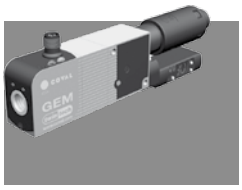
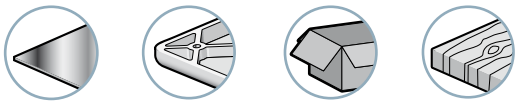
GEM series

twin tech
Integration & Intelligence

Vacuum pump with integrated pressure regulator



Applications



For all objects, porous or air-tight

Advantages

■ " All-in-one " solution, no more peripherals to be added.
■ Simplified installation and use thanks to the Plug & Play system
■ Strong suction rate: up to 385 Nl/min.
■ A GEM for every need: a wide range, many options, and only the necessary functions are chosen.
■ No clogging, thanks to the through-type silencer.
■ Controlled or timed blow-off.
■ Smart dialogue ➔ User friendly at all stages: initial settings, production, maintenance.

Compact integration

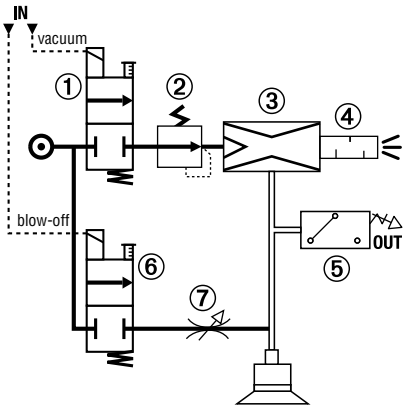
The illustrations below present the 7 functions integrated in the vacuum pump and their respective roles in operation.

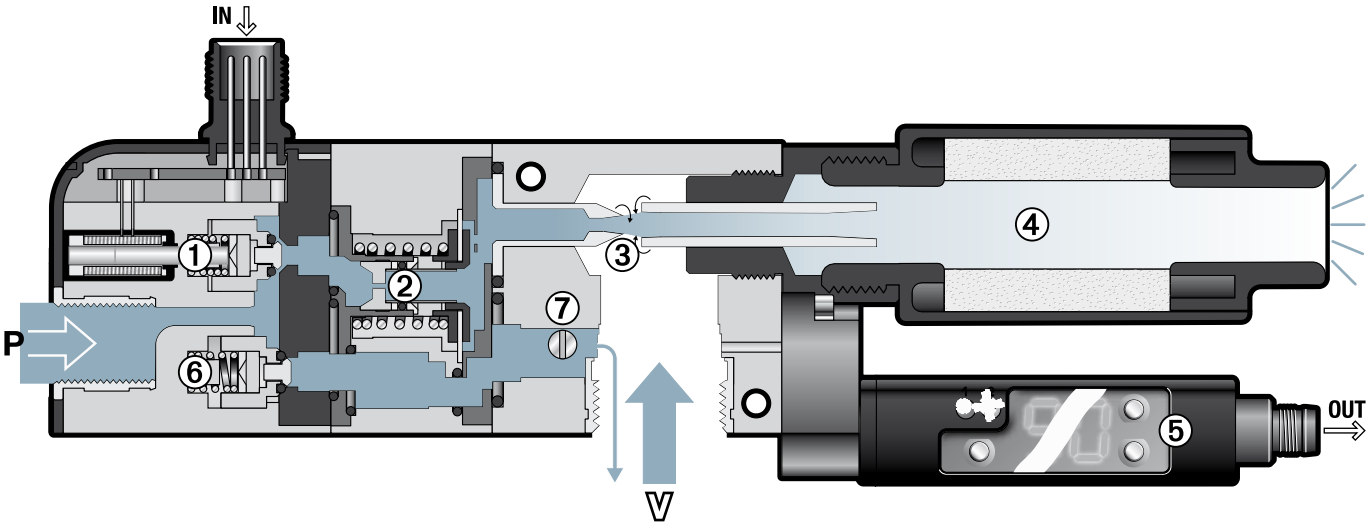
The result of COVAL's innovation is:
-**A compact vacuum pump** that is easy to install as close as possible to the vacuum pads in order to reduce the volume to purge➔ speed and energy savings.

- **A complete vacuum pump** (including integrated pressure regulator and clog-free silencer), therefore not requiring any additional function or connection.

