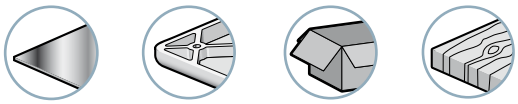
LEM series

twin tech
Integration & Intelligence

Mini integrated-vacuum pump with smart dialogue

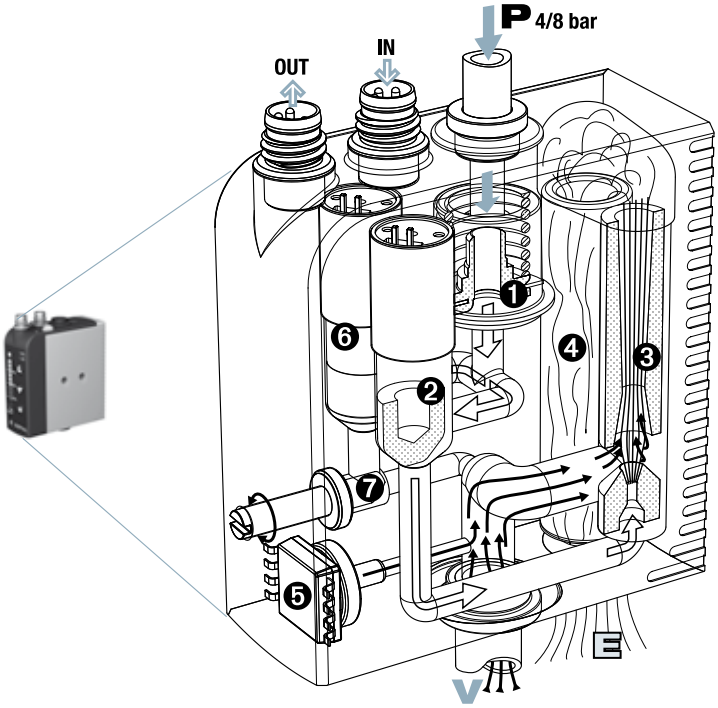
Applications



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
■ Unequalled compactness: Installation very close to the suction pads ➔ speed, energy savings.
■ No clogging, thanks to the through-type silencer.
■ A LEM for every need: a wide range, with many options.
■ Smart dialogue ➔ user friendly at all stages: initial settings, production, maintenance.



Compact integration

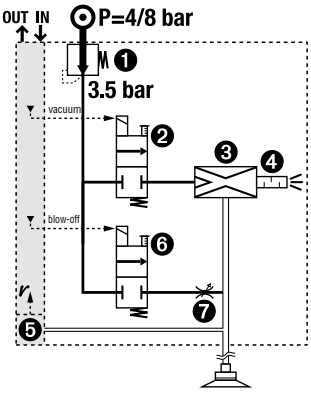
The illustrations opposite present the 7 functions integrated in the mini-module, and their respective roles in operation.

The result of this COVAL performance is:

- **A mini module** (≅ 120 g) that is easy to install as close as possible to the suction pads in order to reduce the volume to be emptied ➔ speed and energy savings.
- **A complete module** (including integrated pressure regulator and clog-free silencer), therefore not requiring any additional function or connection.

INTEGRATED FUNCTIONS

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

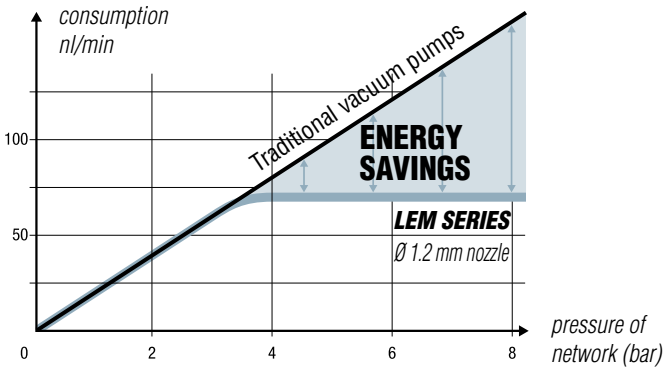


Integrated Regulation

The 4-8 bar air network is automatically reduced internally, to 3.5 bar, the optimal 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.



