

Vacuum generators OVM

FESTO



Key features

At a glance

Rapid purging of vacuum for safe placement of the workpiece using an integrated solenoid valve to control the ejector pulse

Central electrical connection via an M12 plug

OVEM-...-1PD/2P/2N/PU/PI/LK

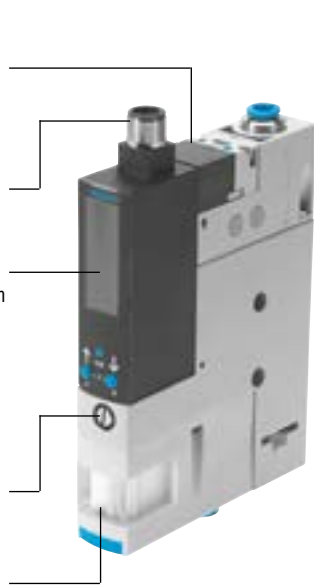
Monitoring and visualisation of the vacuum pressure using a vacuum sensor with LCD display (bar)

OVEM-...-LK

Vacuum sensor with IO-Link

Adjustment of the ejector pulse via a flow control screw

Contamination of the vacuum generator is prevented by an integrated filter



Quick and secure installation thanks to QS fitting

Fast vacuum build-up using an integrated solenoid valve to control the compressed air supply

OVEM-...-1P/1N

Monitoring of the vacuum pressure and status displays for switching output and solenoid valves using a vacuum sensor with LED display

Prevention of pressure drop using an integrated check valve

Maintenance-free operation and reduced noise level through an integrated, open silencer



The modular vacuum generator series

The modular series of vacuum generators OVEM offers a wide range of individually selectable functions, providing numerous solutions for a wide variety of applications.

Functions	Values
Laval nozzle	0.45 mm
	0.7 mm
	0.95 mm
	1.4 mm
	2.0 mm
	3.0 mm
Vacuum generator characteristics	High vacuum
	High suction rate
Housing size	20 mm, metric version, display in bar
	20 mm, NPT version, display in inHg ¹⁾
	36 mm, metric version, display in bar
Pneumatic connections	QS fittings, with or without open silencer
	QS fittings (inch), with or without open silencer ¹⁾
	G female thread, with or without open silencer
	NPT female thread, with or without open silencer ¹⁾
	Prepared for supply manifold
Normal position of the vacuum generator	Normally open, with or without ejector pulse
	Normally closed, with or without ejector pulse
Electrical connection	M12 plug (5-pin)
Vacuum sensor	Without vacuum sensor
	1 switching output PNP or NPN, LED display
	1 switching output PNP, LCD display
	2 switching outputs PNP or NPN, LCD display
	1 switching output PNP and 1 analogue output, LCD display
IO-Link, LCD display	
Alternative vacuum display	inHg ²⁾
	inH ₂ O ^{1) 2)}
	bar ²⁾

1) Product documentation → Internet: ovem-npt

2) Vacuum sensor with LCD display

Key features

The innovative vacuum generator

Economical

- Short switching times thanks to integrated solenoid valves
 - Vacuum on/off
 - Ejector pulse
- Quick, precise and safe placement of the workpiece via the ejector pulse
- Cost saving through preventive maintenance/service thanks to maintenance display
- Cost saving through integrated air-saving function
- Powerful supply of multiple vacuum generators via a common supply manifold (→ page 23)
- Low-cost variants with one switching output (OVEM-...-1P/1N)

Reliable

- Permanent monitoring of the entire vacuum system via a vacuum sensor to reduce downtimes (condition monitoring)
- Prevention of pressure drop using an integrated air-saving function in conjunction with an integrated check valve

Space-saving

- All functions are compactly integrated in one unit.
- No protruding elements such as valves or vacuum sensors
 - Space-optimised installation is possible as all the control elements can be accessed from one side

Easy to use

- Simple installation using M12 plugs and QS fittings
- Straightforward mounting with retaining screws
- All control elements on one side
- Low-noise operation due to integrated silencer
- Vacuum sensor with LCD display (OVEM-...-1PD/2P/2N/PU/PI/LK)
 - Vacuum is displayed numerically and as a bar chart
 - Important parameters and diagnostic information are displayed

Easy to maintain

- Integrated filter with inspection window for maintenance display
- Reduced contamination of the vacuum generator thanks to an open silencer

Choice of mounting types

- Direct mounting or via mounting bracket
- Straightforward mounting on H-rail via accessories
- Linking of multiple vacuum generators on a common supply manifold (→ page 23)

Key features

Functional principle of OVEM

Vacuum ON/OFF

The compressed air supply is controlled by an integrated solenoid valve. The solenoid valve is available in two different switching functions, NC/NO.