INTEGRATED FUNCTIONS

1. Solenoid valve"vacuum"
2. 3.5 bar Pressure regulator
3. 3.5 bar optimized Venturi
4. Clog-free silencer
5. Electronic vacuum switch
6. Solenoid valve "blow-off"
7. Blow-off flow adjustment



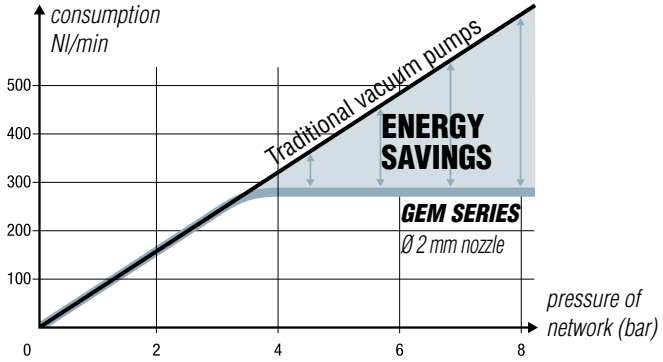


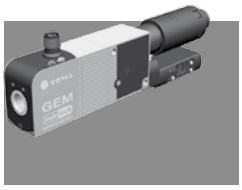
Integrated Regulation

The 4-8 bar air network is automatically reduced internally, to 3.5 bar, the optimum pressure for the venturi - Two key advantages:

1- Energy savings
The adjacent graph shows this savings in air consumed, for any network at a pressure higher than 4 bar.

2- Integrated clog-free silencer
At the venturi exhaust, the pressure does not depend on the air network pressure. Totally controlled, it allows for the integration of an open silencer: this silencer is clog-free, thus requiring no maintenance.



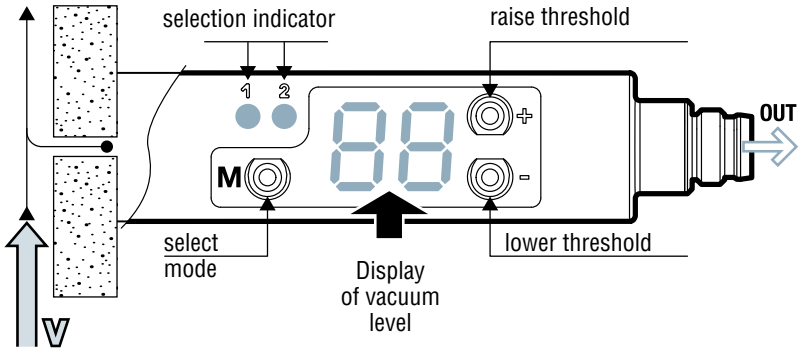


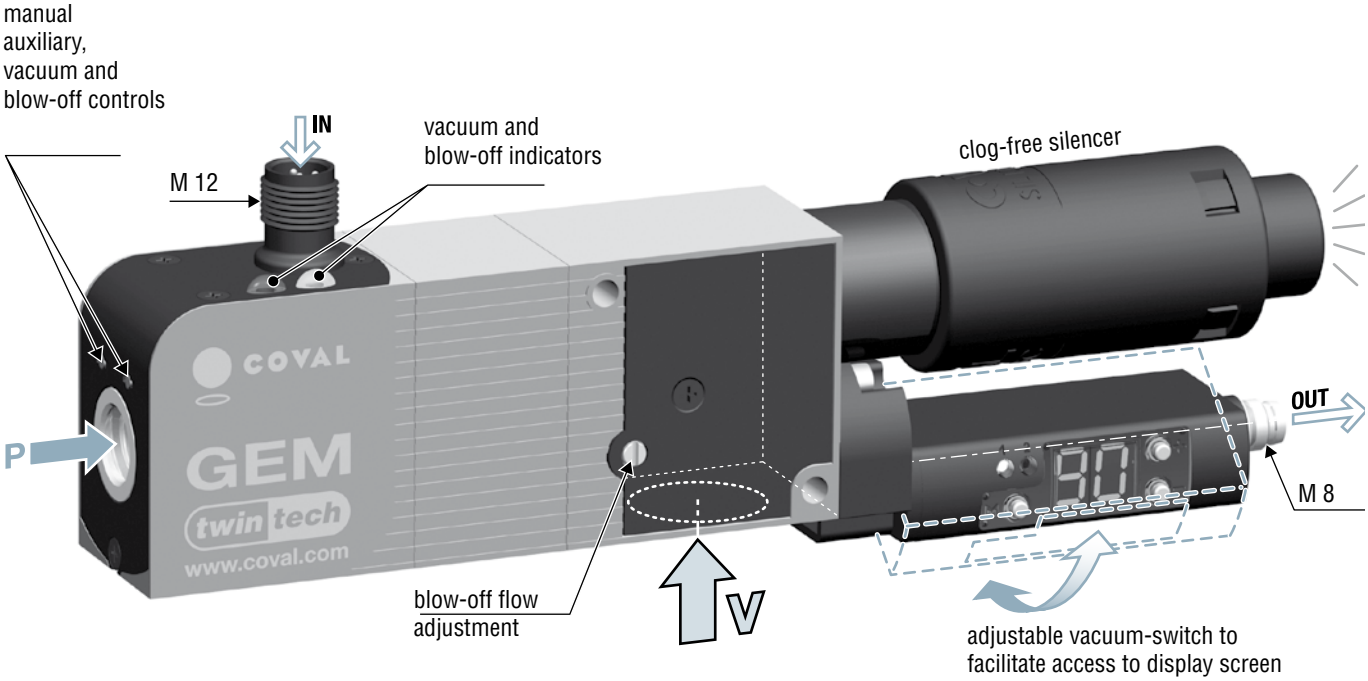
Programmable vacuum switch with display

In its version with electronic vacuum switch with display, GEM presents a particularly high-performance smart dialogue.

