LEMAX series

twin tech Integration & Intelligence

AIR Saving Control

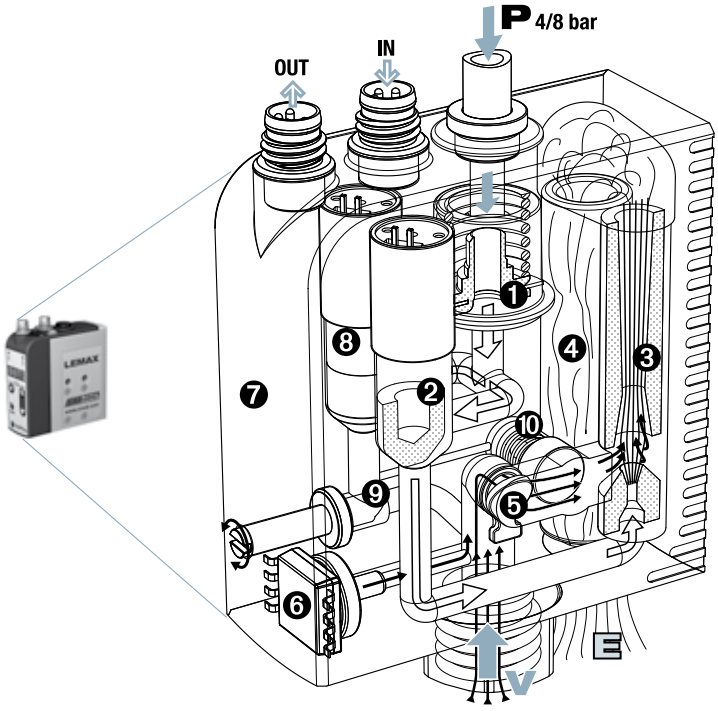
Integrated mini vacuum pump with"ASC" (Air Saving Control)

Applications

For all objects, air-tight or not very porous

Advantages

■ Energy savings of 75 to 99% (depending on application) thanks to automatic ASC (Air Saving Control) operation.
■ "All-in-one"solution, no more peripherals to be added.
■ Simplified installation and use thanks to the Plug & Play system
■ Unequalled compactness: fixing very close to the suction pads for short response times.
■ No clogging, thanks to the through-type silencer.
■ Controlled or timed blow-off.
■ Gripping safety in the event of electricity shut-off.
■ Smart communication ➔ Easier experience at all stages: initial settings, production, maintenance.



Compact integration

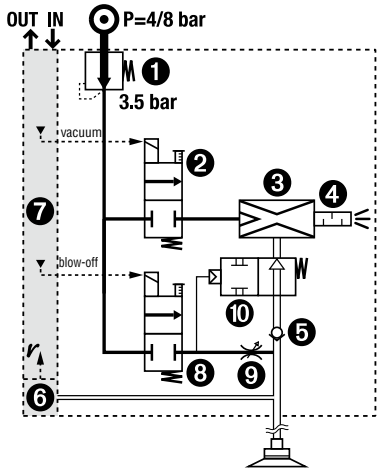
The illustrations opposite presents the 10 functions integrated in the mini-module, and their respective roles in operation.

The result of this COVAL performance is:

- **A mini module** (≅ 130 g) that is easy to install very close to to the suction pads in order to reduce the volume to be emptied➔ short response time.
- **A complete module**, therefore not requiring any additional function or connections.

INTEGRATED FUNCTIONS

1. 3.5 bar Pressure regulator
2. Solenoid valve"vacuum"
3. 3.5 bar optimized Venturi
4. Clog-free silencer
5. Check valve on vacuum
6. Electronic vacuum switch
7. Integrated electronics
8. Solenoid valve"blow-off"
9. Blow-off flow adjustment
10. Isolation valve

