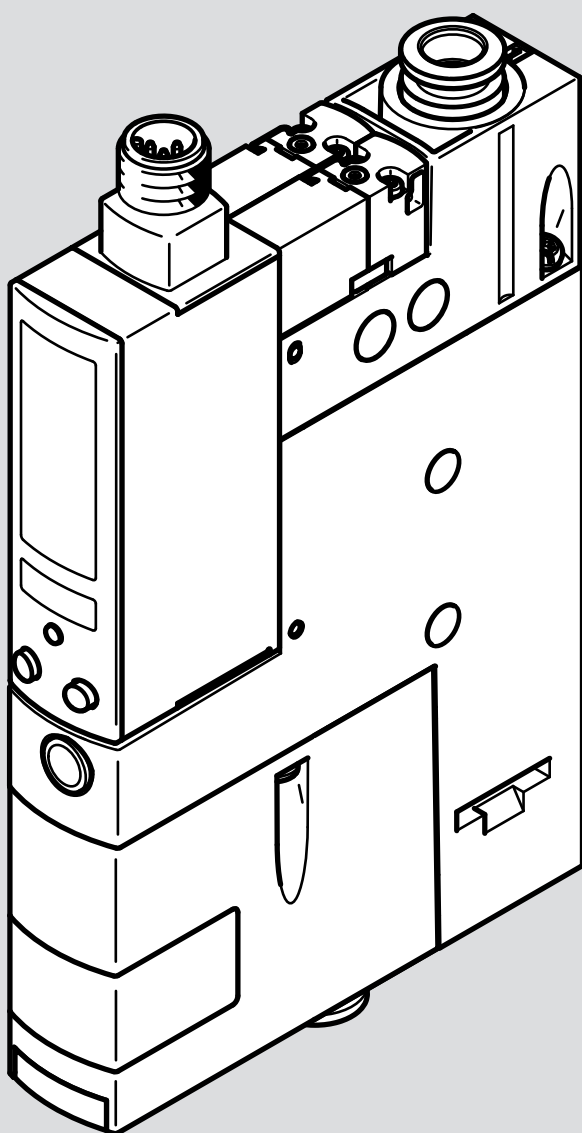


OVEM
Vacuum generator

FESTO

Operating instructions



8243570

8243570
2025-08i
[8243572]

Original instructions

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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.
- Observe the identifications on the product.
- Take into account the ambient conditions at the location of use.
- Store the product in a cool, dry environment protected from UV and corrosion. Keep storage times short.
- Before working on the product, switch off the compressed air supply and lock it to prevent it from being switched on again.
- Before working on the product: Switch off the power supply, ensure that it is off and secure it against being switched on again.
- The product is intended for use in industrial environments.
- Use the product only inside buildings.
- The product may generate high frequency interference, which may require interference suppression measures in residential areas.

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.

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

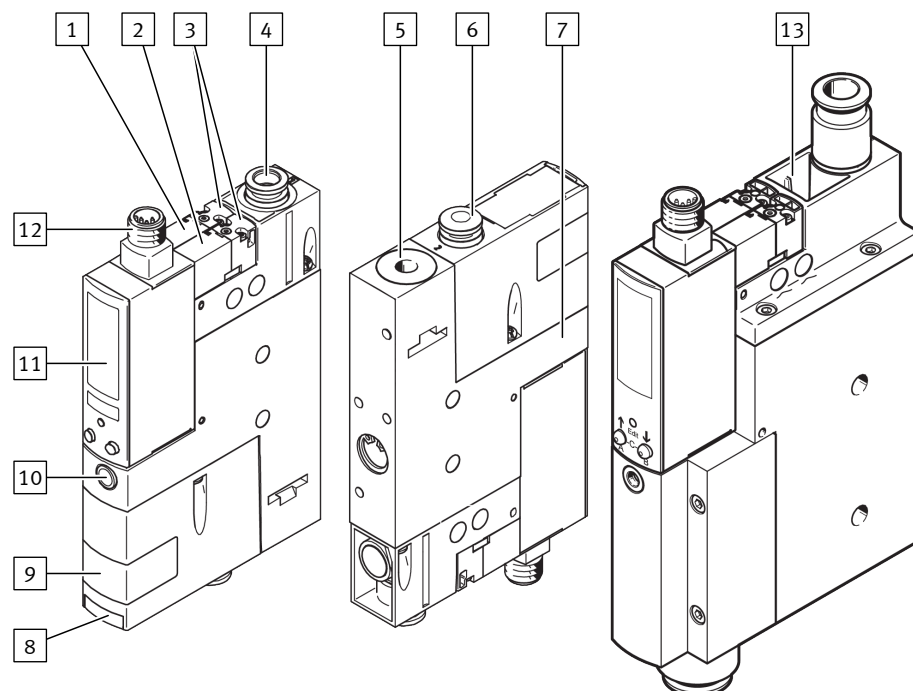


Fig. 1: Operating elements and connections

- | | |
|---|---|
| 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

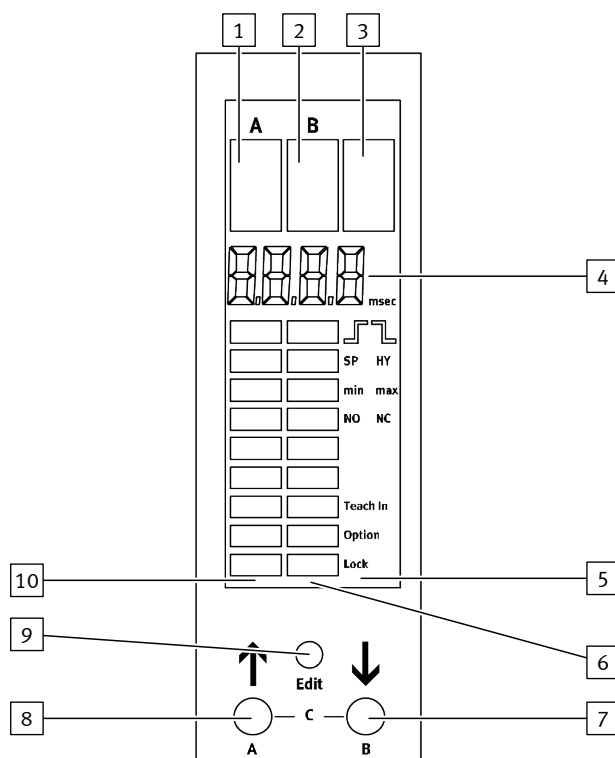


Fig. 2: LCD display and operating keys

- | | |
|--|---|
| 1 Display segment switching output Out A | 7 B key |
| 2 Display segment switching output Out B (except OVEM-...-1PD) | 8 A key |
| 3 Display segment switching input In A1 (except OVEM-...-1PD) | 9 EDIT button |
| 4 4-digit alphanumeric display | 10 Segment bar left: graphic display of the current pressure value as a function of the maximum measured value of the measuring range |
| 5 Toolbar for functions | |
| 6 Segment bar right: graphic display of the current status of the digital inputs or valve status | |

Symbol	Description
	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
	Segments display the following: – current status of the digital inputs – current valve status ➔ Tab. 4 OVEM-...-2P/-2N/-PU/-PI: additional displays of segment bars – examples ➔ Tab. 5 OVEM-...-1PD: additional displays of segment bars – examples

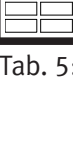
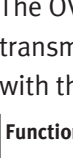
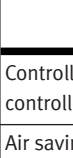
Tab. 3: Symbols in the display

