COVAL

vacuum managers

INTELLIGENT VACUUM PUMPS

ADVANCED VACUUM SOLUTIONS

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VACUUM MANAGERS

Welcome to the new COVAL catalog!

At COVAL, we set out to provide our clients and users with **vacuum handling** solutions that meet their goals in terms of profitability, productivity, quality, safety, and environmental conservation.

To achieve this, COVAL is rallying its efforts to predict, plan, innovate, and manufacture with one aim in mind: offering the right products and services at the right time. In practical terms, this is what it takes:

- Impeccable knowledge of various industrial sectors.
- Being attentive and available to our clients' teams and users.
- The ability to adapt quickly to evolving needs.
- A rigorous approach to all of COVAL's efforts and endeavors.

To meet our commitments every day, at COVAL we have been developing an organization and a culture geared towards constant innovation, quality, and service for more than 35 years:

- Teams specialized by industry: food processing, aeronautics, robotics, plastic processing, packaging, and more.
- Strong in-house capacity for research and innovation complemented with external resources through public and private partnerships.
- Strong presence thanks to our sales team, foreign subsidiaries, and authorized dealers.

COVAL is the Vacuum Manager for each and every one of its clients.

We bring together all the skills and know-how to manage the vacuum handling of their parts, products, or packaging.

This catalog presents our range of intelligent vacuum pumps, illustrating COVAL's vision of innovation, with a focus on energy savings, communication, and ease of use, as well as compactness.

It is an introduction to discussions with our sales and technical teams about your projects.

The COVAL team

COVAL is a member of the **French Fab**, sharing with it the values of innovation, French manufacturing, digital transformation, and international development.

La FRENCH FAB

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COVAL SERVICES

COVAL combines its products with efficient services to assist in defining your needs, selecting your solution, integrating your products, and optimizing your equipment.

▶ ALL COVAL PRODUCTS ONLINE

Just click to access our entire product range, which is regularly updated, and download any of our catalogs.

www.coval.com

▶ 3D ONLINE LIBRARY

You have free access to 3D files of all our products in formats compatible with leading CAD software from our website at www.coval.com

3D COVAL Data

You can use this fast, new, reliable service to make it easier to integrate our components directly into your designs.

▶ MOBILE APPLICATION

The **COVAL e-catalog** application gives you access to all our products from anywhere, allowing you to perform the following actions for each product:

- Download 3D models.
- View the latest up-to-date technical data.
- Download and share technical data sheets.

Download on the App Store

ANDROID APP ON Google play

▶ TECHNICAL PHONE SUPPORT

COVAL provides you technical support to answer all your questions regarding its products, solutions, and services: find a product or spare part, get advice on recommended use, request technical documentation, ask for technical information (how to avoid pressure losses, reduce noise level, save energy, etc.).

▶ COVAL SOLUTIONS SERVICES

To adapt our products to your specific applications, both the COVAL engineering and design department and its development team are dedicated to providing solutions that meet your specifications.

vacuum management

ENERGY SAVING APP

Measure the savings online that you can make with a COVAL vacuum handling solution.

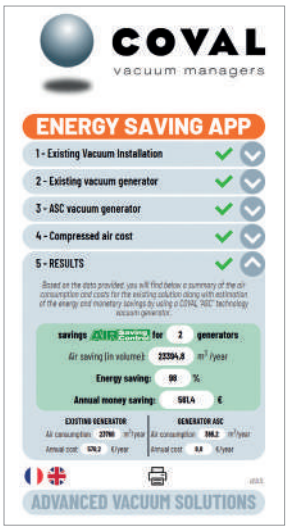
The **ENERGY SAVING APP** allows you to measure the savings you can generate with LEMAX, LEMAX+, LEMAX IO, LEMCOM or GVMAX HD vacuum pumps featuring the ASC technology compared with conventional vacuum pumps.

This unique app in the world of vacuum technology is very intuitive to use. Once you've entered the equipment's main characteristics (gripping cycle time, number of cycles, run time, volume to be evacuated), the savings are displayed automatically in euros, air volume, and savings percentage. In most cases, it is quite significant since it peaks at 97% of energy saved, for example with the LEMAX.

It is, therefore, easy to realize that investing in a COVAL pump featuring ASC pays for itself, on average, after less than a year of use.

This COVAL exclusive strengthens our calling as your company's Vacuum Manager and our desire to contribute to improving the energy and production performance of your equipment.

AIR Saving Control



You can access this software from the COVAL website:
https://www.coval-international.com/company/our-technologies/

Products concerned: ■ LEMAX ■ LEMAX+ ■ LEMAX IO ■ LEMCOM ■ GVMAX HD…

COVAL's Family of Intelligent Vacuum Pumps

Vacuum pumps are used in a wide variety of automated systems, primarily to generate and control vacuum in suction cups to ensure the gripping of objects. They must be easily integrated into a process and communicate the information necessary to ensure proper production.

To meet the expectations of manufacturers and the demands of automated applications, COVAL offers a complete range of vacuum pumps to meet different needs: vacuum levels, suction rates, control types, communication technologies, and energy savings.

Communication needs vary depending on the industry and application, but more and more, an efficient and real time communication system allows for increased flexibility of the machine.

In addition, the simplification of wiring and configuration is a benefit for integrators, while expanding the possibilities of diagnosis and optimization.

Key points of intelligent vacuum pumps

Functions \ Model	LEMP	LEM	LEMAX	LEMAX IO	LEMCOM	LEM+	LEMAX+	GVMAX HD	CMS HD
Recommended for porous products	■	■			■	■			■
Recommended for airtight products			■	■	■		■	■	
Suction flow rate from 29 to 92 Nl/min	■	■	■	■	■				
Suction flow rate from 125 to 275 Nl/min						■	■	■	
Suction flow rate from 700 to 1600 Nl/min									■
Maximum vacuum level: 60%	■	■			■	■			
Maximum vacuum level: 80 or 85%	■	■	■	■	■	■	■	■	■
Vacuum control		■	■	■	■	■	■	■	■
Blow-off control		■	■	■	■	■	■	■	■
Integrated pressure regulator (ASR) AIR Saving Regulator	■	■	■	■	■	■	■		
Powerful blow-off						□	□	□	
Electronic vacuum switch with display	□	□	■			□	■	■	□
Electronic vacuum switch				■	■				
Pressure sensor								■	□
Vacuum check-valve			■	■	■		■	■	
Automatic vacuum regulation (ASC) AIR Saving Control			■	■	■		■	■	
M8 connections	□	■	■	■	■				
M12 connections						■	■	■	■
Island Assembly Available	■	■	■	■	■			■	
SMART SWAP Quick-mounting system								■	
Field bus EtherNet/IP™ / PROFINET					■				
IO-Link				■				■	□
NFC								■	□

■: Standard or integrated □: Option

Energy Savings

COVAL is committed to making your vacuum handling system energy-efficient.
Our goal is to optimize the overall performance of your equipment by operating on the following three principles:

- Analyzing the system to identify the potential for savings.
- Selecting the most appropriate solution.
- Including COVAL energy-saving technologies, such as ASR and ASC, in our products.

AIR Saving Regulator

ASR (Air Saving Regulator)
A "venturi pressure regulator" that guarantees optimized operation at 3.5 bar.
Ideal for gripping of porous products or rough surfaces.

Advantage: Up to **40 %** energy savings.

AIR Saving Control

ASC (Air Saving Control)
A vacuum regulation system that auto-adjusts to the product being handled.

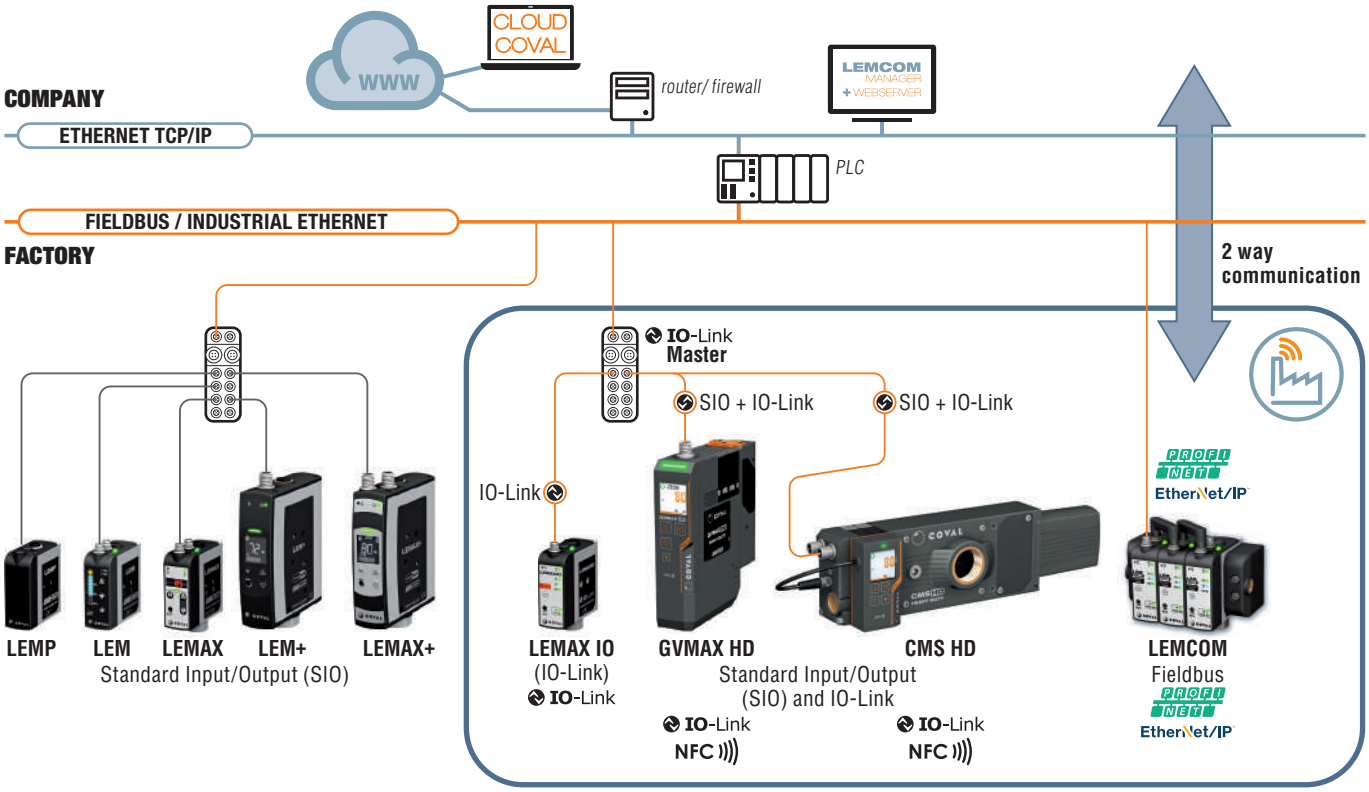
Ideal for gripping airtight products.

Advantage: Up to **90** % energy savings.

COVAL
vacuum managers

A vast **ecosystem of vacuum pumps** to meet all needs.

From simple control to communication technologies designed for the industry of the future...



Key points of communication technology

Communication interface with the machine

Industrial Ethernet

- Supported buses: PROFINET, EtherNet/IP™.
- Direct connection to the machine's ethernet network.
- 2 cables for power and control of 1 to 16 vacuum pumps.

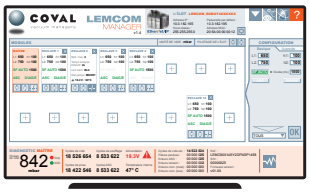
IO-Link

- Compatible with all fieldbus and industrial ethernet networks (via IO-Link master).
- 3-wire connection.
- Easy maintenance thanks to the storage of parameters in the IO-Link master.

User communication interface

LEMCOM Manager

- PC control software, configuration, and diagnostic software for the LEMCOM series, dedicated to "vacuum applications".



WEB Server

- Embedded on the master modules of the LEMCOM series.
- Integrated into the commercial IO-Link master for the LEMAX IO/ GVMAX HD.
- Direct access to control, configuration, and diagnostic functions.

Vacuum Manager App (NFC)

- Available on iOS and Android.
- Configuration and diagnosis of the GVMAX HD and CMS HD series.
- Uploading of operating data to the COVAL cloud.

High resolution display

- LCD color display on GVMAX HD and CMS HD series.

Intelligent Vacuum Pumps

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Intelligent Vacuum Pumps

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LEM+

AIR Saving Regulator

Compact High Flow Vacuum Pumps with ASR (Air Saving Regulator)

- Nozzle Ø: 2 ; 2.5 mm
- 2 vacuum levels: 60% and 85%
- Suction flow rate up to 275 Nl/min
- Integrated pressure regulator (ASR)
- All required functions integrated internally
- M12 connections
- For airtight and porous objects
- Compact and lightweight
- Control panel for monitoring and adjustment
- Energy savings in all networks > 4 bars
- Reduced wiring
- Reduced installation time
- Adaptable to all industries

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LEMAX+

AIR Saving Control

Compact High Flow Vacuum Pumps with ASC (Air Saving Control)

- Nozzle Ø: 2 ; 2.5 mm
- Vacuum level: 85%
- Suction flow rate up to 200 Nl/min
- Integrated pressure regulator (ASR)
- Integrated vacuum regulation (ASC)
- All required functions integrated internally
- M12 connections
- For sealed or slightly porous parts
- Compact and lightweight
- Control panel for monitoring and adjustment
- ASC = 75% to 90% energy savings
- Reduced wiring
- Reduced installation time
- Adaptable to all industries

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GVMAX HD

NFC IO-Link AIR Saving Control

Heavy Duty Communicating Vacuum Pumps

- Nozzle Ø: 2.5 ; 3 mm
- Vacuum level: 85%
- Suction flow rate up to 230 Nl/min
- Integrated vacuum regulation (ASC)
- Standard In/Out (SIO) and IO-Link
- NFC
- M12 connections
- Standalone vacuum pumps or in island assemblies
- For sealed or slightly porous parts
- High visibility color display with clear multi-lingual messages and straightforward settings menu
- ASC = 75% to 90% energy savings
- Easy installation and operation thanks to the IO-Link communication interface
- Easy set up made possible by NFC technology and COVAL Vacuum Manager mobile application
- Adaptable to all industries

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CMS HD

NFC IO-Link

Heavy Duty Communicating Vacuum Pumps

- 3 powerful suction flow rates from 700 Nl/min to 1600 Nl/min
- Vacuum level: 80%
- With or without vacuum and blow-off control
- M12 connections
- Digital inputs/outputs mode (SIO) / IO-Link
- NFC
- 3 exhaust configurations
- For airtight and porous objects
- High visibility color display with clear multi-lingual messages and straightforward settings menu
- Easy installation and operation thanks to the IO-Link communication interface
- Easy set up made possible by NFC technology and COVAL Vacuum Manager mobile application
- Adaptable to all industries

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COVAL
vacuum managers

series
LEMP

Mini Vacuum Pumps without control with "ASR"

- Nozzle Ø: 1; 1.2; 1.4 mm
- 2 vacuum levels: 60% and 85%
- Suction flow rate up to 92 Nl/min
- Integrated pressure regulator (ASR)
- With or without vacuum switch
- M8 connections
- Stand-alone or island module

AIR Saving Regulator

LEMP

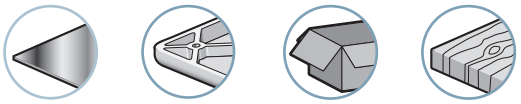
Mini Vacuum Pumps without control with ASR (Air Saving Regulator)

AIR Saving Regulator

Advantages

- 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 LEMP for every need: optional vacuum switch.
- Installation: standalone or island assembly.

Industry-specific applications

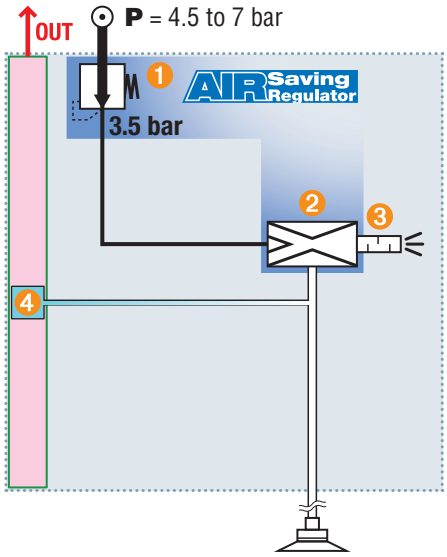


For all objects, porous or airtight

Compact Integration

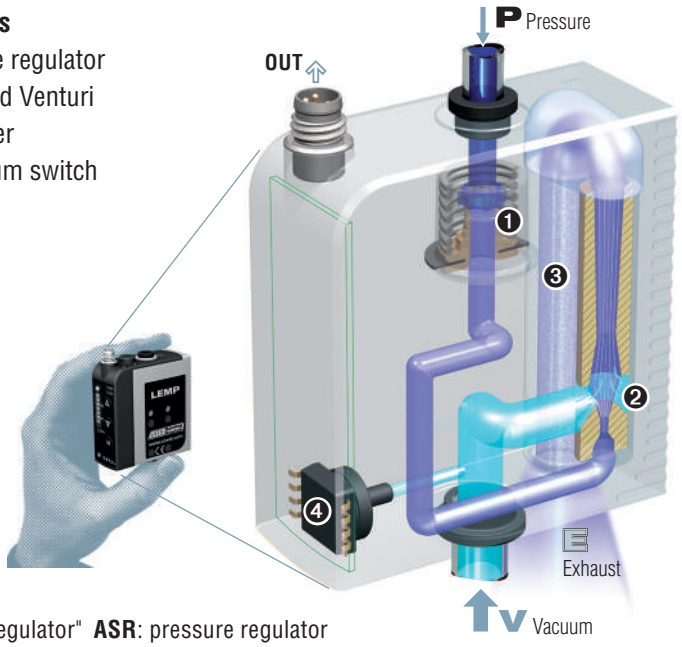
The illustrations below demonstrate the functions integrated in the mini-module, and their respective roles in operation.
The result of this COVAL innovation is:

- **A mini module** (≅ 110 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

❶ 3.5 bar Pressure regulator
❷ 3.5 bar optimized Venturi
❸ Clog-free silencer
❹ Electronic vacuum switch



Schematic representation

AIR Saving Regulator

40% Energy savings

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

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

AIR Saving Regulator (ASR): Air Saving Regulator

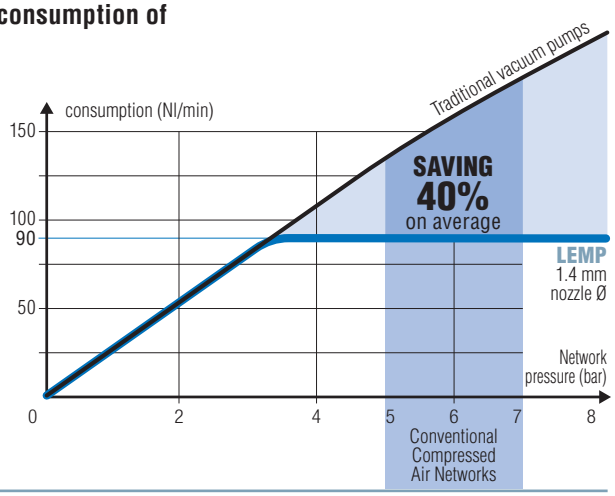
The LEMP vacuum pumps, which integrate an **ASR** "venturi regulator" combination, maintain ideals that COVAL values greatly: reducing both compressed air consumption and noise generation.

