse duration	[ms]	20 ... 9999	40 ... 9999		
Environment/surroundings					
Ambient temperature	[°C]	0 ... 50			
Temperature of medium	[°C]	0 ... 50			
Contamination level		3			
Operating medium		Compressed air to ISO 8573-1:2010 [7:4:4]			
Information on the operating medium		Lubricated operation not possible			
Shock resistance (in accordance with IEC 60068/EN60068)		30 g acceleration with 11 ms duration (half-sine)			
Vibration resistance (in accordance with EN 60068-2)		10 ... 60 Hz: 0.35 mm / 60 ... 150 Hz: 5 g			
Protection class		III			
Degree of protection		IP65, not evaluated by UL			
Relative humidity	[%]	5 ... 85			
Interference emission		In accordance with EN 61000-6-4			
Immunity to interference		In accordance with EN 61000-6-2			
Maximum permissible signal line length	[m]	20			

OVEM-...	-05	-07/-10	-14/-20-B/-BN	-20/-30-C
Materials				
Information on materials: Seals	NBR			HNBR
Information on housing materials	Die-cast aluminium, PA reinforced			Wrought aluminium alloy
Information on materials – plug housing	Brass, nickel-plated			

1) In 2P operation (SIO mode) without master connection: 270 mA

Tab. 19: Technical data

14.2 Technical data for parameterisation interface



Associated device description file (IODD) → www.festo.com/sp Detailed information on the IO-Link specification and the Smart Sensor Profile → www.io-link.com

14.2.1 General information IO-Link

Characteristics	Specification
Protocol version	Device V1.1
Profile	Smart Sensor Profile
Function class	→ Tab. 25 Smart Sensor Profile Parameters
Communication mode	COM2 (38.4 kbaud)
Port class	A
Process data width IN	2 byte → Process data IN
Process data content IN	2 bit BDC (pressure monitoring) 14 bit PDV (pressure measured value)
Process data width OUT	1 byte → Tab. 24 Process data OUT
Process data content OUT	1 bit (vacuum ON/OFF) 1 bit (ejector pulse ON/OFF)
Block parameterisation	Supported
Data memory required	0.5 KB
Minimum cycle time	3.5 ms
SIO mode support	Yes

Tab. 20: General IO-Link specification

14.2.2 Identification of parameters

Identification of direct parameters

Index	Name	Value	Description	Info ¹⁾
0x07	VendorID1 (MSB)	0x01	Manufacturer identification	R
0x08	VendorID2 (LSB)	0x4D		
0x09	DeviceID1 (MSB)	0x00	Device identification	
0x0A	DeviceID2	0x00		
0x0B	DeviceID3 (LSB)	3C	Device variant OVEM-...-H-...-OE	
		3D	Device variant OVEM-...-L-...-OE	
		3E	Device variant OVEM-...-H-...-CE	
		3F	Device variant OVEM-...-L-...-OE	
		104	Device variant OVEM-...-H-...-OPE	
		105	Device variant OVEM-...-L-...-OPE	

Index	Name	Value	Description	Info ¹⁾
0x0B	DeviceID3 (LSB)	106	Device variant OVEM-...-H-...-CPE	R
		107	Device variant OVEM-...-L-...-CPE	

1) R = read

Tab. 21: Identification of direct parameters

Identification of device parameters

Index	Sub-index	Name	Value	Description	Info ¹⁾
0x0010	0	Vendor Name	Festo AG & Co. KG	Manufacturer name	R
0x0011	0	Vendor Text	http://www.festo.com	Contains additional information	
0x0012	0	Product Name	E.g.OVEM-05-H-B-Q0-CE-N-LK	Complete order code of the product	
0x0013	0	Product ID	E.g. OVEM-H-CE	Device variant/order reference	
0x0014	0	Product Text	Vacuum generator	Device characteristic	
0x0015	0	Serial Number	XXXXXXXXXX	Product Key	
0x0016	0	Hardware revision	E.g. 8037693REV00101	Part number and revision status of the product	
0x0017	0	Firmware Revision	E.g. V00.23.03.23	Firmware version of the device	
0x0018	0	Application SpecificTag	***	Application-specific marking, can serve as functional identification.	R/W FR DS

