

COVAL

vacuum managers

LEMAX+

Compact High Flow Vacuum Pumps with "ASC"



AIR Saving Control

ADVANCED VACUUM SOLUTIONS

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EN3

LEMAX+

Compact, High Flow Vacuum Pumps

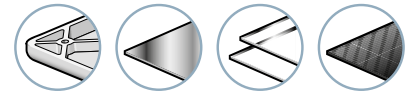
General Information

LEMAX+ Series, compact, high flow vacuum pumps, integrate ASC (Air Saving Control) technology that allows up to 90% of energy savings. They are specifically designed for gripping airtight or semi-airtight products.

For gripping porous products or those with a rough surface, it is recommended to use the **LEM+ Series**.



Industry-specific applications



Advantages

- Easy implementation: Plug & Play, multiple choices, every type of application.
- Maximum automatic energy savings:
 - ASC**: 90% savings for airtight products.
- Compactness: **LEMAX+** vacuum pumps are the most compact on the market.
- Short response times: Possible installation very close to vacuum pads.
- Automatic blow-off: Reduced PLC I/O requirement thanks to the automatic blow-off function (blow-off time configurable from 0 to 10s).
- Dust resistant: Non-clogging through-type silencer.
- Safety: Product gripping is maintained even during power failure.

Configurations

- 85% of maximum vacuum.
- NC or NO, depending on safety.
- ASC advanced electronics.
- High visibility display.
- Integrated vacuum sensor.
- Vacuum non-return valve.
- Combined **ASR** "venturi regulator".
- External blow-off signal or automatic blow-off function.
- Powerful blow-off as option.
- Versions with 1 or 2 M12 connectors.
- Suction flow rate (NI/min):

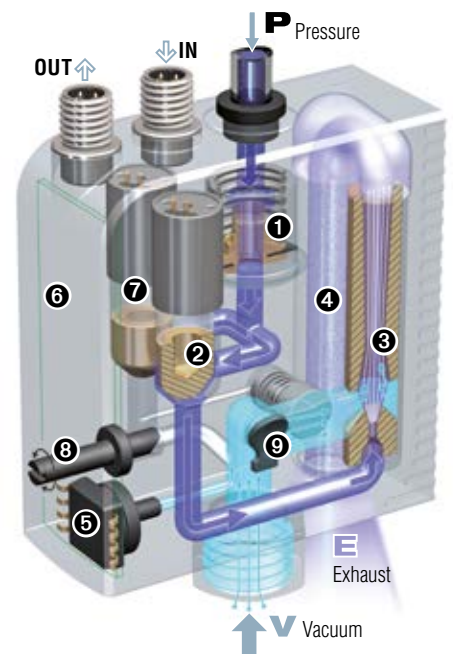
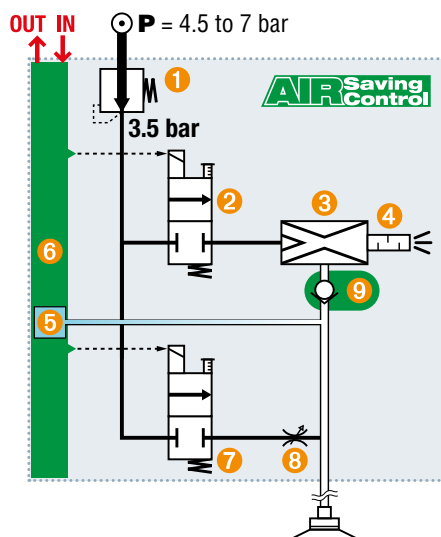
max. vacuum	85%
nozzle Ø	
2.0 mm	125
2.5 mm	200



Integration

The **LEMAX+** compact modules integrate all the functions of "industrial vacuum" including simple, efficient, economical compressed air usage and are adapted for every application:

- 1 3.5 bar pressure regulator
- 2 "Vacuum" solenoid valve
- 3 3.5 bar optimized venturi
- 4 Optimized silencer
- 5 Electronic vacuum sensor
- 6 Integrated electronics
- 7 "Blow-off" solenoid valve
- 8 Blow-off flow rate regulator
- 9 Vacuum non-return valve



Combination of non-return **9** and advanced electronics **6** ensures the ASC's automatic management.