The vacuum switch (figure opposite) measures the vacuum level measured at the input V connected to the vacuum pads and operates it as follows:

- Real-time display for monitoring production.
- Adjustment of the vacuum level generating the "object gripped" signal allowing operations to continue.





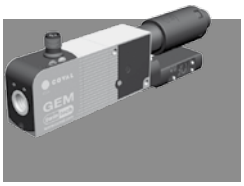
Adjustable face for easy access

Mounted as close as possible to the vacuum pads, the GEM vacuum pump can take on various positions.

Depending on the position selected for the pump, the vacuum switch can be oriented so as to optimize access to its display screen. The different orientations possible are described (p. 9/19).

GEM series

Selection guide



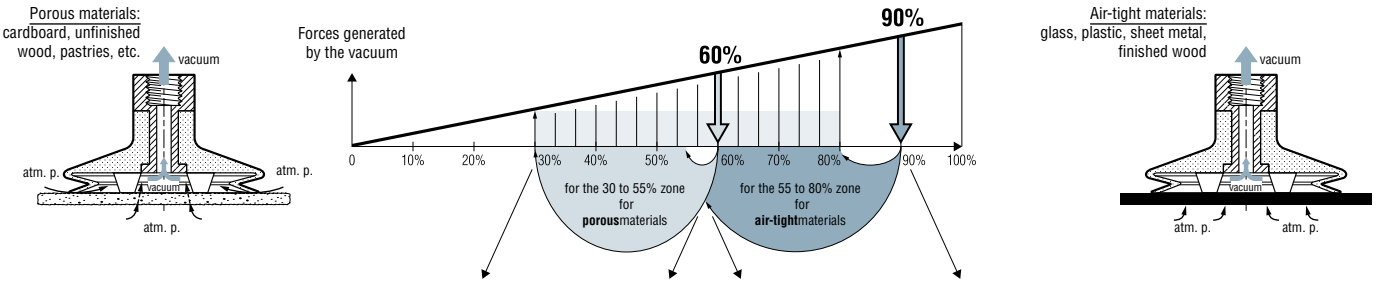
1- Select "maximum vacuum level / nozzle diameter"

The introductory guide in this catalogue shows that for porous objects, a 30-55% vacuum is economical and effective. This is obtained with a 60% maximum vacuum pump.

The table below helps to select the basic nozzle diameter which generates enough vacuum flow to respond in the time required by the application, based on a measurement of the material's leakage rate.

On the contrary, with air-tight objects, the economical and effective vacuum used is 55% to 80%, obtained by a 90% max. vacuum pump.

The table below then helps to select the nozzle diameter which generates enough vacuum flow to respond in the time required by the application.



Porous objects ▸ maximum vacuum level: 60%

Time to create vacuum *(seconds)* for a volume of 1 liter								Air consumed *(Nl/min)*	Air drawn in *(Nl/min)*
vacuum achieved / *ø nozzle*		30%	35%	40%	45%	50%	55%		
also see LEM	1.2 mm	0.35	0.43	0.55	0.72	0.9	1.09	65	72
	1.5 mm	0.23	0.25	0.36	0.46	0.59	0.73	97	110
	2 mm	0.13	0.16	0.21	0.27	0.34	0.42	179	189
	2.5 mm	0.09	0.11	0.14	0.18	0.24	0.31	260	275
	3mm	0.07	0.08	0.10	0.13	0.17	0.22	385	385

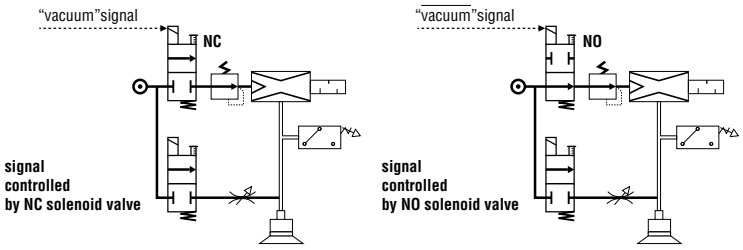
Air-tight objects ▸ maximum vacuum level: 90%

Time to create vacuum *(seconds)* for a volume of 1 liter								Air consumed *(Nl/min)*	Air drawn in *(Nl/min)*
vacuum achieved / *ø nozzle*		55%	60%	65%	70%	75%	80%		
also see LEMAX	1.2 mm	1.01	1.19	1.40	1.62	1.98	2.37	65	50
	1.5 mm	0.66	0.73	0.93	1.08	1.33	1.59	97	75
	2 mm	0.38	0.46	0.55	0.65	0.80	0.95	179	125
	2.5 mm	0.26	0.30	0.35	0.41	0.50	0.59	260	200
	3mm	0.21	0.24	0.28	0.33	0.40	0.48	385	245

2- Select vacuum controlled by NC solenoid valve or NO solenoid valve

The vacuum controlled by the NC (Normally Closed) solenoid valve remains the simplest standard option to use. In the event of an electricity shut-off, the vacuum is interrupted and the object is released.