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.



LEMP

Mini Vacuum Pumps without control with ASR

Optional Vacuum Switch/Stand-alone and Island Modules

Version with Integrated Vacuum Switch

The front dialogue panel shown below 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.

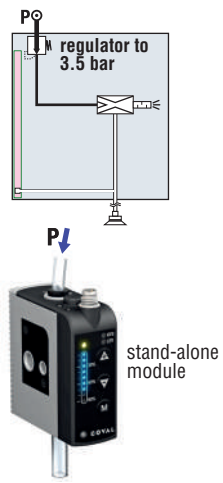
Stand-alone or Island Modules?

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.

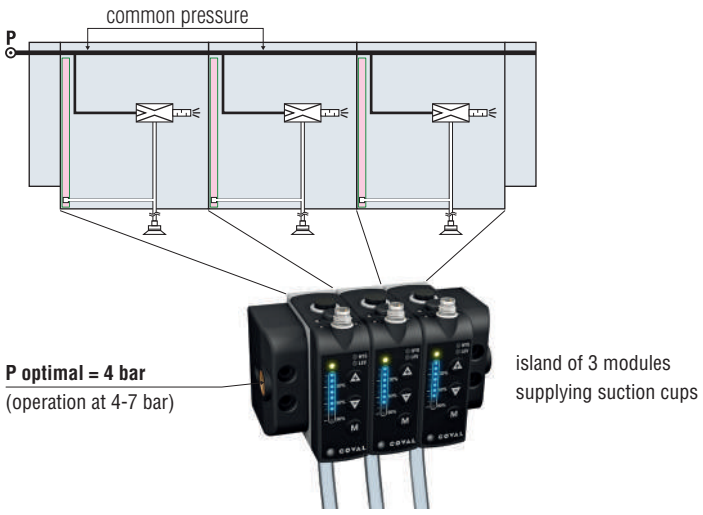
When several suction cups are operating according to different sequences, multiple modules are required, which can be:
- several stand-alone modules,
- an island of these modules with an internal common pressure unit.

The diagrams below help in the selection:
- Stand-alone modules are complete, with the integrated pressure regulator
- 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



LEMP

Mini Vacuum Pumps without control with ASR

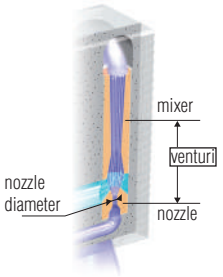
Selection Guide

AIR Saving Regulator

Select Vacuum Level and Nozzle Diameter

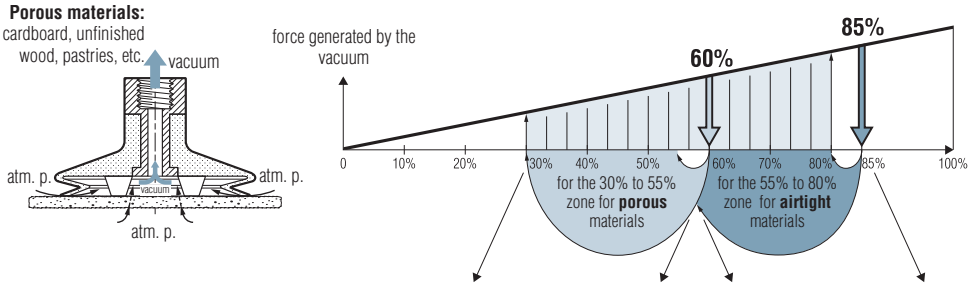
■ **Airtight products handling: glass, plastic, coated wood, sheet metal…**

Because vacuum leaks are limited, the vacuum level to be used may be high: between 50% to 80%, to be generated by a 85% 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.



■ **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 product leak flow measurement.



Porous Objects ▸ Maximum Vacuum Level: 60%

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

ø nozzle \ vacuum achieved	30%	35%	40%	45%	50%	55%	Air consumed (Nl/min)	Air drawn in (Nl/min)
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: 85%

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

ø nozzle \ vacuum achieved	55%	60%	65%	70%	75%	80%	Air consumed (Nl/min)	Air drawn in (Nl/min)
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**

Select with or without Vacuum Switch

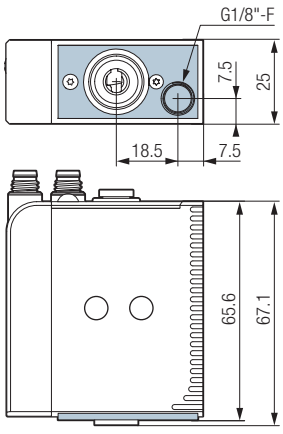
For common applications, the vacuum switch is needed, with the dialogue face for digital display and adjustment.
However, some applications may just require a simple operation, without an "object gripped" return signal. The simplified version may then be chosen, with no vacuum switch, display, or adjustment.

Exhaust manifold: option E

The LEMP 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 (LEMP___**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.



LEMP

Mini Vacuum Pumps without control with ASR

Configuring a Vacuum Pump

AIR Saving Regulator

Part numbers for an island assembly or components in an island

Part numbers for stand-alone units

LEMP	60	X	12	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	
V0	■ No vacuum switch and no adjustment	

EXHAUST

Open (integrated silencer)	–
Exhaust manifold (G1/8''-F)	E

ISLAND ASSEMBLIES

B2		LEMP__X_____**B2** island assembly with 2 identical modules.
B3		LEMP__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.

COMPONENTS FOR THE ISLAND TO BE ASSEMBLED

B		LEMP__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:

■ **LEMP60X14VAB3**

LEMP island assembly, containing 3 x 60% max. vacuum modules, Ø1.4 mm nozzle and vacuum switch.

ORDER EXAMPLE FOR AN ISLAND TO BE ASSEMBLED:

■ **LEMP60X10VAB**
■ **LEMP90X12VAB**
■ **LEMP60X14VAB**

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

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

REFERENCE EXAMPLE COMPOSED OF A STAND-ALONE MODULE:

■ **LEMP60X12VA**

Stand-alone LEMP Module, 60% max. vacuum, Ø1.2 mm nozzle and vacuum switch.

Accessory

Protection for standalone mini vacuum pumps LEMP__VA (with one M8 connector), Part No.: **80004409**

The COVER is made of silicone and serves as a protective sleeve for vacuum pumps, protecting them against splashing water, in particular during cleaning cycles.

- High level of protection against splashing water.
- Easy to mount and clean.

LEMP

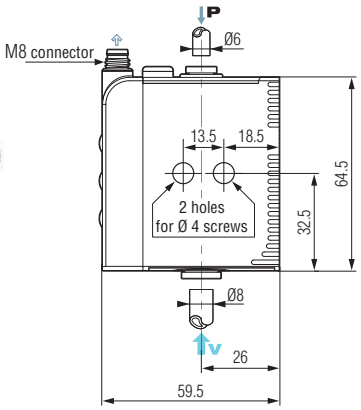
Mini Vacuum Pumps without control with ASR

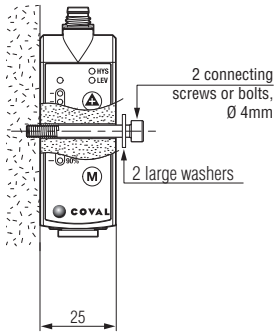
Dimensions / Mounting options

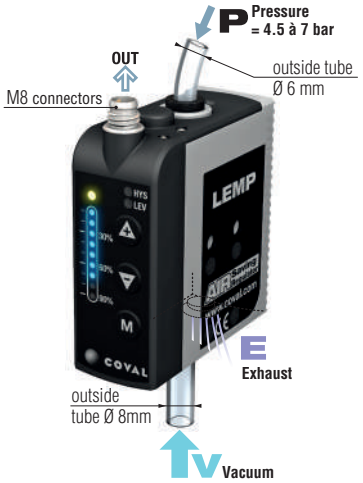
AIR Saving Regulator

Stand-alone Modules

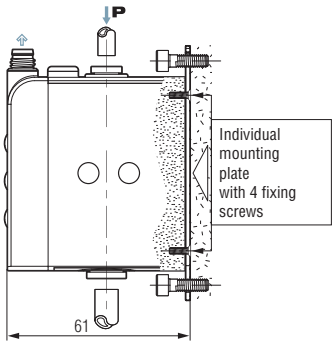
Side mounting

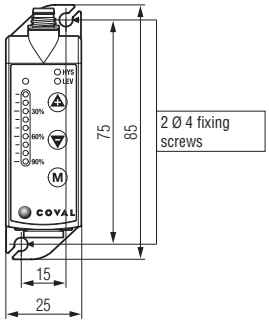






Front mounting

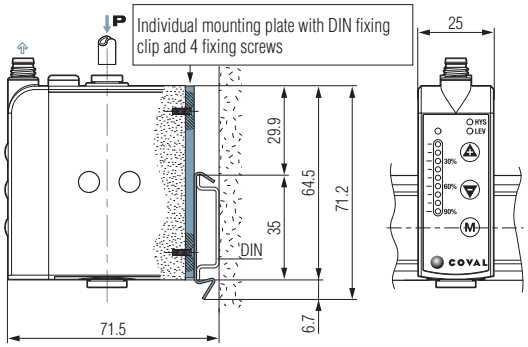




For front mounting, order the necessary kit, in addition to the module:

Front mounting kit: 1 plate + 4 screws
Part No.: LEMFIXA

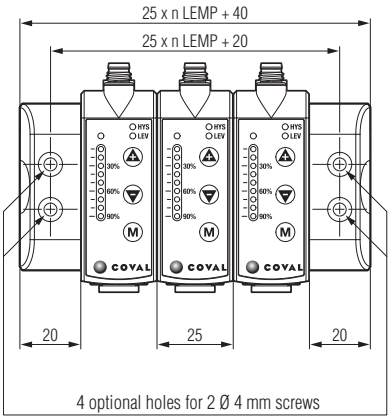
Mounting on DIN rail



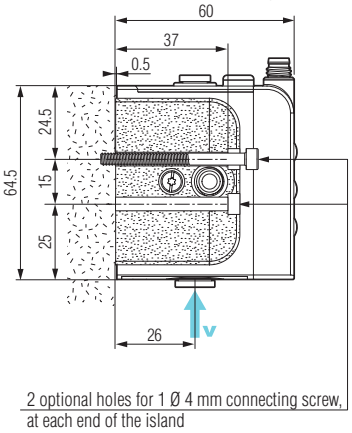
A module can be clipped onto a DIN rail. For this purpose, the module must first be equipped with an individual DIN installation plate, ordered separately:

DIN rail mounting kit: 1 plate/clip + 4 screws
Part No.: LEMFIXB

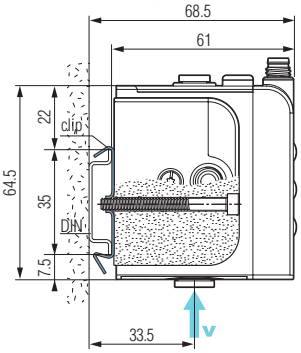
Islands



Front mounting



Mounting on DIN rail



DIN rail mounting kit: 2 clips + 2 screws
Part No.: LEMFIXC

LEMP

Mini Vacuum Pumps without control with ASR

Characteristics / Assembling an Island

AIR Saving Regulator

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: P = 4 bar.
- Maximum vacuum: 60% or 85% 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: IP 65.
- Weight: 90 to 110 g, depending on model.
- Operating temperature: 0 to 50 °C.
- Materials: PA 6-6 15 %FV, brass, aluminum, NBR.

Integrated Vacuum Switch Characteristics

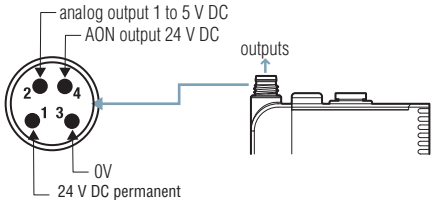
- Measuring range: -1 to 0 bar.
- Precision: ± 1.5% of the range.
- Hysteresis: adjustable from 0% to 100%.
- Output threshold: 1 x T.O.R. in NO.
- Analog output: 1 V DC to 5 V DC on the measuring range.
- Switching power: 125 mA, PNP.
- Threshold status display: 1 green LED.
- Supply voltage 24V DC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

Integrated Silencer Characteristics

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

Electrical Connections

MODULES WITH VACUUM SWITCH FUNCTION

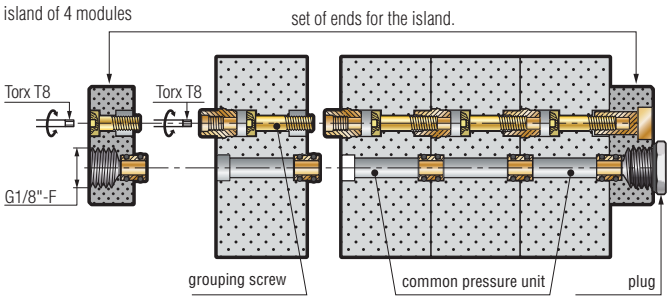


Accessories

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.

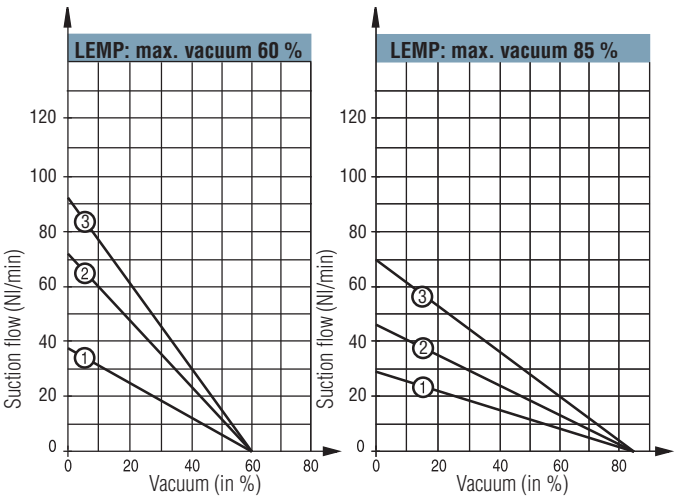
Characteristics and Connecting an Island



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

Suction Flow Rate / Vacuum Curves



1 - LEMP60X10
2 - LEMP60X12
3 - LEMP60X14

1 - LEMP90X10
2 - LEMP90X12
3 - LEMP90X14

COVAL
vacuum managers

series
LEM

Integrated Mini Vacuum Pumps with "ASR"

- Nozzle Ø: 1; 1.2; 1.4 mm
- 2 vacuum levels: 60% and 85%
- Suction flow rate up to 92 Nl/min
- Integrated pressure regulator (ASR)
- M8 connections
- Stand-alone or island module

AIR Saving Regulator

LEM

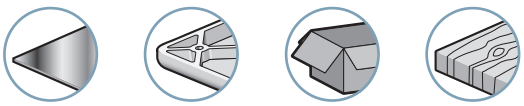
Integrated Mini Vacuum Pumps with ASR (Air Saving Regulator)

AIR Saving Regulator

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.

Industry-specific applications

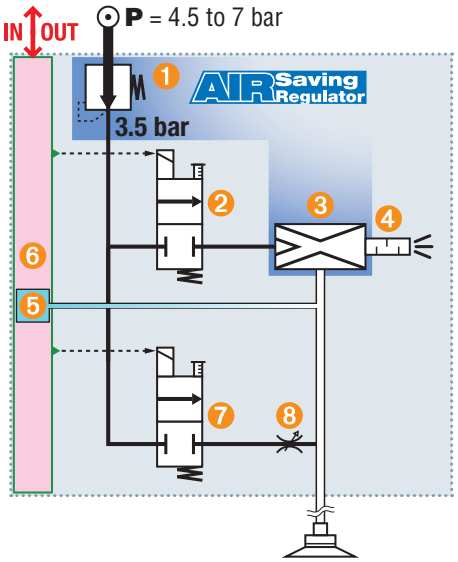


For all objects, porous or airtight

Compact Integration

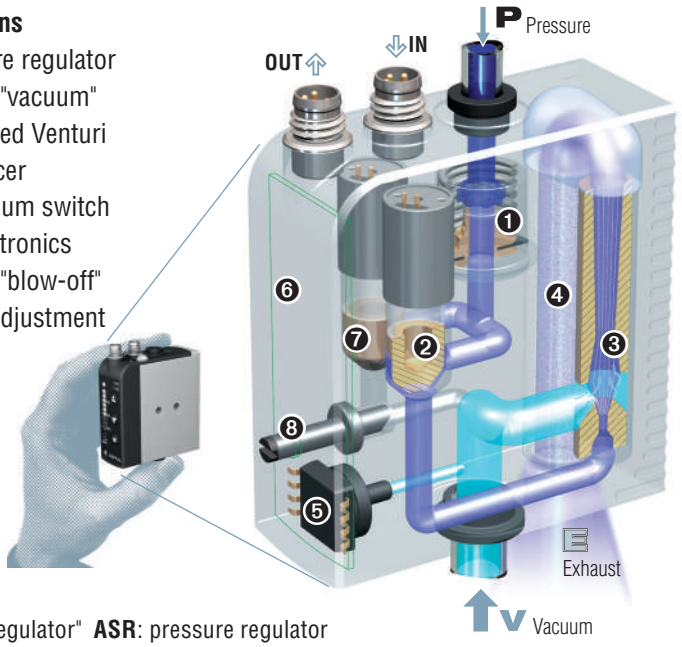
The illustrations below demonstrate the 8 functions integrated in the mini-module, and their respective roles in operation.
The result of this COVAL innovation is:

- **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

❶ 3.5 bar pressure regulator
❷ Solenoid valve "vacuum"
❸ 3.5 bar optimized Venturi
❹ Clog-free silencer
❺ Electronic vacuum switch
❻ Integrated electronics
❼ Solenoid valve "blow-off"
❽ Blow-off flow adjustment



Schematic representation

AIR Saving Regulator

40% Energy savings

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

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

AIR Saving Regulator (ASR): Air Saving Regulator

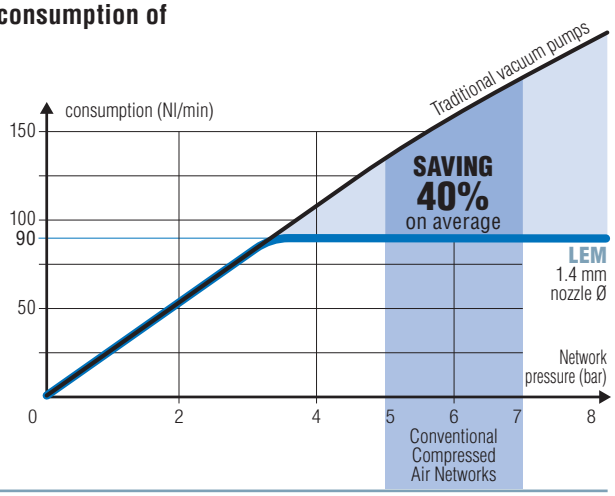
The LEM vacuum pumps, which integrate an **ASR** "venturi regulator" combination, maintain ideals that COVAL values greatly: reducing both compressed air consumption and noise generation.