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)
	Segment L12 is lit Input signal not active, Solenoid valve ejector pulse is switched, ejector pulse for set time
	Segment L10 is lit Vacuum solenoid valve is switched.
	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 Diagnostics of evacuation and pressurisation times
	{msec} + {[_][_]} + {min} flashing Display of minimum evacuation time
	{msec} + {[_][_]} + {max} flashing Display of maximum evacuation time
	{msec} + {[_][_]} + {min} flashing Display of minimum pressurisation time

Display		Description
	'[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	Set 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 using operating keys Ejector pulse solenoid valve (Eject) switched

Tab. 4: OVEM-...-2P/-2N/-PU/-PI: additional displays of segment bars – examples

Display		Description
	Segments L10 and L16 light up	Input signal active, vacuum not generated (Out A not reached)
	Display segment switching output Out A and Segment L16 light up	Input signal active, vacuum generated (Out A reached)
	Segments L12 and L18 light up	Input signal not active, ejector pulse active
	Segments L10, L12, L16, L18 lit and	Input signal and ejector pulse active/actuated
	Segment L10 is lit	Vacuum solenoid valve is switched.
	Segment L12 is lit	Ejector pulse solenoid valve is switched.

Display		Description
	Segment L16 is lit	digital switching input DI1 (suction) is set.
	Segment L18 is lit	digital switching input DI2 (ejection) is set.
	Segment L17 + '[A]' lit and '[min]' flashing	Minimum pressure value display
	Segment L17 + '[A]' lit and '[max]' flashing	Maximum pressure value display
	Segments L1, L3, L4, L5 lit and '[msec]' + '[]' + '[min]' flashing	Diagnostics of evacuation and pressurisation times
	'[msec]' + '[]' + '[min]' flashing	Display of minimum evacuation time
	'[msec]' + '[]' + '[max]' 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	Set 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 using operating keys Ejector pulse solenoid valve (Eject) switched

Tab. 5: OVEM-...-1PD: additional displays of segment bars – examples

4.3 Function

Function overview

The OVEM is a vacuum generator with digital setpoint value and actual value transmission and also diagnostics and parameterisation options. It is configured with the operating keys. Diagnostic messages are shown on the display.

Function	OVEM-...-2 P/2N / PU/ PI	OVEM-...-1 PD
Controlling the compressed air supply with 2 valve functions → 4.3.2 Valve controller	x	x
Air saving function → 4.3.3 Air saving function	x	x

Function	OVEM-...-2 P/2N /PU/ PI	OVEM-...-1 PD
Electrical and mechanical manual override ➔ 8.11 Electrical manual override and ➔ 8.10 Mechanical manual override	X	X
Monitoring of the vacuum build-up by integrated pressure sensor and advanced monitoring functions ➔ 4.3.5 Monitoring and diagnostics	X	X
Auto-drop function: generation of an automatic ejector pulse/power ejector pulse for accelerated vacuum purging and safe placement ➔ 4.3.2 Valve controller	X	-
Generation of an ejector pulse/power ejector pulse via a control signal at the digital switching input (Eject) DI2	-	X

Tab. 6: Function overview

4.3.1 Switching functions

The solenoid valve for the vacuum generator switches as an N/C or N/O contact, depending on the version, when pressurised with compressed air.

The switching outputs can be configured via the switching functions. The switching mode of the switching outputs can be set 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. 7: 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. 8: Window comparator: setting of switching points SP1, SP2 and hysteresis HY

Code	Switching output A	Switching output B	Switching inputs
-1PD	Switching output positive switching pressure sensor output A	-	2 switching inputs, positive switching
-2P	Switching output positive switching pressure sensor output A	Switching output positive switching pressure sensor output B or diagnostic message channel	Switching input positive switching
-2N	Switching output negative switching pressure sensor output A	Switching output negative switching pressure sensor output B or diagnostic message channel	Switching input negative switching

Code	Switching output A	Switching output B	Switching inputs
-PI	Switching output positive switching pressure sensor output A	Analogue output 4 ... 20 mA vacuum	Switching input positive switching
-PU	Switching output positive switching pressure sensor output A	Analogue output 0 ... 10 V vacuum	Switching input positive switching

Tab. 9: Switching output and switching input variants

4.3.2 Valve controller

Ejector pulse controller

- Auto-drop function (except for OVEM-...-1PD)
The ejector pulse is generated after the “Suction” signal change.
The duration of the ejector pulse can be set → 8.1 Setting the ejector pulse duration.
- Signal-controlled ejector pulse/power ejector pulse (OVEM-...-1PD only)
The ejector pulse is generated via a control signal at the digital switching input (ejection) DI2. The duration of the ejector pulse can be set via the duration of the control signal at the digital switching input (ejector) DI2. The vacuum solenoid valve or the ejector pulse solenoid valve is controlled as defined by the input signal.



Destruction of vacuum sensor by overpressure (-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.

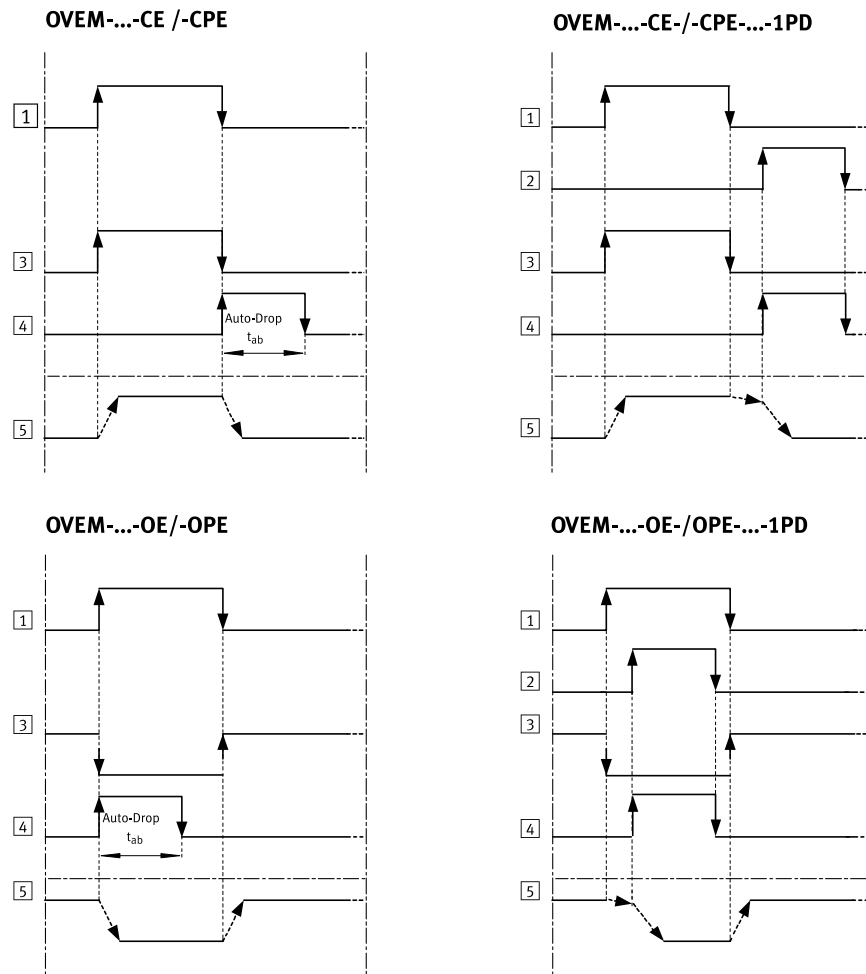


Fig. 3: Valve controller switching response

- | | |
|---|---|
| <p>1 Control signal at the digital switching input (suction) DI1</p> <p>2 Control signal at the digital switching input (ejection) DI2 (only OVEM-...-1PD)</p> <p>3 Switching position of vacuum solenoid valve</p> | <p>4 Switching position of ejector pulse solenoid valve</p> <p>5 Vacuum port (2)</p> <p>t_{ab} Duration of ejector pulse</p> |
|---|---|