→ **Once vacuum is established, the pump does not continue to consume air to hold the product.**



90% energy savings (on average).

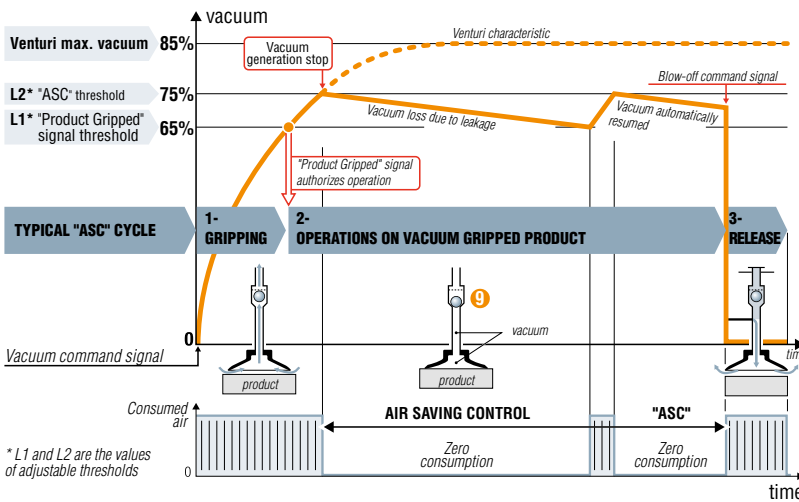
LEMAX+

Compact, High Flow Vacuum Pumps

Energy Saving & Auto-adjustment



AIR Saving Control "Air Saving Control" Cycle



As illustrated in the above figure, the LEMAX module automatically executes the "ASC", cycle, thus saving the maximum amount of energy, based on the following 3 phases.

1- Gripping the object

The "vacuum" solenoid ② starts the cycle by supplying the venturi ③ which generates the vacuum to quickly pick up the object with the suction cup → short-term consumption.

2- Operations on the object held by vacuum

The vacuum level is constantly monitored by the vacuum switch ④. When it reaches the L1 threshold (65%), the "gripped object" signal is generated, which allows the planned operations (transfer, machining, etc.). When the vacuum reaches threshold L2 (75%), the supply to the venturi via the solenoid valve ② is cut off → consumption is halted. The object remains held by the vacuum maintained thanks to the closed valve ④.

Micro-leaks will generally cause the vacuum level to fall slowly. Each time it falls below 65%, vacuum generation is briefly resumed until it reaches threshold L2 (75%).

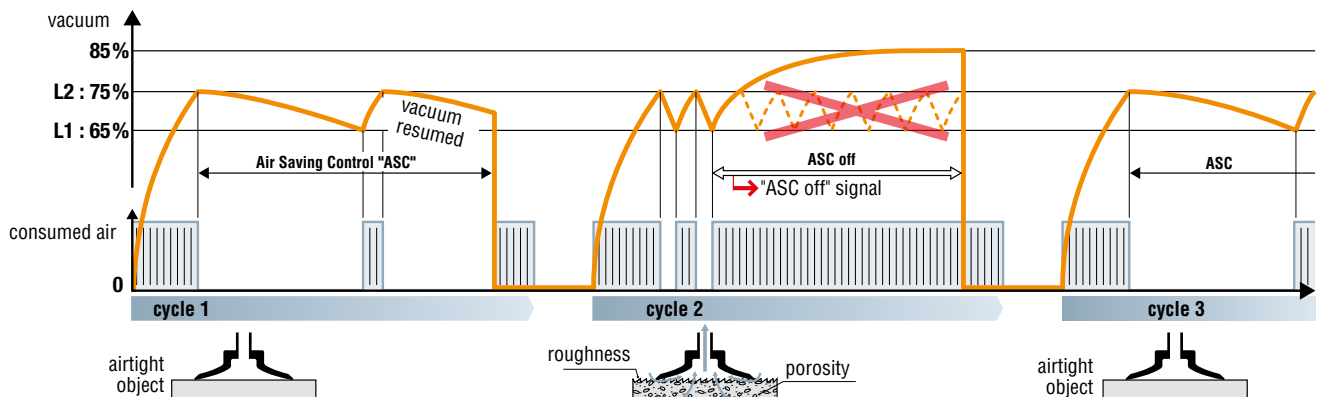
3- Releasing the object

At the end of operations, blow-off is ordered. The "blow-off" solenoid valve ⑦ generates a stream of air which closes the isolation valve ④, blows on the object to release it quickly.

