

COVAL

vacuum managers

LEM

Integrated Mini Vacuum Pumps with "ASR"



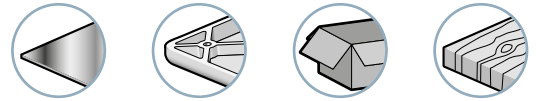
AIR Saving
Regulator

ADVANCED VACUUM SOLUTIONS

Integrated Mini Vacuum Pumps with ASR (Air Saving Regulator)



Industry-specific applications



For all objects, porous or airtight

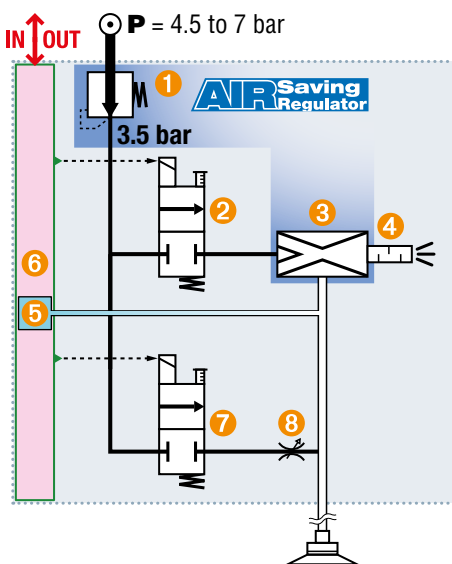
Advantages

- "All-in-one" solution, no more peripherals to be added.
- Simplified installation and use thanks to the Plug & Play system
- Unmatched compactness: Installation close to suction cups → short response times and 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, operation, maintenance.

Compact Integration

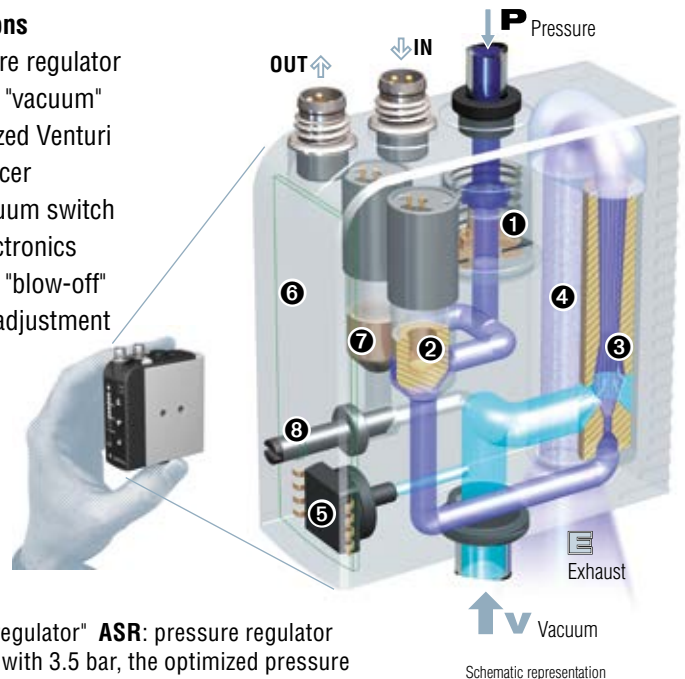
The illustrations below demonstrate the 8 functions integrated in the mini-module, and their respective roles in operation. The result of this COVAL innovation is:

- **A mini module** (≅ 120 g) that is easy to install close to the suction cups, reducing the volume to be evacuated → increased 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 Integrated electronics
- 7 Solenoid valve "blow-off"
- 8 Blow-off flow adjustment



Combined "venturi regulator" **ASR**: pressure regulator 1 feeds venturi 3 with 3.5 bar, the optimized pressure for its operation.