4.3.3 Air saving function

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

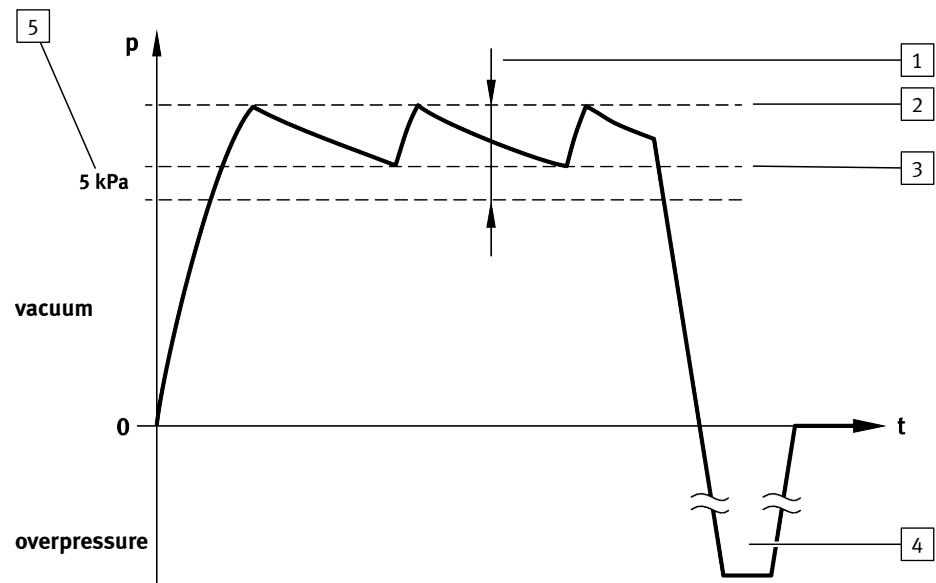


Fig. 4: Mode of operation of the air saving function

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

If the pressure value has reached the 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 → 8.13 Switching air saving function on or off.

4.3.4 Optimisation of the transport time

For variants with 2 switching outputs (OVEM-...-2P/-2N/-PU/-PI), the transport time can be optimised by using the switching output Out B.

The vacuum required for the transport is controlled by the switching output Out A. For example, the transport time can be optimised by gripping the workpiece by the usable vacuum while the vacuum is being generated. The minimum usable vacuum required is monitored by switching output Out B.

4.3.5 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 → 10.1 Diagnostic levels
- Fault detection → 10 Fault clearance

The diagnostic messages are shown in the display.

For variants with 2 switching outputs (OVEM-...-2P/-2N), switching output Out B can also be set as a diagnostic message channel (dl 1 or dl 2) → 8.3 Set diagnostic message channel.

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 limits for evacuation time and pressurisation time → 8.6 Setting critical limits for the evacuation and air supply times.

4.3.6 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 switching point SP1 of the switching output is reached.

The pressurisation time t_B is measured from the start of pressurisation up to the time at which the pressure value (vacuum) falls below –50 mbar.

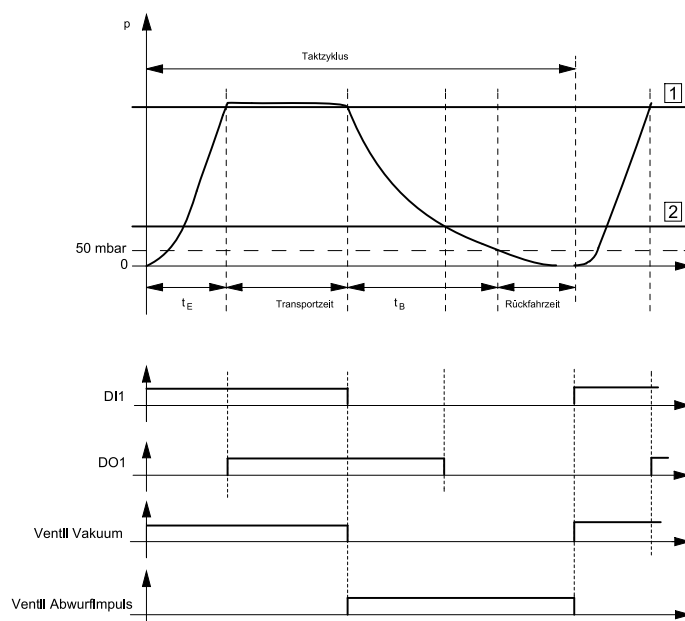


Fig. 5: Cycle time - example for Out A (air save)

1 Switching point SP1

t_E Evacuation time

2 Reset point RSP1

t_B Pressurisation time

The displayed sequence of the switching statuses and control signals applies to all product variants except OVEM-...-1PD. Sequence for OVEM-...-1PD → Fig. 3

4.3.7 Teach function

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.

Dynamic teach-in

Setpoint values are calculated during the teach-in procedure from a time period. The procedure is used to determine evacuation and pressurisation 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 function reserve of 100 % is added to the averaged values.

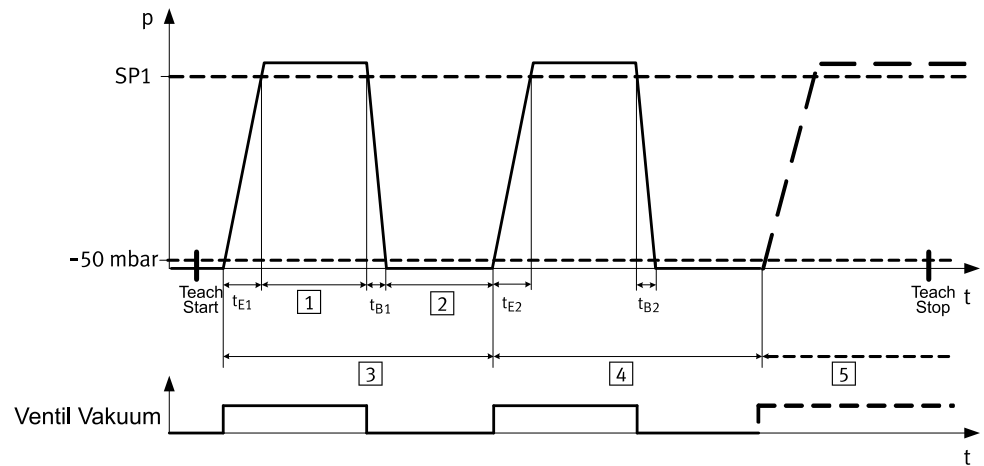


Fig. 6: Mode of operation of dynamic teach-in - example OVEM-...-CE/-CPE

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

4.3.8 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

Symbol	Meaning
	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. 10: 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