Select vacuum controlled by NO (Normally Open) solenoid valve if the application requires holding the object in the event of an electricity shut-off. In this case, make sure to control the NO solenoid valve with the inverse signal the “vacuum”signal, which is noted as “$\overline{\text{vacuum}}$”.

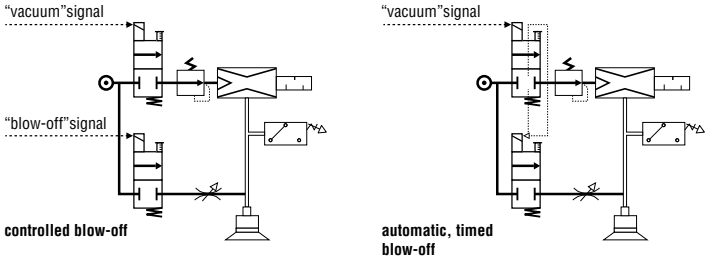


3- Select blow-off control

The GEM range offers a choice between 2 types of blow-off control:

- **Controlled blow-off**
  A specific signal controls blow-off, out of 2 control signals, “vacuum” and “blow-off” .
- **Automatic, timed blow-off**
  Interruption of the”vacuum” signal automatically triggers blow-off, the duration of which is adjustable from 0 to 3 seconds.

In both cases, flow is adjustable by a screw

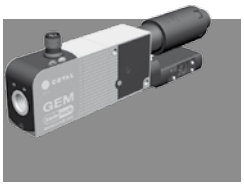


4- Select a vacuum-switch type

In addition to the electronic vacuum switch with display that supplies the full smart dialogue described on the previous page, the GEM range offers a selection of simplified vacuum switches for certain applications ➔see their descriptions p. 9/19.

GEM series

Configuring a vacuum pump



Composite part numbers

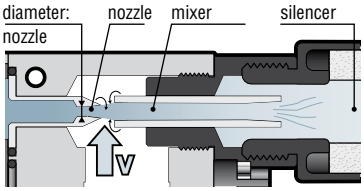
GEM	90	X	12	S								VA

VACUUM LEVEL

maximum 60% vacuum optimum for porous objects	**60**
maximum 90% vacuum optimum for air-tight objects	**90**

NOZZLE DIAMETER

ø **1.2 mm nozzle**	**12**
ø **1.5 mm nozzle**	**15**
ø **2 mm nozzle**	**20**
ø **2.5 mm nozzle**	**25**
ø **3 mm nozzle**	**30**

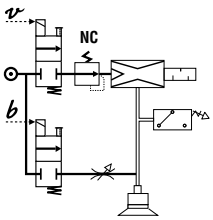
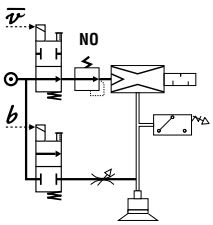
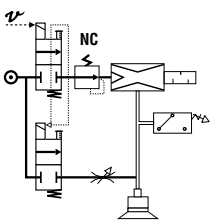
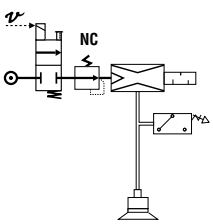
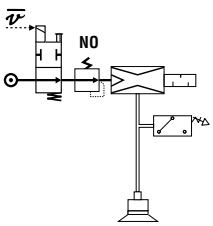


Venturi: max. vacuum level and nozzle diameter.

The stream of compressed air draws on ambient air, which generates the vacuum.

- The mixer determines the maximum vacuum level: 60% or 90%.
- The nozzle diameter determines the power expressed in vacuum flow rate and in air flow consumed, on the tables on the previous page.