→ **No more unnecessary consumption of compressed air.**



40% Energy savings

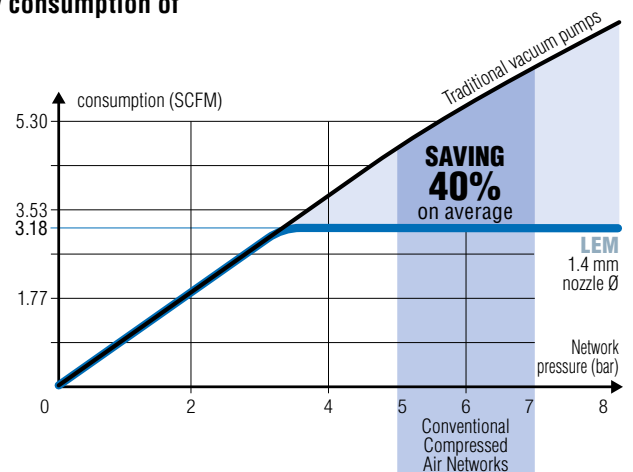
AIR Saving Regulator (ASR): Air Saving Regulator

The LEM vacuum pumps, which integrate an **ASR** "venturi regulator" combination, maintain ideals that COVAL values greatly: reducing both compressed air consumption and noise generation.

Regardless of pressure supplied by the compressed air network, the integrated regulator feeds the venturi at **3.5 bar** pressure, optimal for its operation.

- No more unnecessary energy consumption.
- No external regulator required and thus the risk of inadvertent misadjustment is eliminated.

Compared to pressures found in most compressed air networks (5-7 bar), the graph opposite demonstrates an achieved economy of 40% on average.





A Complete Line

- 4 basic configurations, see adjacent illustrations →
- 2 levels : 60% and 85% vacuum.
- 3 standard nozzle diameters: 1, 1.2 and 1.4 mm.
- Air suction flow : up to 3.25 SCFM.
- Other options on request.

with vacuum switch, display and setting

without vacuum switch



with blow-off
(LEM__X__SVA)

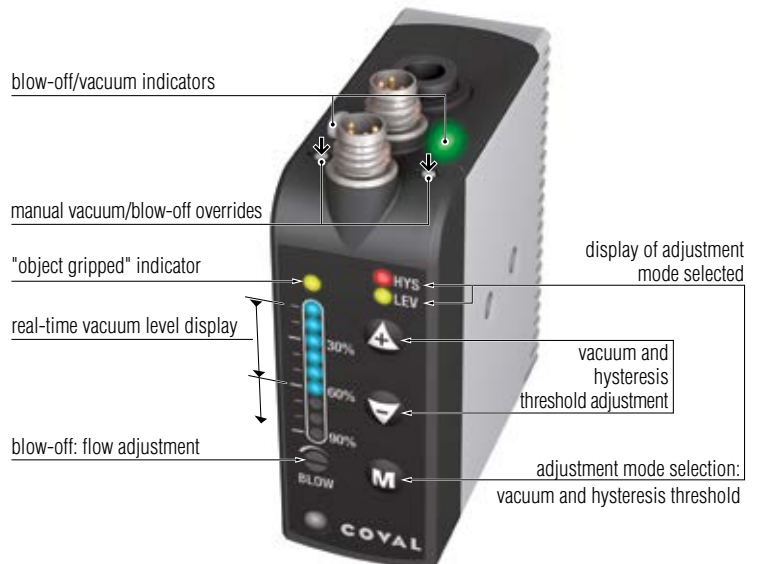
without blow-off
(LEM__X__RVA)

with blow-off
(LEM__X__SVO)

without blow-off
(LEM__X__RVO)

Smart Dialogue

The front dialogue panel shown here displays the real-time vacuum level and lets the operator set the threshold level which triggers the "object gripped" signal allowing operations to continue. This communications 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.



Mounting Options

Individual mountings, close to vacuum cups or compact island assembly.

side mounting



front mounting



over a DIN rail



island mounting





Stand-alone or Island Modules?