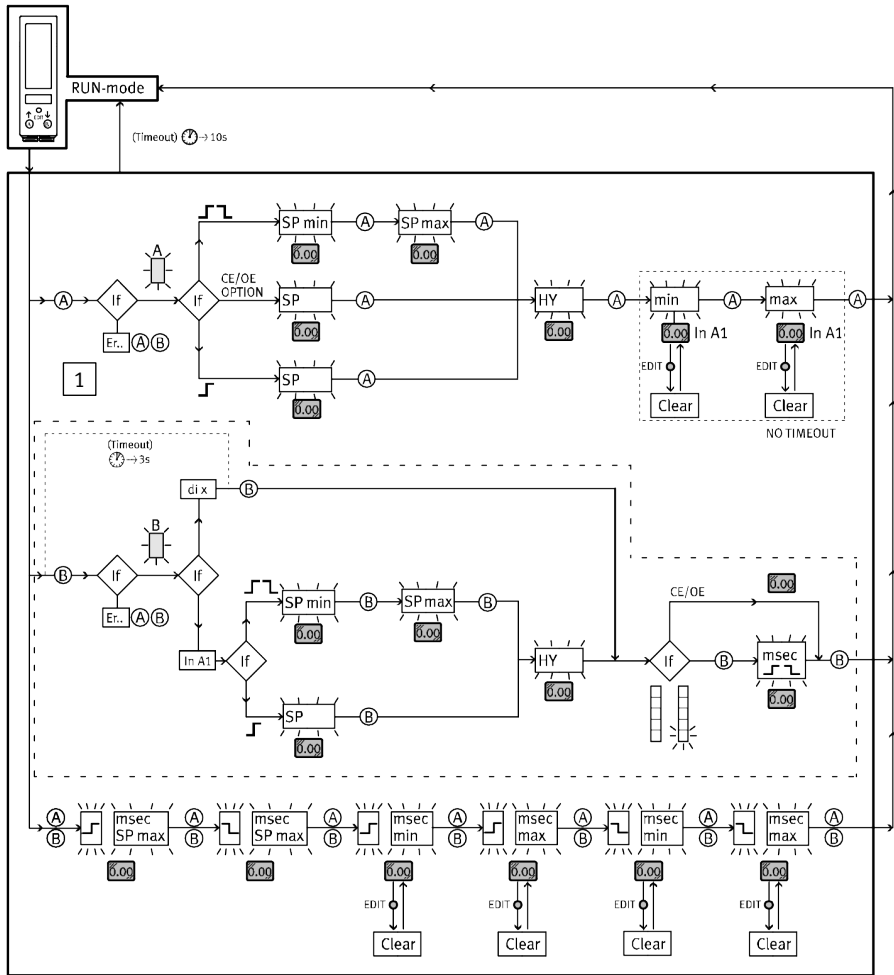


Fig. 7: Menu structure for SHOW mode

1 Submenu only available with
OVEM-...-2P/-2N/-PU/-PI

EDIT mode

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

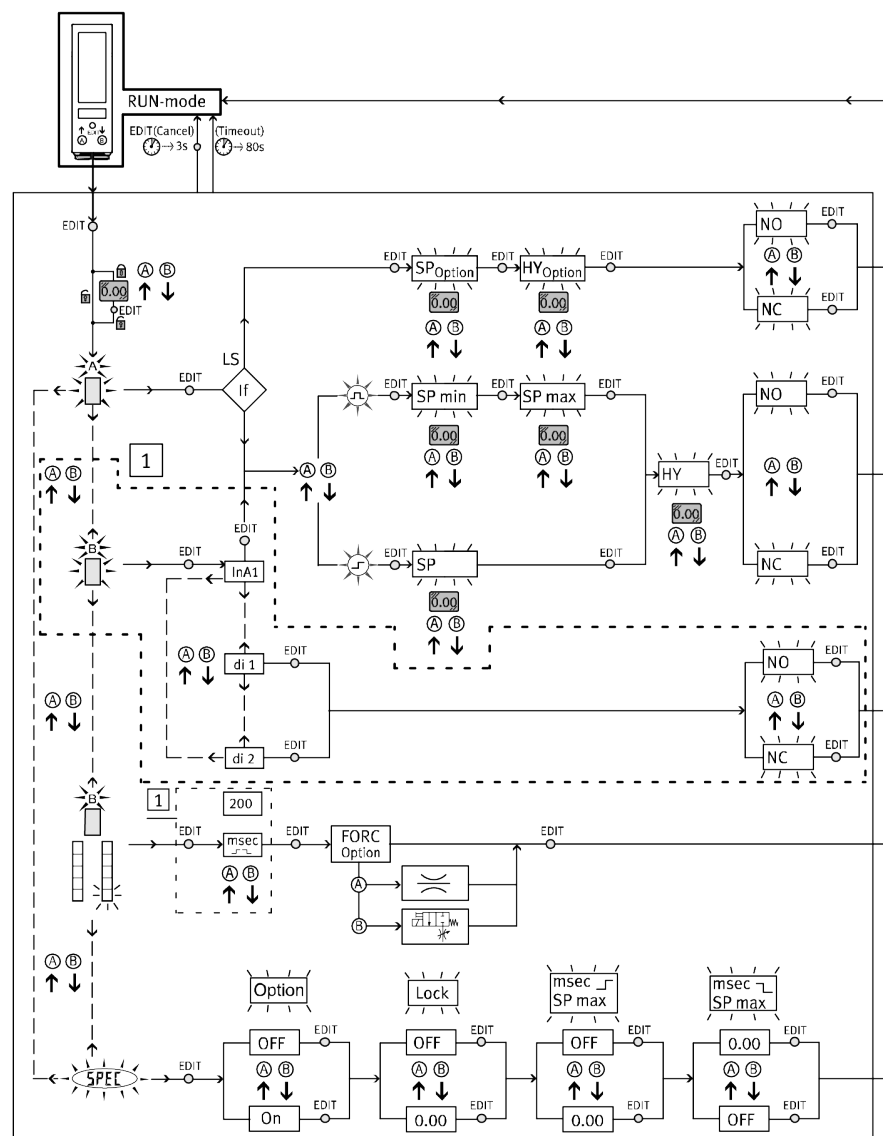


Fig. 8: EDIT mode menu structure

1 Submenu only available with
OVEM-...-CE/-OE/-CPE/-OPE

TEACH mode

- Acceptance of the current measured value to determine switching points

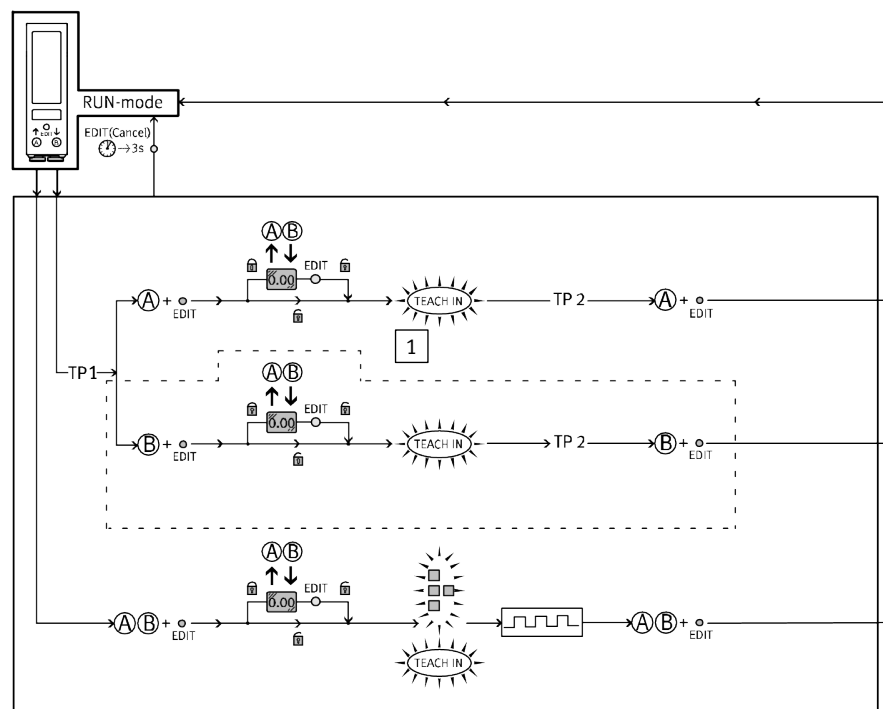


Fig. 9: TEACH mode menu structure

1 Submenu only available with
OVEM-...-2P/-2N

5 Mounting



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.