- NC - normally closed:
The vacuum is generated when the vacuum generator is pressurised with compressed air and the solenoid valve has been switched.
- NO - normally open:
The vacuum is generated when the vacuum generator is pressurised with compressed air and the solenoid valve is in the normal position.

Ejector pulse

After the vacuum is switched off, an ejector pulse is activated and generated by a second integrated solenoid valve to release the workpiece safely from the suction cup and to purge the vacuum quickly.

Power ejector pulse

A power ejector pulse is generated by means of an additional shut-off piston, thus preventing the ejector pulse from escaping via the silencer.

Note

Use the power ejector pulse only in open vacuum systems as the exhaust duct is sealed tightly during the ejector pulse. This can cause overpressure at the vacuum port and destroy the vacuum sensor.

Vacuum sensor

The set or taught-in setpoint value for the generated vacuum is monitored via an integrated vacuum sensor. If the setpoint value is reached or if it is not reached due to malfunctions (e.g. leakages, dropped workpiece), the vacuum sensor emits an electrical signal.

Connection to higher-level systems and configuration of the switching outputs

OVEM-...-1P/1PD/1N

- Switching inputs for actuating the solenoid valves for vacuum generation and ejector pulse
- OVEM-...-1P/1N only:
One switching output for supplying a control signal
 - Configured as an N/O contact
 - Switching function configured as a threshold value comparator
- OVEM-...-1PD only:
One digital switching output for supplying a control signal
 - Switching output can be configured as N/C or N/O contact
 - Switching function of the output can be configured as a threshold value or window comparator

OVEM-...-2P/2N/PU/PI

- One digital switching input for actuating the solenoid valves
- Two digital switching outputs or one digital switching output and one analogue output for supplying control signals
 - Switching outputs can be configured as N/C or N/O contacts
 - Switching function of the outputs can be configured as a threshold value or window comparator

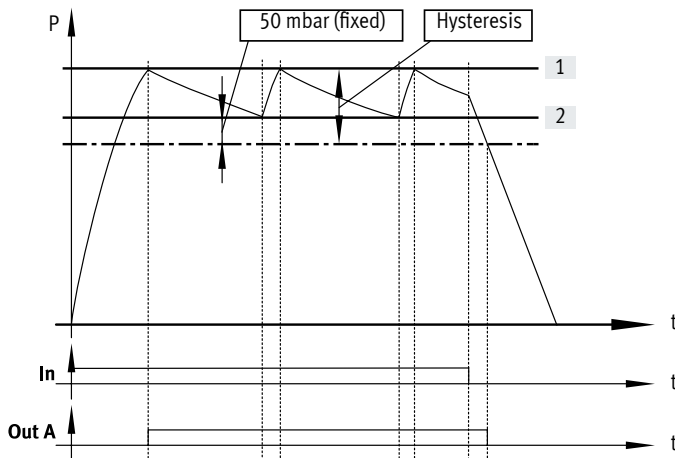
- If there are two switching outputs, these can be configured independently of each other. This enables tasks to be performed in parallel with one vacuum generator, reducing the time needed for sorting good and reject parts, for example.

OVEM-...-LK

- Digital setpoint and actual value transfer for simple parameterisation and diagnostic feedback. Communication takes place in IO-Link mode with an IO-Link master.
- SIO mode is supported. In the case of this local configuration using the operating buttons on the vacuum sensor, the OVEM takes on the function of an OVEM-...-2P.