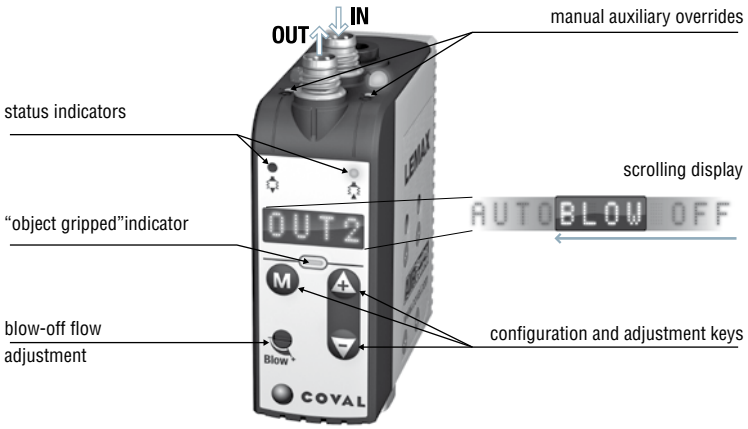


Smart communication

The adjacent illustration presents the display panel which enables:

- Initial settings
- Any adjustments
- Production monitoring
- Maintenance

In particular, the "no ASC" alert, (see next page), helps to start maintenance operations in order to return to "ASC" operation, which is especially energy saving.



LEMAX series

ASC (Air Saving Control) operation

“Air Saving Control” Cycle

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

1- Gripping the object

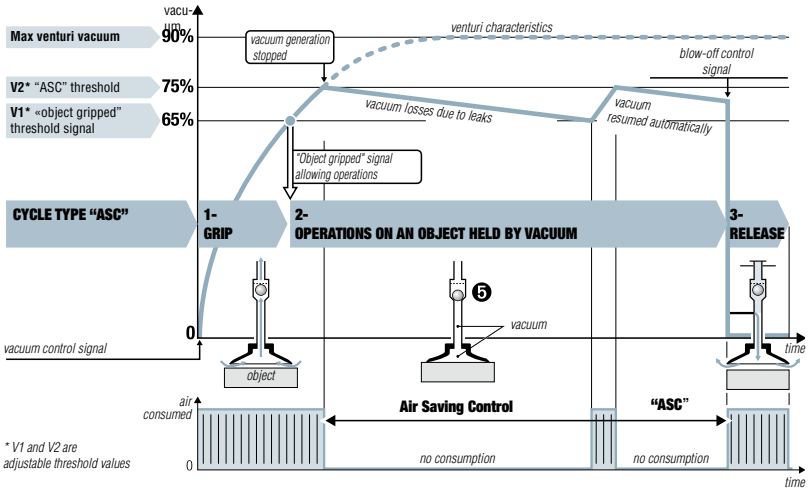
The "vacuum" solenoid ❷ starts the cycle by supplying the venturi ❸ which generates the vacuum to quickly pick up the object with the suction pad ➔ short-term consumption.

2- Operations on the object held by the vacuum

The vacuum level is constantly monitored by the vacuum switch ❻. When it reaches the V1 threshold (65%), the “gripped object” signal is generated, which allows the planned operations (transfer, machining, etc.). When the vacuum reaches threshold V2 (75%), the supply to the venturi via the solenoid valve ❷ is cut ➔ consumption is halted. The object remains held by the vacuum maintained thanks to the closed valve ❺. 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 V2 (75%).

3- Releasing the object

At the end of operations, blow-off is ordered. The “blow-off” solenoid valve ❽ generates a stream of air which closes the isolation valve ❿, and, via flow regulation ❾, blows on the object to release it quickly.



“ASC” : AN ADVANTAGE WITHOUT LIMITATIONS

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

1- No specific adjustment
The initial setting (V1 = 65%, V2 = 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.

Resulting savings

Energy savings from “ASC” are major, as the two examples opposite show:

- 75% 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.

1- Grip + transfer *(Ø 1.4 mm nozzle, 0.2 l of vacuum)*

Phase	Duration	Air consumption		
		“ASC” off	“ASC” on	
Grab	0.28 s	0.4 Nl	0.4 Nl	savings made
Transfer	1.20 s	1.8 Nl	0	
Release	0.14 s	0.2 Nl	0.2 Nl	
		2.4 Nl →	0.6 Nl →	75%