1) R = read, R/W = read and write, FR = factory reset, DS = data storage possible

Tab. 22: Identification of device parameters

14.2.3 Process data

Process data IN

Bit	15 (MSB)	2 (LSB)	1	0
Process data ¹⁾	Process Data Variable (PDV)		BDC3	BDC1/BDC2 ²⁾
Data content ¹⁾	Pressure value ³⁾		Out B	Out A (air-save) / Out A

1) R = read

2) Allocation of the BDC is dependent on the parameter "Air saving function": Air-save ON = BDC1, Air-save OFF = BDC2

3) Current pressure value standardised and scaled to 14 bit. Formula: $p_2 = \text{pressure value} \cdot (1000 \text{ mbar} / 16383)$

Tab. 23: Process data IN

Process data OUT

Bit	7	2	1	0
Process data ¹⁾	Reserved		BCS2 ²⁾	BCS1 ³⁾
Data content ¹⁾	Reserved		Drop	Vacuum

1) W = write, no data storage

2) values: BCS2 = 0: Solenoid valve ejector pulse not switched, BCS2 = 1: Solenoid valve ejector pulse switched

3) values: BCS1 = 0: vacuum solenoid valve not switched, BCS1 = 1: vacuum solenoid valve switched

Tab. 24: Process data OUT

14.2.4 Smart Sensor Profile Parameters (Smart Sensor Profile Parameters)

Index	Sub-index	Name	Value	Description	Length (byte)	Info ¹⁾
0x000D	0	Profile characteristic	List of profile characteristics		12	R
	1		0x0001	Smart Sensor Profile	2	
	2		0x8000	Device identification	2	

Index	Sub-index	Name	Value	Description	Length (byte)	Info ¹⁾
0x000D	3	Profile characteristic	0x8001	Binary data channel (BDC)	2	R
	4		0x8002	Process data variable (PDV)	2	
	5		0x8003	Diagnostics	2	
	6		0x8004	Teach channel	2	
0x000E	0	PD Input Descriptor	Data structure of the process input data		6	
	1		0x010200	BDC1, BDC2	3	
	2		0x020E02	Process data variable (pressure)	3	
0x000F	0	PD Output Descriptor	Data structure of the process output data		3	
	1		0x010200	BCS1, BCS2	3	
0x003A	0	Teach-In channel	0	Default; BDC1 with activated air-saving function (= ON); BDC2 with deactivated air-saving function (= OFF)	1	R(W DR DS
			1	BDC1 (Out A air-save)		
			2	BDC2 (Out A)		
			3	BDC3 (Out B)		
			4	BDC4 (monitoring of evacuation time/air supply time)		
0x003B	0	Teach-in status	0	Current status of the activated teach-in channel	1	R DR
			1	Teach flag TP2 for SP2		
	1	Teach point TP2 for SP2 adopted				
	2	Teach flag TP1 for SP2	0	Teach point TP1 for SP2 not adopted		
			1	Teach point TP1 for SP2 adopted		
	3	Teach flag TP2 for SP1	0	Teach point TP2 for SP1 not adopted		
			1	Teach point TP2 for SP1 adopted		
	4	Teach flag TP1 for SP1	0	Teach point TP1 for SP1 not adopted		
			1	Teach point TP1 for SP1 adopted		
	5	Teach state		Current status of the teach-in		
BDC1 - Out A (Air-save) air saving function						
0x003C	1	Setpoint SP1	0...16383 (0...-1 bar)	Lower switching point default values: OVEM-...-L: 6553 (-0.4 bar) OVEM-...-H: 11468 (-0.7 bar)	2	R/W FR DS
	2	Setpoint SP2	0	Upper switching point default value: 0	2	
0x003D	1	Switchpoint logic		Switching point logic	1	
			0	N/O (standard)		
			1	Switching point logic N/C		
	2	Switchpoint mode		Switching point mode	1	
1	Single point mode (default)					