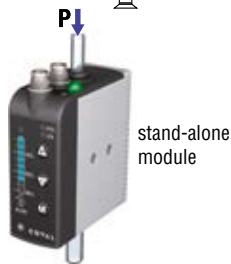
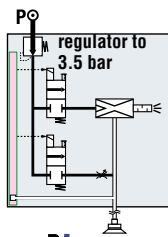
Stand-alone modules are suitable for the most common applications; one module controls one or more suction cups which all operate according to the same sequence. When several suction cups are operating according to different sequences, multiple modules are required, which can be:

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

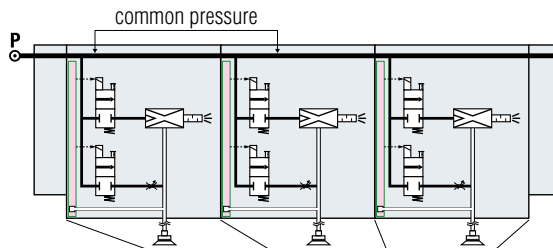
The diagrams help in the selection:

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

4.5 to 7 bar network pressure



network pressure 4 bar



P optimal = 4 bar
(operation at 4-7 bar)



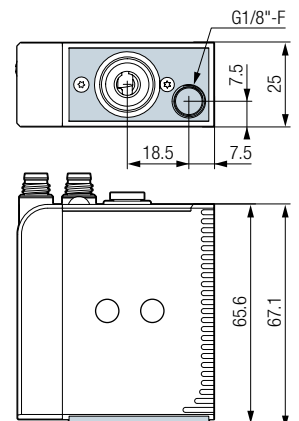
island of 3 modules supplying suction cups according to different sequences

Exhaust manifold: option E

The LEM mini vacuum pumps can be equipped with the "exhaust manifold" option, which provides a G1/8"-F connection to the exhaust in order to add a silencer, transfer the exhaust outside the work area or to avoid air discharge near the workpiece (LEM___E version).

This option must be specified at time of ordering as it cannot be added later.

Note: The design of the exhaust manifold and vacuum pumps do not guarantee the complete sealing of the exhaust and therefore cannot be used in a "clean room" environment.

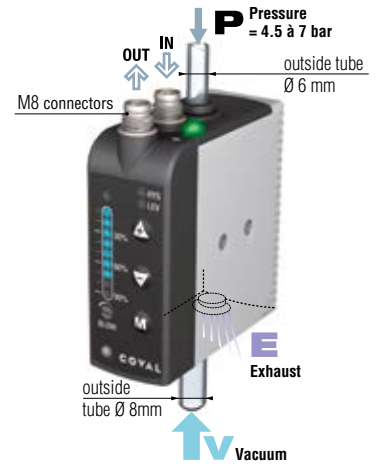
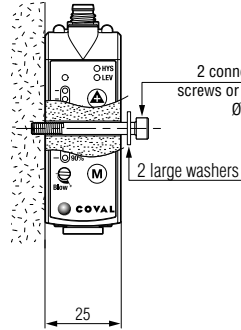
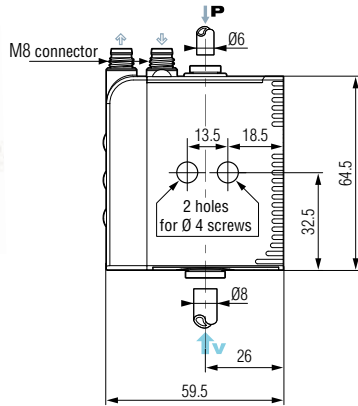