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.



LEM

Integrated Mini Vacuum Pumps with ASR

Smart Dialogue / Stand-alone and Island Modules

AIR Saving Regulator

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 92 Nl/min.
- 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

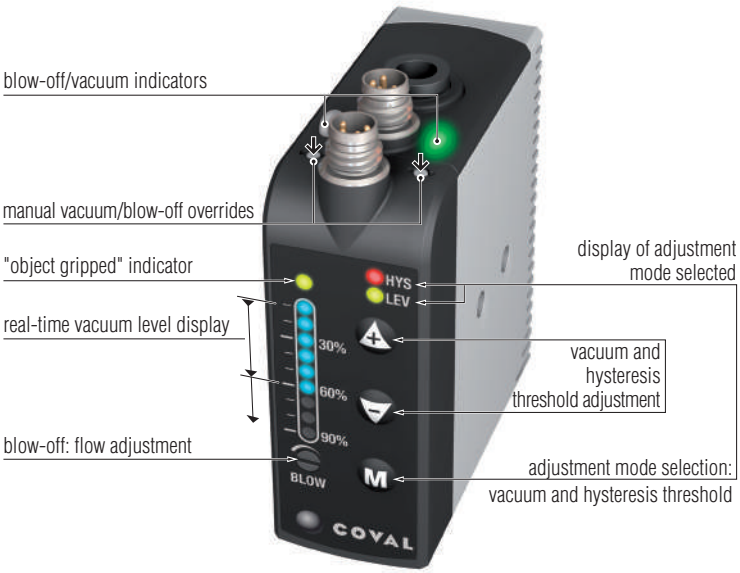
with blow-off (LEM__X__**SVO**)

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

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

LEM

Integrated Mini Vacuum Pumps with ASR

Stand-alone and Island Modules / Option

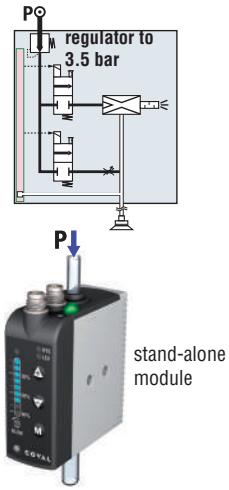
AIR Saving Regulator

Stand-alone or Island Modules?

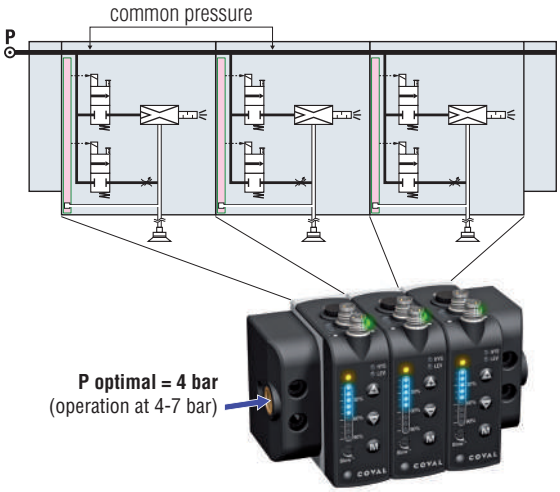
Stand-alone modules are suitable for the most common applications; one module controls one or more suction cups which all operate according to the same sequence.
When several suction cups are operating according to different sequences, multiple modules are required, which can be:
- several stand-alone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



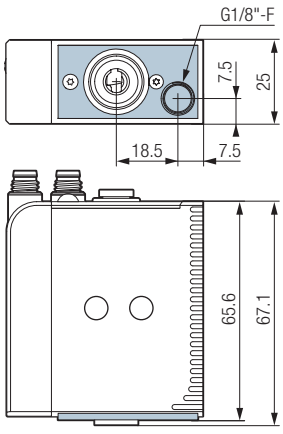
island of 3 modules supplying suction cups according to different sequences

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.



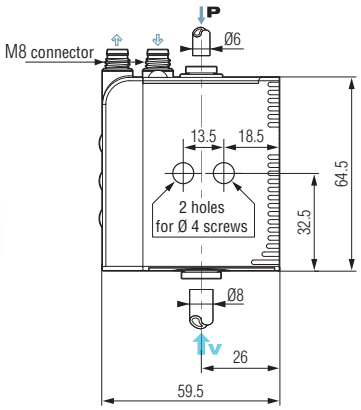
Integrated Mini Vacuum Pumps with ASR

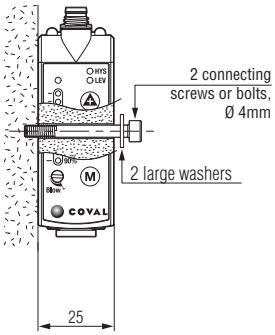
Dimensions / Mounting options

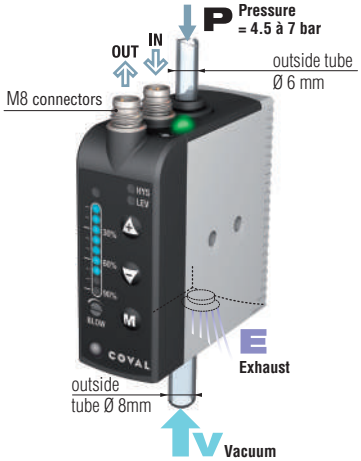
AIR Saving Regulator

Stand-alone Modules

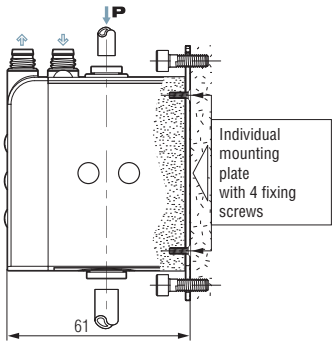
Side mounting

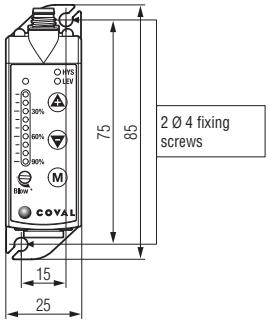






Front mounting

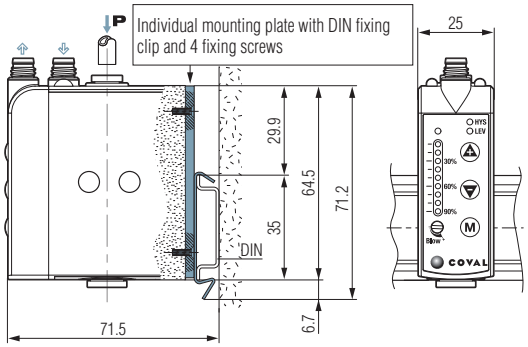




For front mounting, order the necessary kit, in addition to the module:

Front mounting kit: 1 plate + 4 screws
Part No.: LEMFIXA

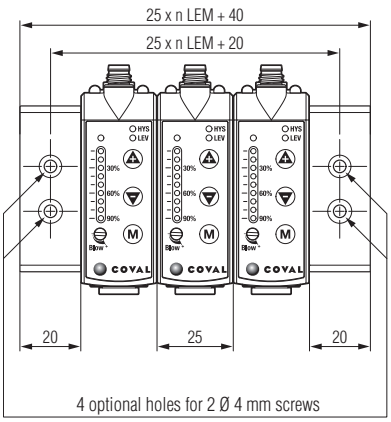
Mounting on DIN rail



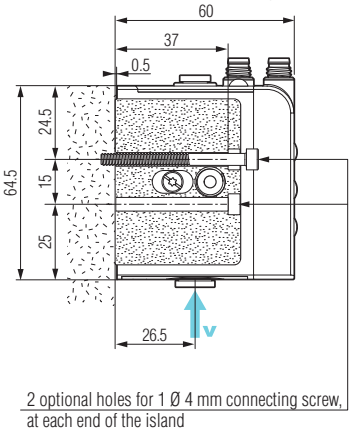
A module can be clipped onto a DIN rail. For this purpose, the module must first be equipped with an individual DIN installation plate, ordered separately:

DIN rail mounting kit: 1 plate/clip + 4 screws
Part No.: LEMFIXB

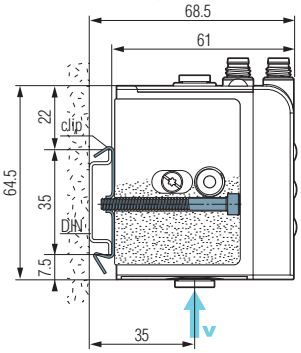
Islands



Front mounting



Mounting on DIN rail



DIN rail mounting kit: 2 clips + 2 screws
Part No.: LEMFIXC

LEM

Integrated Mini Vacuum Pumps with ASR

Selection Guide

AIR Saving Regulator

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.

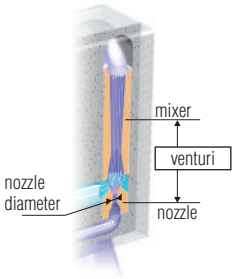
Select Vacuum Level and Nozzle Diameter

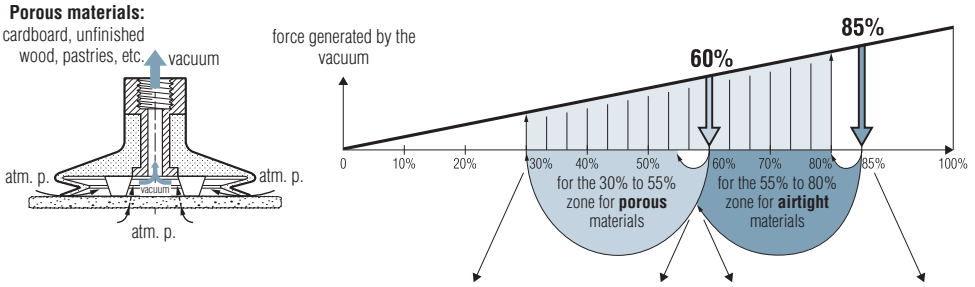
The introductory guide in this catalog shows that for porous objects, a 30-55% vacuum is economical and effective. This is obtained with a 60% maximum vacuum pump.

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 Objects ▸ Maximum Vacuum Level: 60%

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

ø nozzle \ vacuum achieved	30%	35%	40%	45%	50%	55%	Air consumed *(Nl/min)*	Air drawn in *(Nl/min)*
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: 85%

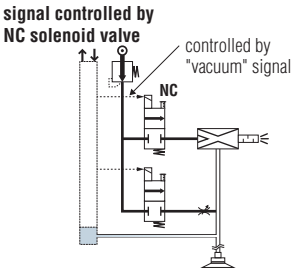
Time to create vacuum *(seconds)* **for a volume of 1 liter**

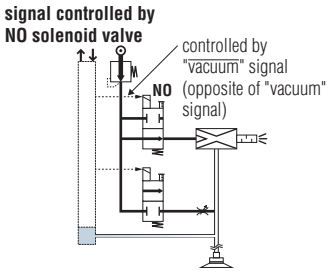
ø nozzle \ vacuum achieved	55%	60%	65%	70%	75%	80%	Air consumed *(Nl/min)*	Air drawn in *(Nl/min)*
1.0 mm	1.76	2.04	2.38	2.80	3.33	4.09	**44**	**29**
1.2 mm	1.13	1.31	1.53	1.80	2.15	2.64	**65**	**45**
1.4 mm	0.73	0.85	0.99	1.16	1.38	1.70	**90**	**70**

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 "$\overline{\text{vacuum}}$".





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.

LEM

Integrated Mini Vacuum Pumps with ASR

Configuring a Vacuum Pump

AIR Saving Regulator

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

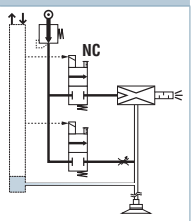
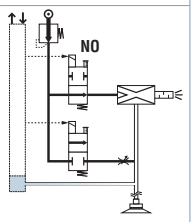
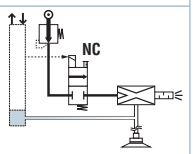
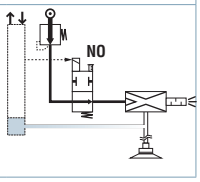
NOZZLE DIAMETER

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	

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 NC solenoid valve ■ No blow-off	
U	■ Vacuum controlled by NO solenoid valve ■ No blow-off	

EXHAUST

Open (integrated silencer)	–
Exhaust manifold (G1/8''-F)	E

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.

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**

→ 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 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.

LEM

Integrated Mini Vacuum Pumps with ASR

Characteristics / Assembling an Island

AIR Saving Regulator

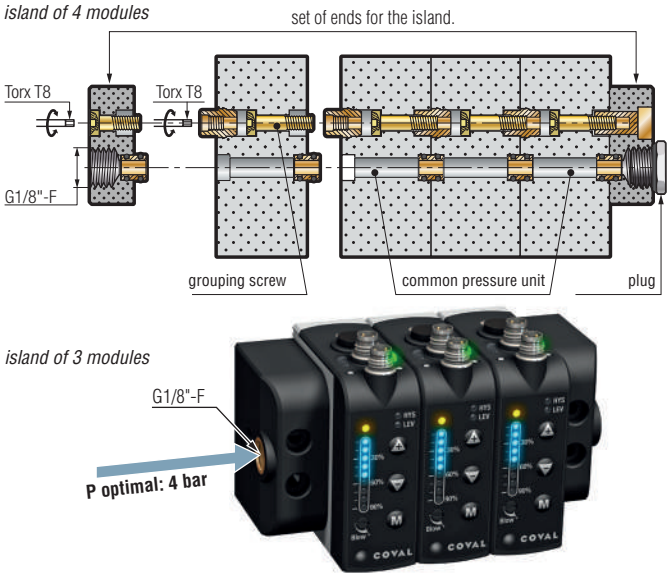
Overall Characteristics

- 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: 29 to 92 Nl/min depending on model.
- Air consumption: 44 to 90 Nl/min depending on model.
- Electrical protection level: IP 65.
- Control voltage: 24 V DC (regulated ± 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: 0 to 50 °C.
- Materials: PA 6-6 15 %FV, brass, aluminum, 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.
- 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 ± 10%).
- Current draw: < 20 mA.
- Protection: against polarity inversions.

Characteristics and Connecting an Island



Maximum number of modules in an island:

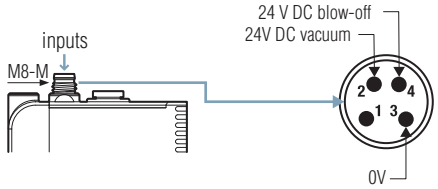
- Ø 1.4 mm nozzle ➔ 5 modules
- Ø 1.2 mm nozzle ➔ 7 modules
- Ø 1 mm nozzle ➔ 9 modules

Integrated Silencer Characteristics

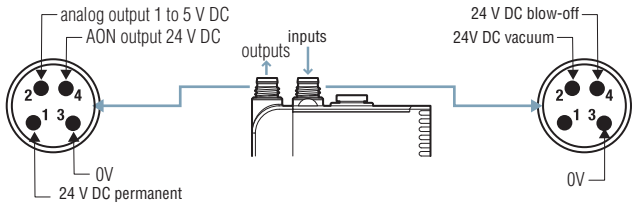
- Noise level: approximately 68 dBA.
- Clog-free silencer.

Electrical Connections

MODULES WITHOUT VACUUM SWITCH FUNCTION



MODULES WITH VACUUM SWITCH FUNCTION



Accessories

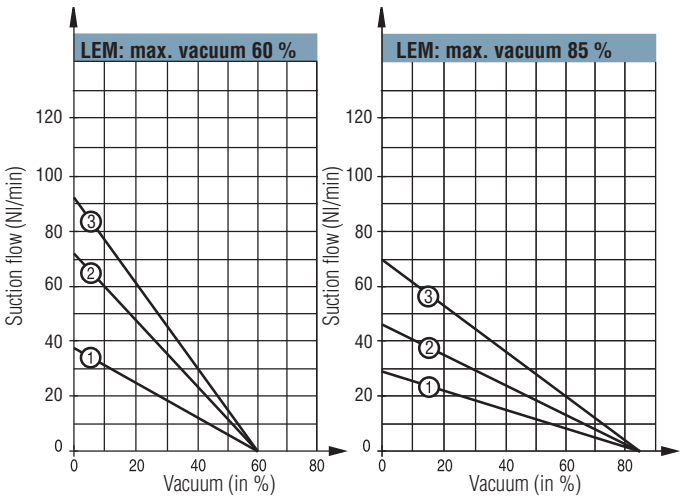
Power supply cable M8, straight, female, 4-pin – open end:

- **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

series
LEMAX

Integrated Mini Vacuum Pumps with "ASC"

- Nozzle Ø: 1; 1.2; 1.4 mm
- Vacuum level: 85%
- Suction flow rate up to 70 Nl/min
- Integrated pressure regulator (ASR)
- Integrated vacuum regulation (ASC)
- M8 connections
- Stand-alone or island module

AIR Saving Control

LEMAX

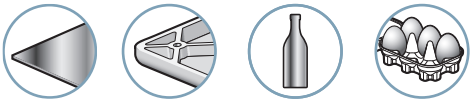
Integrated Mini Vacuum Pumps with "ASC"
(Air Saving Control)

AIR Saving Control

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.
- Unmatched compactness: installation close to suction cups ➔ short response times and energy savings.
- 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.

Industry-specific applications



For all objects, airtight or not very porous

Compact Integration

The illustrations below demonstrate the 9 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 close to the suction cups, reducing the volume to be evacuated ➔ increased speed and energy savings.
- **A complete module**, therefore not requiring any additional function or connections.