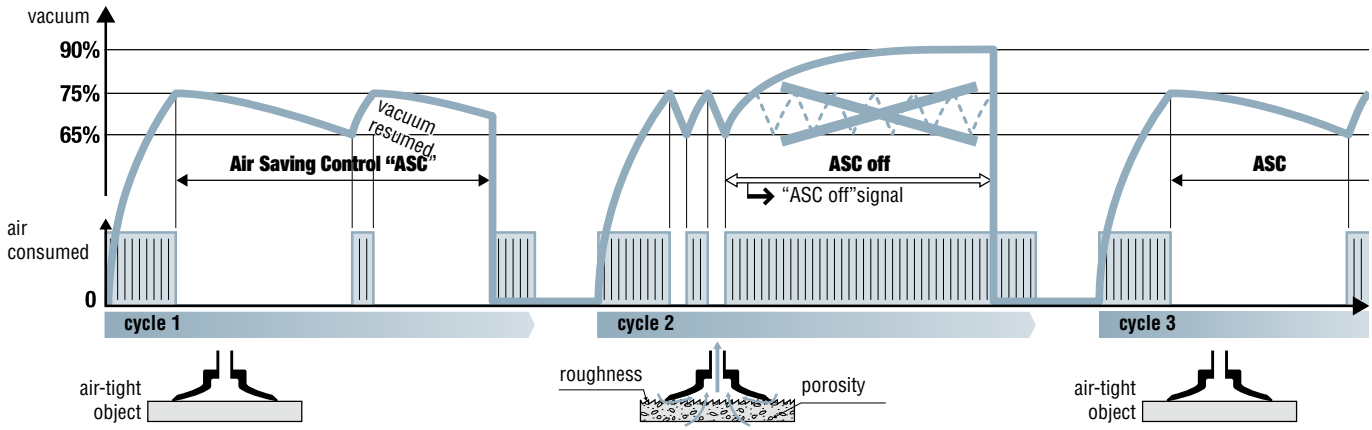
2- Clamping + operations *(Ø 1.4 mm nozzle, 0.4 l of vacuum)*

Phase	Duration	Air consumption		
		“ASC” off	“ASC” on	
Holding	0.55 s	0.8 Nl	0.8 Nl	savings made
Operations	60 s	90 Nl	0	
Release	0.14 s	0.2 Nl	0.2 Nl	
		91 Nl →	1.0 Nl →	99%

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.



LEMAX series

Selection guide

Stand-alone or island modules?

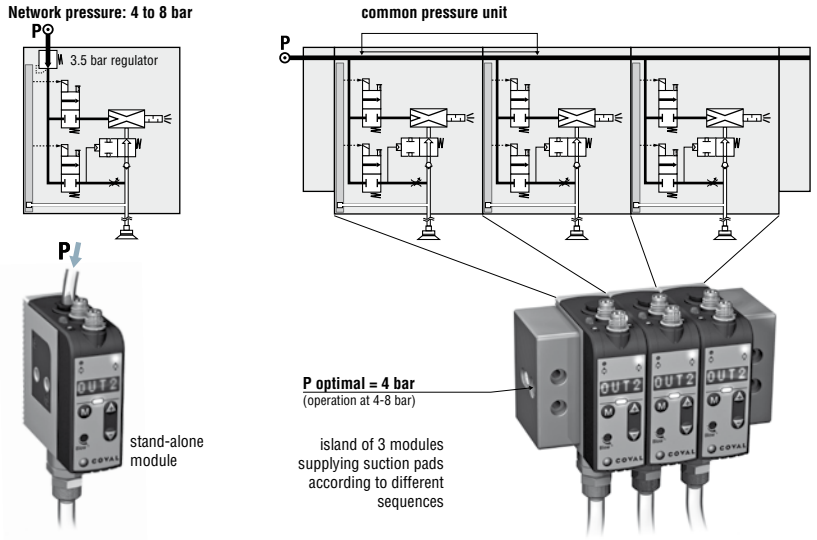
Stand-alone modules are suitable for the most common applications: one module controls one or more suction pads which all operate according to the same sequence.

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

- several autonomous modules, OR
- a group of these modules with an internal common pressure unit.

The illustrations opposite guide the selection:

- autonomous modules are coupled with integrated pressure regulators (see p. 9/8)
- in a group, the integrated regulator is eliminated: to maintain the advantage of economical and silent operation, it is recommended to reduce the group's common pressure supply pressure to 4 bar.



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.

