COVAL

vacuum managers

mini-modules LEM

compact integrated vacuum pumps

twin tech™
Integration & Intelligence

www.coval.com

LEM series: mini-module

twin tech™

Integration & Intelligence

All industrial vacuum functions integrated into the mini-module

Efficient communication for easy setting, production and maintenance.

twin tech™ Integration & Intelligence

A mini-module for each application:

A COMPLETE LINE

- 4 basic configurations, see adjacent illustrations ➔
- 2 levels : 60% and 90% vacuum.
- 3 standard nozzle diameters : 1, 1.2 and 1.4 mm.
- Air suction flow : up to 92 Nl/mn.
- Other options on request.

with vacuum switch, display and setting

with blow-off (LEM__X__**SVA**)

without blow-off (LEM__X__**RVA**)

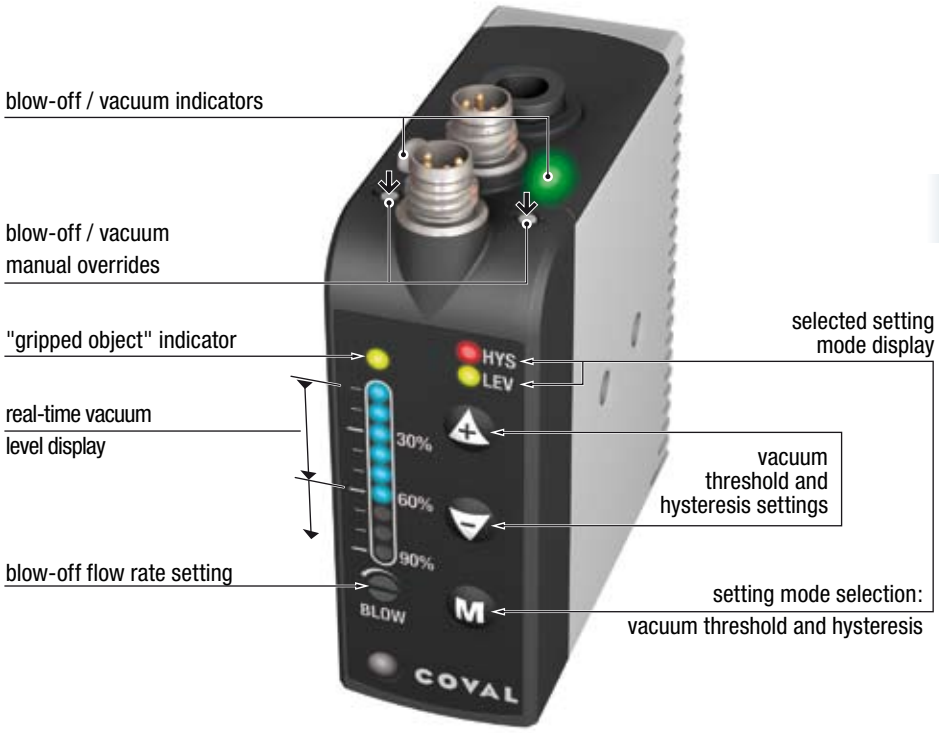
without vacuum switch

with blow-off (LEM__X__**SVO**)

without blow-off (LEM__X__**RVO**)

AN EFFICIENT COMMUNICATION

For settings and troubleshooting, a simple and complete communication through the means described by the adjacent illustration.



MOUNTINGS CHOICE

Individual mountings, close to vacuum pads or compact island association.