COMPOSITION OF THE MODULE

S	■ Vacuum controlled by an NC solenoid valve ■ Controlled blow-off ➔ 2 control signals	
V	■ Vacuum controlled by an NO solenoid valve ■ Controlled blow-off ➔ 2 control signals	
T	■ Vacuum controlled by an NC solenoid valve ■ Automatic, timed blow-off ➔ 1 single control signal	
R	■ Vacuum controlled by an NC solenoid valve ■ No blow-off ➔ 1 single control signal	
U	■ Vacuum controlled by an NO solenoid valve ■ No blow-off ➔ 1 single control signal	

VACUUM SWITCH

VA	**Electronic vacuum switch with display** 2 outputs on M8 connector
VB	**Electronic vacuum switch** 1 output on M8 connector
VC	**Vacuum switch with electrical contact** 1 output on M12 connector
VO	**No vacuum switch**

COMPLETE REFERENCE EXAMPLES:

GEM60X30SVA

GEM vacuum pump, 60% max. vacuum, 3 mm nozzle diameter, vacuum controlled by NC solenoid valve and blow-off controlled by external signal, electronic vacuum-switch with display.

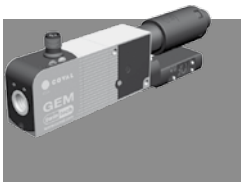
GEM90X20VVA

GEM vacuum pump, 90% max. vacuum, 2mm nozzle diameter, vacuum controlled by NO solenoid valve and blow-off controlled by external signal, electronic vacuum-switch with display.

GEM series

Characteristics and dimensions

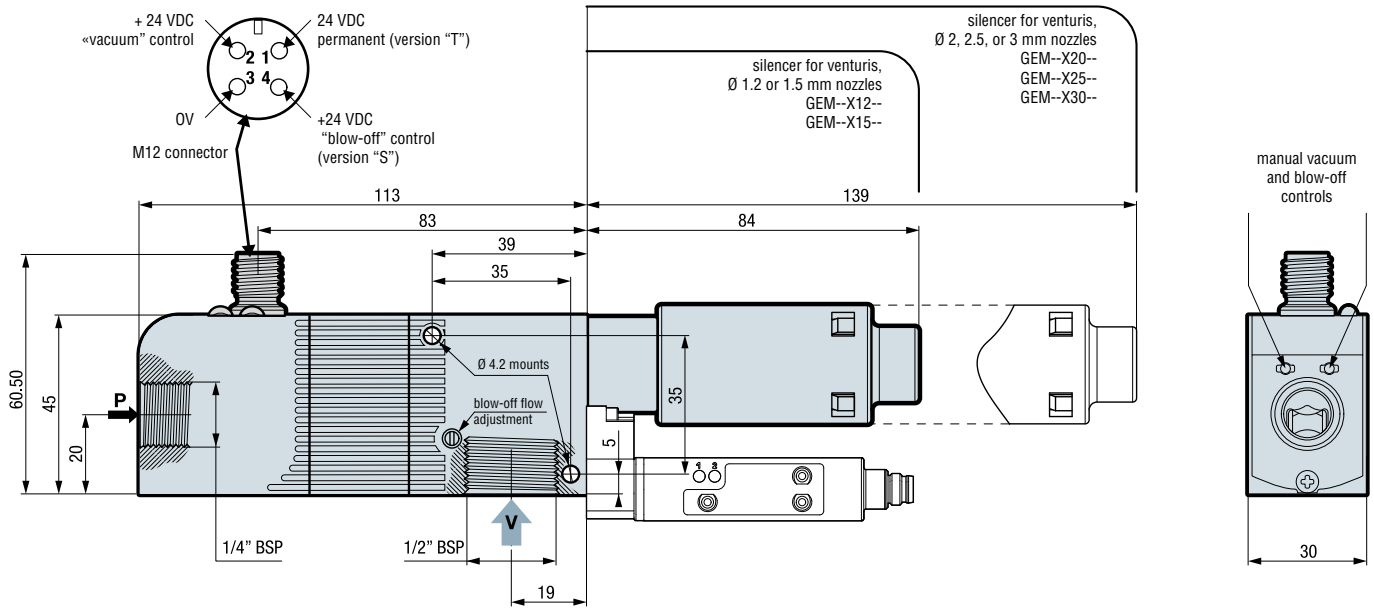
(excluding vacuum switch)



Overall Characteristics

- Supply: non-lubricated air filtered to 5 microns according to standard ISO 8573-1 class 4.
- Electrical protection level: IP65.
- Optimum operating pressure: 4 to 8 bar.
- Blow-off: - network supply pressure,
  - adjustable flow
- Maximum vacuum: 60% or 90% depending on model.
- Suction rate: 50 to 385 Nl/min depending on model.
- Air consumption: 65 to 385 Nl/min depending on model.
- Noise level: depending on the nozzle diameter selected:
  - ø 1.2, 1.5, and 2mm nozzle → 57 dBA
  - ø 2.5 mm nozzle → 65 dBA
  - ø 3 mm nozzle → 67 dBA
- Control voltage: 24 V DC (regulated ± 10%).
- Current draw: 30 mA (0.7 W) vacuum or blow-off.
- Max. operating frequency: 2 Hz.
- Number of operations: 10 million cycles.
- Weight: 250 g (depending on version).
- Materials: PA 6-6 15% FV, POM, PC 15% FV, brass, aluminum, NBR.
- Operating temperature: 10 to 60 °C