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

❶ **3.5 bar** pressure regulator

❷ Solenoid valve "vacuum"

❸ **3.5 bar** optimized Venturi

❹ Through-type silencer

❺ Electronic vacuum switch

❻ Integrated electronics

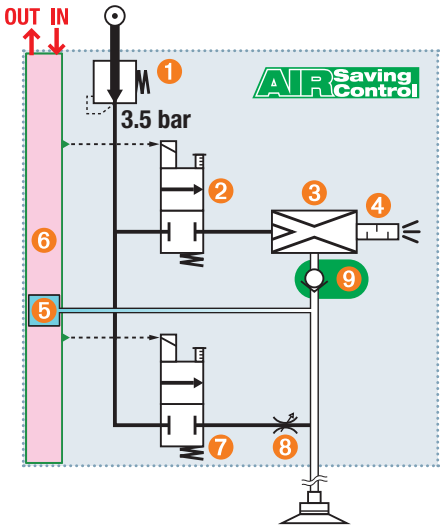
❼ Solenoid valve "blow-off"

❽ Blow-off flow adjustment

❾ Check valve on vacuum

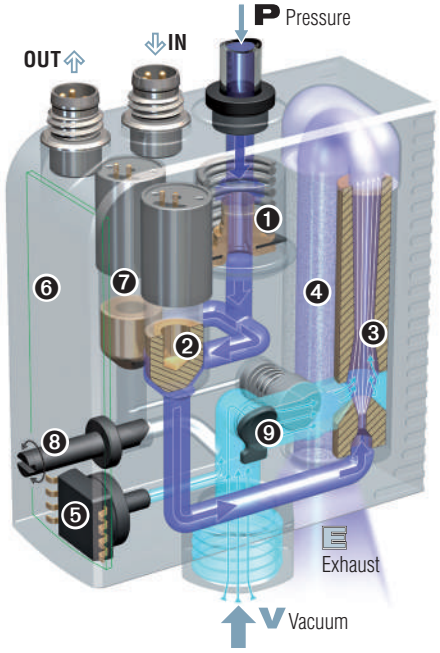
AIR Saving Control

90% energy savings (on average).



Combination of non-return ❾ and advanced electronics ❻ ensures the **ASC's** automatic performance.

➔ **Once desired vacuum level is reached, the LEMAX no longer consumes air when gripping the product.**



Schematic representation

Smart Communication

The adjacent illustration presents the display panel which enables:
- Initial settings
- Any adjustments
- Production monitoring
- Maintenance

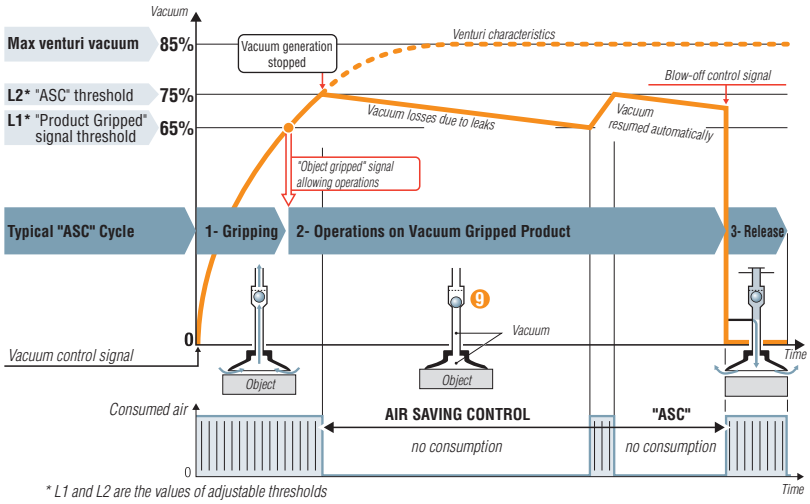
In particular, the no "**ASC**" alert, (see next page), helps to start maintenance operations in order to return to "**ASC**" operation, which is especially energy-saving.

LEMAX

Integrated Mini Vacuum Pumps with "ASC"

Energy Savings

"Air Saving Control" Cycle



1- Gripping + Transfer *(Ø 1.4 mm nozzle, 0.2 l of vacuum)*

Phase	Duration	Air consumption		
		"ASC" off	"ASC" on	
Gripping	0.28 s	0.4 Nl	0.4 Nl	Energy savings achieved
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	
Clamping	0.55 s	0.8 Nl	0.8 Nl	Energy savings achieved
Operations	60 s	90 Nl	0	
Release	0.14 s	0.2 Nl	0.2 Nl	
		91 Nl →	1.0 Nl →	99 %

As illustrated above, 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 ❷ starts the cycle by supplying the venturi ❸ 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 ❺. 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 ❷ is cut off ➔ consumption is halted. The object remains held by the retained vacuum thanks to the closed valve ❾. 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 ❼ generates a stream of air which closes the isolation valve ❽, blows on the object to release it quickly.

Resulting savings

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

- 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.

"ASC": AN ADVANTAGE WITHOUT LIMITATIONS

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

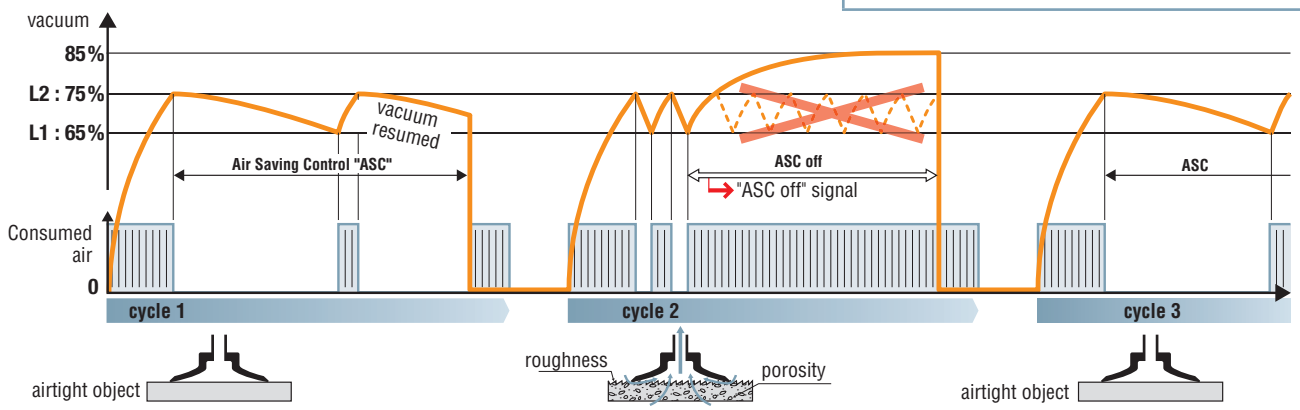
1- No specific adjustment: The initial setting (L1 = 65%, L2 = 75%) is suitable for most applications.

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.

Smart Adaptation

The illustration below shows the adaptation capacities of the LEMAX module. "**ASC**" operation is automatic for any object that is airtight enough (cycle 1). If a leak occurs (cycle 2), due to a rough object or to suction-cup 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.



The LEMAX vacuum pumps, which integrate an **ASR** "venturi regulator" combination, share values that COVAL values greatly: they greatly reduce the volume of compressed air consumption and noise level.

LEMAX

Integrated Mini Vacuum Pumps with "ASC"

Selection Guide

AIR Saving Control

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 with "**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.

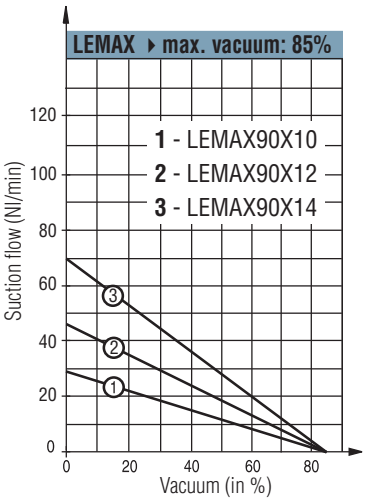
In conclusion:

- A large nozzle enables quicker gripping without consuming more during "**ASC**" operation.
- A small nozzle consumes less only when operating continues without "**ASC**".

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 (Nl/min)	air consumed (Nl/min)	grip time (s) (65% vacuum)	time (s) up to 75% vacuum	air consumed (Nl)
1.4 mm	**70**	**90**	**0.99**	**1.38**	**2.2**
1.2 mm	**45**	**65**	**1.53**	**2.15**	**2.2**
1.0 mm	**29**	**44**	**2.38**	**3.33**	**2.2**

Suction Flow Rate / Vacuum Curves



Select Vacuum Controlled by NC or NO Solenoid Valve

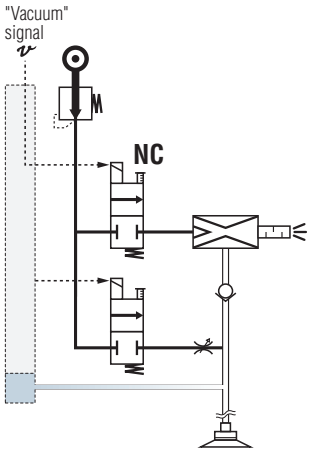
Vacuum controlled by a NC (Normally Closed) solenoid valve remains the simplest standard option to use. In the event of an electricity shutoff, the vacuum is interrupted and the object is released. On the contrary, with vacuum control by NO (Normally Open) solenoid valve, the vacuum continues to be generated in the event of an electrical shut-off: positive object-holding security.

The diagrams opposite show that both versions are controlled by the same "vacuum" signal v:

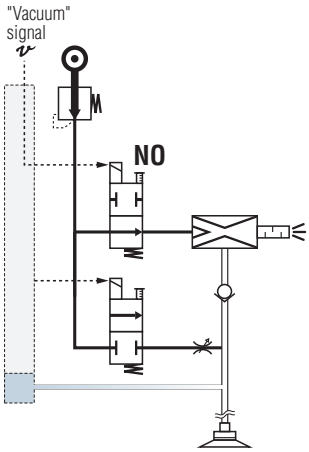
- NC version, the signal v controls the vacuum generation.
- NO version, the signal v controls the vacuum shutdown.

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



Stand-alone or Island Modules?

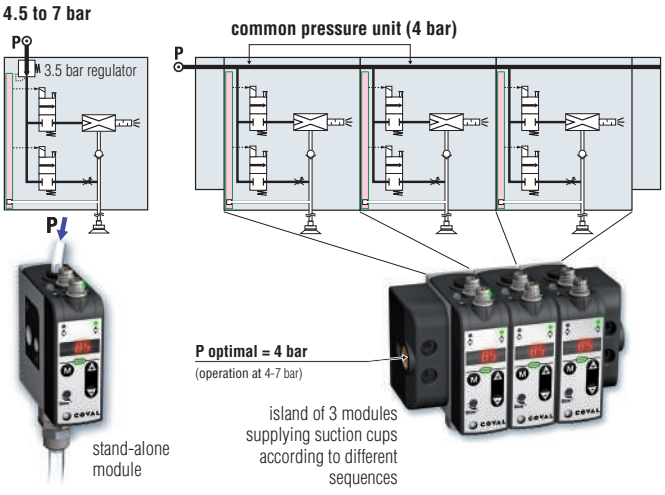
Stand-alone modules are suitable for the most common applications: one module controls one or more suction cups which all operate according to the same sequence.

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

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

The illustrations opposite guide the selection:

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



LEMAX

Integrated Mini Vacuum Pumps with "ASC"

Configuring a Vacuum Pump

AIR Saving Control

Part numbers for an island assembly or components in an island

Part numbers for stand-alone units

LEMAX	90	X	14	S	–		–		B3

VACUUM LEVEL

maximum 85% vacuum optimum for airtight objects	**90**

NOZZLE DIAMETER

Ø 1.4 mm nozzle	**14**
Ø 1.2 mm nozzle	**12**
Ø 1 mm nozzle	**10**

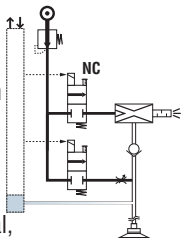
COMPOSITION OF THE MODULE

S

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

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 9.9 sec. (➔ a single control signal vacuum and blow-off).

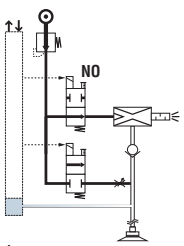


V

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

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.



CONNECTORS

-

Vacuum Pump with 2 M8 4-pin Connectors LEMAX90X___

- Discrete 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.

C14

Vacuum Pump with 1 M8 4-pin Connector LEMAX90X__**SC14** (**S** version only)

- "Gripped product" switching output 24V DC / NO.
- Automatic blow-off, timed 0 to 9.9 sec.

EXHAUST

Open (integrated silencer)	**–**
Exhaust manifold (G1/8''-F)	**E**

ISLAND ASSEMBLIES

B2 LEMAX90X__**B2** island assembly with 2 identical modules.

B3 LEMAX90X__**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.

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.

PART NO.: LEMSETA

Input/Output switching type can be set to PNP/NPN

REFERENCE EXAMPLE COMPOSED OF A STAND-ALONE MODULE:

- **LEMAX90X14S**

LEMAX, mini vacuum pump, 85% 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 85% max. vacuum modules, ø 1.4 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

Integrated Mini Vacuum Pumps with "ASC"

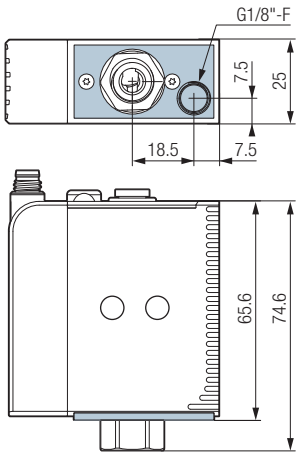
Dimensions, Mounting Options

Exhaust manifold: option E

The LEMAX 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 (LEMAX___**E** version).

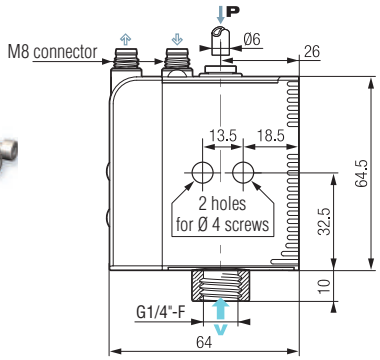
This option must be specified at time of ordering as it cannot be added later.

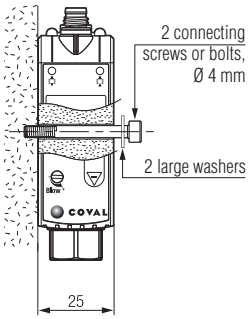
Note: The design of the exhaust manifold and vacuum pumps do not guarantee the complete sealing of the exhaust and therefore cannot be used in a "clean room" environment.

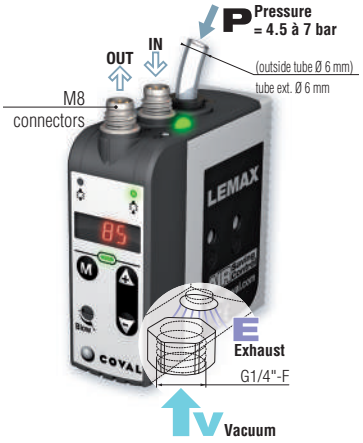


Stand-alone Modules

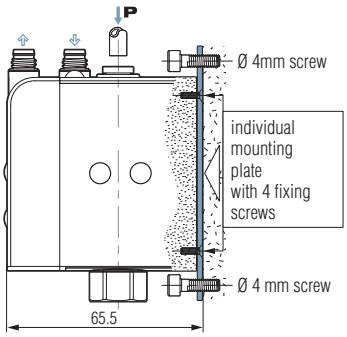
Side mounting

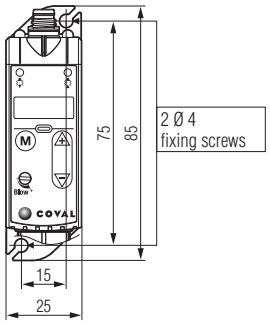






Front mounting

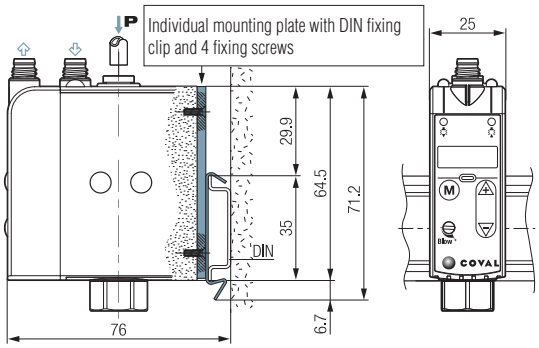




For front mounting, order the necessary kit, in addition to the module:

Front mounting kit: 1 plate + 4 screws
Part No.: 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:

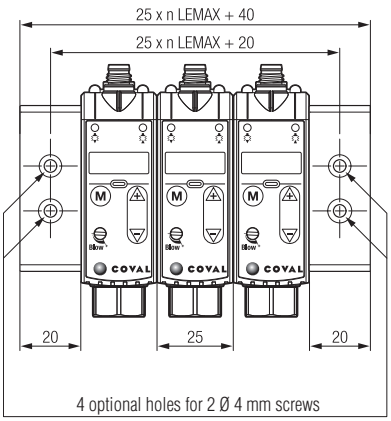
DIN rail mounting kit: 1 plate/clip + 4 screws
Part No.: LEMFIXB

Integrated Mini Vacuum Pumps with "ASC"

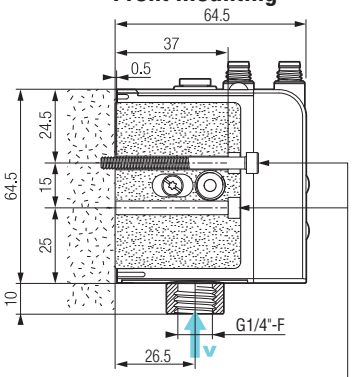
Dimensions, Mounting Options

AIR Saving Control

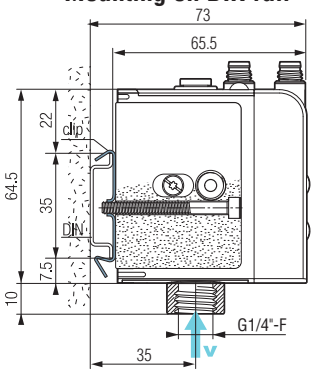
Islands



Front mounting



Mounting on DIN rail

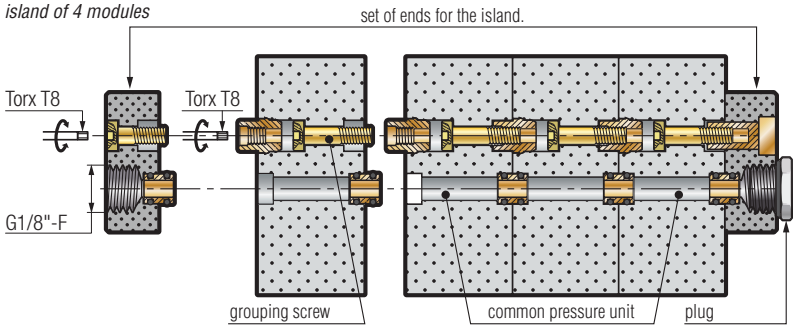


DIN rail mounting kit: 2 clips + 2 screws

Part No.: LEMFIXC

Assembling 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 a single island, it is possible to combine LEMAX series modules and LEM series modules.