Smart Adaptation

The illustration below shows the adaptation capacities of the LEMAX module. "ASC" operation is automatic for any object that is air-tight enough (cycle 1).

If a leak occurs (cycle 2), due to a rough object or to suction-pad wear, the module automatically detects the anomaly, ends the cycle without "ASC" in order to continue production and reports the event for possible maintenance. Production continues. Once everything is returned to normal (cycle 3), "ASC" operation is automatically resumed.



1- Gripping + transfer (2 mm nozzle Ø, emptying 0.2 l)

Phase	Duration	Air consumption		achieved economy
		without "ASC"	with "ASC"	
Gripping	0.16 s	0.45 NI	0.45 NI	80 %
Transfer	1.20 s	3 NI	0	
Release	0.14 s	0.3 NI	0.3 NI	
		3.75 NI	0.75 NI	

2- Clamping + operations (2 mm nozzle Ø, emptying 0.4 l)

Phase	Duration	Air consumption		achieved economy
		without "ASC"	with "ASC"	
Clamping	0.32 s	0.9 NI	0.9 NI	99 %
Operations	60 s	179 NI	0	
Release	0.14 s	0.3 NI	0.3 NI	
		180.2 NI	1.2 NI	

Resulting Savings

Energy savings from "ASC" are major, as the two examples above show:

- 80 % savings for transferring an object after gripping.
- 99 % savings for holding an object during a 1 minute operation.

The investment generally pays for itself in just a few months.

"ASC": AN ADVANTAGE WITHOUT LIMITATIONS

Saving energy has become essential. With LEMCOM, thanks to ASC, energy is automatically saved without interfering with established operations:

1- No specific adjustment

The initial setting (L1 = 65%, L2 = 75%) is suitable for most applications.

2- Production regardless of what happens

Operation is always ensured, if necessary without "ASC", if the leakage level is too high.

3- Guided maintenance

Clear display of the need for maintenance to return to auto-regulated "ASC" operation.



Specially designed by COVAL, the LEMAX+ vacuum pumps integrate the ASR (regulator-venturi) combination which greatly reduces the compressed air consumption and noise level.

LEM MAX+

Compact, High Flow Vacuum Pumps

Intelligence & Selection Guide



Intelligence

The front communication face panel allows access and programming of all operations: Various types of monitoring, threshold settings, pump configuration, diagnostics, etc. This front face panel can be locked to prevent an inadvertent misadjustment.

Built-in intelligence, as well as standard factory settings, optimize the implementation, operation, monitoring and maintenance.

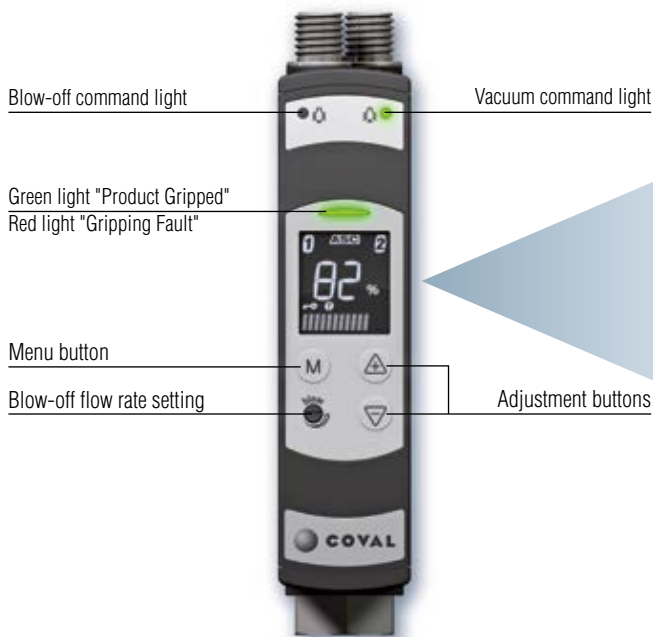
→ Simplified & Protected Installation and Operation.