Dimensions and connections

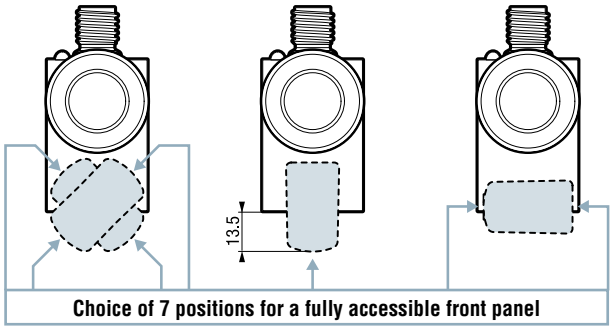


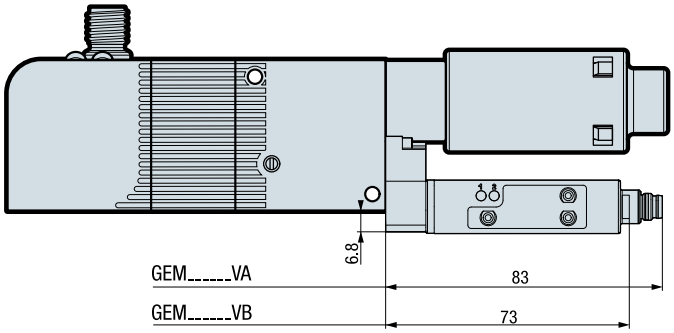
Note: Straight and angled M8 and M12 connectors shown (p. 8/14).

GEM series

Vacuum switch functions and connections

1 - Modules with electronic indexable vacuum switch GEM------**VA** or GEM------**VB**



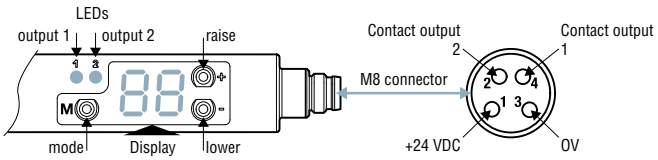


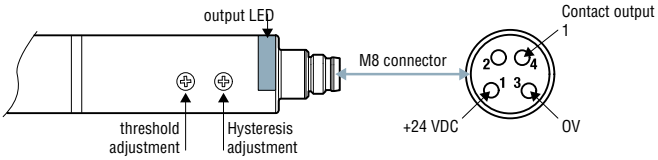
VACUUM SWITCH WITH DISPLAY, 2 OUTPUTS, GEM------VA

- compatible fluids: non-corrosive gas, dry, non-lubricated air.
- measuring range: -1 ... 0 bar
- hysteresis: configurable from 0 to 99%.
- maximum overpressure:: 3 bar.
- repetitivity: +/- 1% of the range.
- output thresholds: 2 x NO / NC.
- switching power: 125 mA transistor PNP
- threshold status display: 2 x LEDs.
- display unit: % vacuum (2 digits).
- Electrical connection: M8 (4 pins).
- supply voltage: 18 - 30 VDC (regulated).
- current draw: < 100 mA.
- protection level: IP65.
- working temperature: 0 to 50 °C

ELECTRONIC VACUUM SWITCH, 1 OUTPUT, GEM------VB

- compatible fluids: non-corrosive gas, dry, non-lubricated air.
- measuring range: -1 ... 0 bar
- hysteresis: configurable from 0 to 30%.
- maximum overpressure: 3 bar.
- repetitivity: +/- 1% of the range.
- output thresholds: 1 x NO.
- switching power: 125 mA transistor PNP
- threshold status display: 1 x LED.
- Electrical connection: M8 (4 poles).
- supply voltage: 18 - 30 VDC (regulated).
- current draw: < 20 mA.
- protection level: IP50.
- working temperature: 0 to 50 °C

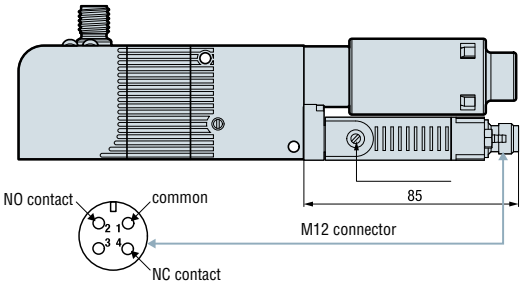




2 - Modules with electrical contact vacuum switch GEM------**VC**

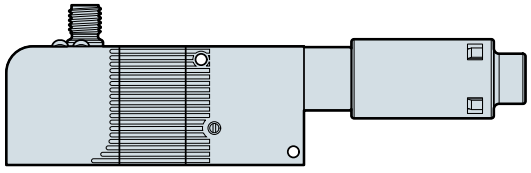
CONTACT VACUUM SWITCH, GEM------VC

- compatible fluids: non-corrosive gas, dry, non-lubricated air.
- measuring range: -350 to -850 mb.
- hysteresis: 125 mb.
- maximum overpressure: 2 bar.
- repetitivity: 3% of the range.
- output thresholds: 1 x NO, 1 x NC.
- switching power: 3 A (breaker)-
- Electrical connection: M12 (4 poles).
- supply voltage: up to 125 V.
- protection level: IP40.
- working temperature: -10 to 50° C.
- number of operations: 5 million cycles.
- maximum throughput: 30 cycles per minute.