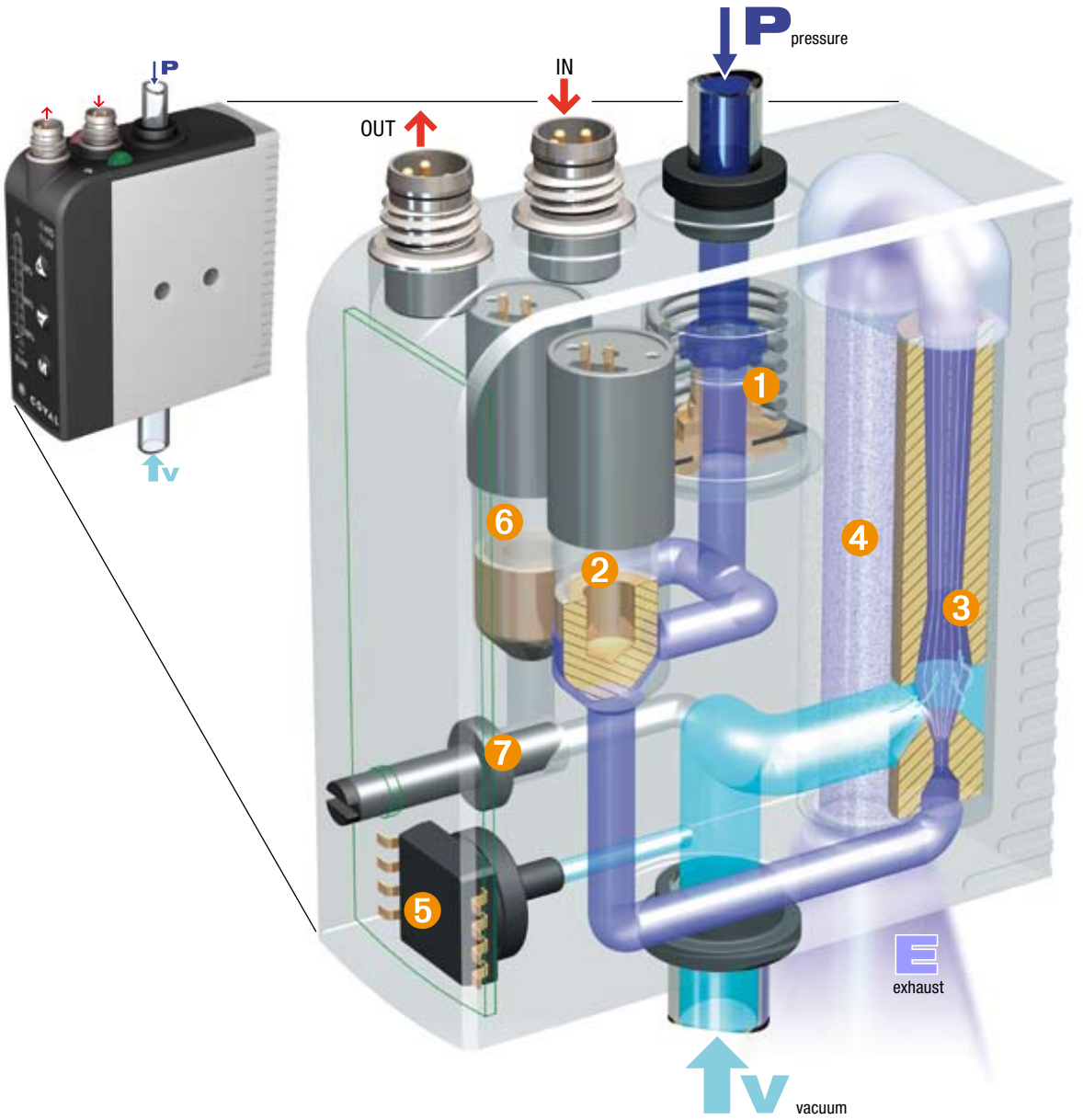
side mounting

front mounting

island mounting

COVAL vacuum managers

LEM series: compact functions



The COVAL compact integration technique

The traditional venturi vacuum pumps must be completed with the optional components necessary to their functioning: solenoid valves, pressure regulator, vacuum switch, blow-off circuit, electronic control …

One can see the advantages of a compact integration of these functions into a sole mini-module vacuum pump that becomes all inclusive. The above illustration shows the excellence of Coval in this perspective: each function type to be integrated has been redesigned, optimized and miniaturized to fit its place in the mini-module body.

ADVANTAGES

• direct control 24 V DC - 0.7W
- M8 connectors, IP65 protection.

• simplified use
- only one easy to install module;
- instant pneumatic and vacuum connections;
- plug and pay.