Due to the high visibility display of the **LEM MAX+** modules, all useful information can be seen at a single glance: vacuum level, product gripped, thresholds reached, energy saving mode activated, etc.

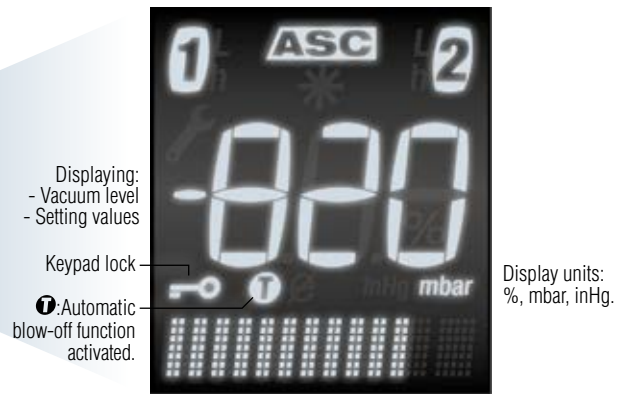
The actual vacuum level is shown with direct reading (selection of different display units), and with "bar graph".

Configuration help messages (multilingual: in French, English, Italian, Spanish, German) are also provided.

→ Clear & Complete Communication at Each Stage.



L1 "Product Gripped" visualization and setting: (vacuum threshold, hysteresis)
 "ASC" monitoring
 L2 "ASC Threshold" visualization and setting: (vacuum threshold, hysteresis)



Display shows data in many languages / bar graphs

Power Determined by the Venturi Nozzle Diameter

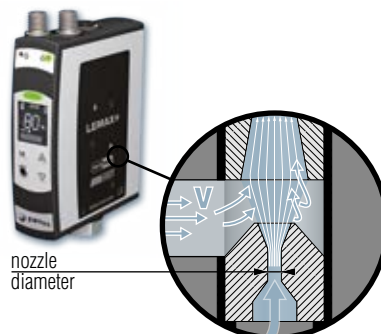
The table shows the power levels generated by each of the nozzle diameters available: when the module is operating "ASC" off, a larger nozzle draws and consumes more compressed air.

On the other hand, during "ASC" operation, a large nozzle quickly reaches the vacuum threshold generating power shut-off.

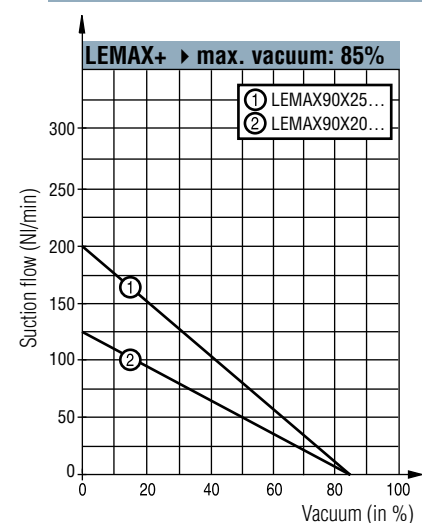
In conclusion:

- A large nozzle enables quicker gripping without consuming more during "ASC" operation.
- A small nozzle does not consume less when operating with "ASC" off.

nozzle Ø	Nozzle Diameter Selection				
	Venturi Specifications While Working Without "ASC"		Evacuation of 1L Volume. "ASC" Operation:		
	Vacuum flow (NI/min)	Consumed Air (NI/min)	Gripping Time (65% Vacuum) (s)	Time Until 75% Vacuum (s)	Consumed Air (NI)
2.0 mm	125	179	0.55	0.80	2.2
2.5 mm	200	260	0.35	0.50	2.2