Index	Sub-index	Name	Value	Description	Length (byte)	Info ¹⁾
0x003D	2	Switchpoint mode	2	Window mode	1	R/W FR DS
	3	Switchpoint hysteresis	0...14745 (0...-0,9 bar)	Hysteresis value Default value: 4096 (0.25 bar)	2	
BDC2 - Out A						
0x003E	1	Setpoint SP1	0...16383 (0...-1 bar)	Lower switching point: OVEM-...-L: 6553 (-0.4 bar) OVEM-...-H: 11468 (-0.7 bar)	2	
	2	Setpoint SP2	0...16383 (0...-1 bar)		2	
0x003F	1	Switchpoint logic		Switching point logic	1	R/W FR DS
			0	N/O (standard)		
			1	N/C		
	2	Switchpoint mode		Switching point mode	1	
			1	Single point mode (default)		
			2	Window mode		
	3	Switchpoint hysteresis	0...14745 (0...-0,9 bar)	Hysteresis value default: OVEM-...-L: 1638 (0.1 bar) OVEM-...-H: 4096 (0.25 bar)	2	
BDC3 - Out B						
0x4000	1	Setpoint SP1	0...16383 (0...-1 bar)	Lower switching point: OVEM-...-L: 3227 (-0.2 bar) OVEM-...-H: 11468 (-0.5 bar)	2	R/W FR DS
	2	Setpoint SP2	0...16383 (0...-1 bar)	Upper switching point default values: OVEM-...-L: 6717 (-0.41 bar) OVEM-...-H: 15892 (-0.71 bar)	2	
0x4001	1	Switchpoint logic		Switching point logic	1	
			0	N/O (standard)		
			1	N/C		
	2	Switchpoint mode		Switching point mode	1	
			1	Single point mode (default)		
			2	Window mode		
3	Switchpoint hysteresis	0...14745 (0...-0,9 bar)	Hysteresis value defaults: OVEM-...-L: 1638 (0.1 bar) OVEM-...-H: 3227 (0.2 bar)	3		
BDC4 - evacuation time t _E and pressurisation time t _B (time monitoring evacuation/ventilation)						
0x4002	1	Setpoint SP1 (evacuation timeout)	0...4000 (0... 10000 ms)	Limit value for evacuation time t _E ²⁾ Default: 0	2	R/W FR DS
	2	Setpoint SP2 (ventilation timeout)	0...4000 (0... 10000 ms)	Critical limit for pressurisation time t _E ³⁾ Default: 0	2	
0x4003	1	Switchpoint logic		Switching point logic for diagnostic output 1/2	1	
			0	N/O (standard)		
			1	N/C		

Index	Sub-index	Name	Value	Description	Length (byte)	Info ¹⁾
0x4003	2	Switchpoint mode	128	Switching point mode BDC4 ⁴⁾ default value: 128	1	R/W FR DS
	3	Switchpoint hysteresis	0	Hysteresis value	2	

1) R = read, W = write, R/W = read and write, DR = device reset, DS = data storage possible

2) Time = 2.5 ms * Value

3) time = 2.5 ms * value

4) Value = 128: vendor specific. 5 measurements are recorded; if 3 overruns occur, an event is generated as a warning