5.1 Fixing

5.1.1 DIN rail mounting



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

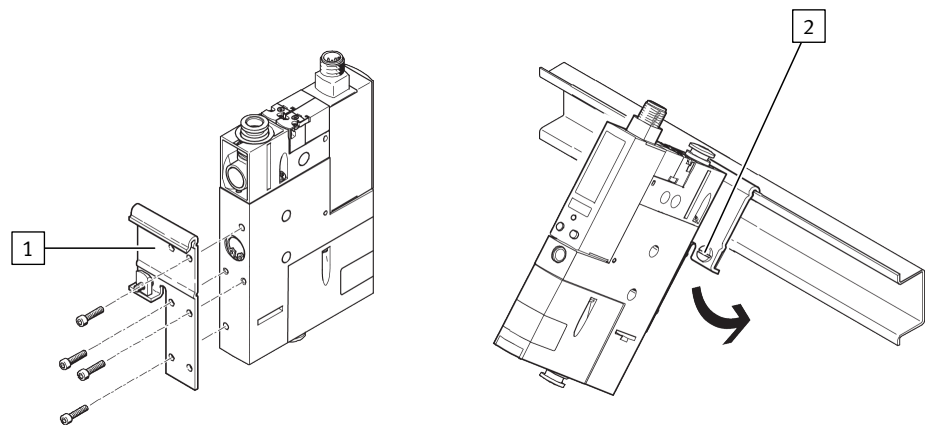


Fig. 10: DIN rail mounting

- 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].

5.1.2 Mounting with mounting bracket



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

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

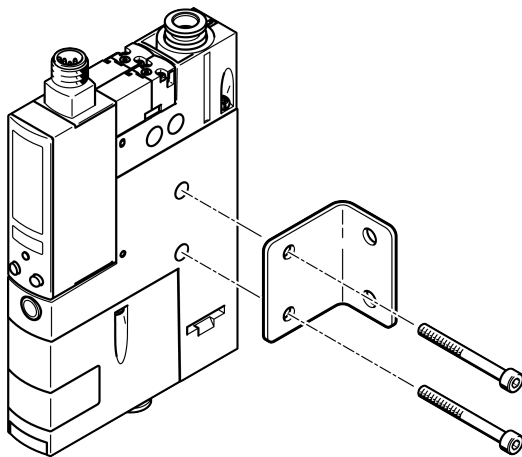


Fig. 11: Mounting with mounting bracket

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

Tab. 11: Size and tightening torque of the screws for mounting with mounting bracket

Mounting on common supply manifold

OVEM-...-B/-BN: 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

5.1.3 Direct mounting

Direct mounting on the side

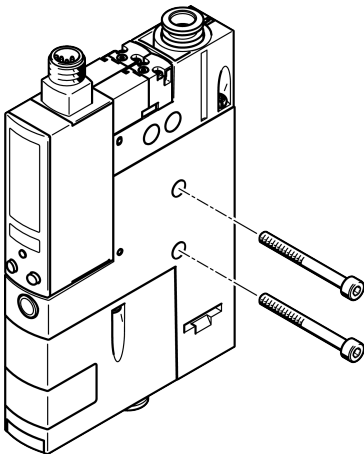


Fig. 12: Direct mounting on the side

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

Tab. 12: Size and tightening torque of the screws for direct mounting on the side

Direct mounting on the back

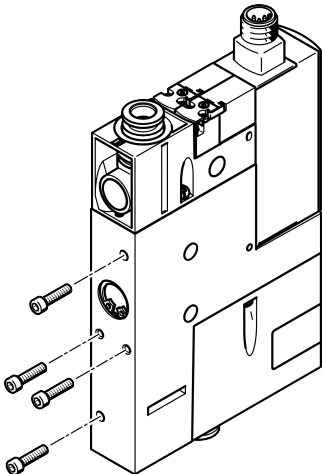


Fig. 13: Direct mounting on the back

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

Tab. 13: Size and tightening torque of the screws with direct mounting on the back

6 Installation

6.1 Pneumatic installation

Variant	Circuit symbol	Variant	Circuit symbol
OVEM-...-QO-CN OVEM-...-GO-CN		OVEM-...-QO-CE OVEM-...-GO-CE	
OVEM-...-QO-CPE OVEM-...-GO-CPE		OVEM-...-QO-CPE OVEM-...-GO-CPE	
OVEM-...-QS-CN OVEM-...-GN-CN		OVEM-...-QS-CE OVEM-...-GN-CE	
OVEM-...-QS-CPE OVEM-...-GN-CPE		OVEM-...-QS-CPE OVEM-...-GN-CPE	
OVEM-...-QO-ON OVEM-...-GO-ON		OVEM-...-QO-OE OVEM-...-GO-OE	
OVEM-...-QO-OPE OVEM-...-GO-OPE		OVEM-...-QO-OPE OVEM-...-GO-OPE	
OVEM-...-QS-ON OVEM-...-GN-ON		OVEM-...-QS-OE OVEM-...-GN-OE	
OVEM-...-QS-OPE OVEM-...-GN-OPE		OVEM-...-QS-OPE OVEM-...-GN-OPE	

Tab. 14: 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. 15: Minimum inside diameter of the connection tubes for connections with G-female thread

Notes on the pneumatic connection

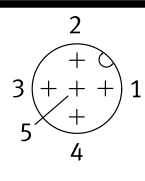
- Maximum permissible tube length 2 m
- OVEM-...-GN/-GO: minimum inside diameter of the connection tubes → Tab. 15
Minimum inside diameter of the connection tubes for connections with G-female thread.
- Do not seal exhaust port.
- OVEM-...-07/-10/-14/-20/-30: If necessary, lengthen silencers with a silencer extension → www.festo.com/catalogue.
- Recommendation: Use type PUN tubes → www.festo.com/catalogue.

6.2 Installation, electrical

⚠ WARNING

Risk of injury due to electric shock.

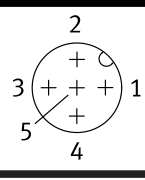
- Use exclusively PELV circuits in accordance with IEC 60204-1/EN 60204-1 for the electrical power supply (Protective Extra-Low Voltage, PELV).
 - Observe the general requirements of IEC 60204-1/EN 60204-1 for PELV circuits.
 - Use exclusively voltage sources that guarantee reliable electrical isolation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

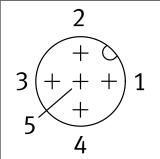
Plug	Pin	Wire colour ¹⁾	Function	
	1	Brown (BN)	L+	+24 V
	2	White (WH)	DO2	Digital output Out B
	3	Blue (BU)	L-	0 V
	4	Black (BK)	DO1	Digital output Out A/Out A (air-save)
	5	Grey (GY)	DI1	Digital switching input (suction) ²⁾

1) When using the connecting cable as per Accessories

2) The workpiece is placed with a falling edge of the "suction" control signal.