3 - Modules without vacuum switch GEM------**V0**

This model without vacuum switch must be accompanied by an independent vacuum switch on the vacuum circuit or a vacuum gauge for manually-controlled vacuum capacity.

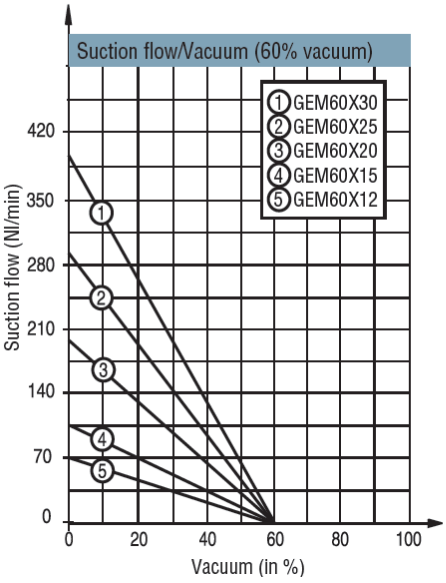


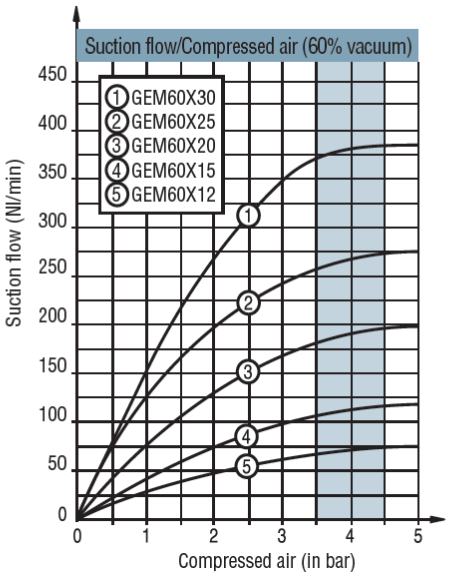
Note:

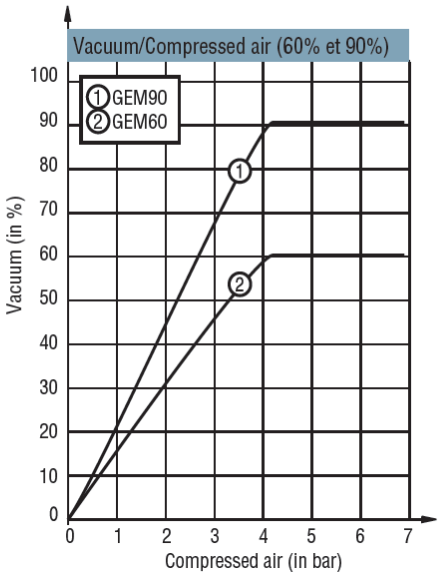
Screw-on electrical connectors, straight and angled M8 and M12 shown (p. 8/14).