Tab. 25: Smart Sensor Profile Parameters

14.2.5 Device parameters

Index	Sub-index	Name	Bit	Value	Description	Info ¹⁾
0x000C	0	Device Access Lock			Controls the blocking function of the device	R/W FR DS
			0	0	(Write) access to parameters unblocked	
				1	(Write) access to parameters blocked	
			1	0	Data storage (DS) unblocked	
				1	Data storage (DS) blocked	
			2	0	Local parameterisation unblocked	
				1	Local parameterisation blocked	
			3	0	Local user interface unblocked	
				1	Local user interface blocked	
0x01E2	0	Air-saving function		0	Air saving function is deactivated Switching status of BDC2 (Out A) is output to process data IN.	
				1	Air saving function is activated (default). Switching status of BDC1 (Out A Air-save) is output in process data IN.	
0x011F	0	Pin-2 configuration		1	Switching status of BDC3 is output to pin 2 (default)	
				5	The switching status of the diagnostic signalling channel 1 (di1) is output at pin 2.	
				6	The switching status of diagnostic signalling channel 2 (di2) is output at pin 2.	
0x0130	0	Pin-2 switchpoint logic		0	Switching point logic of pin 2 - N/O (default)	
				1	Switching point logic of pin 2 - N/C	
0x01EA	0	Lock code		0	Local parameterisation is enabled (default)	
				≥1	Local parameterisation is blocked by security code (max. 9999)	

Index	Sub-index	Name	Bit	Value	Description	Info ¹⁾
0x0198		Auto-Drop time		0	Auto-drop not active	R/W FR DS
				16... 4000 (40 ms ... 10 s)	Length of the automatic ejection pulse ²⁾ ; Default: 80 (200 ms)	

1) R/W = read and write, FR = factory reset, DS = data storage possible.

2) Length of the automatic ejection pulse = 2.5 ms * Value

Tab. 26: Device parameters

14.2.6 Observation parameters

Index	Subindex	Name	Value	Description	Info ¹⁾
Process data					
0x0028	0	Process data input	0...65535	Contains the last valid process input data; default: 0	
			1	BDC3 not active	
	1	Process data input BDC3 status	1	BDC3 active	
			2	Process data input BDC1/BDC2 status ²⁾	0
	1	BDC1 or BDC2 active			
	3	Process data input Pressure value	0...16383 (0...1 bar)	Last valid pressure value	
	0x0029	1	Process data output	0...3	Contains the last valid process output data, default: 0
2		Process data output BCS1	0	Vacuum solenoid valve not switched	
			1	Vacuum solenoid valve switched	
3		Process data output BCS2	0	Ejector pulse solenoid valve not switched	
			1	Ejector pulse solenoid valve switched	
Runtime parameters					
0x2005	0	Minimum process value	0...16383 (0 mbar... 1 bar)	Minimum measured pressure value as process value	R DR
0x2006	0	Maximum process value	0...16383 (0 mbar... 1 bar)	Maximum measured pressure value as process value	
0x2001	0	Last process value	0...16383 (0 mbar... 1 bar)	Last measured pressure value as process value	
0x2021	0	Minimum evacuation time	0...4000 (0...10 s)	Minimum measured evacuation time $t_E^{(3)}$	
0x2022	0	Maximum evacuation time	0...4000 (0...10 s)	Maximum measured evacuation time $t_E^{(3)}$	
0x2020	0	Last evacuation time	0...4000 (0...10 s)	Last measured evacuation time $t_E^{(3)}$	
0x2024	0	Minimum ventilation time	0...4000 (0...10 s)	Minimum measured pressurisation time $t_B^{(3)}$	

Index	Subindex	Name	Value	Description	Info ¹⁾
0x2025	0	Maximum ventilation time	0...4000 (0...10 s)	Maximum measured pressurisation time $t_B^{3)}$	R DR
0x2023	0	Last ventilation time	0...4000 (0...10 s)	Last measured pressurisation time $t_B^{3)}$	

1) R = read, DR = device reset

2) With air saving function activated (=ON), the status of the BDC1 is output With air-saving function deactivated (=OFF), the status of the BDC2 is output

3) time = 2.5 ms * Value

Tab. 27: Observation parameters

14.2.7 Diagnostics (Diagnosis)

General diagnostic parameters

Index	Sub-index	Name	Value	Description	Info
0x0020	0	Error count	0	Number of errors (device status 3) since the device was switched on or reset	R DR
0x0024	0	Device status	0	Device is working correctly (default)	
			1	Servicing required	
			2	Device outside specification	
			3 ... 4	Function test or failure	
0x0025	0	Detailed device status	0	Detailed device status → Tab. 29 Index 0x0025: detailed device status (event codes)	
0x2010	0	Supply voltage	7864 24 V	Current power supply to the device as process value	