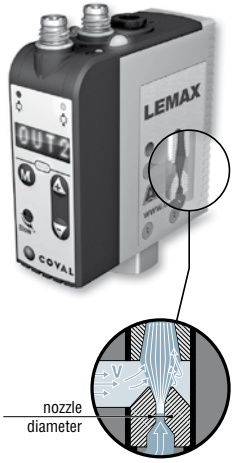
On the other hand, during "ASC" operation, a large nozzle quickly reaches the vacuum threshold generating power shut-off.

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.

Selecting the nozzle diameter

Ø nozzle	Venturi characteristics during "ASC" off operation.		"ASC" operation - gripping at 65% vacuum - vacuum shutoff at 75% Time for a volume of 1l		
	air drawn in	air consumed	grip time (65% vacuum)	time to 75% vacuum	air consumed
1.4 mm	70 Nl/min	90 Nl/min	0.99 s	1.38 sec	2.2 Nl
1.2 mm	45 Nl/min	65 Nl/min	1.53 sec	2.15 sec	2.2 Nl
1.0 mm	29 Nl/min	44 Nl/min	2.38 sec	3.33 sec	2.2 Nl



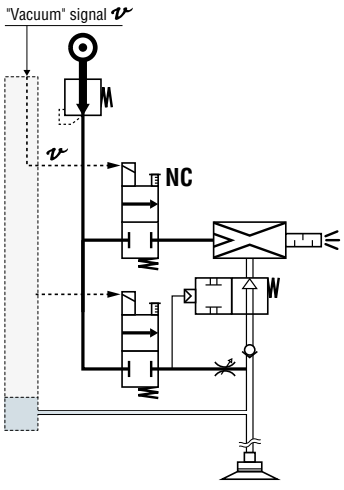
Vacuum control by NC solenoid valve or NO solenoid valve

Vacuum control by NC (Normally Closed) solenoid valve, is the most standard version: in the case of an electrical shut-off, vacuum is no longer generated. On the contrary, with vacuum control by NO (Normally Open) solenoid valve, the vacuum continues to be generated in the event of an electrical shut-off: positive object-holding security.

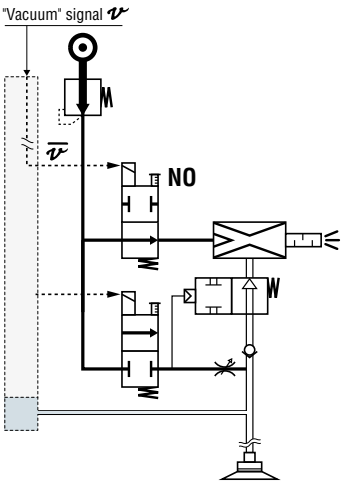
The diagrams opposite show that both versions are controlled by the same "vide" signal v :
The opposite $\overline{v}$ required for control of the NO solenoid valve is automatically obtained internally by the control electronics.

Note, however, that the NO version requires blow-off controlled by a specific signal: automatic, timed blow-off can only be configured in the NC version.

■ **NC solenoid valve**



■ **NO solenoid valve**



LEMAX 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

LEMAX	90	X	14	S		B3

VACUUM LEVEL

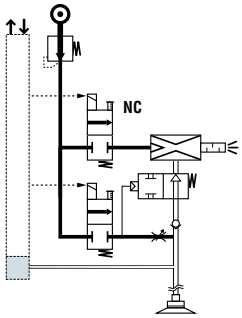
maximum 90% vacuum optimum for air-tight objects	**90**

NOZZLE DIAMETER

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

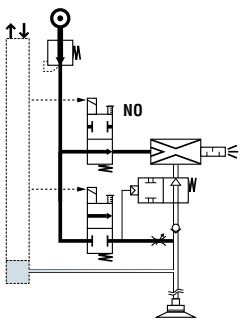
COMPOSITION OF THE MODULE

Vacuum pump controlled by a Normally Closed (NC) solenoid valve — **S**



LEMAX90X--**S**--
- In the event of an electrical shut-off, vacuum is no longer generated.
- Optional configured blow-off:
  - by specific signal.
  - automatic, timed 0 to 3 sec. (➔ a single control signal vacuum and blow-off)

Vacuum pump controlled by a Normally Open (NO) solenoid valve — **V**



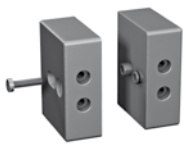
LEMAX90X--**V**--
- In the event of an electrical shut-off, the vacuum continues to be generated: gripped object held
  ➔ positive security
- Blow-off controlled by a specific signal

ISLAND ASSEMBLIES

B2		LEMAX90X___**B2** group assembly with 2 identical modules.
B3		LEMAX90X___**B3** group 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. (see p. 9/19)

COMPONENTS FOR THE ISLAND TO BE ASSEMBLED

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

REFERENCE EXAMPLE COMPOSED OF A STAND-ALONE MODULE:

■ **LEMAX90X14S**

LEMAX, mini vacuum pump, 90% max. vacuum, 1.4 mm nozzle, controlled by a NC (Normally Closed) solenoid valve.