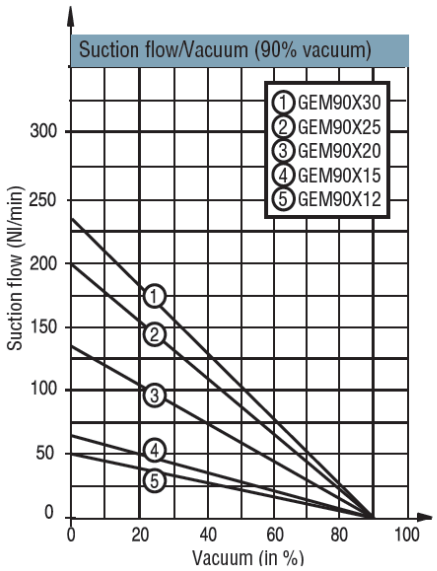
Curves

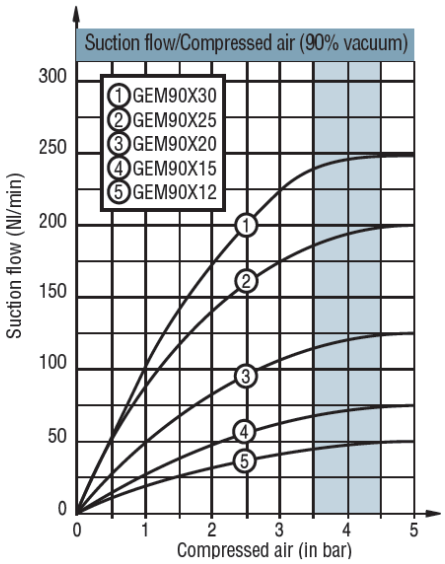
Curves

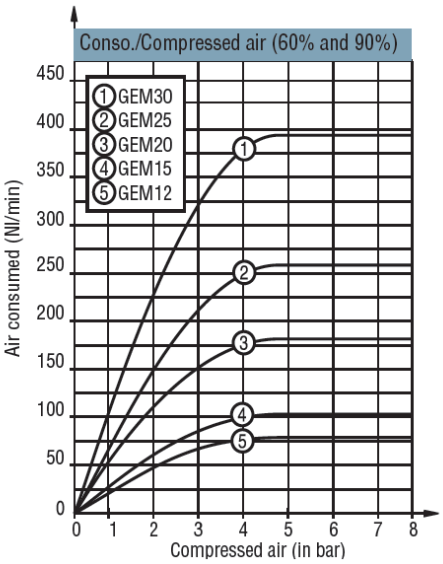












The range of modular and intelligent vacuum pumps

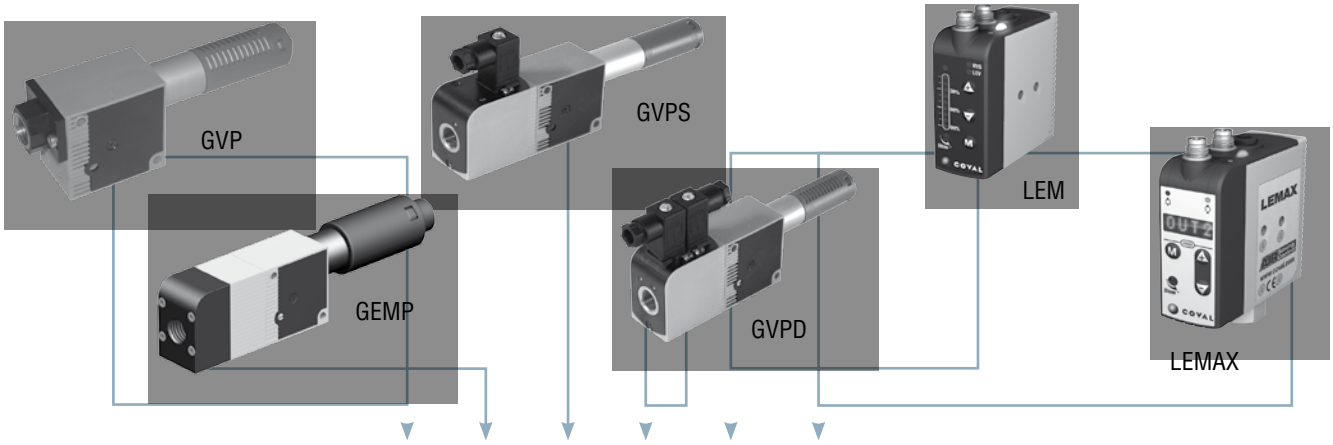
Advantages

- Reduced energy consumption
- Reduced noise levels
- Increased life expectancy
- Can be adapted to all branches
- Technical development of the Coval valve resulting from technological advances in aerospace and automotive applications.

New optimized fluidics

The COVAL range of modular vacuum pumps operates with a pressure supply of 4 bar.

Developed by COVAL over the years, this range is the result of research and optimized technical solutions. Thanks to the new fluidics, this range of vacuum pumps offer an optimized performance.



Model	MODULAR VACUUM PUMPS				INTELLIGENT VACUUM PUMPS					
	GVP	GEMP	GVPS	GVPD	LEM	LEMAX	GEM	GVMAX--V3	GVMAX--V2	GVMAX
Compressed air control (Suction)			■	■	■	■	■	■	■	■
Blow-off control				■	■	■	■	■	■	■
Integrated pressure regulator		■			■	■	■	■		
Powerful blow-off						■		■		
Electronic vacuum switch with display	□	□	□	□	■	■	■	■	■	■
Electronic vacuum switch	□	□	□	□	■	■	■			
Vacuum switch with electrical contact	□	□	□	□			■			
Vacuum check-valve	□		□	□	□	■	□	■	■	■
Electric control			■	■	■	■	■	■	■	■
Pneumatic control										■
Twin Tech (Integration & Intelligence)					■	■	■	■		
ASC (Air saving Control)						■				
Automatic vacuum regulation						■		■	■	■
M8 connections					■	■				
M12 connections							■	■	■	

■: Standard or integrated □ : Option