Stand-alone Modules



Side mounting



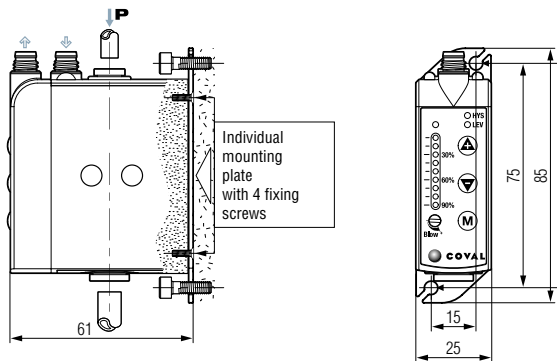
For front mounting, order the necessary kit, in addition to the module:

Front mounting kit:
1 plate + 4 screws

Part No.: LEMFIXA



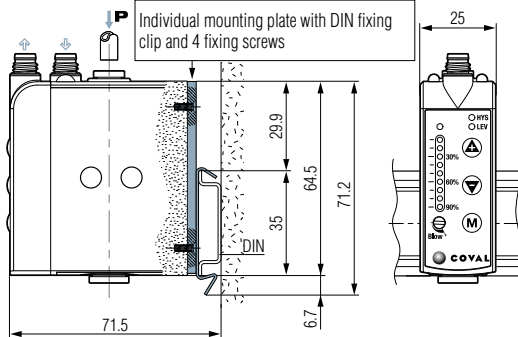
Front mounting



2 Ø 4 fixing screws



Mounting on DIN rail

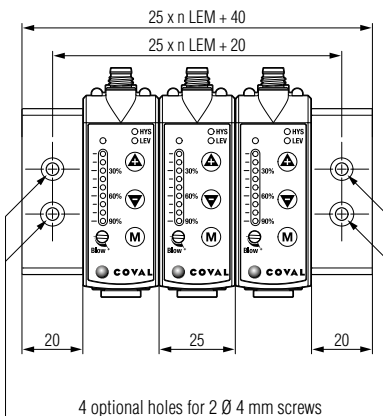


A module can be clipped onto a DIN rail. For this purpose, the module must first be equipped with an individual DIN installation plate, ordered separately:

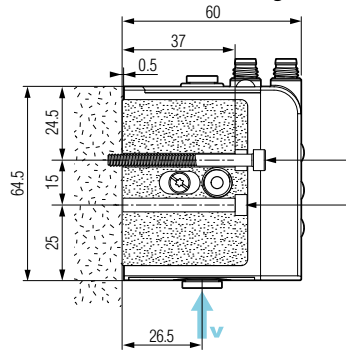
DIN rail mounting kit:
1 plate/clip + 4 screws

Part No.: LEMFIXB

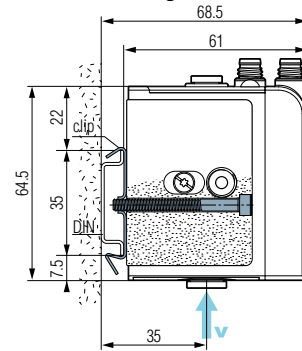
Islands



Front mounting



Mounting on DIN rail



DIN rail mounting kit:
2 clips + 2 screws

Part No.: LEMFIXC



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.

Select Vacuum Level and Nozzle Diameter

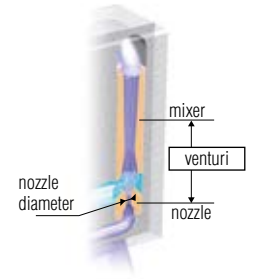
The introductory guide in this catalog shows that for porous objects, a 30-55% vacuum is economical and effective. This is obtained with a 60% maximum vacuum pump.

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 airtight material, the vacuum used is 55% to 80%, obtained by a 85% max. vacuum pump.

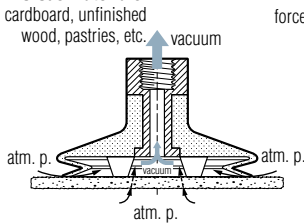
- For standard cases, with its integrated blow-off, the LEMAX series is preferable, as it is more economical due to its ASC (Air Saving Control) function.