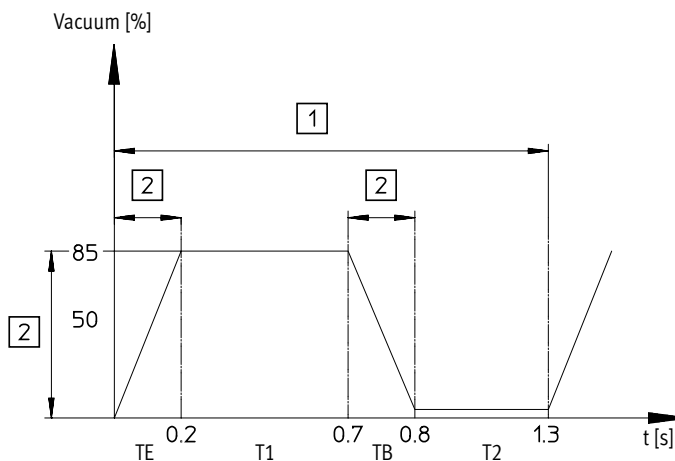
Key features

Air saving function (with OVEM-...-OE/OPE/CE/CPE-...-1PD/2P/2N/PU/PI/LK)



If the desired threshold value [1] for the vacuum is reached, vacuum generation is automatically switched off. A check valve prevents a decrease of the vacuum. Nonetheless, leakage (e.g. due to rough workpiece surfaces) will slowly reduce the vacuum. If the vacuum drops below the threshold value [2], vacuum generation is automatically switched on. Vacuum is generated until the set threshold value [1] is reached again.

Condition monitoring and diagnostics (with OVEM-...-1PD/2P/2N/PU/PI/LK)



- | | |
|--------------------|--------------------|
| [1] Cycle time | T1 Transport time |
| [2] Monitoring | TB Air supply time |
| TE Evacuation time | T2 Return time |

The most important operating parameters:

- Vacuum
- Evacuation time
- Air supply time

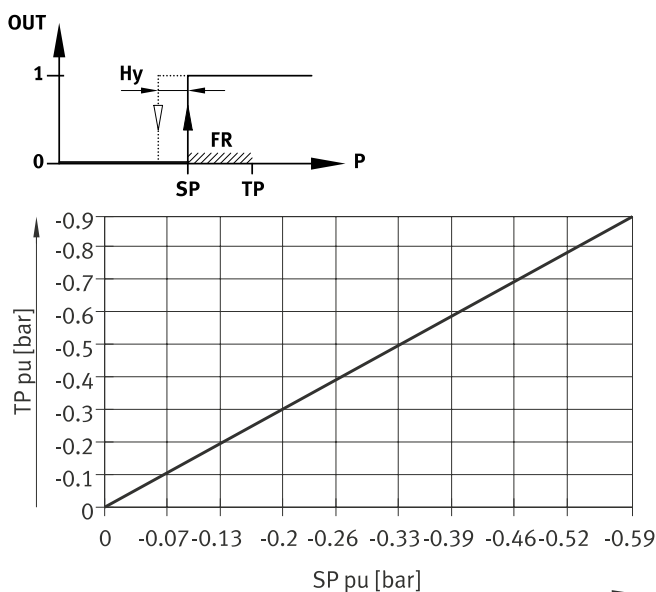
are continuously measured in the vacuum generator and compared with the individually set setpoint values (condition monitoring). If deviations in the setpoint values occur, these will be determined by the vacuum generator and shown on the display (diagnostics).

In addition, in the case of an OVEM with two switching outputs (OVEM-...-2P/2N, OVEM-...-LK in SIO mode), diagnostic messages can also be transmitted by the switching output Out B.

This enables preventive action to be taken:

- in order to prevent machine failure or downtime, for example, through timely maintenance
- and to ensure process reliability (adherence to the cycle time).

From the teach-in point to the switching point (with OVEM-...-1P/1N)



- | | |
|--------------------|---------------------|
| TP Teach-in point | Hy Hysteresis |
| SP Switching point | FR Function reserve |

The switching point is determined from the teach pressure and the function reserve.

A function reserve (35% of the teach pressure) is deducted from the teach pressure ($SP = TP - 0.35 \cdot TP$).