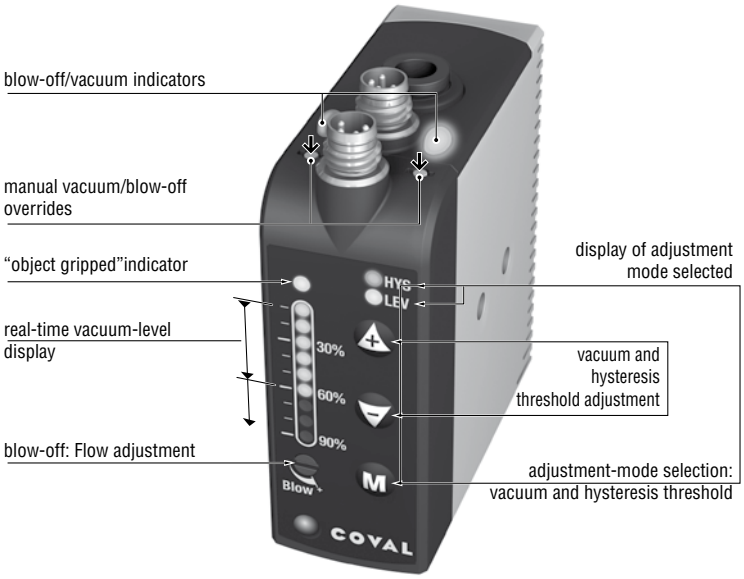
LEM series

Smart Dialogue
Stand-alone and Island Modules

Smart Dialogue

The dialogue front panel shown opposite displays the real-time vacuum level and lets the operator set the level which triggers the “object gripped” signal allowing operations to continue.

This communications front panel is particularly visual and intuitive. It makes it easy to monitor production by viewing each of the phases of the cycle: vacuum, blow-off, and rest.



Stand-alone or island modules?

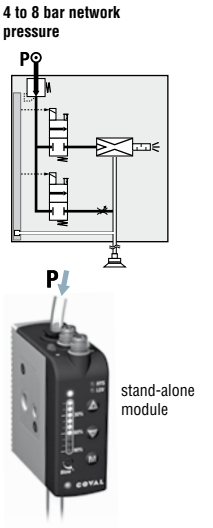
Stand-alone modules are suitable for the most common applications; one module controls one or more suction pads which all operate according to the same sequence.

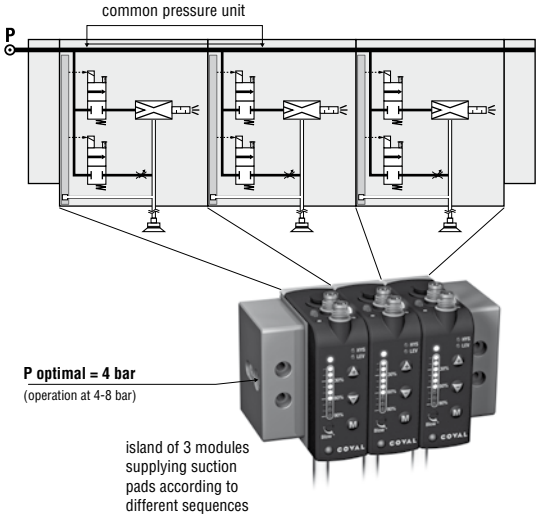
When several suction pads are operating according to different sequences, multiple modules are required, which can be:

- several stand-alone modules, OR
- an island of these modules with an internal common pressure unit.

The adjacent illustrations help in the selection:

- Stand-alone modules are complete, with the integrated pressure regulator (see p 9/2)
- in an island, the integrated regulator is absent: to maintain the advantage of economical and silent operation, it is recommended to reduce the pressure to the island's common pressure unit to 4 bar.





LEM series

Selection guide

LEM: versatile series for all applications

The opposite page demonstrates the versatility of this series. In addition to a very wide range of complete, stand-alone, or island vacuum pumps, there are the options of no blow-off and/or no vacuum switch, and for specific applications.

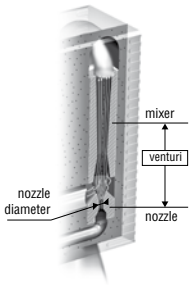
1- Select “vacuum level / nozzle diameter”