EXAMPLE COMPOSITE PART NUMBER FOR AN ISLAND ASSEMBLY:

■ **LEMAX90X14SB3**

LEMAX group assembly, containing 3 x 90% max. vacuum modules, ø1.4 mm nozzle, controlled by NC (Normally Closed) solenoid valve.

ORDER EXAMPLE FOR AN ISLAND TO BE ASSEMBLED:

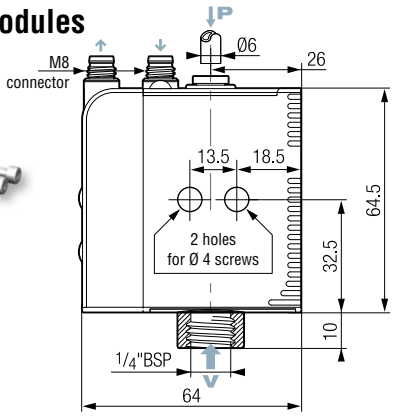
■ **LEMAX90X14VB**
■ **LEMAX90X12SB**
■ **LEMAX90X10VB** → 3 LEMAX modules for an island, of different types.
■ **LEMSETA** → Set of ends for island.

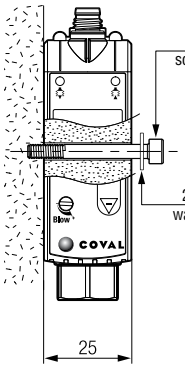
LEMAX series

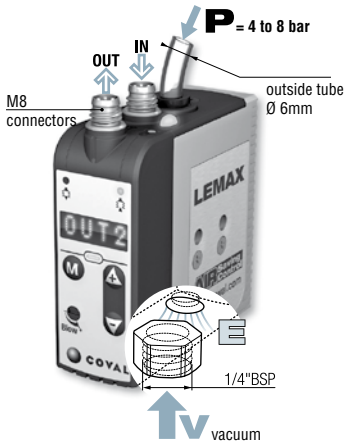
Dimensions
Mounting options

1- Stand-alone modules

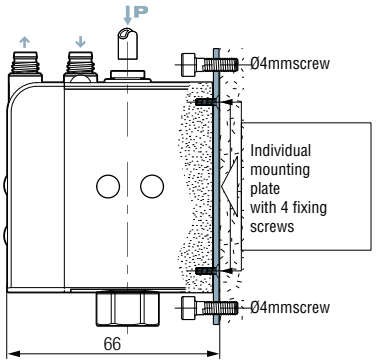
Side mounting

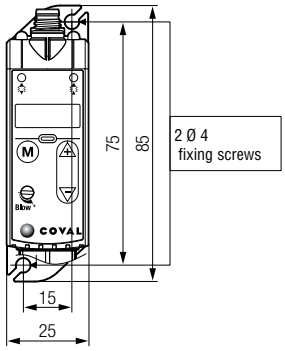






Front mounting

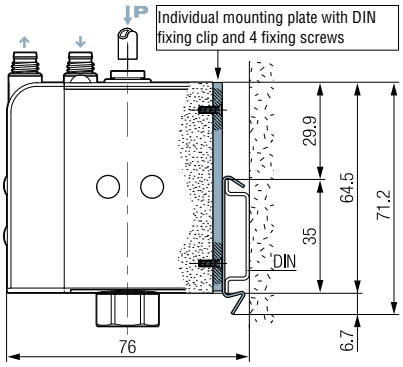


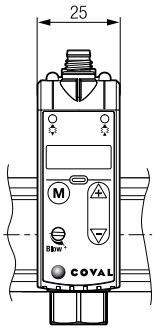


For front mounting, order the necessary kit, in addition to the module:

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

Mounting on DIN rail



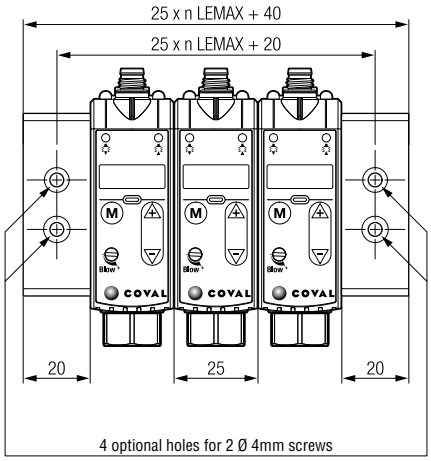


A module can be clipped onto a DIN rail.

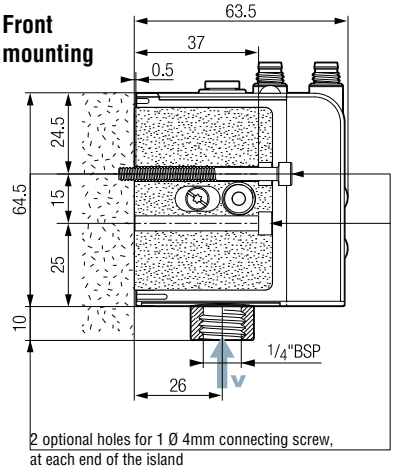
For this purpose, the module must first be equipped with an individual DIN installation plate, ordered separately:

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

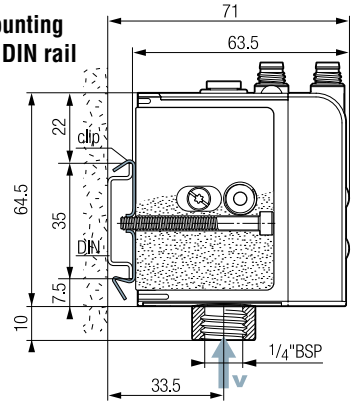
2- Islands



Front mounting



Mounting on DIN rail



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

LEMAX series

Characteristics
Assembling a group

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: - stand-alone version: P = 3.5 bar.
  - island version: P network
- Maximum vacuum: 90%.
- Suction rate: 29 to 70 Nl/min.
- Air consumption: 44 to 90 Nl/mn during "ASC off" operation.
- Integrated clog-free silencer.
- Noise level: approximately 68 dBA "ASC off". 0 dBA with ASC.
- Electrical protection level: IP65.
- Max. operating frequency: 4 Hz.
- Endurance: 10 million cycles.
- Weight: 130 g.
- Operating temperature: 10 to 60 °C.
- Materials: PA 6-6 15%FV, brass, aluminium, NBR.

■ **Electrical controls**
- Control voltage: 24 V DC (regulated ± 10%).
- Current draw: 30 mA (0.7 W) vacuum or blow-off.

■ **Integrated electronics**
- Power supply 24V; current draw: <57mA.
- Measuring range: 0 to 99% vacuum.
- Measuring precision: ± 1.5% of the range, compensated in temperature.
- Display: 4 digit red LED matrix.

Service characteristics

■ **"Object gripped" output signal**
- 24 VDC, TOR / NO, switching power: 125 mA PNP.

■ **Configurable auxiliary output,** you can choose from:
- "ASC off" signal, +5 V TOR / NO, or.
- "vacuum level" signal , analogue 1 to 5 VDC of the measuring range.

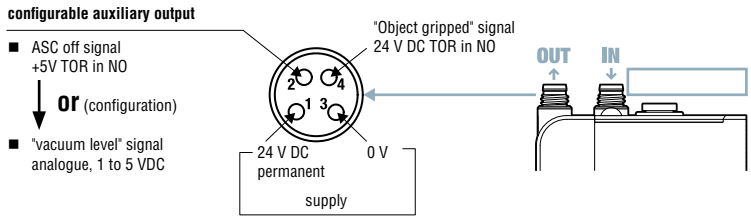
■ **Displays**
- Scrolling display: 4 digit red LED matrix.
- Configurable according to language: FR, ENG, D, IT or ES.
- Flashing if "ASC off" for maintenance.
- Status indicators: "Vacuum," green LED, "blow-off," red LED.
- "Object gripped" indicator: Green LED on front panel.