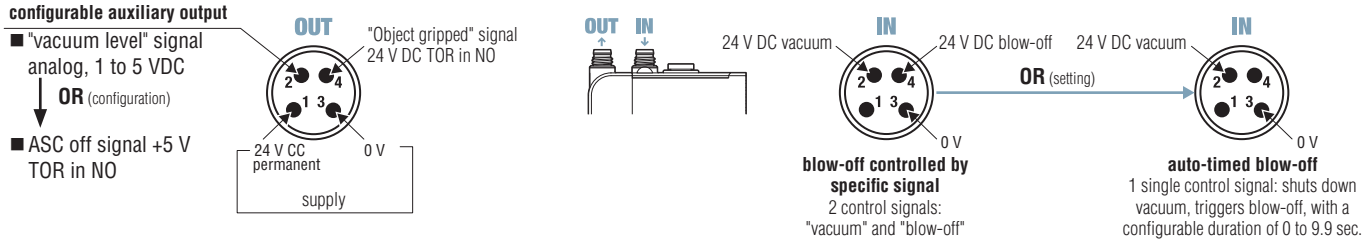
LEMAX

Integrated Mini Vacuum Pumps with "ASC"

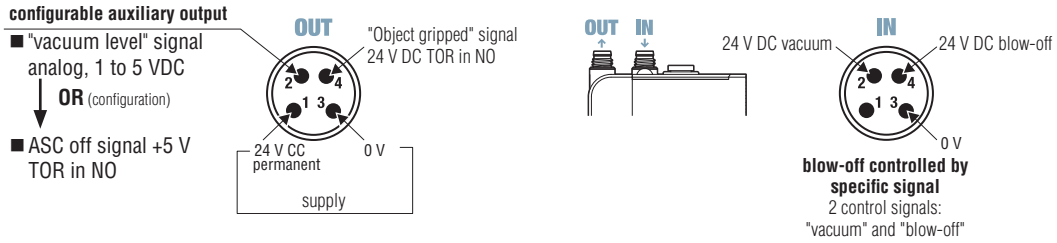
Connectors

AIR Saving Control

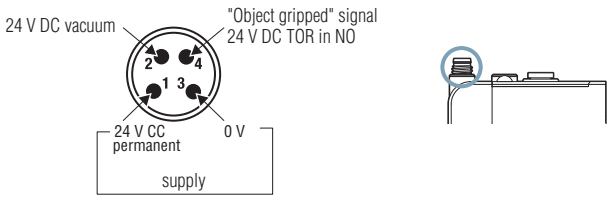
For NC Vacuum Pumps with 2 M8 4-pin connectors, model LEMAX90X..S..



For NO Vacuum Pumps with 2 M8 4-pin connectors, model LEMAX90X..V..



For NC Vacuum Pumps with 1 M8 4-pin connector, model LEMAX90X..SC14



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.

Accessory

Protection for standalone mini-vacuum pumps LEMAX__SC14 (with one M8 connector), Part No.: **80004409**

The COVER is made of silicone and serves as a protective sleeve for vacuum pumps, protecting them against splashing water, in particular during cleaning cycles.
- High level of protection against splashing water
- Easy to mount and clean

LEMAX

Integrated Mini Vacuum Pumps with "ASC"

Characteristics

AIR Saving Control

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 version: P = 4.5 bar.
  - island version: P = 4 bar.
- Blow-off: adjustable flow: - stand-alone version: P = 3.5 bar.
  - island version: P network
- Maximum vacuum: 85%
- Suction rate: 29 to 70 Nl/min.
- Air consumption: 44 to 90 Nl/min during "**ASC**" off operation
- Integrated clog-free silencer.
- Noise level: approximately 68 dBA "**ASC**" off. 0 dBA with "**ASC**".
- Electrical protection level: IP 65.
- Max. operating frequency: 4 Hz.
- Endurance: 30 million cycles.
- Weight: 130 g.
- Operating temperature: 0 to 50 °C.
- Materials: PA 6-6 15%FV, brass, aluminum, NBR.

Electrical controls

- Control voltage: 24 V DC (regulated ± 10%), PNP or NPN.
- Current draw: 30 mA (0.7 W) vacuum or blow-off.

Integrated electronics

- Power supply 24 V; current draw: <57mA.
- Measuring range: 0 to 99% vacuum.
- Measuring precision: ± 1.5% of the range, compensated in temperature.
- Display: 3 digits, 7 segments.

Service Characteristics

"Object gripped" output signal

- 24 VDC, switching output / NO, switching power: 125 mA PNP or NPN.

Configurable auxiliary output, choose either of the following

(not available for version LEMAX90X**__SC14):**

- "vacuum level" signal , analog 1 to 5 V DC of the measuring range.
- "ASC" off signal, +5 V switching output / NO.

Input/Output switching type

- can be set to PNP(by default) or NPN.

Displays

- Scrolling display: 3 digits, 7 segments.
- Flashing if "**ASC**" off for maintenance.
- Status indicators: "Vacuum," green LED, "blow-off," red LED.
- "Object gripped" indicator: Green LED on front panel.

Configurations

- By mechanical keys and drop-down menu.
- Measurement unit selection (%, mbar, inHg).
- Choice of blow-off type:
  - LEMAX90X__**S**__ version: controlled by a specific signal or automatic and adjustable from 0 to 9.9 s.
  - LEMAX90X__**V**__ version: controlled by a specific signal.
  - LEMAX90X__**SC14** version: automatic and adjustable from 0 to 9.9 s.

Settings

- Display of the number of cycles (vacuum cycle counter).
- If the application so requires, specific adjustment of thresholds and hysteresis different to original factory settings (L1=65% h1=10%, L2=75%, h2=10%).

Autoreactivity

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

COVAL
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series
LEMAX IO

Mini Vacuum Pumps with Communication

IO-Link

- Nozzle Ø: 1; 1.2; 1.4 mm
- Vacuum level: 85%
- Suction flow rate up to 70 Nl/min
- Integrated pressure regulator (ASR)
- Integrated vacuum regulation (ASC)
- M8 connections
- Stand-alone or island module

AIR Saving Control

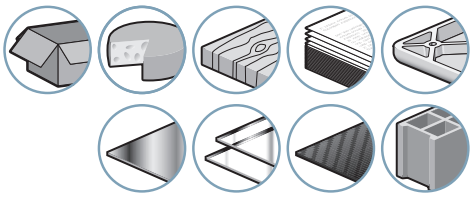
LEMAX IO

Mini Vacuum Pumps with Communication IO-Link

General Information

AIR Saving Control IO-Link

Industry-specific applications



Advantages

- Easy installation and operation thanks to the IO-Link communication interface.
- 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.
- Unmatched compactness: installation close to suction cups ➔ short response times and energy savings.
- No clogging, thanks to the through-type silencer.
- Controlled or timed blow-off.

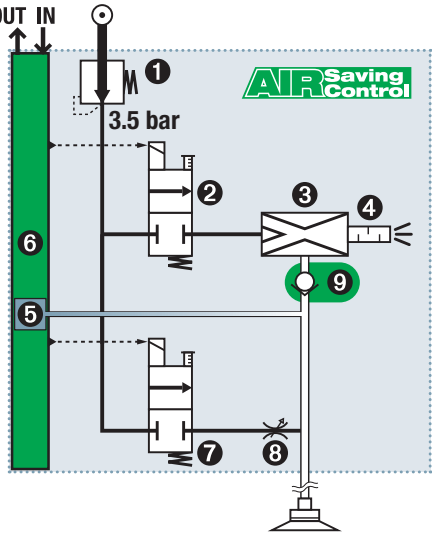
Compact Integration

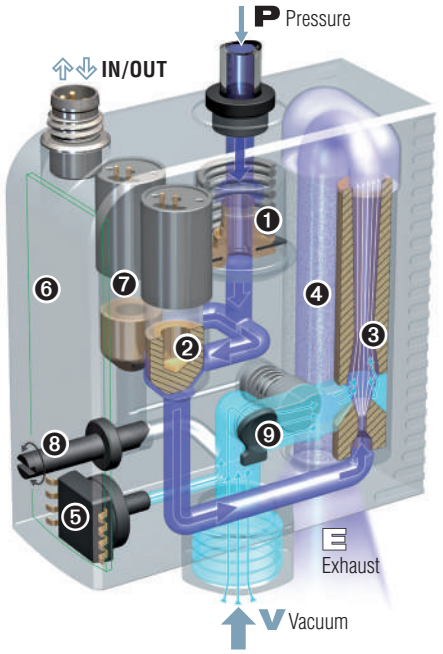
The illustrations below show the 9 functions integrated into the mini-module, and their respective roles in operation.
The result of this COVAL performance is:

– **A mini module** (≅ 130 g) that is easy to install close to the suction cups, reducing the volume to be evacuated ➔ increased speed and energy savings.
– **A complete module**, therefore not requiring any additional function or connections.

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

❶ **3.5 bar** pressure regulator
❷ Solenoid valve "vacuum"
❸ **3.5 bar** optimized Venturi
❹ Through-type silencer
❺ Electronic vacuum switch
❻ Integrated electronics
❼ Solenoid valve "blow-off"
❽ Blow-off flow adjustment
❾ Check valve on vacuum





Schematic representation

AIR Saving Control

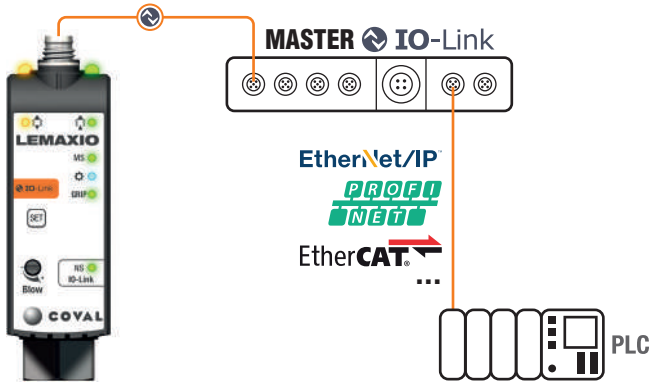
90% energy savings (on average)

Combination of non-return ❾ and advanced electronics ❻ ensures the **ASC's** automatic performance.
➔ **Once desired vacuum level is reached, the LEMAX IO no longer consumes air when gripping the product.**

IO-Link

The IO-Link system provides efficient real-time communication between LEMAX IO vacuum pumps and any higher-level protocol (EtherNet/IP, PROFINET, EtherCAT, etc.) required to monitor the production line. It can be used to control pumps, configure settings, and get feedback to ensure maximum productivity.

Advantages:
- Straightforward wiring, installation, and setup
- Availability of diagnostic status data
- Simpler preventive maintenance and vacuum pump replacement without manual setup, and more

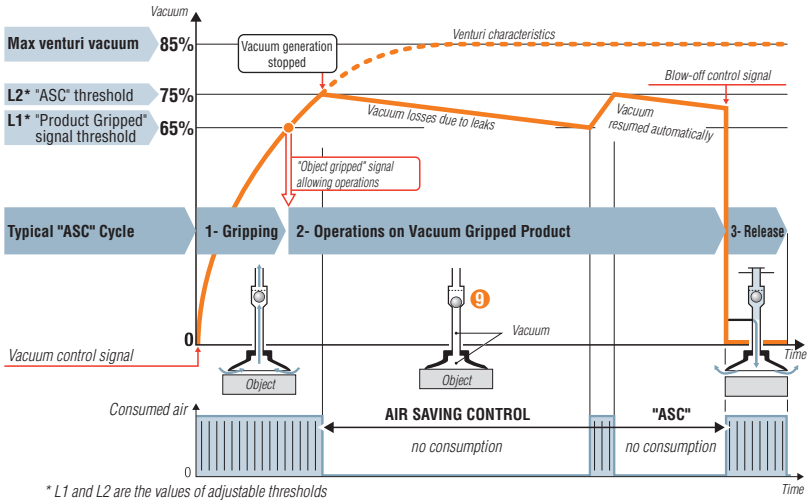


LEMAX IO

Mini Vacuum Pumps with Communication IO-Link

Energy Savings

"Air Saving Control" Cycle



As illustrated above, the **LEMAX IO** 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 ❷ starts the cycle by supplying the venturi ❸ 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 ❺. 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 ❷ is cut off ➔ consumption is halted. The object remains held by the retained vacuum thanks to the closed valve ❾. 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 ❼ generates a stream of air which closes the isolation valve ❽, blows on the object to release it quickly.

1- Gripping + Transfer *(Ø 1.4 mm nozzle, 0.2 l of vacuum)*

Phase	Duration	Air consumption		
		"ASC" off	"ASC" on	
Gripping	0.28 s	0.4 Nl	0.4 Nl	Energy savings achieved
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	
Clamping	0.55 s	0.8 Nl	0.8 Nl	Energy savings achieved
Operations	60 s	90 Nl	0	
Release	0.14 s	0.2 Nl	0.2 Nl	
		91 Nl →	1.0 Nl	→ 99 %

Resulting savings

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

- 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.

"ASC": AN ADVANTAGE WITHOUT LIMITATIONS

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

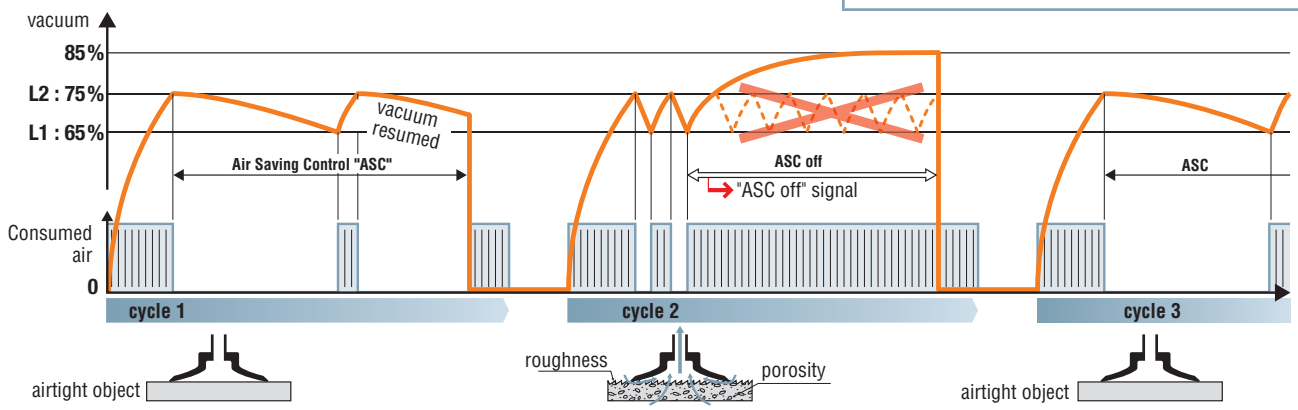
1- No specific adjustment: The initial setting (L1 = 65%, L2 = 75%) is suitable for most applications.

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.

Smart Adaptation

The illustration below shows the adaptation capacities of the LEMAX IO module. "**ASC**" operation is automatic for any object that is airtight enough (cycle 1). If a leak occurs (cycle 2), due to a rough object or to suction-cup 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.



The LEMAX IO vacuum pumps, which integrate an **ASR** "venturi regulator" combination, share values that COVAL values greatly: they greatly reduce the volume of compressed air consumption and noise level.

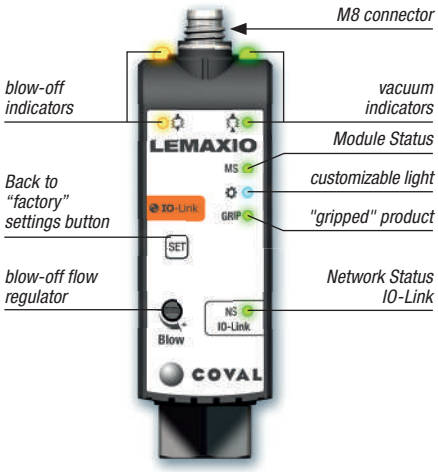
LEMAX IO

Mini Vacuum Pumps with Communication IO-Link

Communication / Selection Guide

AIR Saving Control — IO-Link

Communication HMI / IO-Link



Settings, Diagnostics, and Process Data

CONFIGURABLE SETTINGS

- "Object gripped" and ASC control thresholds.
- ASC vacuum control system management.
- Automatic blow-off.
- Configurable LED.

DIAGNOSTICS

- Cycle counters (vacuum and blow-off control, objects gripped, objects lost, etc.)
- Monitoring of the supply voltage.
- Software version.
- Product number and serial number.

PROCESS INPUT DATA

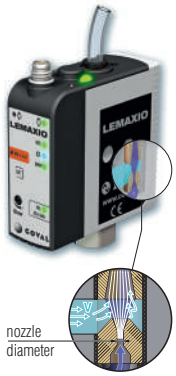
- Vacuum and blow-off control.

PROCESS OUTPUT DATA

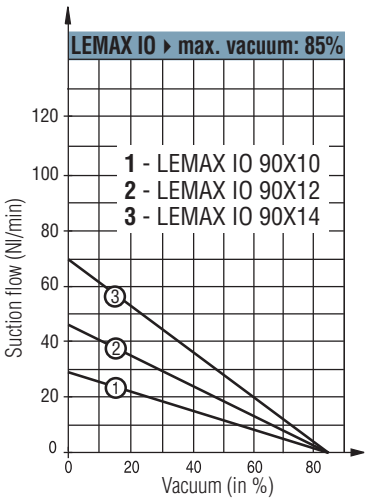
- Instantaneous vacuum level.
- Object gripped and object lost information.
- Status of ASC vacuum regulation system.
- Alarms (high / low voltage).

Power Determined by the Venturi Nozzle Diameter

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 (Nl/min)	air consumed (Nl/min)	grip time (s) (65% vacuum)	time (s) up to 75% vacuum	air consumed (Nl)
1.4 mm	70	90	0.99	1.38	2.2
1.2 mm	45	65	1.53	2.15	2.2
1.0 mm	29	44	2.38	3.33	2.2



Suction Flow Rate / Vacuum Curves



Electrical Connections

Pin	Designation	Function	Wire
1	24 V DC	L+	Brown
2	/	/	White
3	0 V - GND	L-	Blue
4	IO-Link communication line	C/Q	Black

Note
Max. total cable length: 20 meters

Accessory

Power supply cable M8, straight, female, 4-pin – M12, straight, male, 4-pin:

- **CDM8M12**: length. 1 m.

LEMAX IO

Mini Vacuum Pumps with Communication IO-Link

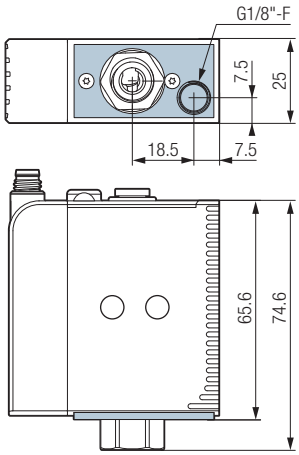
Option, Choice of Layout

Exhaust manifold: option E

The LEMAX IO 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 (LEMAXIO___**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.