- For special cases, the LEM series contains versions without blow-off and versions without a vacuum switch. The table below helps to select the nozzle diameter required for the application.

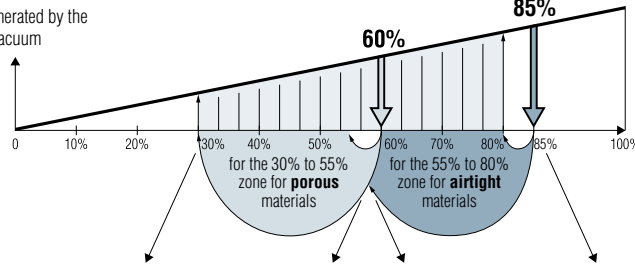


Porous materials:

cardboard, unfinished wood, pastries, etc.

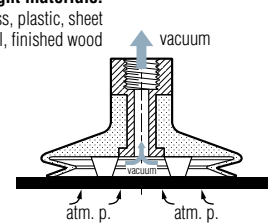


force generated by the vacuum



Airtight materials:

glass, plastic, sheet metal, finished wood



Porous Objects ▶ Maximum Vacuum Level: 60%

Time to create vacuum (seconds) for a volume of 1 liter

vacuum achieved	vacuum achieved						Air consumed (SCFM)	Air drawn in (SCFM)
	30%	35%	40%	45%	50%	55%		
ø nozzle								
1.0 mm	0.66	0.83	1.04	1.31	1.70	2.35	1.55	1.34
1.2 mm	0.41	0.52	0.66	0.83	1.07	1.49	2.30	2.54
1.4 mm	0.27	0.34	0.43	0.54	0.70	0.97	3.18	3.25

Airtight Objects ▶ Maximum Vacuum Level: 85%

Time to create vacuum (seconds) for a volume of 1 liter

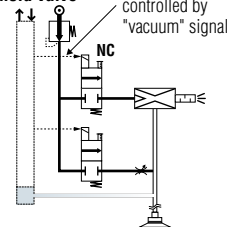
vacuum achieved	vacuum achieved						Air consumed (SCFM)	Air drawn in (SCFM)
	55%	60%	65%	70%	75%	80%		
ø nozzle								
1.0 mm	1.76	2.04	2.38	2.80	3.33	4.09	1.55	1.02
1.2 mm	1.13	1.31	1.53	1.80	2.15	2.64	2.30	1.59
1.4 mm	0.73	0.85	0.99	1.16	1.38	1.70	3.18	2.47

Select Vacuum Controlled by NC or NO Solenoid Valve

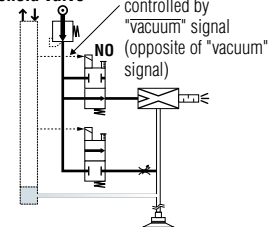
Vacuum controlled by a NC (Normally Closed) solenoid valve remains the simplest standard option to use. In the event of an electricity shutoff, the vacuum is interrupted and the object is released.

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 of the "vacuum" signal, which is noted as "vacuum".

signal controlled by NC solenoid valve



signal controlled by NO solenoid valve



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.

Select with or without Vacuum Switch

For common applications, the vacuum switch is needed, with the dialogue face for digital display and adjustment. 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.



Part numbers for an island assembly or components in an island

Part numbers for stand-alone units

LEM 60 X 12 S VA - B3

VACUUM LEVEL	
60% max. vacuum → porous objects	60
85% max. vacuum → airtight objects	90

NOZZLE DIAMETER	
Ø 1 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 adjustment

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 ordered as separate components in order to then be assembled on site according to the arrangement suitable to the application.