Tab. 16: Pin allocation OVEM-...-2P/-2N

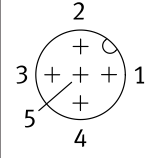
Plug	Pin	Wire colour ¹⁾	Function	
	1	Brown (BN)	L+	+24 V
	2	White (WH)	AO1	Analogue output Out B
	3	Blue (BU)	L-	0 V

Plug	Pin	Wire colour ¹⁾	Function
	4	Black (BK)	DO1
	5	Grey (GY)	DI1
			Digital output Out A/Out A (air-save)
			Digital switching output (suction) ²⁾

1) When using the connecting cable as per Accessories

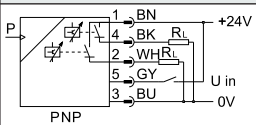
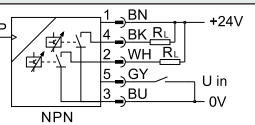
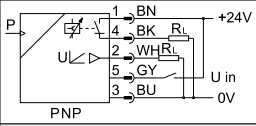
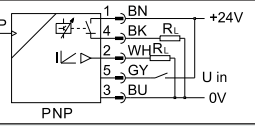
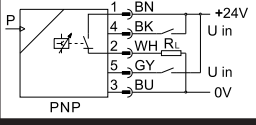
2) The workpiece is placed with a falling edge of the "suction" control signal.

Tab. 17: Pin allocation OVEM-...-PU/-PI

Plug	Pin	Wire colour ¹⁾	Function
	1	Brown (BN)	L+
	2	White (WH)	DO1
	3	Blue (BU)	L-
	4	Black (BK)	DI2
	5	Grey (GY)	DI1
			+24 V
			Digital output Out A/Out A (air-save) (PNP)
			0 V
			digital switching input (ejection) (PNP)
			Digital switching input (suction) (PNP)

1) When using the connecting cable as per Accessories

Tab. 18: Pin allocation OVEM-...-1PD

Circuit diagrams	
OVEM-...-2P	OVEM-...-2N
	
OVEM-...-PU	OVEM-...-PI
	
OVEM-...-1PD	
	

Tab. 19: Circuit diagrams for vacuum generator

7 Commissioning

7.1 Commissioning the vacuum generator



Commissioning by qualified personnel.

At initial commissioning, the vacuum generator is placed in operation with the factory settings → Tab. 20 Factory settings.

Requirement

Vacuum generator is fully mounted and connected → 5 Mounting.

Checking operating conditions

- Check operating conditions and critical limits → 12 Technical data.

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

- Apply operating pressure to the compressed air port (1).
⇒ Negative pressure is generated at the vacuum port (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 allows the vacuum to be adjusted.

Functions and parameters can be specified:

- manually at the device
- by teach-in

7.2 Setting the intensity of the ejector pulse

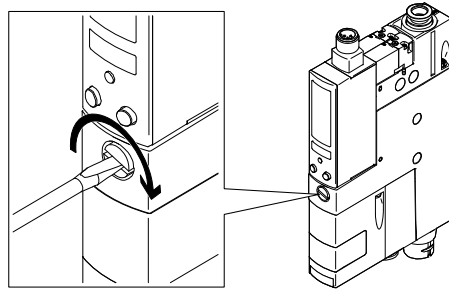


Fig. 14: Set the intensity of the ejector pulse

Requirement

- Vacuum generator is in operation

Feed through with automatic ejector pulse (-2P/-2N/-NU/-NI/-PU/-PI)

1. Screw in the flow control screw [10] completely
⇒ The channel for the ejector pulse is closed. An ejector pulse is not generated.
2. Switch on vacuum generation.
⇒ Negative pressure is generated at the vacuum port.
3. Switch off vacuum generation.
4. Unscrew flow control screw slightly.
⇒ An automatic ejector pulse is generated. If an automatic ejector pulse is not generated, operate the mechanical manual override of the ejector pulse solenoid valve.
5. Screw the flow control screw out or in to adjust the ejector pulse to the required intensity.



Setting the ejector pulse duration → 8.1 Setting the ejector pulse duration



The use of large suction cups with connectors can create a device-independent vacuum due to the interference resistance when the suction cup with connector is detached from the workpiece.
Set up the ejector pulse accordingly.

Requirement

- Vacuum generator is in operation

Procedure without automatic ejector pulse (1PD)

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.



The use of large suction cups with connectors can create a device-independent vacuum due to the interference resistance when the suction cup with connector is detached from the workpiece.
Set up the ejector pulse accordingly.

8 Operation and use

Additional information on operating statuses and menu structure → 4.3.8 Operating statuses and menu structure.

8.1 Setting the ejector pulse duration

Requirements

- RUN mode is active.
- Security code is not active.

Procedure

1. Press the EDIT button.
⇒ [A] flashes and EDIT mode is active.
2. Press B button.
⇒ [B] + segment L18 flash.
3. Press the EDIT button.
⇒ [msec], [] and [] flash.
4. Set time (in ms) with the A key and the B key. To deactivate the ejector pulse, set to OFF.
5. Press and hold the EDIT button for 3 seconds.
⇒ RUN mode is active.



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.

8.2 Configuring switching outputs

Display settings of the switching outputs



The procedure for teach-in of the switching outputs for Out A (A key) and Out B (B key) is basically the same. In addition, the configuration of the switching output and the duration of the ejector pulse is displayed for switching output Out B. The process is described below based on the Out A switching output.

Requirement

- RUN mode is active.

Procedure

1. Press the A key.
⇒ SHOW mode is active. The error number is displayed in case of errors.
2. Press the A key.
⇒ The following settings will be displayed:
 - Switching function (threshold value comparator or window comparator)
 - Switching points [SP] or [SP][min].
 - Switching characteristic [N/O-N/C]
3. Press the A key.
⇒ Only with window comparator switching function: switching point [SP], [max] is displayed.
 - Press the A key.
 - Hysteresis [HY] is displayed.
4. Press the A key.
⇒ Minimum pressure value is displayed.
5. Press the A key.
⇒ Maximum pressure value is displayed.
6. Press the A key.
⇒ RUN mode is active.

8.2.1 Setting the switching response of a switching output

The procedure for teach-in of the switching outputs for Out A (A key) and Out B (B key) is basically the same. In addition, the switching output Out B must be defined as switching output In A1, because Out B can also be set as a diagnostic signalling channel → 8.3 Set diagnostic message channel. The process is described below based on the Out A switching output.

Requirements

- RUN mode is active.
- Switching output Out B is defined as switching output In A1.
- Security code is not active.

Procedure

1. Press the EDIT button.
⇒ [A] flashes. EDIT mode is active.
2. Press B button.
⇒ [B] flashes.
3. Press the EDIT button.
⇒ Display <InA1>
4. Press the EDIT button.
⇒ The currently set switching function flashes (threshold value comparator or window comparator).
5. Set switching function with the A or B key.
6. Press the EDIT button.
⇒ [SP] flashes (threshold value comparator) or [SP], [min] flashes (window comparator).
7. Set switching point (SP or SPmin) with the A or B key.
8. Press the EDIT button.
⇒ Only with window comparator switching function: [SP], [max] flashes.
 - Set switching point (SPmax) with the A or B key.
 - Press the EDIT button.
 - [HY] flashes.

9. Set hysteresis [HY] with the A or B key.
10. Press the EDIT button.
⇒ [NO] or [NC] flashes.
11. Set the switching characteristic [N/O-N/C] with the A or B key.
12. Press the EDIT button.
⇒ RUN mode is active.