Suction Flow Rate / Vacuum Curves



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Configuring a Vacuum Pump



LEMAX 90 X 25 S C15 P* G1 F -

VACUUM LEVEL

85 % max. vacuum is optimal for airtight products

90

NOZZLE DIAMETER

2 mm nozzle Ø

20

2.5 mm nozzle Ø

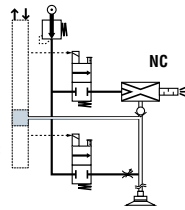
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MODULE COMPOSITION

NC Vacuum Pump With Blow-Off

LEMAX__X__SV_C__PG1

- 2 command signals.
- NC** vacuum command valve.
- Blow-off configured on site, at choice:
 - Blow-off controlled by specific signal;
 - Automatic blow-off function (blow-off time configurable from 0 to 10s.).
- Advantage: reduced PLC I/O requirement.
- Adjustable blow-off flow rate.

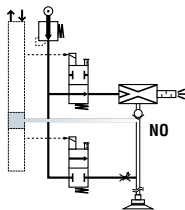


S

NO Vacuum Pump With Blow-Off

LEMAX__X__VV_C__PG1

- 2 command signals.
- NO** vacuum command valve.
- Blow-off controlled by external signal.
- Adjustable blow-off flow rate.



V

Safety in Case of Power Failure

This version is suitable for applications where product gripping safety must be ensured in the event of an untimely power failure, and this even in the case of leakage (failsafe).

This version does not include automatic blow-off function that enables control of the module with a single "vacuum and blow-off" signal.

EXAMPLE OF COMPLETE PART NUMBER:

LEMAX90X25SC24PG1

LEMAX+ vacuum pump, 85% maximum vacuum, 2.5 mm nozzle Ø, controlled by a NC (Normally Closed) solenoid valve, connection by 2 M12 4-pin connectors.

CONNECTORS

C15

Vacuum Pump with 1 M12 5-pin Connector
LEMAX90X__C15PG1



- "Gripped product" switching output 24V DC / NO.

C24

Vacuum Pump with 2 M12 4-pin Connectors
LEMAX90X__C24PG1



- Stand alone I/O.
- "Gripped product" switching output 24V DC / NO.
- 1 configurable auxiliary output:
 - either "Vacuum level" signal analogic 1 to 5V DC.
 - or "Without ASC" signal +5V DC switching output NO.

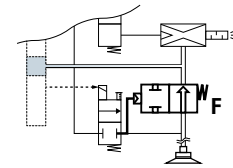
*P = PNP electronic
→ NPN version available upon request.

POWERFUL BLOW-OFF

- Without

F With

The powerful blow-off option allows you to release the product quickly.



Isolation valve **F** directs the entire blow-off flow to the vacuum pad.

NB: If option **F** is selected, no blow-off flow rate setting is available.

EXHAUST

Open (integrated silencer)

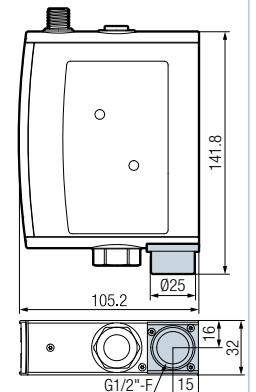
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Exhaust manifold (G1/2"-F)

E

The LEMAX+ vacuum pumps can be equipped with the "exhaust manifold" option, which provides a G1/2"-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 work-piece. (LEMAX__E Version).

This option can be added at a later date by ordering the reference **GVOKITEC2**.



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.

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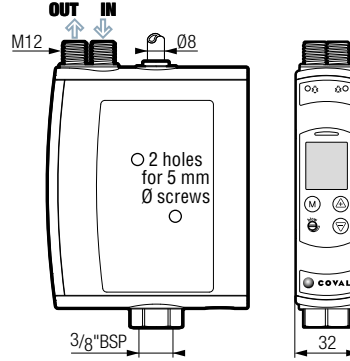
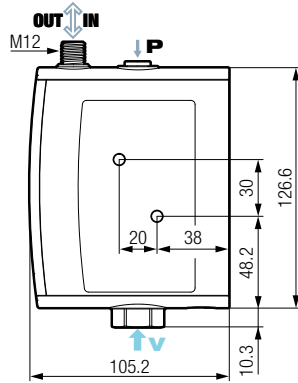
Dimensions, Mounting Options