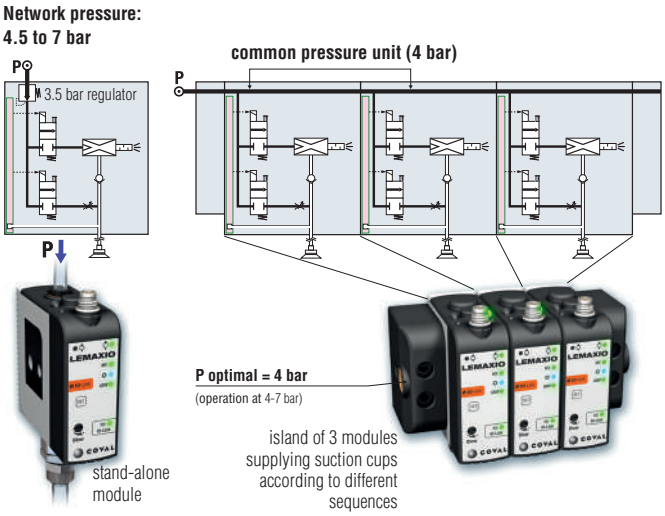


Stand-alone or Island Modules?

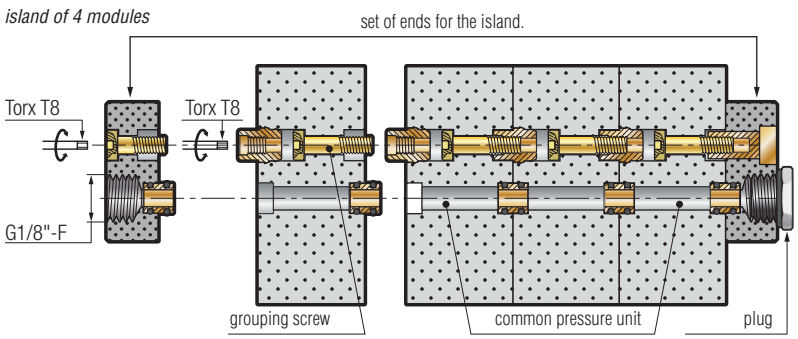
Stand-alone modules are suitable for the most common applications: one module controls one or more suction cups which all operate according to the same sequence.

When several suction cups are operating according to different sequences, multiple modules are required, which can be:
- several autonomous modules;
- a group of these modules with an internal common pressure unit.

The illustrations opposite guide the selection:
- stand-alone modules are coupled with integrated pressure regulators
- in an island, the integrated regulator is removed: to maintain the advantage of economical and silent operation, it is recommended to reduce the island's common pressure supply pressure to 4 bar.



Assembling and Connecting an Island



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

LEMAX IO

Mini Vacuum Pumps with Communication IO-Link

Configuring a Vacuum Pump

Part numbers for an island assembly or components in an island

Part numbers for stand-alone units

LEMAXIO	90	X	14	S	C14	–	B2

VACUUM LEVEL

maximum 85% vacuum optimum for airtight objects	**90**

NOZZLE DIAMETER

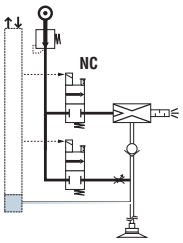
Ø 1.4 mm nozzle	**14**
Ø 1.2 mm nozzle	**12**
Ø 1 mm nozzle	**10**

COMPOSITION OF THE MODULE

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

LEMAXIO90X__**S**__

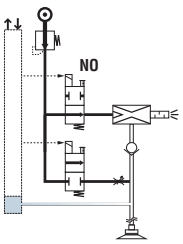
- In the event of an electrical shut-off, vacuum is no longer generated.
- Optional configured blow-off:
  - by specific signal,
  - automatic, timed 0 to 9.9 sec. (➔ a single control signal vacuum and blow-off).



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

LEMAXIO90X__**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.



EXHAUST

Open (integrated silencer)	**–**
Exhaust manifold (G1/8''-F)	**E**

ISLAND ASSEMBLIES

B2	LEMAXIO90X___**B2** Island assembly with 2 identical modules. 
B3	LEMAXIO90X___**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.

COMPONENTS FOR THE ISLAND TO BE ASSEMBLED

B	LEMAXIO___**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.  **PART NO.: LEMSETA**

REFERENCE EXAMPLE COMPOSED OF A STAND-ALONE MODULE:

■ **LEMAXIO90X14SC14**

LEMAX IO, mini vacuum pump, 85% max. vacuum, 1.4 mm nozzle, controlled by a NC (Normally Closed) solenoid valve.

EXAMPLE COMPOSITE PART NUMBER FOR AN ISLAND ASSEMBLY:

■ **LEMAXIO90X14SC14B3**

LEMAX IO group assembly, containing 3 x 85% max. vacuum modules, ø 1.4 mm nozzle, controlled by NC (Normally Closed) solenoid valve.

ORDER EXAMPLE FOR AN ISLAND TO BE ASSEMBLED:

- **LEMAXIO90X14VC14B**
- **LEMAXIO90X12SC14B**
- **LEMAXIO90X10VC14B**

→ 3 LEMAX IO modules for an island, of different types.

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

LEMAX IO

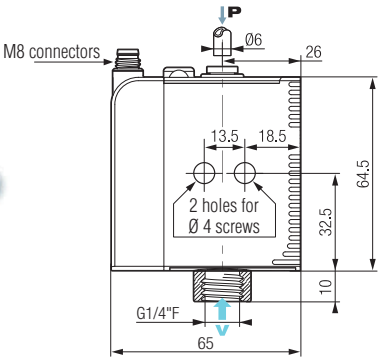
Mini Vacuum Pumps with Communication IO-Link

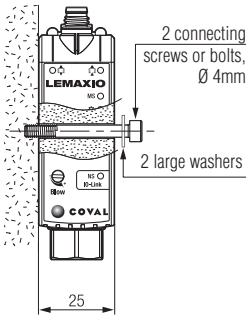
Dimensions, Mounting Options

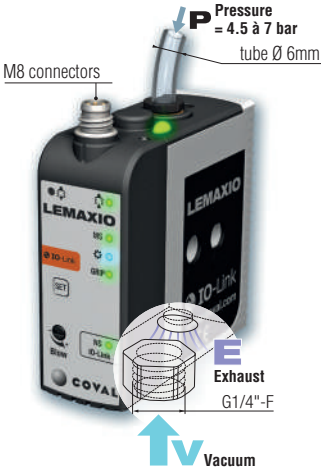
AIR Saving Control IO-Link

1- Stand-alone Modules

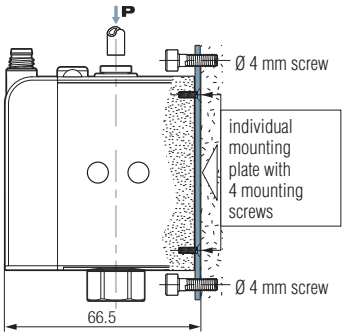
Mounting from side

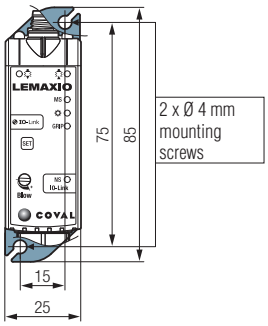






Mounting from front



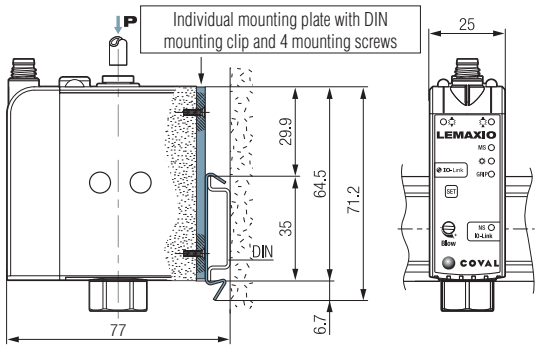


To mount from front, in addition to the module, a mounting kit must be ordered:

Kit for mounting from front:
1 plate + 4 screws

Part No.: LEMFIXA

Mounting on DIN rail

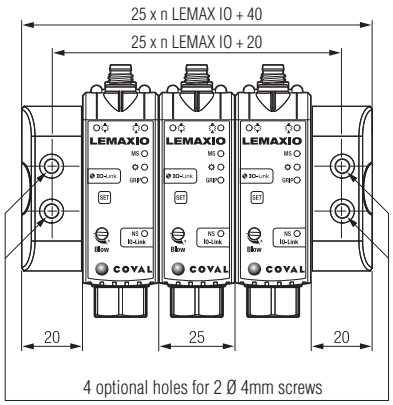


For static mounting (for example, in a cabinet), a module can be clipped onto a DIN rail. For this purpose, the module must first be equipped with an individual plate for mounting onto a DIN rail

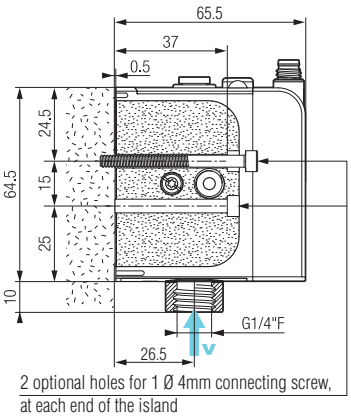
DIN rail mounting kit:
1 plate/clip + 4 screws

Part No.: LEMFIXB

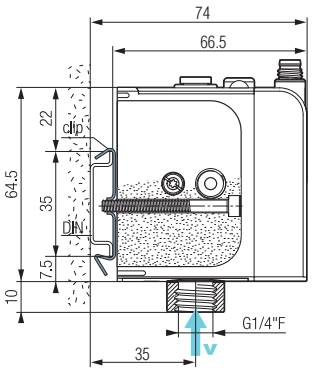
2- Islands



Mounting from front



Mounting on DIN rail



DIN rail mounting kit:
2 clips + 2 screws

Part No.: LEMFIXC

LEMAX IO

Mini Vacuum Pumps with Communication IO-Link

Characteristics

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 version: P = 4.5 bar.
  - island version: P = 4 bar.
- Blow-off: adjustable flow: - stand-alone version: P = 3.5 bar.
  - island version: P network
- Maximum vacuum: 85%
- Suction rate: 29 to 70 Nl/min.
- Air consumption: 44 to 90 Nl/min during "**ASC**" off operation.
- Integrated clog-free silencer.
- Noise level: approximately 68 dBA "**ASC**" off. 0 dBA with "**ASC**".
- Electrical protection level: IP 65.
- Max. operating frequency: 4 Hz.
- Endurance: 30 million cycles.
- Weight: 130 g.
- Operating temperature: from 0 to 50°C (32 to 122°F).
- Materials: PA 6-6 15%FV, brass, aluminum, NBR.
- 4-pins M8 male connector.

Analysis of the vacuum regulation system (ASC)

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

Integrated electronics

- 24 V DC supply (regulated ± 10 %).
- Electric consumption < 100 mA, of which 30 mA (0.7W) per vacuum and blow-off pilot.
- Measurement range: 0 to 99% vacuum.
- Measurement accuracy: ±1.5 % of range, temperature compensated.
- Inputs/outputs protected against wiring errors or reversed polarity.
- IO-Link Operation.

Diagnosis

- Instantaneous vacuum level (0 to 99%).
- Gripped product, loss of product, regulation in process, regulation default information.
- Cycle counters (vacuum, blow-off, gripped piece, ASC, etc.).
- Supply voltage.
- Product reference and serial number.
- Firmware version.

Displays

- Control status indicators:
  - "vacuum": green LED
  - "blowoff": orange LED
- "Part gripped" indicator: green LED
- Configurable indicator: blue LED
- "Module Status" indicator: green/red LED
- "IO-Link Network Status" indicator: green/red LED

Settings

- Piece gripping (L1) and regulation (L2) thresholds.
  If the application so requires, specific adjustment of thresholds and hysteresis different to original factory settings (L1=65% h1=10%, L2=75%, h2=10%).
- Automatic timed blow-off (0 to 10 seconds) only on LEMAXIO90X__**S**__
- Activation/deactivation of ASC regulation system.
- Activation/deactivation of the (DIAG ECO) leakage level monitoring system.
- Adjustable blue LED functioning mode
- Valve functioning mode in the event of loss of communication.
- Back to “factory” settings.

IO-Link

- Revision: 1.1
- Transmission rate: COM2 / 38.4 kbit/s
- Min. cycle time: 3.6 ms
- SIO mode: No.
- Process Data Input (PDI): 4 bytes.
- Process Data Output (PDO): 1 byte.
- IO device description file (IODD) available for download.
- Max. total cable length: 20 meters.

Accessory

Protection for standalone mini-vacuum pumps LEMAXIO__SC14 (with one M8 connector), Part No.: **80004409**

The COVER is made of silicone and serves as a protective sleeve for vacuum pumps, protecting them against splashing water, in particular during cleaning cycles.

- High level of protection against splashing water
- Easy to mount and clean

COVAL
vacuum managers

series
LEMCOM

Mini Vacuum Pumps Communicating via Industrial Field Bus

- Nozzle Ø: 1; 1.2; 1.4 mm
- 2 vacuum levels: 60% and 85%
- Suction flow rate up to 96 Nl/min
- Integrated pressure regulator (ASR)
- Integrated vacuum regulation (ASC)
- Field bus: PROFINET, EtherNet/IP™
- M8 connections
- Stand-alone or island module

PROFINET
EtherNet/IP™
AIR Saving Control

LEMCOM

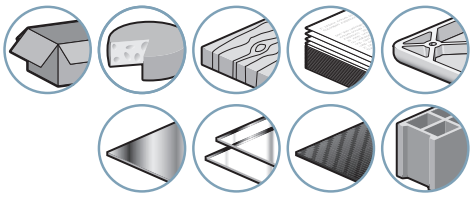
1st Mini Vacuum Pump on Industrial Fieldbus

General Points

PROFINET EtherNet/IP

In a world where everything is connected, COVAL is innovating once more by unveiling the LEMCOM series: the first vacuum pump on fieldbus.
The LEMCOM establishes a verified remote communication between the operator and the vacuum pump, with two possible fieldbus choices, EtherNet/IP and PROFINET. This allows the operator to receive real-time information and more importantly respond at all times to configure, diagnose and maintain the operation.

Industry-specific applications

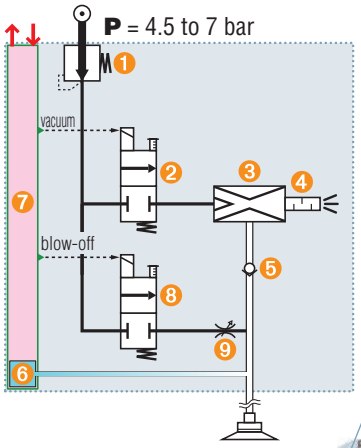


Compact Integration: The COVAL Technique

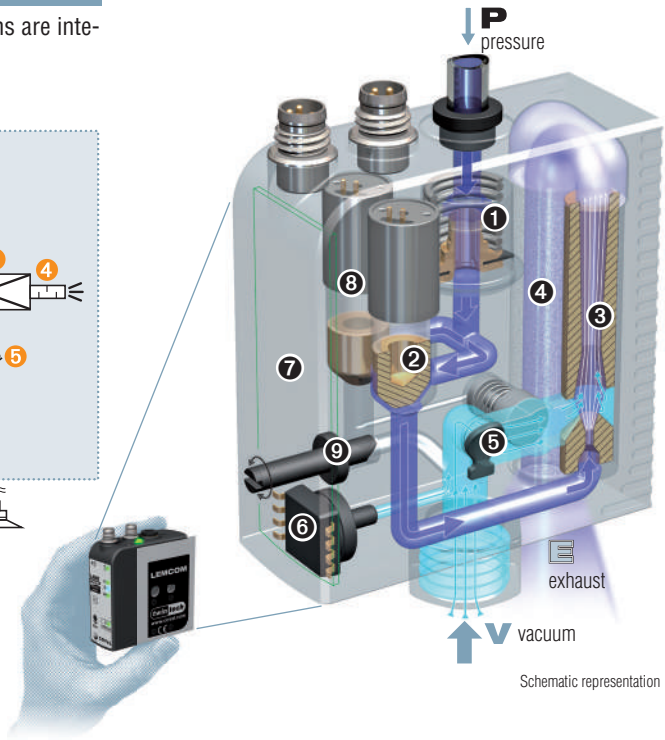
The illustrations demonstrate the COVAL advantage: all necessary functions are integrated into a complete and self-governing mini-module.

INTEGRATED FUNCTIONS:

❶ Pressure regulator **3.5 bar**
❷ "Vacuum" solenoid valve
❸ **3.5 bar** optimized venturi
❹ Optimized silencer
❺ Vacuum non-return valve
❻ Vacuum sensor
❼ Integrated electronics: management of "vacuum" functions and communication
❽ "Blow-off" solenoid valve
❾ Blow-off flow regulator



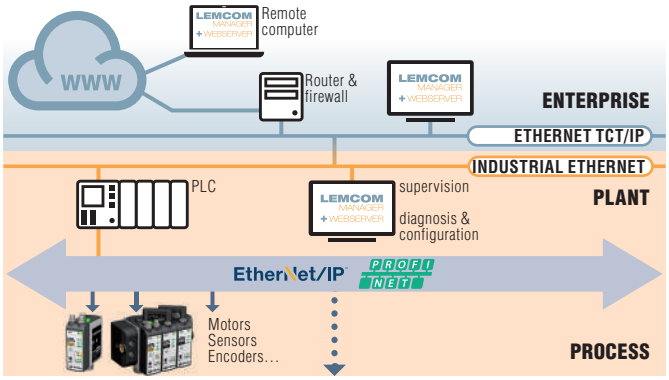
PROFINET EtherNet/IP



Schematic representation

Easy Integration with Existing Industrial Network

LEMCOM is the first vacuum pump which seamlessly integrates with the field network without the use of gateways or other specific interfaces.
The LEMCOM "master" modules enable the continuity of a fieldbus through their two integrated communication ports. Tested and certified by ODVA (EtherNet/IP) and by PI (PROFINET), LEMCOM is connected very easily to the PLC (EDS file, RSLogix 5000 Add-On Instructions, GSDML file).
Based on a "master/secondary" structure where the "master" is a fully-integrated pump, the LEMCOM design enables the supply and control of 1 to 16 vacuum pumps while requiring only 2 connecting cables.



Advantages

- **Easy implementation**: Plug & Play, custom configuration for every type of application.
- **Maximum automatic** energy savings:
  AIR Saving Regulator **ASR**: 40% savings for porous products.
  AIR Saving Control **ASC**: 90% savings for airtight products.
- **Compactness**: LEMCOM vacuum pumps are the most compact on the market.
- **Short response times**: Installed in close proximity to vacuum cups.
- **Dust resistant**: Non-clogging through-type silencer.
- **Safety**: Product gripping is maintained even during power failure.
- **Supported buses**: EtherNet/IP and PROFINET.
- **Wiring simplified**: 2 cables are capable of managing 1 to 16 modules.
- Settings and diagnosis via **remote monitoring**.
- Nearly unlimited arrangements (stand-alone modules, island assemblies or remote modules).

➔ An essential innovation for intelligent vacuum gripping.

LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Vacuum Levels and Energy-saving

PROFINET EtherNet/IP

2 Vacuum Levels to Match Precise Application Needs

VERSION 60 (Max. 60% vacuum)
To enable a high rate of vacuum flow and compensate for leakage when gripping porous materials.