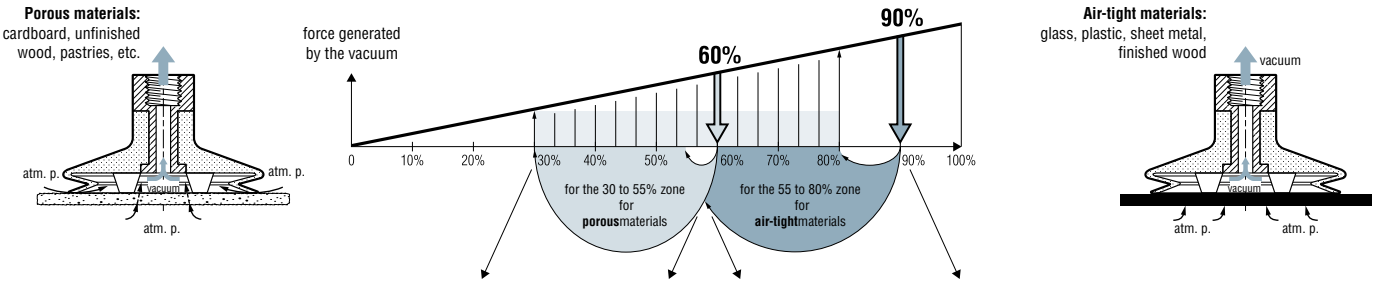
The introductory guide in this catalogue shows that for porous objects, a 30-55% vacuum is economical and effective. This is obtained with a 60% maximum vacuum pump.

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

On the contrary, with an air-tight material, the vacuum used is 55% to 80%, obtained by a 90% max. vacuum pump.

- For standard cases, with integrated blow-off the LEMAX series is preferable, and more economical due to its ASC (Air Saving Control) function ➔ see p. 9/8 to 9/13
- For special cases, the LEM series contains versions without blow-off and versions without vacuum switch. The table below helps to select the nozzle diameter required for 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%		
1.0 mm	0.66	0.83	1.04	1.31	1.70	2.35	**44**	**38**
1.2 mm	0.41	0.52	0.66	0.83	1.07	1.49	**65**	**72**
1.4 mm	0.27	0.34	0.43	0.54	0.70	0.97	**90**	**92**

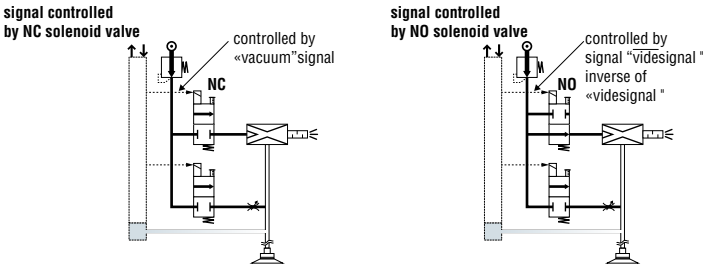
Airtight objects ▸ maximum vacuum level: 90%

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%		
1.0 mm	1.76	2.04	2.38	2.80	3.33	4.09	**44**	**29**
1.2 mm	1.13	1.31	1.53	1.80	2.15	2.64	**65**	**45**
1.4 mm	0.73	0.85	0.99	1.16	1.38	1.70	**90**	**70**

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 shutoff, 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 with or without integrated blow-off

Many applications require integrated blow-off. However, for some applications not requiring blow-off, a simplified version without blow-off is offered.

4- Select with or without vacuum switch

For common applications, the vacuum switch is needed, with the dialogue face for digital display and adjustment ➔ see page p.9/3

However, some applications may just require a simple operation, without an “object gripped” return signal. The simplified version may then be chosen, with no vacuum switch, display, or adjustment.

LEM series

Configuring a vacuum pump

Reference composed of an assembled island or components for an island to be assembled

Reference composed of a stand-alone module

LEM	60	X	12	S	VA		B3

VACUUM LEVEL

60% max. vacuum ➔porous objects	60
90% max. vacuum ➔air-tight objects	90

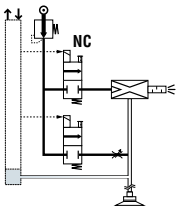
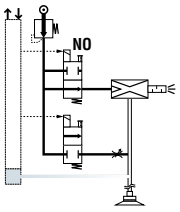
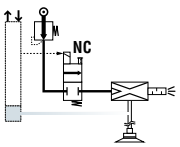
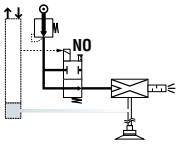
NOZZLE DIAMETER

ø 1.0 mm nozzle	10
ø 1.2 mm nozzle	12
ø 1.4 mm nozzle	14

VACUUM SWITCH

VA	■ Electronic vacuum switch with digital display and adjustment	
VO	■ No vacuum switch and no adjust-ment	

COMPOSITION OF THE MODULE

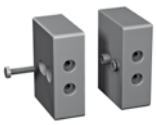
S	■ Vacuum controlled by NC solenoid valve ➔ if the electricity is shut off, the vacuum is interrupted. ■ Blow-off controlled by a specific signal	
V	■ Vacuum controlled by NO solenoid valve ➔ vacuum is maintained if electricity is shut off ■ Blow-off controlled by a specific signal	
R	■ Vacuum controlled by an NC solenoid valve ■ No blow-off	
U	■ Vacuum controlled by an NO solenoid valve ■ No blow-off	

ISLAND ASSEMBLIES

B2		LEM_X_____**B2** island assembly with 2 identical modules.
B3		LEM_X_____**B3** island assembly with 3 identical modules.
B4	...	