8.3 Set diagnostic message channel



If the switching output Out B is set as a diagnostic signalling channel (dl 1 or dl 2), the switching output Out B can no longer be used as switching output In A1.

Requirements

- RUN mode is active.
- Security code is not active.

Procedure

1. Press the EDIT button.
⇒ [A] flashes. EDIT mode is active.
2. Press B button.
⇒ [B] flashes.
3. Press the EDIT button.
⇒ If Out B is defined as switching output, <InA1> is displayed.
4. Set the diagnostic signalling channel (dl 1 or dl 2) with the A key or B key.
5. Press the EDIT button.
⇒ [NO] or [NC] flashes.
6. Set the switching characteristic [N/O-N/C] with the A or B key.
7. Press the EDIT button.
⇒ RUN mode is active.

8.4 Teach-in switching point



The air saving function is automatically deactivated during teach-in. If the pressure differential between the teach points is too low, teach-in will not work.



The process for teach-in of the switching outputs for Out A (A key) and Out B (B key) is the same. The process is described below based on the Out A switching output.

Requirements

- RUN mode is active.
- Switching function is set.
- Security code is not active.

Procedure

Object gripped or object not gripped – the sequence is freely selectable.

1. Set the vacuum for the first teach point.
2. Press the A pushbutton and the EDIT button simultaneously.
⇒ – TEACH mode is active.
– Air saving function is deactivated.
– Measured value will then be taken as first teach point (TP1).
– [A] and [TeachIn] flash.

3. Set the vacuum for the second teach point (TP2).
4. Press the A pushbutton and the EDIT button simultaneously.
 - ⇒ – Measured value is taken as second teach point (TP2).
 - Switching points (SP or SPmin and SPmax) are valid.
 - Air saving function is activated.
 - RUN mode is active.



The hysteresis is adjusted to the teach-in values. Set hysteresis (→ 8.2 Configuring switching outputs).
Recommendation: Test the set values with a test run.

8.5 Deleting minimum or maximum pressure value

Requirements

- RUN mode is active.

Procedure

1. Press the A key.
 - ⇒ SHOW mode is active.
 - If errors are present, error numbers are displayed.
2. Press the A key repeatedly until the minimum pressure value is displayed.
3. To display the next value, press the A key.
To delete the minimum pressure value, press the EDIT button.
 - ⇒ Minimum pressure value is deleted.
4. Press the A key.
 - ⇒ Maximum pressure value is displayed.
5. Press the A key to return to RUN mode.
Press the EDIT button to delete the maximum pressure value.
 - ⇒ Maximum pressure value is deleted.
6. Press the A key.
 - ⇒ RUN mode is active.

8.6 Setting critical limits for the evacuation and air supply times

Requirements

- EDIT mode is active and [Out A] flashes.
- Security code is not active.

Procedure

1. Press the A key.
 - ⇒ Display <SPEC>
2. Press the EDIT button.
 - ⇒ [Option] flashes.
3. Press the EDIT button.
 - ⇒ [Lock] flashes.
4. Press the EDIT button.
 - ⇒ [msec] + [] + [SP] + [max] flash.
5. Set the maximum evacuation time with the A key and B key.
[OFF]: evacuation time monitoring is not active.
6. Press the EDIT button.
 - ⇒ [msec] + [SP] + [max] and [] flash.
7. Set the maximum pressurisation time with the A key and B key.
[OFF]: pressurisation time monitoring is not active.
8. Press the EDIT button.
 - ⇒ RUN mode is active.

8.7 Teaching evacuation and air supply time

Requirements

- RUN mode is active.
- Security code is not active.
- Switching function is set.

Procedure

1. Press the A and B keys and EDIT button simultaneously.
⇒ – TEACH mode is active.
– [TeachIn] and the diagnostics segments flash.
2. Measure at least one clock cycle.



An average is calculated from the measured cycles.
The more cycles are run the better the value. The teach-in values are applied with a function reserve of 100%.

3. Press the A key, B key and EDIT button.
⇒ RUN mode is active.



If the switching points or the intensity of the ejector pulse are changed, each-in the evacuation and pressurisation times again.
Recommendation: check the teach-in values in a test run.

8.8 Displaying evacuation and air supply times

Requirement

- RUN mode is active.

Procedure

1. Press A and B keys simultaneously.
⇒ – SHOW mode is active.
– Evacuation time critical limit is displayed.
2. Press A and B keys simultaneously.
⇒ Air supply critical limit is displayed.
3. Press A and B keys simultaneously.
⇒ Minimum evacuation time is displayed.
4. Press A and B keys simultaneously.
⇒ Maximum evacuation time is displayed.
5. Press A and B keys simultaneously.
⇒ Minimum pressurisation time is displayed.
6. Press A and B keys simultaneously.
⇒ Maximum pressurisation time is displayed.
7. Press A and B keys simultaneously.
⇒ RUN mode is active.

8.9 Deleting evacuation and air supply times

Requirements

- SHOW mode is active.
- Minimum evacuation time is displayed.

Procedure

1. To display the next value, press the A key and B key simultaneously.
To delete the displayed value, press the EDIT button.
2. Press A and B keys simultaneously.
⇒ RUN mode is active.

8.10 Mechanical manual override

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

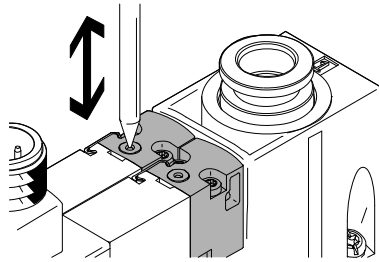


Fig. 15: Manual override

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.

8.11 Electrical manual override

Requirements

- RUN mode is active.
- Security code is not active.

Procedure

1. Press the EDIT button.
⇒ – [A] flashes.
– EDIT mode is active.
2. Press B button.
⇒ [B] flashes + segment L18 lit.
3. Press the EDIT button.
⇒ [msec], [] and [] flash. The duration of the ejector pulse is displayed.
4. Press the EDIT button.
⇒ Display <FORC>. Electrical Manual override is active.
5. Switch solenoid valves.
 - Vacuum solenoid valve: press A key.
 - Ejector pulse solenoid valve: press B key.
6. Press the EDIT button to exit the submenu.
⇒ RUN mode is active.

8.12 Activating security code

A security code can be set and activated to prevent changes by unauthorised persons.

- Factory setting: “OFF”
- The security code is reset when factory settings are restored.

Requirements

- RUN mode is active.
- Security code is not active.

Procedure

1. Press the EDIT button.
⇒ – [A] flashes.
– EDIT mode is active.
2. Press the A key.
⇒ Display <SPEC>

3. Press the EDIT button.
⇒ [Option] flashes.
4. Press the EDIT button.
⇒ [Lock] flashes.
5. Set the security code with the A and B keys.
[OFF]: security code not active.
6. Press and hold the EDIT button for 3 seconds.
⇒ RUN mode is active.

8.13 Switching air saving function on or off

Requirements

- EDIT mode is active and [Out A] flashes.
- Security code is not active.

Procedure

1. Press the A key.
⇒ Display <SPEC>
2. Press the EDIT button.
⇒ [Option] flashes.
3. Switch air saving function on or off with the A or B key.
 - [ON]: air saving function active.
 - [OFF]: air-saving function not active.
4. Press and hold the EDIT button for 3 seconds.
⇒ RUN mode is active.

8.14 Restoring factory settings

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

The current settings are lost.