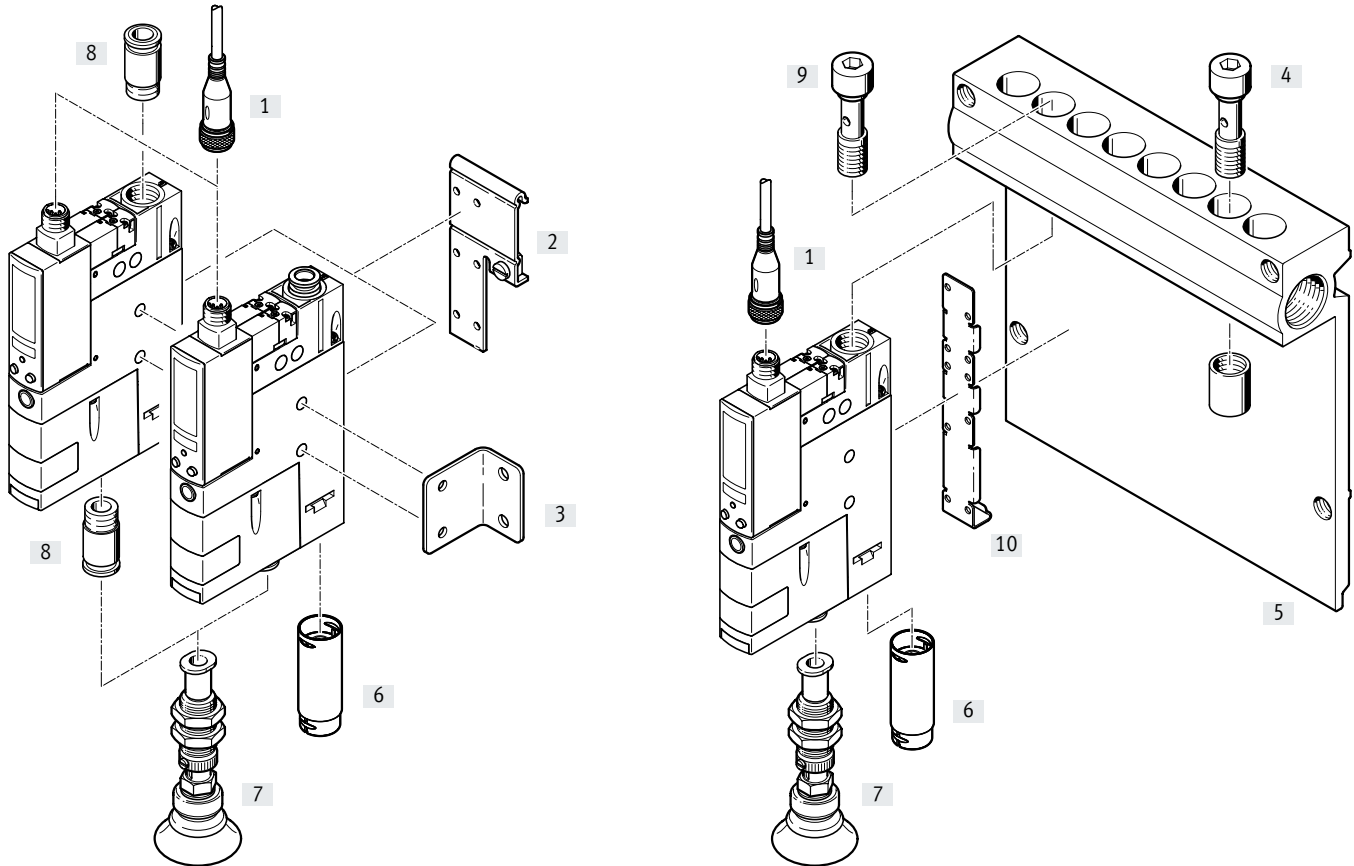
For example, with a teach pressure of -0.5 bar, a switching point of -0.33 bar is set.

The hysteresis has a fixed value.

Peripherals overview

OVEM-...-QS/QO/GN/GO

OVEM-...-PL/PO¹⁾



1) Hollow bolt [9] and mounting bracket [10] are included in the scope of delivery for the OVEM-...-PL/PO.