If the planned island contains different module types, it must be delivered as separate components in order to then be assembled on site according to the arrangement suitable to the application.

COMPONENTS FOR THE ISLAND TO BE ASSEMBLED

B		LEM_X_____**B2** Module that can be grouped (complete with integrated grouping screw)
		Set of ends for a complete group, with grouping screw and common pressure unit plug. **REF : LEMSETA**

EXAMPLE COMPOSITE PART NUMBER FOR AN ISLAND ASSEMBLY:

■ **LEM60X14SVAB3**

LEM island assembly, containing 3 x 60% max. vacuum modules, ø 1.4 mm nozzle, controlled by NC solenoid valve, blow-off and vacuum switch

ORDER EXAMPLE FOR AN ISLAND TO BE ASSEMBLED:

■ **LEM60X10VVAB**
■ **LEM90X12SVAB**
■ **LEM60X14SVAB**

→ 3 LEM modules for a group, of different types.

■ **LEMSETA** → Set of ends for island.

REFERENCE EXAMPLE COMPOSED OF A STAND-ALONE MODULE:

■ **LEM60X12SVA**

Stand-alone LEM Module, 60% max. vacuum, ø 1.2 mm nozzle, vacuum controlled by NC solenoid valve, blow-off and vacuum switch.

Additional options: On request:

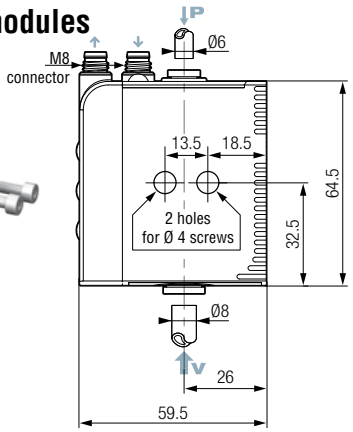
■ Modules with enhanced blow-off by integrated isolation valve
➔ see operation in the LEMAX chapter.
■ Modules with check valve will maintain vacuum in the event of a loss of pneumatic and/or electrical power, during the grip cycle.