Tab. 28: General diagnostic parameters (diagnostics)

Detailed device status (event codes)

Subindex	Name	Event Code	Description	Info ¹⁾
1	Device failure	0x5000	Hardware error in device	R DR F
2	Supply fault	0x5100	General error in power supply	
3	Temperature over-run	0x4210	Device temperature exceeded	R DR W
4	Pin-4 overload	0x1815	Overload on plug pin 4	
5	Pin-2 overload	0x1816	Overload on plug pin 2	
6	Evacuation solenoid failure	0x1820	Vacuum solenoid valve faulty	
7	Ventilation solenoid failure	0x1821	Ejector pulse solenoid valve faulty	
8	Evacuation time over-run	0x1822	Evacuation time t_E within 5 measurements 3 times overrun	
9	Evacuation time explicit over-run	0x1823	Evacuation time t_E within 5 measurements 3 times overrun by at least twice the value	
10	Ventilation time over-run	0x1824	Aeration time t_B within 5 measurements 3 times overrun	
11	Ventilation time explicit over-run	0x1825	Pressurisation time t_B within 5 measurements overshoot 3 times by at least double the value	
12	Air-save max. frequency	0x1826	Max. switching frequency of the air saving function exceeded, air saving function deactivated	
13	Vacuum low level	0x1827	SP1 at BDC1/BDC2 not reached after 10 s	
			RSP1 at BDC1/BDC2 not reached	

Subindex	Name	Event Code	Description	Info ¹⁾
13	Vacuum low level	0x1827	SP2 at BDC2 exceeded	R DR W
14	Supply voltage over-run	0x5110	Supply voltage too high	
15	Supply voltage under-run	0x5111	Supply voltage too low	
16	Air-save failure	0x182A	BDC1 outside the min. critical limit values, air saving function deactivated	

1) R = read, DR = device reset, F = event type fault, W = event type warning

Tab. 29: Index 0x0025: detailed device status (event codes)

14.2.8 Device commands

System commands

Index	Subindex	Name	Description	Info ¹⁾
0x0002	0	System Command	System command, is sent with a command code → Tab. 31 Configuration short code (Command Code)	W

1) W = write

Tab. 30: System commands

Command code	Name	Description
0x00	Reserved	–
0x01	ParamUploadStart	Start of the parameter upload
0x02	ParamUploadEnd	Stop of the parameter upload
0x03	ParamDownloadStart	Start of the parameter download
0x04	ParamDownloadEnd	Stop of the parameter download
0x05	ParamDownloadStore	Finish parameterisation and start data storage
0x06	ParamBreak	Cancel all “Param” commands
0x41	SP1 Single Value Teach	Determines teach point TP1 for switching point SP1 for the specific BDCx in the window comparator
0x42	SP2 Single Value Teach	Determines teach point TP1 for switching point SP2 for the specific BDCx in the window comparator
0x43	SP1 Two Value Teach TP1	Determines teach point TP1 for switching point SP1 for the specific BDCx in the threshold value comparator
0x44	SP1 Two Value Teach TP2	Determines teach point TP2 for switching point SP1 for the specific BDCx in the threshold value comparator
0x4B	BDCx Teach Start	Starts the teach-in sequence for the specific BDCx
0x4C	BDCx Teach Stop	Stops the teach-in sequence for the specific BDCx
0x4F	Teach Cancel	Abort all teach-in sequences
0x80	Device Reset	Warm start of the device, reset of runtime parameters
0x82	Restore factory settings	Reset the configuration and the parameters to the original condition (default values)

Tab. 31: Configuration short code (Command Code)

Festo SE & Co. KG

73734 Esslingen

Ruiter Straße 82

Germany

Phone: +49 711 347-0

www.festo.com