Side Mounting

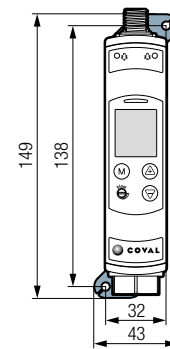
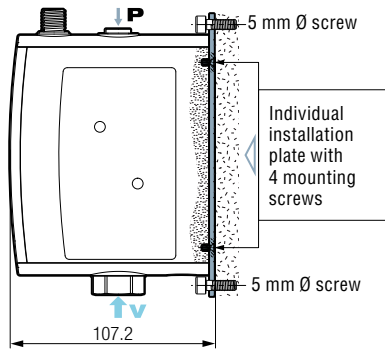
▪ Version: one M12 connector

▪ Version: two M12 connectors



Mounting from the side is the simplest to implement: Two \varnothing 5 mm through screws or bolts with large washers.

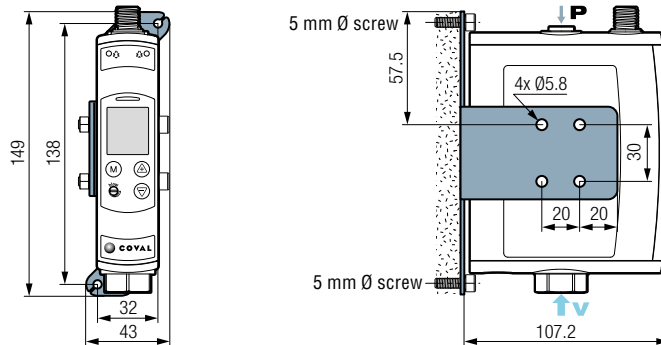
Mounting from Front



For mounting from the front, in addition to the module, you need to order an additional kit:

Mounting from front kit:
1 plate + 4 screws

Part No.: LEMFIX2A

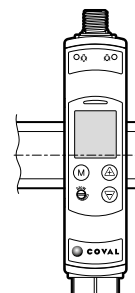
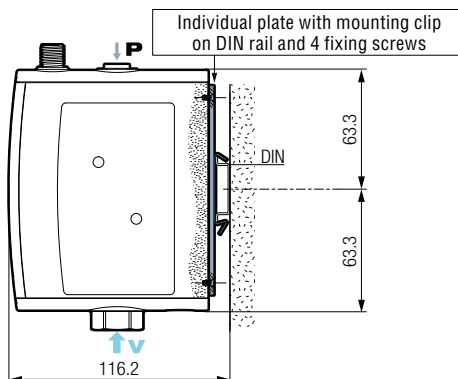


For front installation with side pump mounting this kit is needed in addition to the module:

Front installation kit:
1 bracket + 2 screws CHC5x40 + 2 nuts

Part No.: LEMFIX2D

Mounting on DIN rail



For a static mounting (for example, in a cabinet), a module can be clipped onto a DIN rail. For this purpose, the module must first be equipped with an individual plate for fixing onto a DIN rail, to be ordered separately:

Kit for mounting on DIN rail:
1 plate / clip + 4 screws

Part No.: LEMFIX2B



Specifications

- Supply: Non-lubricated air 5 microns filtered, according to standard ISO 8573-1:2010 [4:5:4].
- Operating pressure: 4.5 to 7 bar.
- Blow-off: Adjustable flow rate.
- Powerful blow-off (option F) P = 3.5 bar without flow rate control.
- Maximum vacuum: 85%.
- Suction flow rate: From 125 to 200 NI/min, depending on model.
- Air consumption: From 179 to 260 NI/min, depending on model (when operating "without ASC").
- Integrated non-clogging silencer.
- Sound level: From 72 to 75 dBA "without ASC". 0 dBA with ASC available.
- Display status:
 - of the vacuum control on the front panel: Green LED.
 - of the blow-off control on the front panel: Orange LED.
- Electric protection grade: IP 65.
- Maximum operating frequency: 4 Hz.
- Response time for opening / closing: 20/30 ms.
- Service life: 30 million cycles.
- Weight: From 410 to 460 g, depending on model.
- Operating temperature: From 0 to 50°C.
- Materials: PA 6-6 15% FG, brass, aluminum, NBR, HNBR, PU.