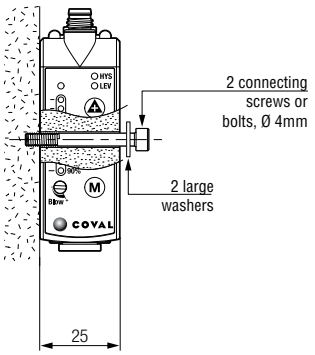
LEM series

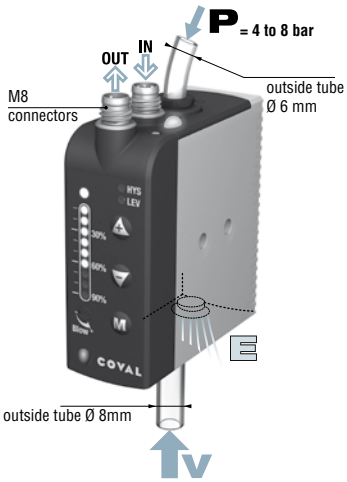
Dimensions
Mounting options

1- Stand-alone modules

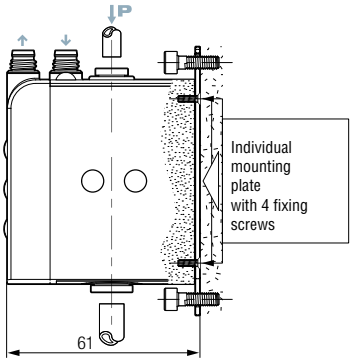
Side mounting

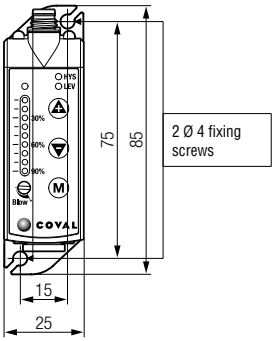






Front mounting

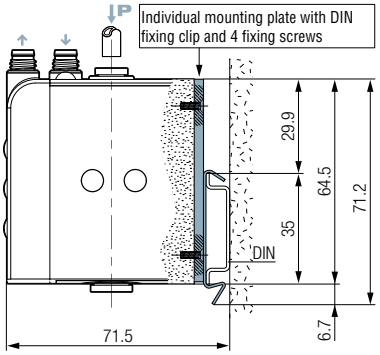


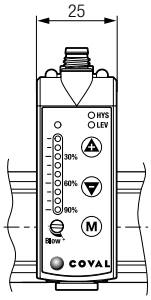


For front mounting, order the necessary kit, in addition to the module:

Front mounting kit: 1 plate + 4 screws
REF: LEMFIXA

Mounting on DIN rail



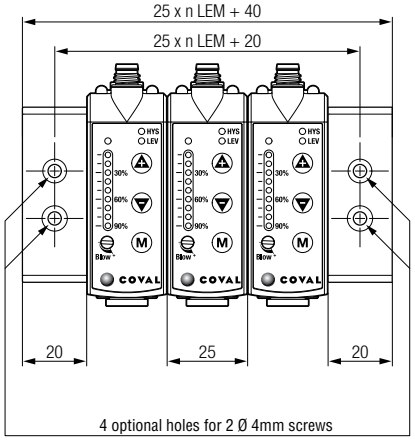


A module can be clipped onto a DIN rail.

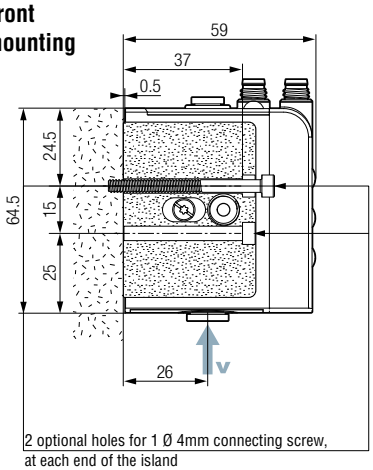
For this purpose, the module must first be equipped with an individual DIN installation plate, ordered separately:

DIN rail mounting kit: 1 plate/clip + 4 screws
REF: LEMFIXB

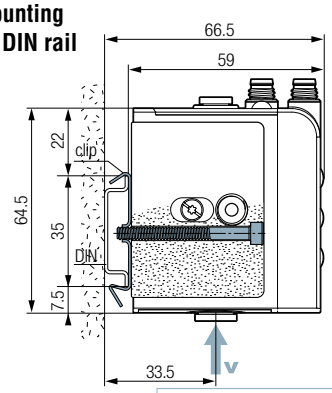
2- Islands



Front mounting



Mounting on DIN rail



DIN rail mounting kit: 2 clips + 4 screws
REF: LEMFIXC

LEM series

Characteristics
Assembling an island

Overall Characteristics

- Supply: non-lubricated air filtered to 5 microns according to standard ISO 8573-1 class 4.
- Operating pressure: 4 to 8 bar.
- Blow-off: adjustable flow.
- Maximum vacuum: 60% or 90% depending on model.
- Suction rate: 29 to 92 Nl/min depending on model.
- Air consumption: 44 to 90 Nl/min depending on model.
- Electrical protection level: IP65.
- Control voltage: 24 V DC (regulated ± 10%).
- Current draw: 30 mA (0.7 W) vacuum or blow-off.
- Max. operating frequency: 4 Hz.
- Endurance: 10 million cycles.
- Weight: 80 to 120 g, depending on model.
- Operating temperature: 10 to 60 °C.
- Materials: PA 6-6 15 %FV, brass, aluminium, NBR.

Integrated vacuum-switch characteristics

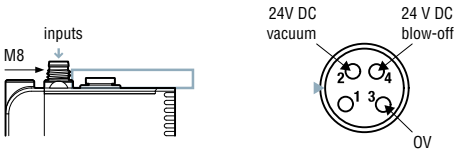
- Measuring range: -1 to 0 bar.
- Precision: ± 1.5% of the range.
- Hysteresis: adjustable from 0% to 100%.
- Output threshold: 1 x T.O.R. in NO.
- Analogue output: 1 V DC to 5 V DC on the measuring range.
- Switching power: 125 mA, PNP.
- Threshold status display: 1 green LED.
- Supply voltage 24V DC (regulated ± 10%).
- Current draw: < 20 mA.
- Protection: against polarity inversions.