COMPOSITION OF THE MODULE

S	<ul style="list-style-type: none"> Vacuum controlled by NC solenoid valve → if the electricity is shut off, the vacuum is interrupted. Blow-off controlled by a specific signal 	
V	<ul style="list-style-type: none"> Vacuum controlled by NO solenoid valve → vacuum is maintained if electricity is shut off Blow-off controlled by a specific signal 	
R	<ul style="list-style-type: none"> Vacuum controlled by NC solenoid valve No blow-off 	
U	<ul style="list-style-type: none"> Vacuum controlled by NO solenoid valve No blow-off 	

EXHAUST	
Open (integrated silencer)	-
Exhaust manifold (G1/8"-F)	E

COMPONENTS FOR THE ISLAND TO BE ASSEMBLED

B		LEM_X..... B 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.
		PART NO.: 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
 - LEMSETA
- 3 LEM modules for a group, of different types.
- 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 specific request:

- Modules with enhanced blow-off by integrated isolation valve.
- Modules with non-return valve will maintain vacuum in the event of loss of pneumatic and/or electrical power, during the grip cycle.

Integrated Mini Vacuum Pumps with ASR

Characteristics / Assembling an Island



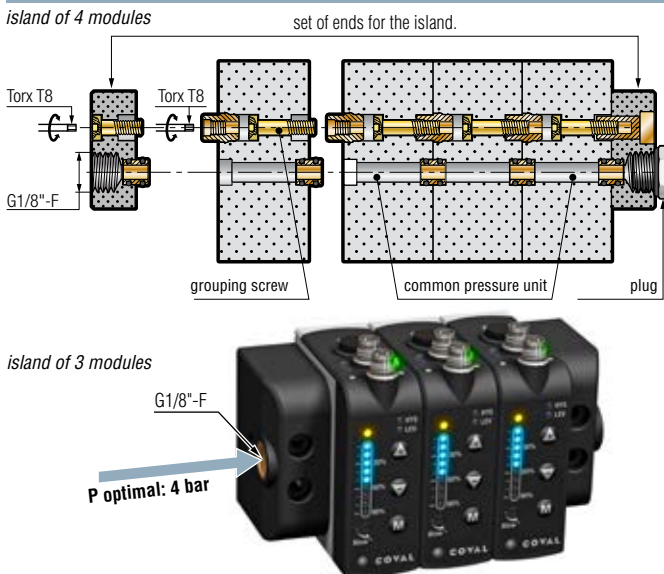
Overall Characteristics

- Supply: non-lubricated air filtered to 5 microns according to standard ISO 8573-1:2010 [4:5:4].
- Operating pressure: 4.5 to 7 bar.
- Mini dynamic pressure: - stand-alone module: P = 4.5 bar.
- island modules: 4 bar.
- Blow-off: adjustable flow: - stand-alone version: P = 3.5 bar.
- island version: P network.
- Maximum vacuum: 60% or 85% depending on model.
- Suction rate: 1.02 to 3.25 SCFM depending on model.
- Air consumption: 1.55 to 3.18 SCFM depending on model.
- Electrical protection level: IP 65.
- Control voltage: 24 V DC (regulated $\pm 10\%$).
- Current draw: 30 mA (0.7 W) vacuum or blow-off.
- Max. operating frequency: 4 Hz.
- Endurance: 30 million cycles.
- Weight: 90 to 120 g, depending on model.
- Operating temperature: 32 to 122 °F.
- Materials: PA 6-6 15 %FV, brass, aluminum, NBR.

Integrated Vacuum Switch Characteristics

- Measuring range: -1 to 0 bar.
- Precision: $\pm 1.5\%$ of the range.
- Hysteresis: adjustable from 0% to 100%.
- Output threshold: 1 x T.O.R. in NO.
- Analog 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 $\pm 10\%$).
- Current draw: < 20 mA.
- Protection: against polarity inversions.