1. Switch off operating voltage.
2. Press and hold the A key + B key + EDIT button.
3. Switch on operating voltage.
⇒ Display <CLEA>
4. Release A key + B key + EDIT button.
⇒ The factory settings are restored.

Factory settings

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	
Out A (air-save)	SP1	[bar]	-0.7	-0.4
	Hysteresis	[bar]	0.25	
Out A	SP1	[bar]	-0.7	-0.4
	SP2	[bar]	-0.97	-0.67
	Hysteresis	[bar]	0.25	0.1
Out B ¹⁾	SP1	[bar]	-0.5	-0.2
	SP2	[bar]	-0.71	-0.41

Parameters			OVEM-...-H	OVEM-...-L
Out B ¹⁾	Hysteresis	[bar]	0.2	0.1
Duration of ejector pulse ¹⁾		[ms]	200	

1) parameter not available for OVEM-...-1PD

Tab. 20: Factory settings

9 Maintenance and care

Cleaning the device

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.

Replacing air filter



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

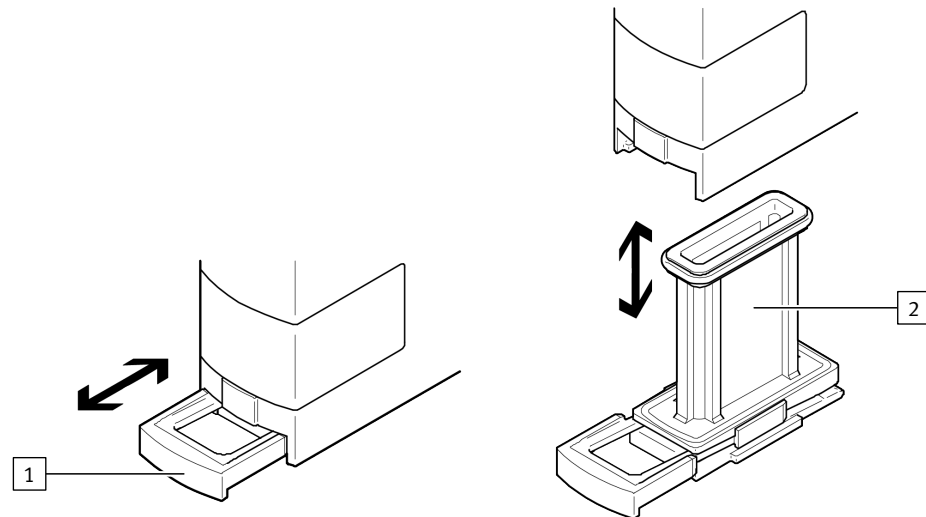


Fig. 16: Removing/installing air filter

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.

10 Fault clearance

The diagnostic messages are shown as error code on the display. For variants with 2 switching outputs (OVEM-...-2P/-2N) one of the two logical channels of the switching output Out B can also be used as a diagnostic message channel → 8.3 Set diagnostic message channel. The diagnostic message channel can be configured as a normally open (N/O contact) or a normally closed (N/C contact).

10.1 Diagnostic levels

There are 4 diagnostic levels. For messages of diagnostic levels 1 to 3, the display backlighting lights up red.

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 channel dl 1 or dl 2 is active	Function is still guaranteed, but with restrictions (e.g. higher power consumption). Emergency operation, maintenance urgently required.
3	logical channel dl 1 or dl 2 is active	Function is no longer guaranteed. All controllable outlets of the product are inactive.

Tab. 21: Diagnostic levels for switching output Out B and display

If the evacuation and pressurisation time is to be monitored, set the critical limits for the evacuation and pressurisation time → 8.13 Switching air saving function on or off.

10.2 Error messages and error codes

Display	Diagnostic level	Description	Remedy
Er01	3	Hardware error 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 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 overrun in 2 of 5 cycles	– Check for leakage.
Er35	2	Evacuation time in 2 of 5 cycles overrun by a factor of two	
Er36	1	Pressurisation time overshoot in 2 of 5 cycles	– Check for leakage. – Extend pressurisation time.
Er37	2	Pressurisation time overshoot in 2 of 5 cycles	– Check throttle setting.
Er38	2	Switching frequency of the air saving function > 1 Hz (warning)	– Check for leakage.

Display	Diagnostic level	Description	Remedy
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. 22: Error messages, error codes, diagnostic levels and error description

10.3 Malfunctions

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 → 6.1 Pneumatic installation).
	Flow control screw closed	– Open flow control screw.
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 → 6.2 Installation, electrical.
	electrical connections swapped	– Connect device correctly → 6.1 Pneumatic installation.
	No control signal	– Check controller
	Device faulty	– Replace device.
Incomplete display	Display faulty	– Replace device.
Pressure indicator incorrect	pneumatic connections swapped	– Connect device correctly → 6.1 Pneumatic installation.
Settings cannot be edited, '[Lock]' is displayed	Security code is active	– Enter security code → 8.12 Activating security code.
'[min]' + '[max]' flashing simultaneously	Diagnostic level 1 active	– → 10.1 Diagnostic levels
Display + '[min]' + '[max]' flashing simultaneously	Diagnostic level 2 active	– → 10.1 Diagnostic levels
Display flashes and error code appears	Diagnostic level 3 active	– → 10.1 Diagnostic levels
'[Option]' flashing	Air saving function deactivated because outside the critical limit	– Check for leakage.

Tab. 23: Malfunctions

11 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.

12 Technical data

OVEM-...		-05	-07/-10	-14/-20-B/-BN	-20/-30-C
General					
Certificates, declaration of conformity		➔ www.festo.com/sp			
Characteristic values					
Operating pressure OVEM-...-QS/-GN/-PL	[MPa]	0.2 ... 0.6			
	[bar]	2 ... 6			
	[psi]	29 ... 87			
Operating pressure OVEM-...-QO/-GO/-PO	[MPa]	0.2 ... 0.8			
	[bar]	2 ... 8			
	[psi]	29 ... 116			
Pressure measuring range	[MPa]	−0.1 ... 0			
	[bar]	−1 ... 0			
	[psi]	−14.5 ... 0			
Overload pressure at vacuum port	[MPa]	≤ 0.5			
	[bar]	≤ 5			
	[psi]	≤ 72.5			
Ready-state delay	[ms]	≤ 500			
Dead time (evacuation and ejection)	[ms]	< 10	≤ 20	≤ 35	≤ 60
Electronics					
Nominal operating voltage	[V DC]	24 ± 15 %			
Max. output current (per switching output)	[mA]	100			
Voltage drop (for all switching outputs) OVEM-...-2N/-2P/-NI/-NU/-PI/-PU	[V]	≤ 1.5			
Voltage drop (for all switching outputs) OVEM-...-1PD	[V]	≤ 2			
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			

OVEM-...		-05	-07/-10	-14/-20-B/-BN	-20/-30-C
Max. current consumption	[mA]	170			
OVEM-...-1PD					
Max. current consumption	[mA]	270			
OVEM-...-2N/-2P					
Max. current consumption	[mA]	180			
OVEM-...-NI/-NU/-PI/-PU					
Accuracy	[% FS]	± 3			
Hysteresis	[% FS]	± 0.1			
Short circuit current rating		Yes			
Reverse polarity protection		For all electrical connections			
Display/operation					
Threshold value setting range	[MPa]	−0.099 ... 0			
	[bar]	−0.999 ... 0			
	[psi]	−14.485 ... 0			
Hysteresis setting range	[MPa]	−0.09 ... 0			
	[bar]	−0.9 ... 0			
	[psi]	−13.05 ... 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: 5g			
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			
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			

Tab. 24: Technical data

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