Electrical Controls

- Control voltage: 24V DC ($\pm 10\%$ regulated).
- Current consumption: 30 mA (0.7W) by vacuum or blow-off solenoid valve.

Displays

- Display status of the threshold on the front panel: Green or red LED.
- Black and white LCD display, 7 matrix, symbols, vacuum reading area.
- Displaying the vacuum level and bar graph.
- Displaying number of cycles (vacuum cycles counter).
- Indication of exceeding service life (> 30 million cycles).

Settings

- Using membrane keypad and pull down menu.
- Language selection: FR, ENG, DE, IT or ES.
- Blow-off type selection: controlled or automatic (blow-off time configurable from 0 to 10s).
- Measurement unit selection (% , mbar, inHg).
- Manual, electrical, monostable commands.
- If the application requires, specific setting of thresholds and hysteresis that are different from the initial factory settings: L1 = 65%, h1 = 10%).

Vacuum Sensor

- Power supply voltage: 24V DC ($\pm 10\%$ regulated).
- Current consumption: Standby: <25mA / max. 60 mA.
- Measurement range: 0 to 99% of vacuum, 0 to -999 mbar, 0 to -29.9 inHg.
- Measurement accuracy: $\pm 1.5\%$ of range, temperature compensated.

"Gripped Product" Output Signal

- 24V DC, switching output / NO, switching capacity: 125 mA PNP.

Configurable auxiliary output

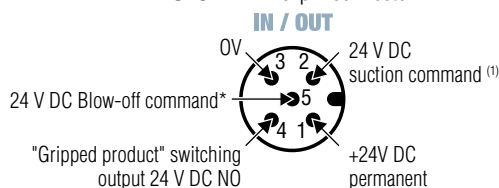
- (C24 model only, 2 x M12 4 pins)
- either "Vacuum level" signal, analogic 1 to 5V DC of measuring range.
 - or "without ASC" signal +5V DC NO switching output.

ASC: Regulation & Self-Adaptation

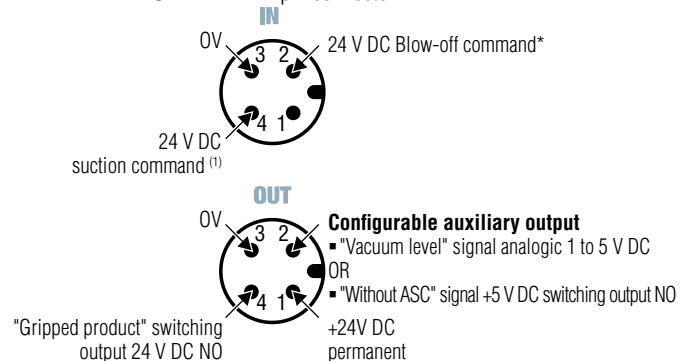
- Continuous monitoring of the leakage level: Back-off or automatic return to operation with ASC.

Electrical Connections

- C15:** 1 M12 5-pin connector



- C24:** 2 M12-4 pin connector



(1) 24 V DC suction command, depending on version:
 - for vacuum pumps model **S** (vacuum control NC valve): 24 V DC vacuum control
 - for vacuum pumps Model **V** (vacuum control NO valve): 24 V DC vacuum off command
 * **S** externally controlled blow-off or automatic blow-off function > economy of an automaton outlet.

Accessories

Power supply cable: M12, straight, female – open end

- CDM12N:** 4-pin, length. 2 m.
- CDM12L5:** 4-pin, length. 5 m.
- CDM125PL2:** 5-pin, length. 2 m.
- CDM125PL5:** 5-pin, length. 5 m.



Power supply cable: M12, elbow, female – open end

- CCM12:** 4-pin, length. 2 m.
- CCM125PL2:** 5-pin, length. 2 m.





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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