Suction flow rate (Nl/min):

Nozzle Ø \ max. vacuum	60%
1.0 mm	38
1.2 mm	72
1.4 mm	92

VERSION 90 (Max. 85% vacuum)
To enable a high vacuum level and thus increase the holding force for gripping airtight materials.

Suction flow rate (Nl/min):

Nozzle Ø \ max. vacuum	85%
1.0 mm	29
1.2 mm	45
1.4 mm	70

	Porous Materials, Rough Surfaces				Airtight & Semi-Porous Materials				
	Cardboard	Food	Wood	Paper	Plastic	Metal	Glass	Composites	Concrete/Stone
LEMCOM 60	●	●	●	●	●	●	●	●	●
LEMCOM 90					■	■	■	■	■

● Air Saving Regulator ➔ **40%** of energy savings on average.

■ Air Saving Control ➔ **90%** of energy savings on average.

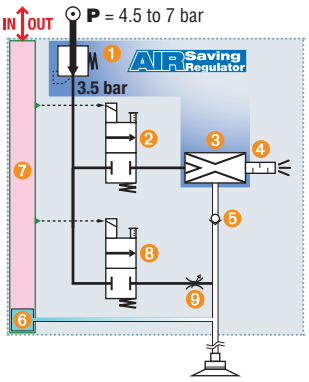
Integrated Energy-saving Technologies

AIR Saving Regulator

40% energy savings (on average, see below).

Combined "venturi regulator" **ASR**: pressure regulator ❶ feeds venturi ❸ with 3.5 bar, the optimized pressure for operation.

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

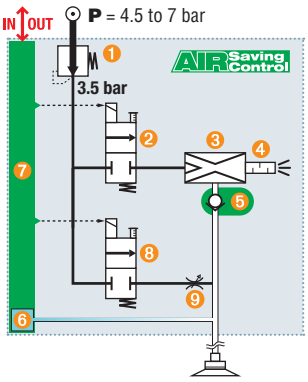


AIR Saving Control

90% energy savings (on average).

Combination of non-return valve ❺ and advanced electronics ❼ ensures **ASC**'s automatic performance.

➔ **Once vacuum is established, the pump no longer consumes air to hold the product.**



AIR Saving Regulator (ASR): Air Saving Regulator

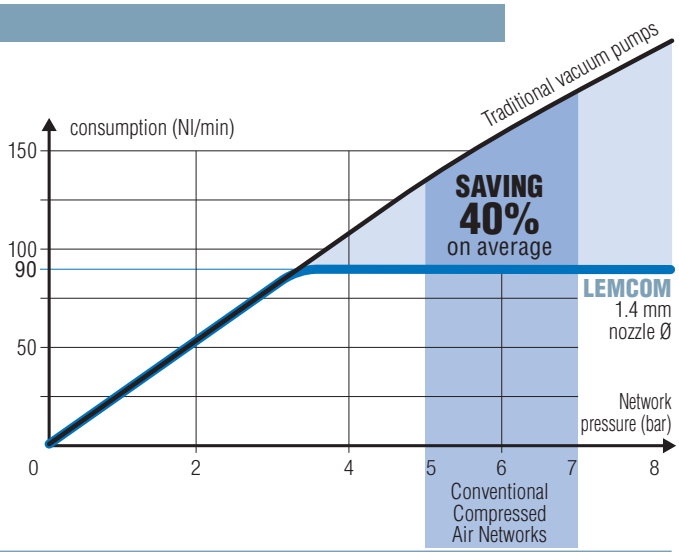
LEMCOM series vacuum pumps, which integrate an **ASR** "venturi regulator" combination, maintain ideals that COVAL values greatly: reducing both compressed air consumption and noise generation.

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, thus eliminating the risk of improper adjustment.

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



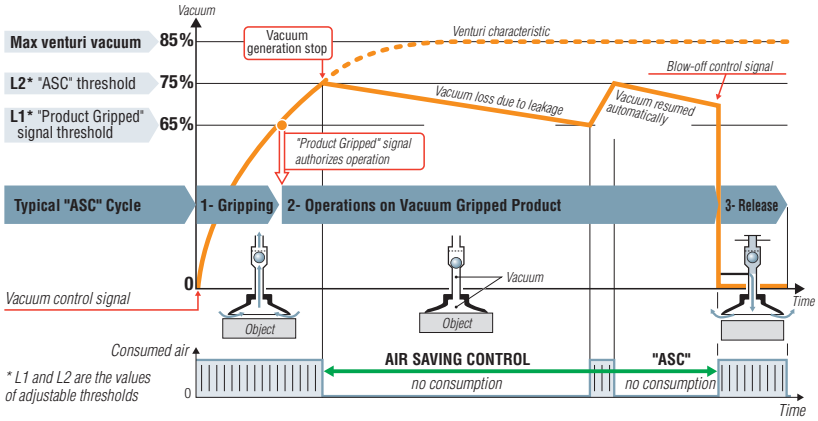
LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Energy Savings

PROFINET EtherNet/IP

AIR Saving Control "Air Saving Control" Cycle



As illustrated above, the **LEMCOM** 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 ❷ starts the cycle by supplying the venturi ❸ 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 ❻. 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 ❷ is cut off ➔ consumption is halted. The object remains held by the retained vacuum 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 L2 (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 ❾, blows on the object to release it quickly.

Smart Adaptation

The illustration above shows the adaptation capability of the LEMCOM module. "**ASC**" operation is automatic for any object that is airtight or generally nonporous (cycle1).
If a leak occurs (cycle 2), due to a rough object or suction cup wear:
1/ the module automatically detects the anomaly, 2/ ends the cycle without "**ASC**" in order to continue production and 3/ reports the event for possible maintenance. Production continues and once everything is returned to normal (cycle 3), "**ASC**" operation is automatically resumed.

1- Gripping + Transfer *(1.4 mm nozzle Ø, emptying 0.2 l)*

Phase	Duration	Air consumption		
		without "ASC"	with "ASC"	
Gripping	0.28 s	0.4 Nl	0.4 Nl	Energy savings achieved
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 *(1.4 mm nozzle Ø, emptying 0.4 l)*

Phase	Duration	Air consumption		
		without "ASC"	with "ASC"	
Clamping	0.55 s	0.8 Nl	0.8 Nl	Energy savings achieved
Operations	60 s	90 Nl	0	
Release	0.14 s	0.2 Nl	0.2 Nl	
		91 Nl	1.0 Nl	99 %

Resulting Savings

Energy savings from "**ASC**" are significant, 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 product often pays for itself in just a few months.

"ASC": AN ADVANTAGE WITHOUT LIMITATIONS

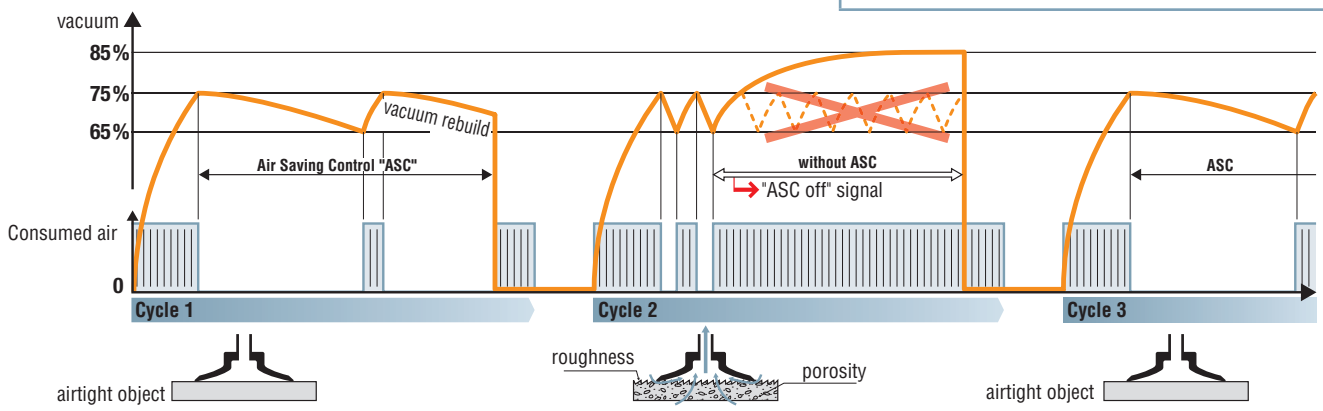
Saving energy has become essential. With LEMCOM, thanks to ASC, energy is saved automatically without interfering with established practices:

1- No specific adjustment
The default setting (L1 = 65%, L2 = 75%) is suitable for most applications.

2- Production regardless of conditions
Performance is guaranteed. When necessary, without "**ASC**", if the leakage level is too high.

3- Guided maintenance
Clear display of the need for maintenance in order to return to autoregulated "**ASC**" operation.

With LEMCOM, all settings are remotely configurable, and diagnosis is made easier.



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

LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

PROFINET EtherNet/IP

Individual or Island Modules?

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

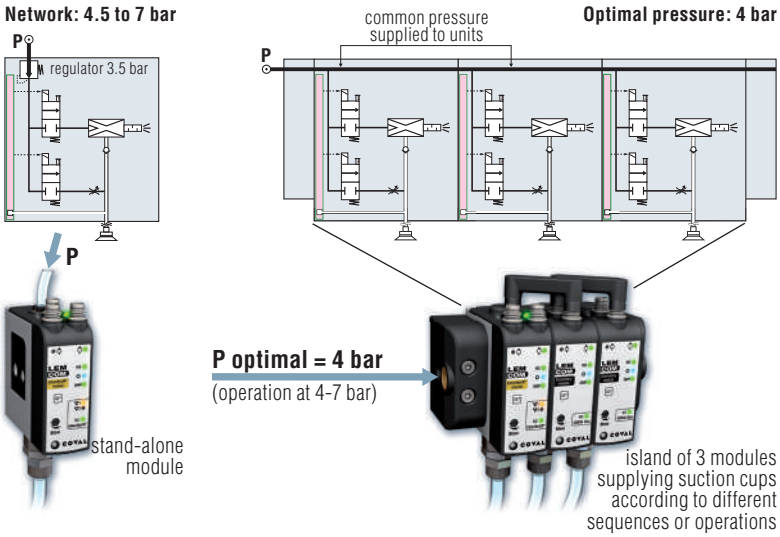
- several autonomous modules, OR
- a group of these modules with an internally shared pressure supply

The illustrations shown here guide the selection:

- autonomous modules are coupled with integrated pressure regulators (ASR)
- 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 to 4 bar.

The maximum number of modules in an island depends on the power of the modules that must be active simultaneously:

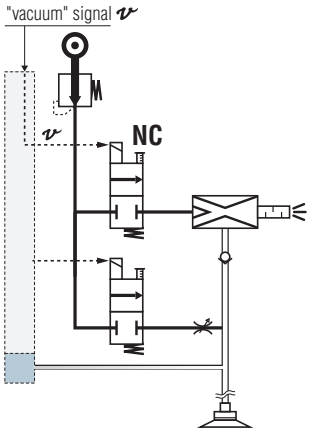
- 5 modules maximum for nozzle 1.4 mm ID.
- 7 modules maximum for nozzle 1.2 mm ID.
- 9 modules maximum for nozzle 1 mm ID.



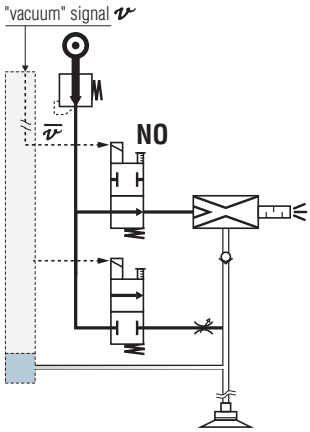
Vacuum Control by NC or NO Solenoid Valve

Vacuum control by NC (Normally Closed) solenoid valve is the most common: in the event of an electrical shut-off, vacuum is no longer generated. On the other hand, with a NO (Normally Open) solenoid valve, vacuum continues to be generated in the event of an electrical shut-off, providing positive object-gripped security.
The diagrams opposite show that both versions are controlled by the same "vacuum" signal v: The opposite $\overline{v}$ required for control of the NO solenoid valve is automatically obtained internally by the control electronics.

■ NC solenoid valve



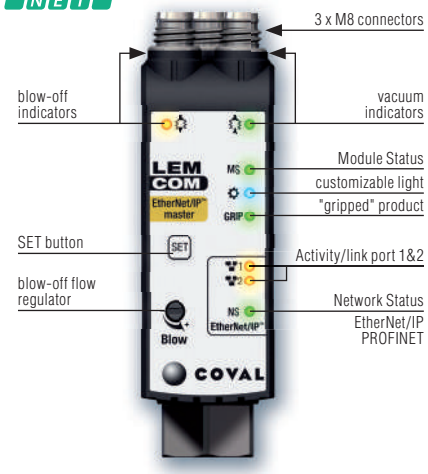
■ NO solenoid valve



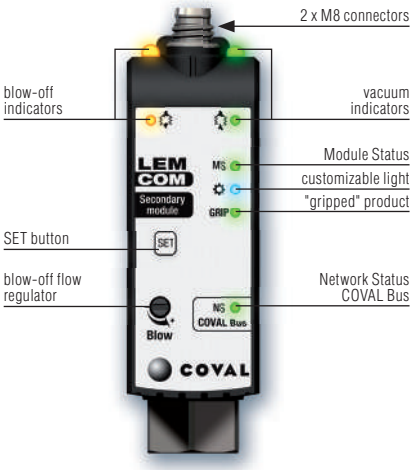
Communications Panel

LEMCOM master

PROFINET EtherNet/IP



LEMCOM secondary module



LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Simplified Communication along the Entire Line

EtherNet/IP PROFINET

Multitude of Innovations

- Maximum intelligence / minimal bulk.
- One "master" module controls up to 15 secondary modules.
- Master module is a fully-integrated pump.
- Remote configuration, monitoring and diagnostics.
- Dedicated Coval bus between master and secondary modules.
- Simplified wiring and installation.
- Standard secondary modules (regardless of the type of bus).
- Additional communications port.
- Supported buses: EtherNet/IP™ / PROFINET / CANopen.
- IP 65 / M8 standard connectors.

A Simple Product to Utilize

LEMCOM master

EtherNet/IP PROFINET

- On-board 2-Port Ethernet Switch.
- On-board web server.
- Dedicated configuration software.
- M8/RJ45 standard connectors.

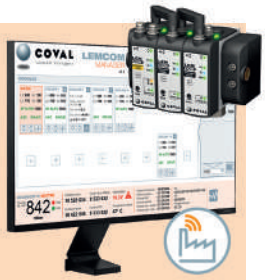
LEMCOM secondary module

- Universal secondary module, whatever the type of bus used.

Dedicated application

LEMCOM MANAGER

Vacuum management made easy



Specially developed with vacuum handling applications in mind, LEMCOM Manager is a PC software package which allows you, in just a few clicks, to remotely set up and configure LEMCOM vacuum generators as well as run diagnostics.

Packed with numerous functions such as the import/export of parameters, vacuum cycle analysis, alarm and operation cycle monitoring, configuration help or even embedded firmware updating.

The application allows all LEMCOM mini pumps to be controlled remotely over the network either by the end user or by COVAL's technical support teams.

Settings, Diagnosis, and Process Data

CONFIGURABLE SETTINGS

- "Product Gripped" and vacuum regulation (ASC) thresholds.
- Automatic blow-off.
- State of valves in the event of loss of communication.
- Client LED status.
- Network parameters.
- Firmware updates…

DIAGNOSTIC

- Cycle counters, vacuum and blow-off control, gripped pieces, lost pieces, ASC…
- Power supply voltage.
- Firmware version.
- Product reference.
- Vacuum cycle acquisition…

INPUT DATA

- Vacuum and blow-off control.

OUTPUT DATA

- Instant vacuum level (0 to 100%).
- "Gripped Product" signal (ON/OFF).
- Regulation system status.
- Alarms (power supply voltage, temperature, preventive maintenance).

LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Simplified Communication along the Entire Line

A Setting for Every Application

The LEMCOM is based on an innovative, efficient product structure:

- The "master" module manages communication on the fieldbus, assures management of the "secondary" modules and is a fully-integrated vacuum pump. Its 2 communication ports enable a continuous fieldbus.
- The "secondary" modules are interconnected with the "master" module via the COVAL bus.

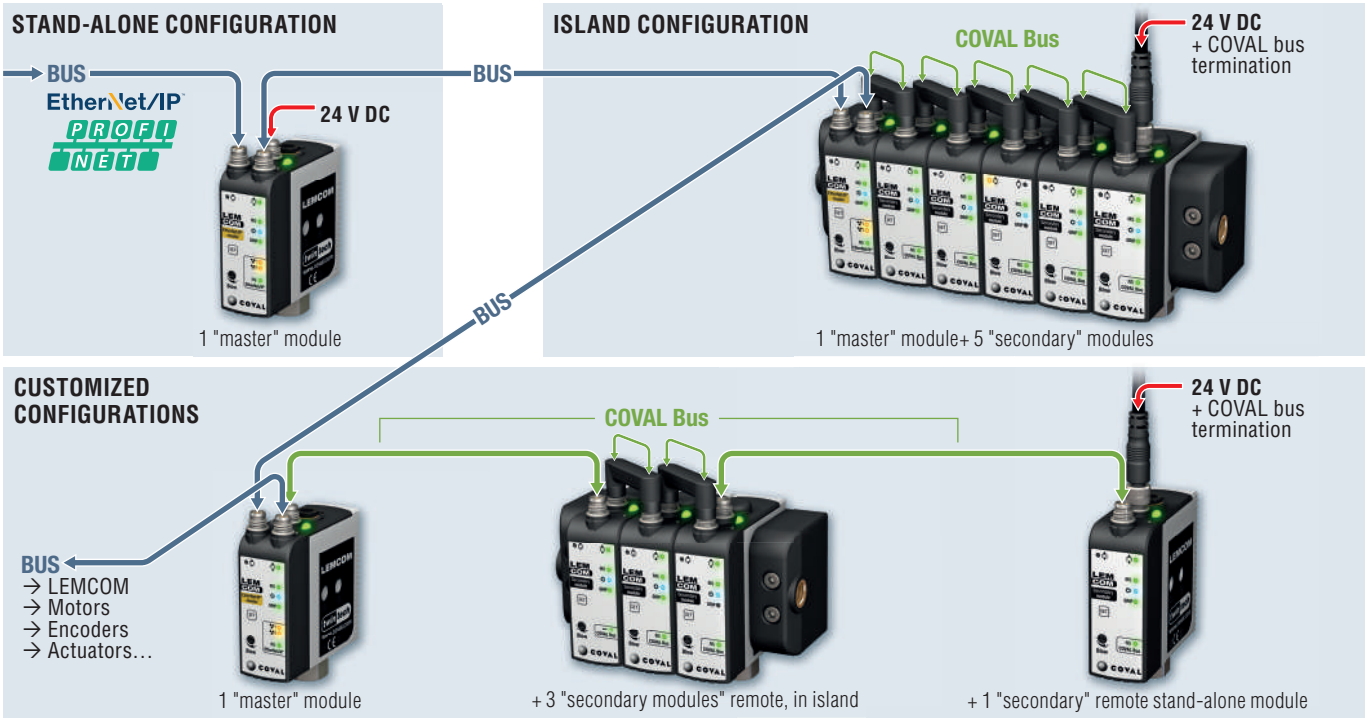
Contact between the "master" module and the "secondary" modules is confirmed by an M8 connecting bridge for island configurations or by a M8/M8 standard cable for configurations based on remote modules.