Mounting attachments and accessories

Type	OVEM-...-B						OVEM-...-C						→ Page/Internet
Pneumatic connections	[QS]	[QO]	[GN]	[GO]	[PL]	[PO]	[QS]	[QO]	[GN]	[GO]	[PL]	[PO]	
[1] Connecting cable NEBU-M12		■				■			■			■	26
[2] H-rail mounting OABM-H		■			-				-			-	25
[3] Mounting bracket HRM-1		■			-				-			-	26
[4] Blanking plug OASC-G1-P		-			■				-			■	25
[5] P manifold rail OABM-P		-			■				-			■	23
[6] Silencer extension UOMS-1/4	-	■ ²⁾	-	■ ²⁾	-	■ ²⁾			-			-	26
Silencer extension UOMS-3/8		-					-	■	-	■	-	■	26
[7] Suction gripper ESG		■			■				■			■	esg
[8] Push-in fitting QS	-		■		-		-		■			-	qs
- Suction cup holder ESH		■			■				■			■	esh
- Suction cup with connection ESS		■			■				■			■	ess

2) Silencer extension UOMS-1/4 [6] is included in the scope of delivery of the OVEM-20.

Type codes

001	Series	
OVEM	Vacuum generator	
002	Nominal width of Laval nozzle	
05	0.45 mm	
07	0.70 mm	
10	0.95 mm	
14	1.4 mm	
20	2.0 mm	
30	3.0 mm	
003	Vacuum type	
H	High vacuum	
L	High suction rate	
004	Housing width	
B	20 mm	
C	36 mm	
005	Pneumatic connections	
QS	All connections with QS fittings	
QO	Supply/vacuum port with QS fittings, exhaust port with open silencer	
GN	All connections with G female thread	
GO	Supply/vacuum port with G female thread, exhaust port with open silencer	
PL	Prepared for supply manifold, vacuum port and exhaust port with QS fittings	
PO	Prepared for supply manifold, vacuum port with QS fittings, exhaust port with open silencer	

006	Normal position of the vacuum generator	
ON	NO, normally open (vacuum generation)	
OE	NO, normally open (vacuum generation) with ejector pulse	
OPE	NO, normally open (vacuum generation) with powerful ejector pulse	
CN	NC, normally closed (no vacuum generation)	
CE	NC, normally closed (no vacuum generation) with ejector pulse	
CPE	NC, normally closed (no vacuum generation) with powerful ejector pulse	

007	Electrical connection	
N	Plug M12 (5-pin)	

008	Vacuum sensor	
	Without vacuum sensor (switching input PNP)	
1P	Switching output 1x PNP	
1PD	Switching output 1 x PNP and display	
1N	Switching output 1 x NPN	
2P	Switching output 2x PNP	
PU	Switching output 1 x PNP + U	
PI	Switching output 1 x PNP + I	
2N	Switching output 2 x NPN	
LK	IO-Link®	




009	Alternative vacuum display	
	Without	
H	inHg	

Data sheet

Function

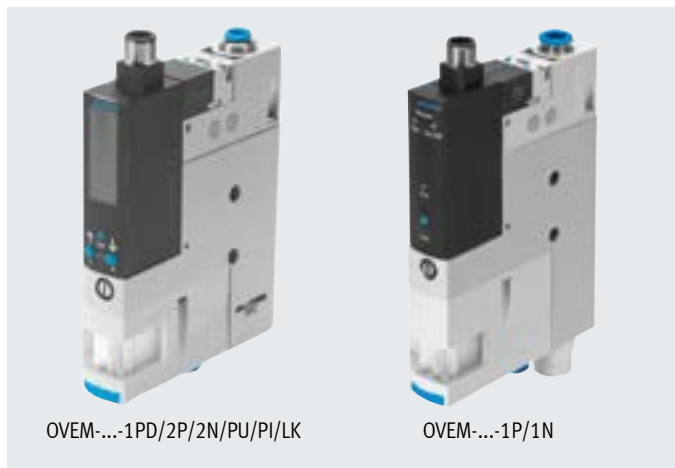
NC, normally closed:

- Ejector pulse
- QS fitting or G female thread
- With open silencer
- Prepared for common supply manifold

-  - Temperature range
0 ... +50°C
-  - Operating pressure
2 ... 8 bar
-  - Spare parts service

NO, normally open:

- Ejector pulse
- QS fitting or G female thread
- With open silencer
- Prepared for common supply manifold



OVEM-...-1PD/2P/2N/PU/PI/LK

OVEM-...-1P/1N

General technical data

Type	OVEM-...-B						OVEM-...-C	
Nominal width of Laval nozzle [mm]	0.45	0.7	0.95	1.4	2.0	2.0	3.0	
Grid dimension [mm]	20						36	
Grade of filtration [µm]	40						-	
Mounting position	Any							
Type of mounting	With through-hole Via female thread With accessories							
Pneumatic port 1 (P)	→ Dimensions on page 16							
Vacuum port (V)	→ Dimensions on page 16							
Pneumatic port 3 (R)	→ Dimensions on page 16							

Technical data – Design

Type	OVEM-...-QO/GO/PO	OVEM-...-QS/GN/PL
Design	Modular	
Ejector characteristic	High vacuum High suction rate	
Silencer design	Open	-
Integrated function [ON]/[CN] [OE]/[OPE]/[CE]/[CPE]	Electric on/off valve	Electric on/off valve
	Vacuum sensor ¹⁾	Vacuum sensor ¹⁾
	Filter	Filter
	Open silencer	-
	Electric on/off valve	Electric on/off valve
	Ejector pulse / power ejector pulse, electrical	Ejector pulse / power ejector pulse, electrical
	Flow control valve	Flow control valve
	Vacuum sensor ¹⁾	Vacuum sensor ¹⁾
	Air saving function, electrical ²⁾	Air saving function, electrical ²⁾
	Check valve	Check valve
	Filter	Filter
	Open silencer	-
Valve function [ON]/[OE]/[OPE] [CN]/[CE]/[CPE]	Open Closed	
Manual override	Non-detenting Additionally via operating buttons ²⁾	

1) Only with OVEM-...-1P/1PD/1N/2P/2N/PU/PI/LK

2) Only possible with OVEM-...-1PD/2P/2N/PU/PI/LK

Data sheet

Operating and environmental conditions		OVEM-...-QO/GO/PO		OVEM-...-QS/GN/PL	
				Without vacuum sensor	With vacuum sensor
Type					
Operating pressure	[bar]	2 ... 8		2 ... 8	2 ... 6
Nominal operating pressure	[bar]	6			
Operating medium		Compressed air to ISO 8573-1:2010 [7:4:4]			
Note on the operating/pilot medium		Operation with lubricated medium not possible			
Ambient temperature	[°C]	0 ... +50			
Temperature of medium	[°C]	0 ... +50			
Relative humidity	[%]	5 ... 85			
Protection class		III			
Degree of protection		IP65			
Corrosion resistance class CRC ¹⁾		2			
CE marking (see declaration of conformity) ²⁾		To EU EMC Directive			
UKCA marking (see declaration of conformity)		To UK instructions for EMC			
Certification		c UL us - Listed (OL) (OVEM-...-B only)			
		RCM compliance mark			
KC mark		KC EMC			

- 1) Corrosion resistance class CRC 2 to Festo standard FN 940070
Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.
- 2) For information about the area of use, see the declaration of conformity at: www.festo.com/catalogue/ovem → Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

Performance data – High vacuum		OVEM-...-B					OVEM-...-C	
Type								
Nominal width of Laval nozzle	[mm]	0.45	0.7	0.95	1.4	2.0	2.0	3.0
Max. vacuum	[%]	93						
Operating pressure for max. vacuum	[bar]	5.1	4.1	3.5	3.6	5.3	4	4
Max. suction rate with respect to atmosphere	[l/min]	6	16	19.5	50.5	86.5	98	181
Suction rate at $p_1 = 6$ bar	[l/min]	5.9	15.1	18.6	46	80.5	93.4	173.8
Air supply time ¹⁾ for 1 l volume, at $p_1 = 6$ bar	[ON]/[CN] [s]	4.8	1.9	1.2	0.6	0.4	0.4	0.3
	[OE]/[CE] [s]	2	0.4	0.2	0.2	0.2	0.2	0.2
	[OPE]/[CPE] [s]	–	–	–	–	–	0.15	0.15
Noise level at $p_1 = 6$ bar	[db(A)]	51	58	73	77	74	62	75