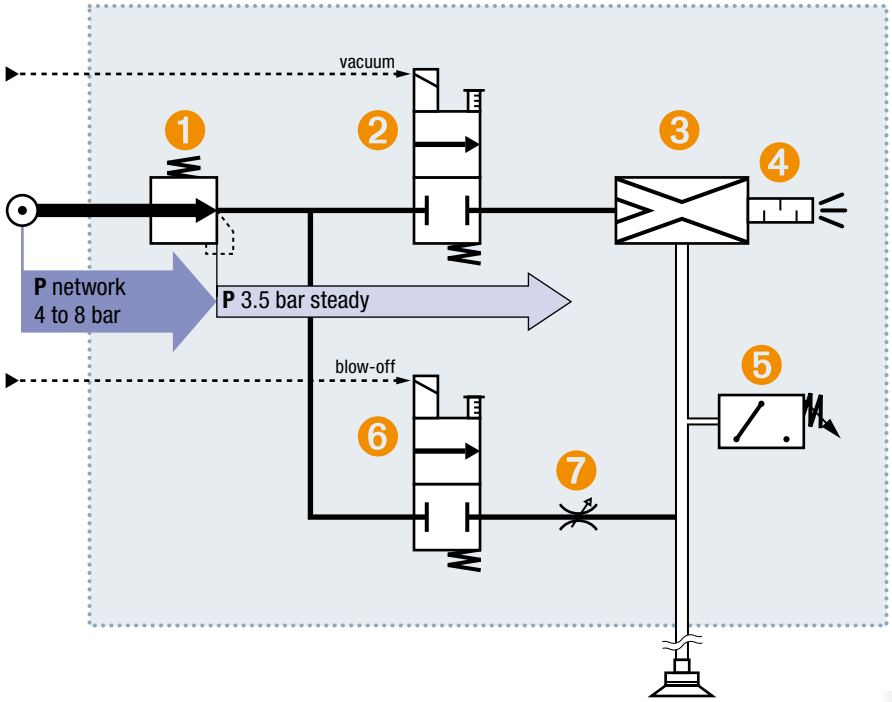
• a LEM for each application
- choice of the vacuum level and of the air suction flow;
- only necessary functions are retained.

integration

twin tech™
Integration & Intelligence

INTEGRATED FUNCTIONS

1. 3.5 bar pressure regulator
2. Vacuum solenoid valve
3. 3.5 bar optimized venturi
4. Optimized muffler
5. Electronic vacuum switch
6. Blow-off solenoid valve
7. Blow-off flow rate setting



The "regulator+venturi" 3.5 bar optimized combination

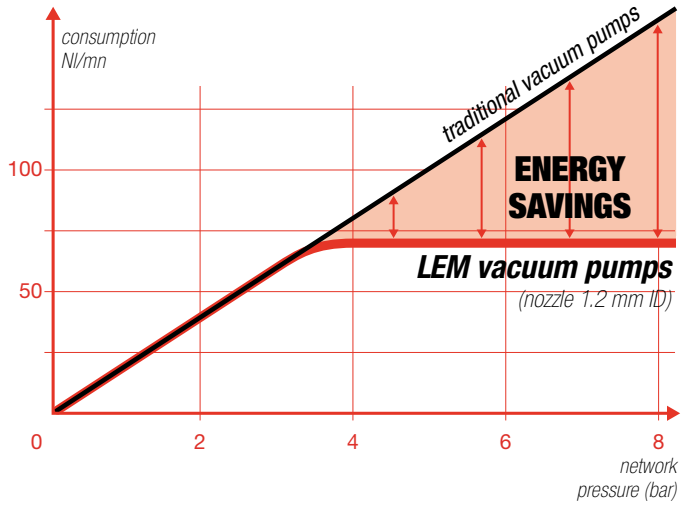
The traditional venturi vacuum pumps must work within the defined compressed air network settings: between 4 to 8 bar, depending of the application. In the process, their efficiency and noise performances have been forsaken to meet these requirements.

With the integration of the 3.5 bar pressure regulator, function as a standard, COVAL succeeded in optimizing the associated venturi for this sole pressure, thus providing two key advantages:

- an exceptional output → energy savings.
  → controlled consumption.
- a remarkably silent functioning.

ENERGY SAVINGS

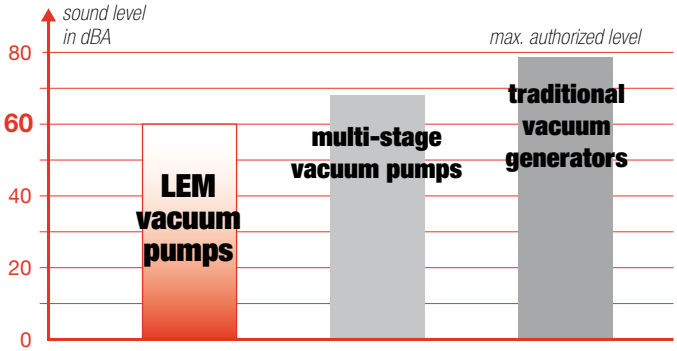
- The internal intelligence of the LEM modules controls the network supply pressure and helps to optimize the air consumption to 3.5 bar. This results in exceptional energy savings as shown in the figure below:



SILENT TECHNOLOGY

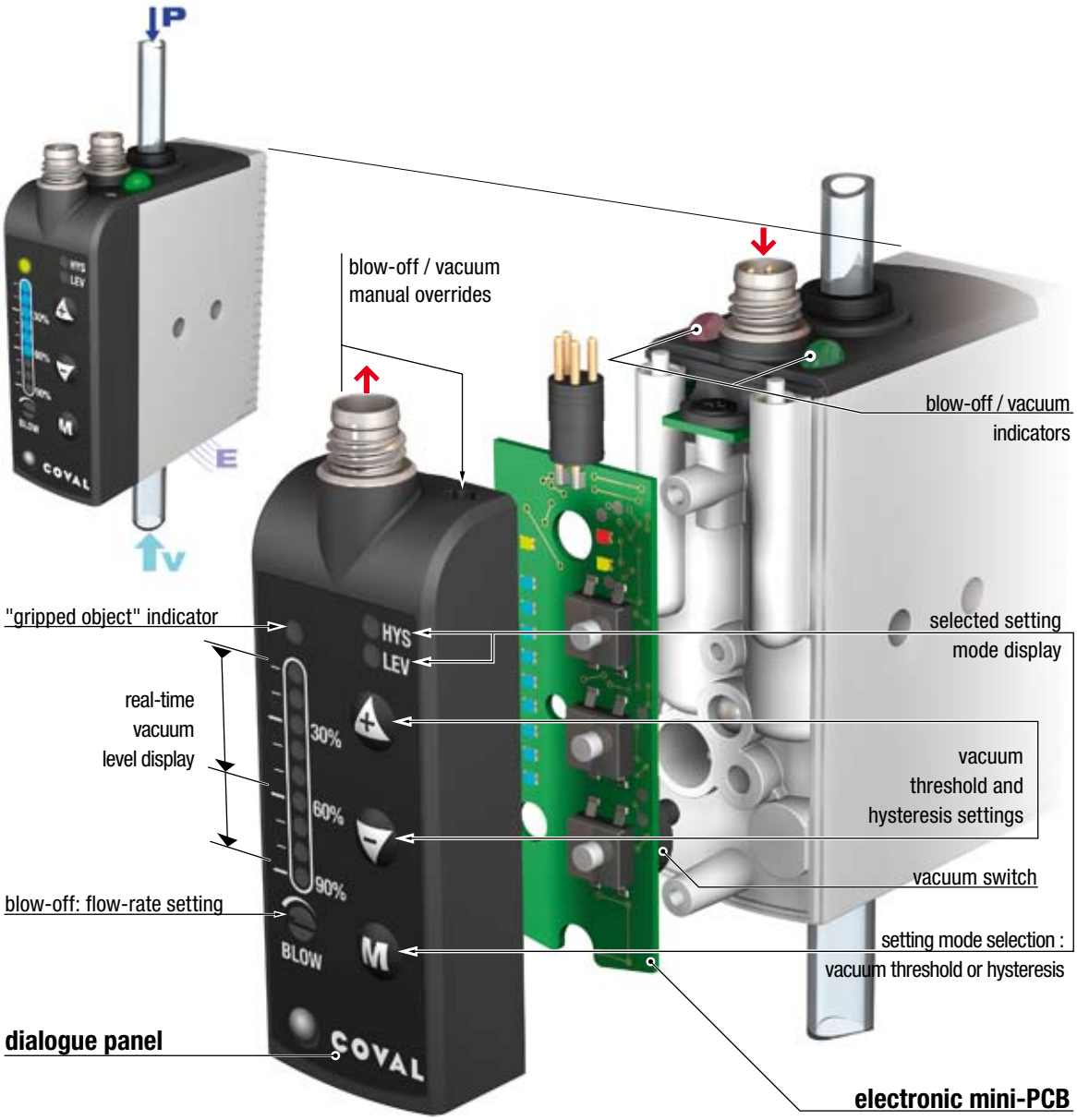
- The pressures to be exhausted to atmosphere are much lower.
- The efficiency of the optimized muffler is better.

From this, results the sound level reduction shown by the bar graph below:



COVAL
vacuum managers

LEM series: dialogue intelligence



The dialogue intelligence completes the compact functions integration

The previous pages have shown the interest to integrate into a sole compact module all the functions necessary for an optional control of vacuum handling.