Characteristics and Connecting an Island



Maximum number of modules in an island:

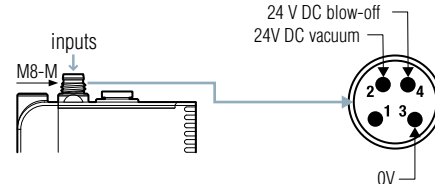
- \varnothing 1.4 mm nozzle \rightarrow 5 modules
- \varnothing 1.2 mm nozzle \rightarrow 7 modules
- \varnothing 1 mm nozzle \rightarrow 9 modules

Integrated Silencer Characteristics

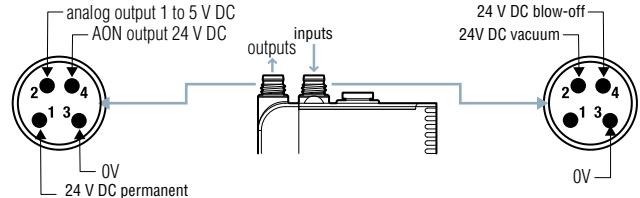
- Noise level: approximately 68 dBA.
- Clog-free silencer.

Electrical Connections

MODULES WITHOUT VACUUM SWITCH FUNCTION



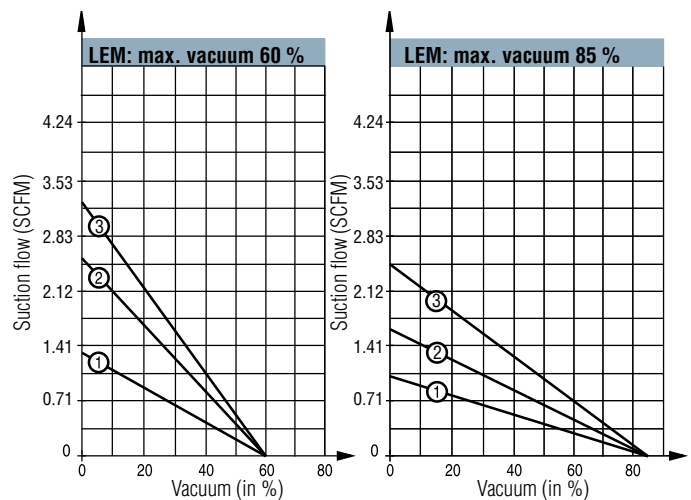
MODULES WITH VACUUM SWITCH FUNCTION



Accessories

- Power supply cable M8, straight, female, 4-pin – open end:
 - CDM8: length. 2 m.
 - CDM8N: length. 0.5 m.
- Power supply cable M8, elbow, female, 4-pin – open end:
 - CCM8: length. 2 m.

Suction Flow Rate / Vacuum Curves



- 1 - LEM60X10
- 2 - LEM60X12
- 3 - LEM60X14

- 1 - LEM90X10
- 2 - LEM90X12
- 3 - LEM90X14

Note: in the same island, it is possible to combine LEM series modules and LEMAX series modules.



COVAL
vacuum managers

vacuum
components



A TECHNOLOGICAL PARTNER ON A GLOBAL SCALE

Located in the southeast region of France, COVAL conceives, manufactures and globally distributes high performance, advanced vacuum automation components and systems for industrial applications in all branches.

COVAL is an ISO 9001: V2015 certified company which offers innovative solutions integrating reliable and optimized components with intelligent functionalities. The focus is to provide the most personalized and economic solution to a given application while assuring a significant improvement in the productivity and the safety for the vacuum users around the world.

COVAL has an ambition for technical excellence and innovation. As a specialist in vacuum automation, COVAL is reputed for offering reliable, personalized, cost effective and productive solutions.

The references of COVAL can be found in several industrial sectors (Packaging, Automotive Industry, Plastic, Graphic, Aeronautic...) where vacuum handling is important for high efficiency and productivity.

COVAL markets its products and services all over Europe, in the United States and South America through its subsidiaries and authorized distribution network. COVAL strives to provide customer driven solutions and gives the best possible treatment to satisfy all its clients.

For all enquiries from Australia, Africa and Asia kindly contact COVAL head office in France.



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