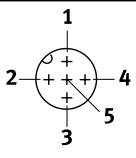
- 1) Time required to reduce the vacuum to a residual vacuum of -0.05 bar

Performance data – High suction rate		OVEM-...-B					OVEM-...-C	
Type								
Nominal width of Laval nozzle	[mm]	0.45	0.7	0.95	1.4	2.0	3.0	
Max. suction rate with respect to atmosphere	[l/min]	13	31.5	45	92	190	348	
Suction rate at $p_1 = 6$ bar	[l/min]	12.8	31.5	45.1	88.7	182.5	320	
Air supply time ¹⁾ for 1 l volume, at $p_1 = 6$ bar	[ON]/[CN] [s]	2	1	0.8	0.4	0.3	0.3	
	[OE]/[CE] [s]	1.3	0.2	0.2	0.2	0.2	0.2	
	[OPE]/[CPE] [s]	–	–	–	–	0.15	0.15	
Noise level at $p_1 = 6$ bar	[db(A)]	45	53	64	70	57	69	

- 1) Time required to reduce the vacuum to a residual vacuum of -0.05 bar

Data sheet

Technical data – Electrical data, general							
Type		Without vacuum sensor	With vacuum sensor			OVEM-...-LK	
			OVEM-...-1P/1N	OVEM-...-1PD	OVEM-...-2P/2N		OVEM-...-PU/PI
Electrical connection		Plug M12x1, 5-pin					
Switching input to standard		IEC 61131-2					
Operating voltage range	[V DC]	20.4 ... 27.6					
Duty cycle	[%]	100					
Coil characteristics 24 V DC	[W]	Low-current phase: 0.3					
		High-current phase: 2.55					
Max. current consumption	[mA]	30	180	170	270	180	150 (270 in SIO mode)
Insulation voltage	[V]	50					
Surge resistance	[kV]	0.8					
Contamination level		3					
Reverse polarity protection		For all electrical connections					
Switching position indication		LED			LCD		

Pin allocation		
Plug M12x1, 5-pin	Pin	Meaning
	OVEM without vacuum sensor	
	1	Supply voltage +24 V DC
	2	Switching input for vacuum ON/OFF
	3	0 V
	4	No function
	5	Switching input for ejector pulse ON/OFF
	OVEM-...-1P/1N	
	1	Supply voltage +24 V DC
	2	Switching input for vacuum ON/OFF
	3	0 V
	4	Switching output (switching output for vacuum sensor)
	5	Switching input for ejector pulse ON/OFF
	OVEM-...-1PD	
	1	Supply voltage +24 V DC
	2	Digital output Out A (switching output for vacuum sensor)
	3	0 V
	4	Digital switching input (ejector pulse)
	5	Digital switching input (vacuum ON/OFF)
	OVEM-...-2P/2N/PU/PI	
	1	Supply voltage +24 V DC
	2	Digital output Out B (OVEM-...-2P/2N)
		Analogue output Out B (OVEM-...-PU/PI)
	3	0 V
	4	Digital output Out A (switching output for vacuum sensor)
	5	Digital switching input (vacuum ON/OFF and ejector pulse)
	OVEM-...-LK	
	1	Supply voltage +24 V DC
	2	Digital output Out B
3	0 V	
4	IO-Link communication or digital output Out A (switching output for vacuum sensor) ¹⁾	
5	Not allocated, or digital switching input (vacuum ON/OFF and ejector pulse) ²⁾	

1) After a fallback or in SIO mode, this pin has the configuration of a digital switching output.
 2) This pin is not allocated in IO-Link mode. After a fallback or in SIO mode, this pin has the configuration of a digital input.