This integration also makes possible, the compact realization of the electronic intelligence shown above:
- an electronic mini-PCB combines the vacuum switch and other electronic components required for controls and settings.
- a dialogue panel completes this by directly controlling the PCB.

ADVANTAGES

• simple and complete communication

For settings and troubleshooting, the dialogue panel gathers all the informations and access required for a complete man/machine dialogue. The machine commissioning, production and maintenance are facilitated.

• easy installation, protected equipment
- only one module to mount and to connect.
- sealed M8 connections; IP65 electrical protection;
- lockable dialogue panel: protection against unexpected actions.

An efficient communication at each step

The internal intelligence offers the dialogue that keeps the machine user friendly at each step: settings, production, troubleshooting.

1-SETTINGS

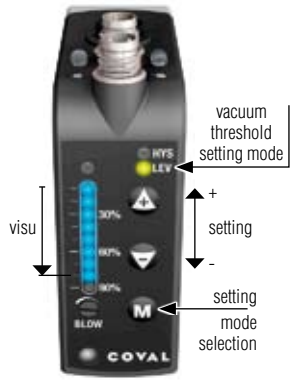
At the first machine commissioning or for all evolutions the different settings are easily made.

- **Vacuum threshold setting**
  Setting of the vacuum threshold, the vacuum level for switching the vacuum switch will generate the "gripped object" signal. Visual display of this setting on the LED scale.

- **Hysteresis setting**
  Setting of the vacuum level "down-gap" that will turn off the "gripped object" signal.

- **Blow-off flow rate setting**
  Adjustable blow-off control with screw setting and manual valve override for testing:
  - vacuum override to grip the product;
  - blow-off override to release the product.

SETTING - vacuum threshold



2-PRODUCTION

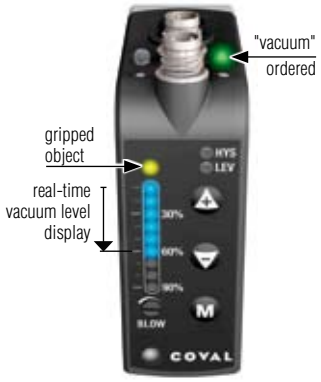
Visual check of functioning during each phase: rest, vacuum, blow-off.

- **vacuum**
  - "vacuum" ordered.
  - "vacuum" indicator (green) ON.
  - linear scale displays the vacuum level.
  - at set threshold, "gripped object" indicator and "gripped object" output signal.

- **blow-off**
  - "blow-off" ordered
  - "blow-off" indicator (red) ON.
  - the object is released.

- **rest**
  - no ordering signal and no display.

PRODUCTION



3-TROUBLESHOOTING

After any malfunctioning, troubleshooting is quickly made.

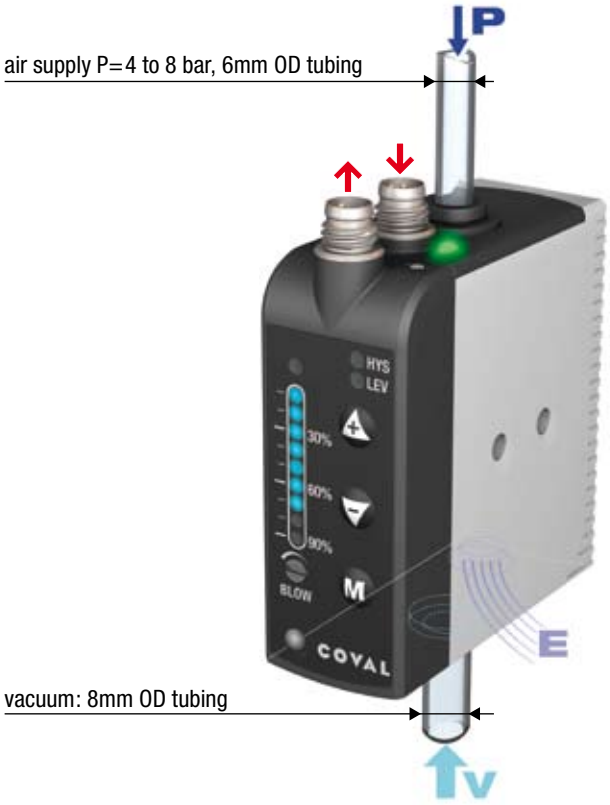
- **Automatic check**
  At each return to tension, automatic check of the electronic functions: vacuum switch, displays, settings …