■ **Settings**
- By mechanical keys and drop-down menu (see page 9/14).
- Language selection.
- Blow-off type selection: controlled or automatic adjustable from 0 to 3 sec.

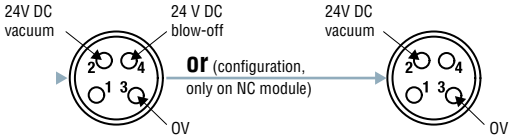
■ **Settings**
- Display of the number of cycles (vacuum cycle counter).
- If the application requires, specific adjustment of thresholds and hysteresis different from original factory settings (V1=65% H1=10%, V2=75%, H2=10%).

■ **Autoreactivity**
- Constant monitoring of leakage rate: abandon or automatic return to ASC operation.

Electrical connections and corresponding configurations



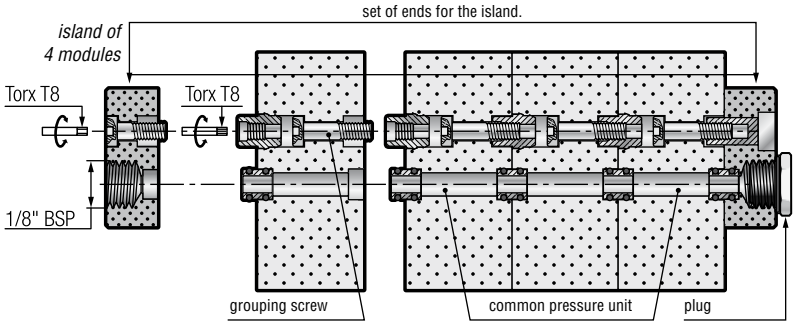
Note: straight and angled M8 connecters shown p. 8/20



blow-off controlled by specific signal
2 control signals: "vacuum" and "blow-off"

auto-timed blow-off
1 single control signal: shuts down vacuum, triggers blow-off, with a configurable duration of 0 to 3 sec.

Assembling and connecting an island



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 1.0 mm nozzle ➔ 9 modules

Note: In a single island, it is possible to combine LEMAX series modules and LEM series modules (p. 9/2 - 9/7).

The range of modular and intelligent vacuum pumps

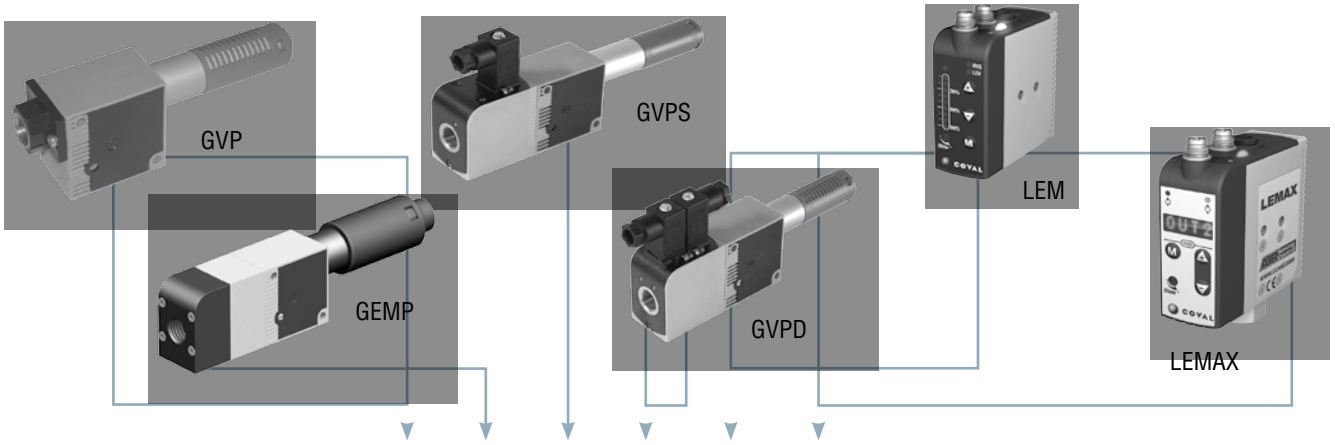
Advantages

- 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