Integrated-silencer characteristics

- Noise level: approximately 60 dBA.
- Clog-free silencer.

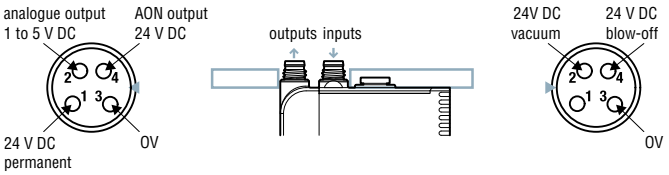
Electrical connections

MODULES WITHOUT VACUUM-SWITCH FUNCTION



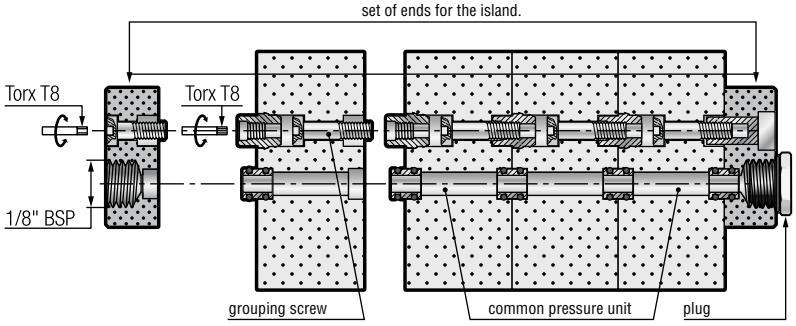
Note: straight and angled M8 connectors shown (p. 8/20)

MODULES WITH VACUUM-SWITCH FUNCTION

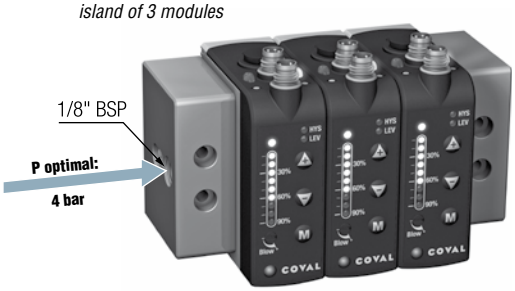


Characteristics and connecting an island

island of 4 modules



island of 3 modules



Maximum number of modules in an island:

- ø 1.4 mm nozzle➔ 5 modules
- ø 1.2 mm nozzle➔ 7 modules
- ø 1 mm nozzle ➔ 9 modules

Note:

In the same island, it is possible to combine LEM series modules and LEMAX series modules.

The range of modular and intelligent vacuum pumps

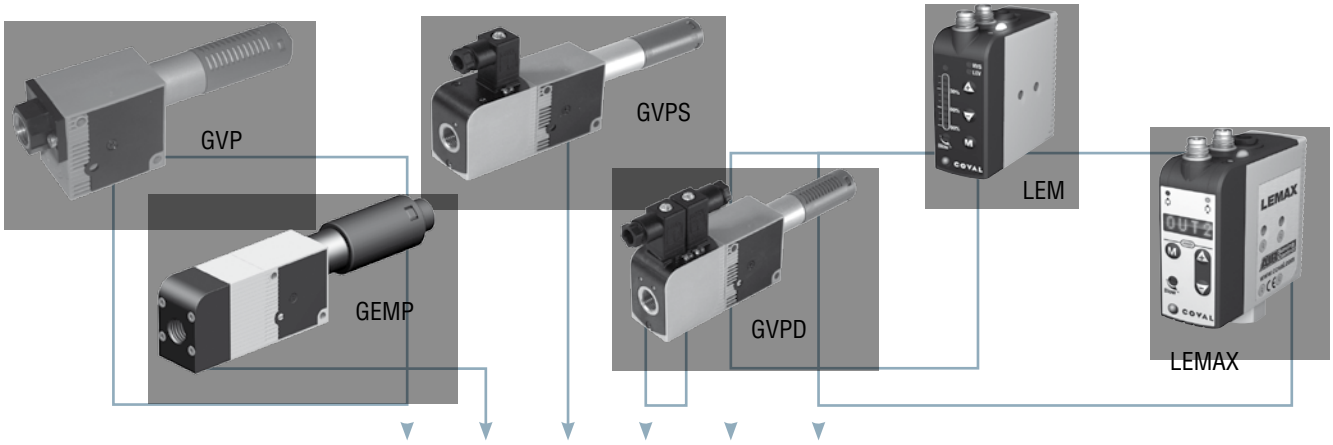
Advantages

- 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