TROUBLESHOOTING - automatic check

COVAL
vacuum managers

LEM series: configuration of the vacuum

COMPOSED MODULE PART NUMBER	LEM	90	X	12



VACUUM LEVEL	
90% max. vacuum optimum for air tight products	**90**
60% max. vacuum optimum for porous products	**60**

NOZZLE DIAMETER	
10	nozzle 1.0mm ID
12	nozzle 1.2mm ID
14	nozzle 1.4mm ID

VENTURI CHARACTERISTICS

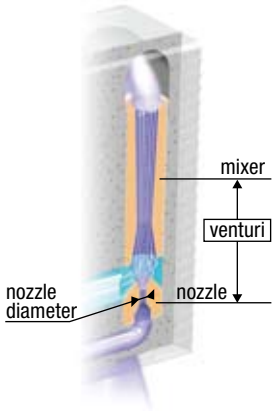
1- Maximum vacuum level

This level results from the venturi mixer's profile:

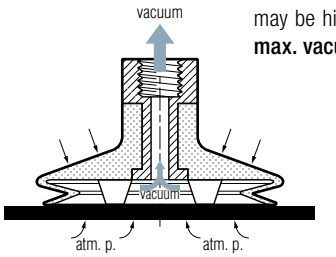
- 90% max. vacuum is optimum for air tight products.
- 60% max. vacuum is optimum for porous products.

2- Nozzle diameter

It reflects the air suction flow, but also the power consumption. Thus it must be chosen for the specific need, without excess.



Air tight products handling: glass, plastic, coated wood, metal sheet …



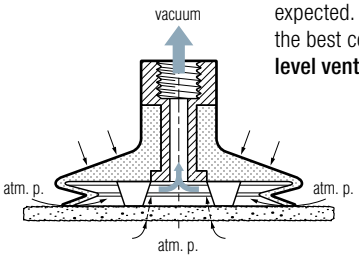
Because vacuum leaks are limited, the vacuum level to be used may be high: between 50 to 80%, to be generated by **a 90% max. vacuum level venturi.**

Taking into account the volume to be emptied and the response time to do so, the chart below is a guide towards the most economical nozzle and gives the air suction flow.

90% max. vacuum LEM

Emptying time *(seconds)* for 1 liter volume							Air consumption *(Nl/mn)*	Air suction *(Nl/mn)*
reached vacuum / nozzle ID	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**

Porous products handling: cardboard, raw wood, pastries …



Significant porosity and/or surface vacuum leaks are to be expected. For handling, a vacuum level between 30 to 55% is the best compromise, to be generated by **a 60% max. vacuum level venturi**.

The chart below is a first indication towards the most economical nozzle ID, to be completed by a leak flow product measurement.

60% max. vacuum LEM

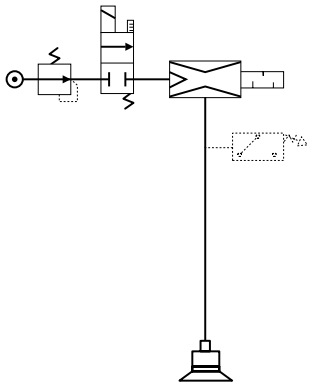
Emptying time *(seconds)* for 1 liter volume							Air consumption *(Nl/mn)*	Air suction *(Nl/mn)*
reached vacuum / nozzle ID	30%	35%	40%	45%	50%	55%		
1.0 mm	0.66	0.83	1.04	1.31	1.70	2.35	**44**	**38**
1.2 mm	0.41	0.52	0.66	0.83	1.07	1.49	**65**	**72**
1.4 mm	0.27	0.34	0.43	0.54	0.70	0.97	**90**	**92**

pump for a given application

	S		V	A

MODULE COMPOSITION

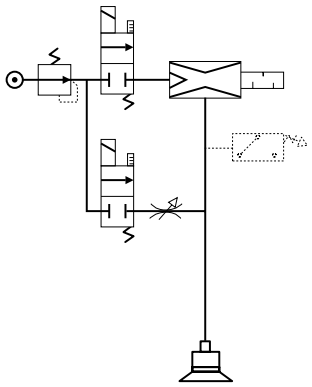
R — Simple vacuum pump without blow-off



LEM__X__**R**V_

- The simplest composition.
- Only one control signal.
- Vacuum control indicator and manual override.

S — Vacuum pump with controlled blow-off



LEM__X__**S**V_

- Blow-off controlled by external signal with adjustable flow rate.
- 2 control signals.
- Vacuum and blow-off control indicators and manual overrides.

VACUUM SWITCH / DIALOGUE PANEL

VA — Electronic vacuum switch with display and setting

- Separate settings for vacuum threshold and hysteresis.
- Real-time vacuum level display.
- "Gripped product" indicator.
- M8 connectors for inputs and outputs.
- Switching output and analogic output.
- Electrical protection: IP65.

VO — No vacuum switch

- Automatic functioning up to maximum vacuum level (no setting and no display).
- M8 connector for inputs only.
- Electrical protection: IP65.

EXAMPLES OF STANDARD MODULE

LEM90X12SVA

LEM mini-module, 90% max. vacuum, 1.2mm nozzle ID, with externally controlled blow-off and electronic vacuum switch.

LEM60X14RV0

LEM mini-module, 60% max. vacuum, 1.4mm nozzle ID, without blow-off and without vacuum switch.

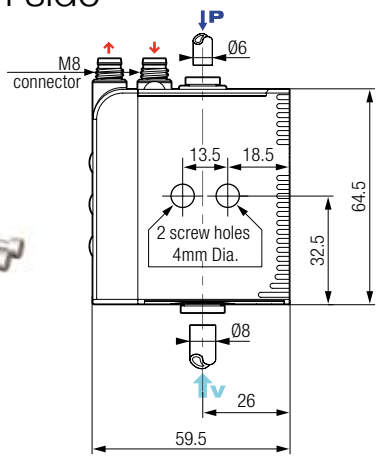
SPECIFIC COMPLEMENTARY OPTIONS

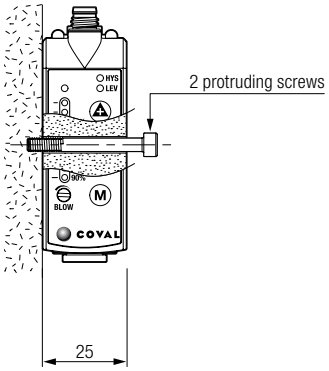
- Integral blow-off for product quick release.
- Non-return safety valve to maintain vacuum in case of unexpected power failure.

COVAL
vacuum managers

LEM series: choice of fixation

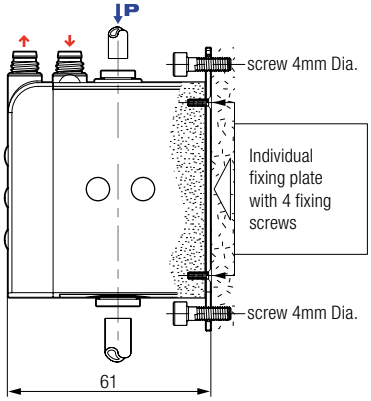
1- fixing from side

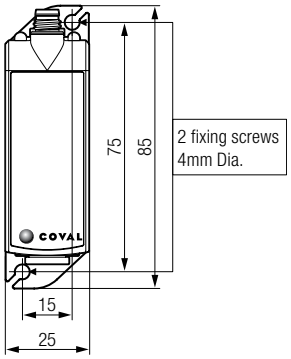




The side fixing is the simplest of all: 2 protruding screws.

2 - fixing from front



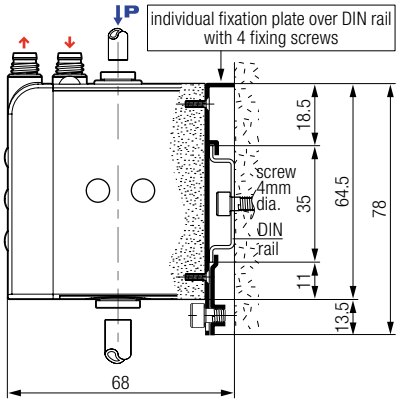


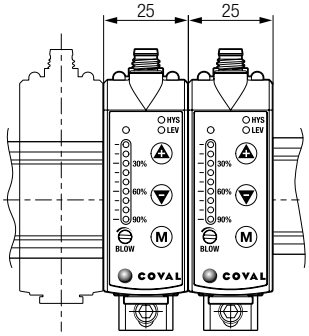
For fixing from front, please order the necessary kit in addition to the ejector module:

Kit for fixing from front :
1 plate + 4 screws

REF : LEMFIXA

3 - island fixing, over a DIN rail





The island is constituted with ejector modules clipped side by side over the same DIN rail.

At the end each module is advised to be equipped with an individual fixation plate over the DIN rail which is to be ordered separately:

fixation kit for the DIN rail:
1 plate + 4 screws

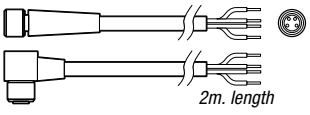
REF : LEMFIXB

M8 electrical connectors

CHARACTERISTICS:
- screw type female connectors.
- 2m PVC cable, pre-assembled four-wire.
- protection IP65.

CONNECTOR WIRING:

REFERENCES :
- straight CDM8
- elbow CCM8



SPECIAL CONNECTORS ON REQUEST:
- PUR cable
- 5 or 10 m. length

LEM series: characteristics

General characteristics

- C.A supply 5µ filtered, non-lubricated air relevant to ISO 8573-1 class 4 standard.
- Optimal working pressure: 4 to 8 bar.
- Blow-off: network supply pressure, adjustable flow rate.
- Maximum vacuum: 60% or 90% according to model (see page 8).
- Suction flow rate: 29 to 92 NL/min according to model (see page 8).
- Air consumption: from 44 to 90 NL/min according to model.
- Electric degree of protection: IP65.
- Voltage tension: 24 V DC (adjustable +- 10%).
- Current draw: 30 mA (0,7W) vacuum or blow-off.
- Maximum frequency of utilization: 4 Hz.
- Number of operations: 10 million cycles.
- Weight: from 80 to 120 g according to model.
- Working temperature: from 10° C to 60 °C or 50 F to 140 F.
- Materials: PA 6-6 15% FG, brass, aluminum, NBR.

Integrated vacuum switch

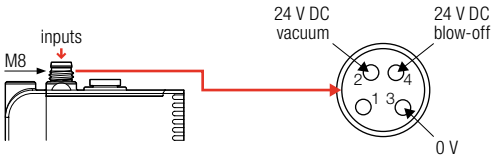
- Adjusting range: -1 to 0 bar.
- Precision: ± 1, 5 % of the range.
- Hysteresis: from 0% to 100% (adjusted by potentiometer).
- Output threshold: 1 x switching output, NO.
- Analogic output: from 1 V DC over the measuring range.
- Switching power: 125 mA PNP.
- Threshold state display : 1x LED green
- Power supply: 24 V DC (regulated ± 10%)
- Current draw: < 20 mA.
- Protection: against the inversions of polarity.

Integrated silencer

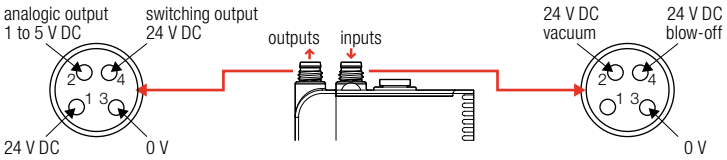
- Sound level: 60 dBA.
- Clog free silencer.

Electrical connections

MODULES WITHOUT VACUUM SWITCH



MODULES WITH VACUUM SWITCH



LEM series: applications

The LEM series mini-module vacuum pumps offer a new approach to vacuum handling in numerous domains: packaging, robotic, clamping, transfers, plastic molding, etc,…

Optimized to serve small and medium sized suction pads, LEM helps to simplify the installation while integrating all control functions into a single light weight mini-module, placed close to the suction pads.

In technical traditions, only the venturi and the vacuum switch are compact enough to be installed close to the suction pads. Further, they should be supplemented by solenoid valves, a pressure regulator, an electronic control … which also need to be installed and fitted resulting in a laborious, expensive and complex installations.

A single block of LEM series mini module is enough to solve these well known problems. Thanks to its light weight, compact design and complete functions, the LEM mini-modules can be installed at the suction pads.

Additionally, as explained in the previous pages, the LEM also offers new energy savings, an exceptional silent functioning, and at last the dialogue intelligence needed for easy settings, follow up and maintenance.

LEM, the unparalleled progress in vacuum handling technology

PACKAGING MACHINES

ROBOTIC HANDLING TOOLS

CLAMPING

PLASTIC INDUSTRY

COVAL
vacuum managers

"THE RIGHT VACUUM
THE PLACE YOU NEED IT
THE TIME YOU NEED IT"

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: V2000 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.

Distributed by:

COVAL VACUUM TECHNOLOGY INC.
212-112 Powell Drive
Raleigh, NC 27606
Phone : (919) 233-4855
Fax : (919) 233-4854

www.coval-inc.com