Advantages:

This product structure guarantees flexibility in selection, enabling use of LEMCOMs in stand-alone, island or mixed configurations. As a result, vacuum generators may be placed in close proximity to the application, guaranteeing a reduction:

- in gripping time
- in cycle time
- in energy consumption.

Because setup and diagnosis of the LEMCOM is carried out remotely, it is not necessary to install them in easily accessible zones.



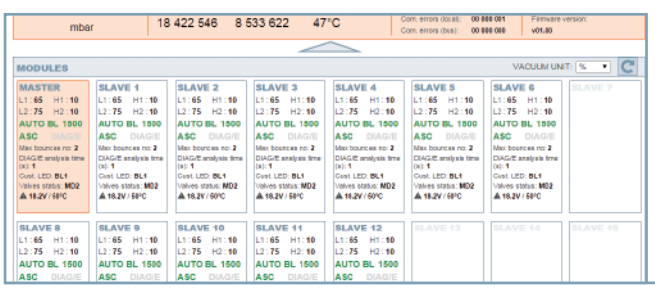
Full Remote Access

LEMCOM parameters can easily be updated remotely and in several ways. Configuration is possible using LEMCOM Manager PC software, the embedded web server (EtherNet/IP and PROFINET) or by sending vacuum parameters directly from the PLC during use or on initialization.

This flexibility enables the LEMCOM user to adapt to all types of applications without direct intervention on the vacuum generator.

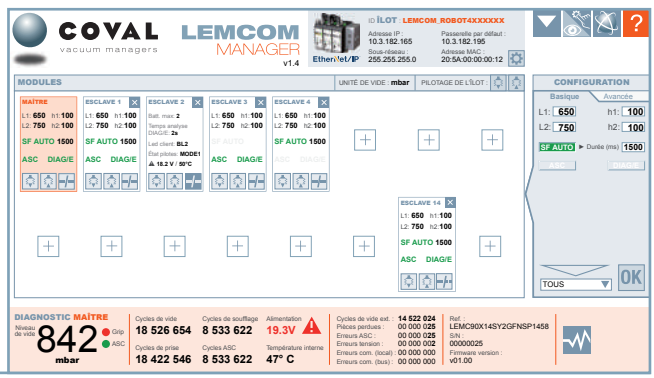
EtherNet/IP PROFINET

- Embedded web server.
- Implicit (I/O) and explicit messaging (setting) (EtherNet/IP).
- Synchronous (I / O) and asynchronous data (configuration) (PROFINET)



LEMCOM MANAGER

- Dedicated universal application: LEMCOM Manager.



LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Selection Guide

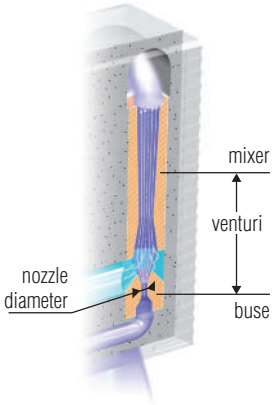
PROFINET EtherNet/IP

Venturi Specifications

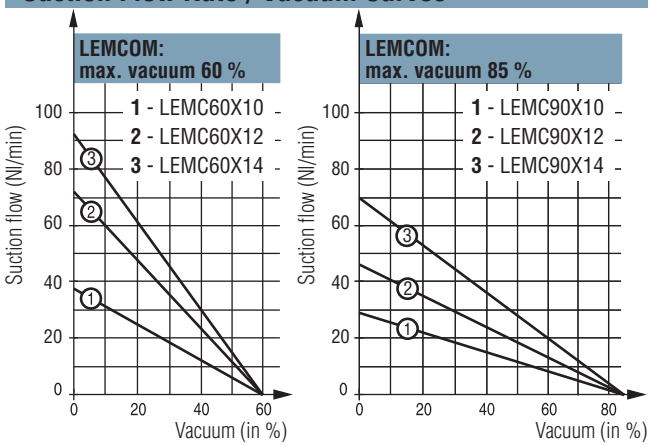
1- Maximum Vacuum Level
Dependent upon the mixer profile:

- 85% of maximum vacuum is optimal for gripping airtight products.
- 60% of maximum vacuum is optimal for gripping porous products.

2- Nozzle Diameter
Reflects the generated vacuum flow rate, as well as energy consumption. Hence, it must be selected to meet precise requirements without wasting energy.



Suction Flow Rate / Vacuum Curves



Handling of Porous Products: *(cardboard, untreated wood, pastries, etc.)* → LEMCOM 60% max. vacuum

When porosity and/or surface leaks are expected during gripping, a vacuum level between 35% and 55% is the best economical compromise generated by a maximum **venturi vacuum level of 60%**. To determine the most effective nozzle diameter, use the table at right and measure the leakage flow rate of the material.

Evacuation time *(in seconds)* **of 1 liter volume**				**Consumed Air** *(Nl/min)*	**Vacuum flow** *(Nl/min)*
vacuum reached / Nozzle Ø	**35%**	**45%**	**55%**		
1.0 mm	0.83	1.31	2.35	44	38
1.2 mm	0.52	0.83	1.49	65	72
1.4 mm	0.34	0.54	0.97	90	92

Handling of Airtight Products: *(glass, plastic, coated wood, sheet metal, etc.)* → LEMCOM 85% max. vacuum

Gripping done without major leaks will benefit from a high level of vacuum: Between 55% and 75% generated by a maximum **venturi vacuum level of 85%**.
Depending on the volume to be evacuated and the time available for product gripping, use the table below to select the most effective nozzle diameter and vacuum flow rate.

Working without "ASC":

Evacuation time *(in seconds)* **of 1 liter volume**				**Consumed Air** *(Nl/min)*	**Vacuum flow** *(Nl/min)*
vacuum reached / Nozzle Ø	**55%**	**65%**	**75%**		
1.0 mm	1.76	2.38	3.33	44	29
1.2 mm	1.13	1.53	2.15	65	45
1.4 mm	0.73	0.99	1.38	90	70

AIR Saving Control On airtight products, "ASC" enables you to considerably reduce compressed air consumption. The table below shows:

- A larger nozzle provides a faster grip without consuming more, when using "ASC".
- A smaller nozzle only consumes less when the operation is continued without "ASC".

When using "ASC" (evacuation of 1 liter volume):

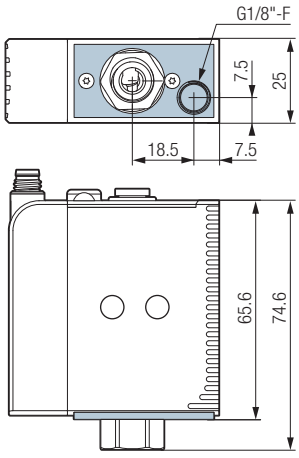
Ø buse	**gripping time (65% vacuum)** *(s)*	**Time up to 75% vacuum** *(s)*	**Consumed Air** *(Nl)*
1.0 mm	**2.38**	**3.33**	2.2
1.2 mm	**1.53**	**2.15**	2.2
1.4 mm	**0.99**	**1.38**	2.2

Exhaust manifold: option E

The LEMCOM 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. (LEMC___**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.



LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Configuring a Vacuum Pump

PROFINET EtherNet/IP

LEMC	90	X	12	S	Y2		G		–		B2

VACUUM LEVEL

60 % max. vacuum is optimal for porous materials	**60**
85 % max. vacuum is optimal for airtight products	**90**

NOZZLE DIAMETER

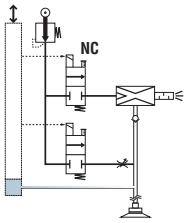
1 mm Ø nozzle	**10**
1.2 mm Ø nozzle	**12**
1.4 mm Ø nozzle	**14**

MODULE COMPOSITION

S — **NC Vacuum pump with blow-off**

LEMC__X__**S**__G__

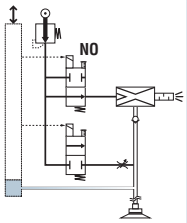
- **NC** vacuum control valve:
  - → in case of electrical cut-off, vacuum generation stops.
- Blow-off configured on site at choice:
  - Blow-off controlled by specific signal;
  - Automatically delayed blow-off time from 0 to 10 s.
- Adjustable blow-off flow rate.



V — **NO Vacuum pump with blow-off**

LEMC__X__**V**__G__

- **NO** vacuum control valve:
  - → In case of electrical cut-off, vacuum continues to be generated.
- Blow-off configured on site, at choice:
  - Blow-off controlled by specific signal;
  - Automatically delayed blow-off time from 0 to 10 s.
- Adjustable blow-off flow rate.



PROTOCOL

Q2 — PROFINET master

LEMC__X___**Q2**G__

- On-board 2-Port Ethernet Switch.
- On-board web server.
- Dedicated configuration software.
- M8/RJ45 standard connectors.
- GSDML file.

Y2 — EtherNet/IP master

LEMC__X___**Y2**G__

- On-board 2-Port Ethernet Switch.
- On-board web server.
- Dedicated configuration software.
- M8/RJ45 standard connectors.
- RSLogix 5000 AOI + EDS file.

Z2 — secondary module

LEMC__X___**Z2**G__

- Universal secondary module, can be used with any fieldbus.
- If necessary, M8/M8 "COVAL Bus" 120 Ω termination, available in accessories.

EXHAUST

Open (integrated silencer)	**–**
Exhaust manifold (G1/8''-F)	**E**

CONFIGURATION

_ — 1 stand-alone module

Island assemblies

B2 — LEMC__X_____G**B2**

Island assembly with 2 modules, with connecting bridges for internal "COVAL Bus" and M8/M8 120 Ω termination:

- → The first module is of the type selected in "PROTOCOL".
- → The following one is a secondary module.

B3 — LEMC__X_____G**B3**

Island assembly with 3 modules, with connecting bridges for internal "COVAL Bus" and M8/M8 120 Ω termination:

- → The first module is of the type selected in "PROTOCOL".
- → The following two are secondary modules.

B4 — …

NB: LEMC__X___**Z2**G**B**_ "Secondary" island modules are delivered without the M8/M8 "COVAL Bus" 120 Ω termination - order separately.

Components for island assembly

B — LEMC__X_____G**B**

Island module, complete with integrated assembly screw.

Island endplates set complete with assembly screw and plug for common pressure inlet.

Part No.: LEMSETA

Connecting bridge for internal "COVAL Bus".

Part No.: 80001231

NB: If necessary, M8/M8 "COVAL Bus" 120 Ω termination is available in accessories

OPTION: Version without non-return valve available on request.

EXAMPLES OF COMPLETE PART NUMBER:

LEMC90X14SY2G LEMCOM vacuum pump, 85% maximum vacuum, 1.4 mm Ø nozzle, controlled by a NC (Normally Closed) solenoid valve, stand-alone EtherNet/IP™ "master" module.

LEMC90X10SY2GB3 Island assembly of 3 LEMCOM vacuum pumps, 85% maximum vacuum, 1 mm nozzle Ø, controlled by a NC (Normally Closed) solenoid valve, EtherNet/IP™ "master" module, 2 secondary modules, with connecting bridges and the M8/M8 "COVAL Bus" 120 Ω termination.

LEMCOM

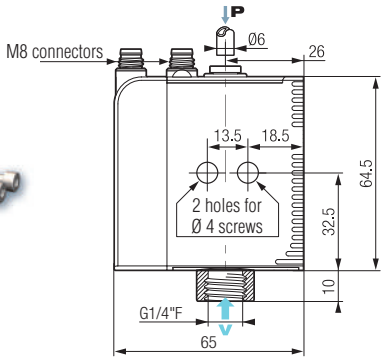
1st Mini Vacuum Pump on Industrial Fieldbus

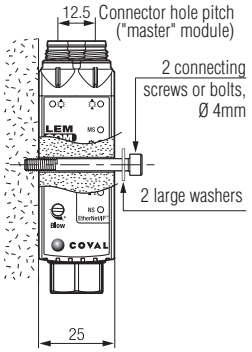
Dimensions, Mounting Options

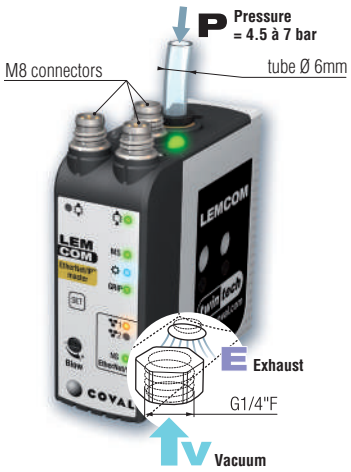
PROFINET EtherNet/IP

1- Stand-alone Modules

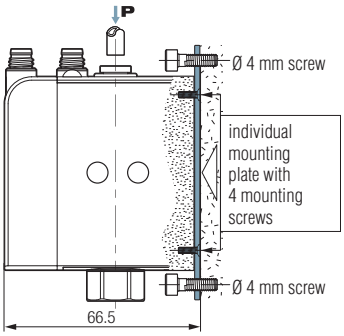
Mounting from side

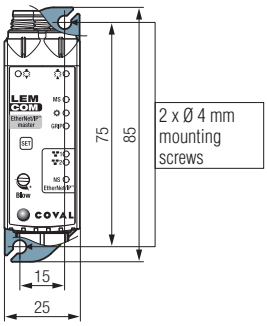






Mounting from front



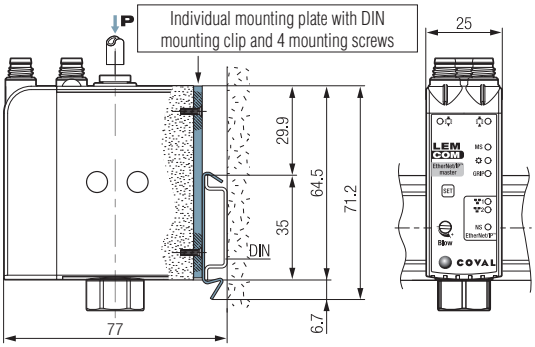


To mount from front, in addition to the module, a mounting kit must be ordered:

Kit for mounting from front:
1 plate + 4 screws

Part No.: LEMFIXA

Mounting on DIN rail

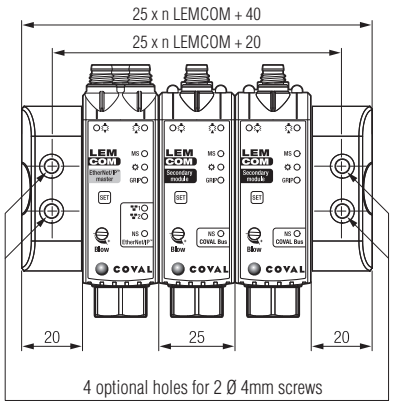


For static mounting (for example, in a cabinet), a module can be clipped onto a DIN rail. For this purpose, the module must first be equipped with an individual plate for mounting onto a DIN rail

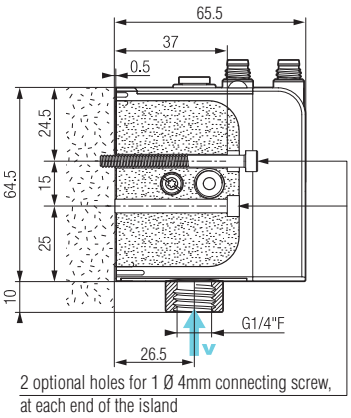
DIN rail mounting kit:
1 plate/clip + 4 screws

Part No.: LEMFIXB

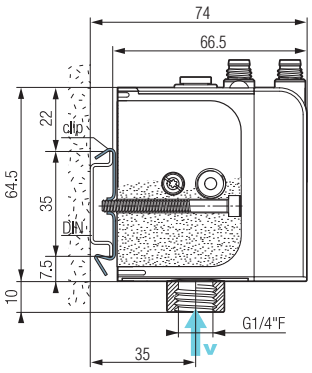
2- Islands



Mounting from front



Mounting on DIN rail



DIN rail mounting kit:
2 clips + 2 screws

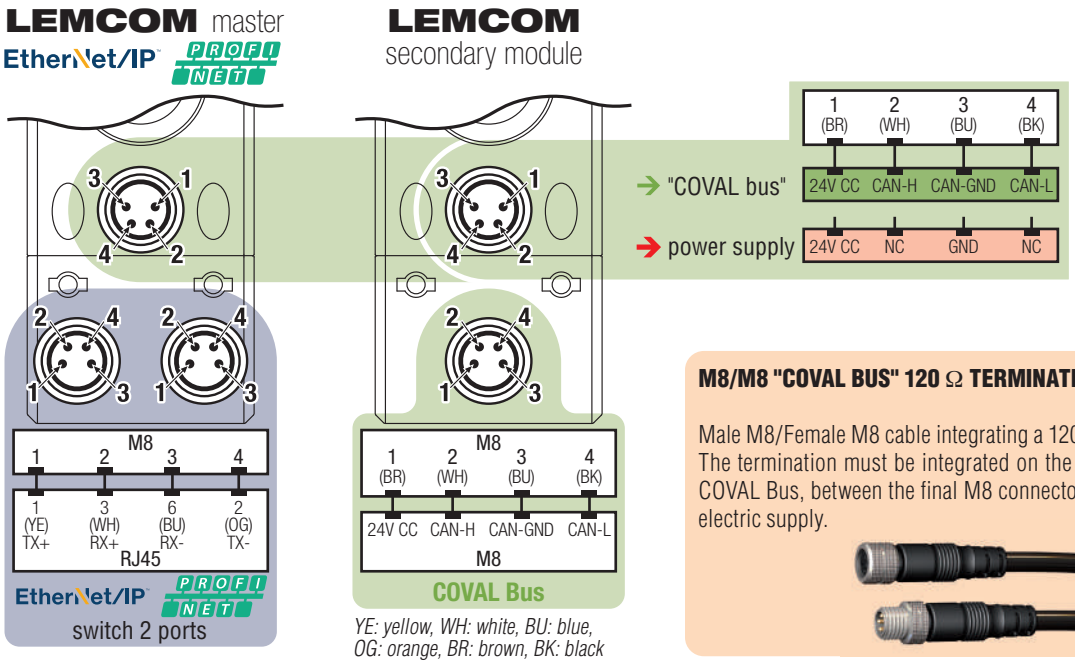
Part No.: LEMFIXC

LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Connections

Electrical Connections



YE: yellow, WH: white, BU: blue, OG: orange, BR: brown, BK: black

M8/M8 "COVAL BUS" 120 Ω TERMINATION

Male M8/Female M8 cable integrating a 120 Ω termination resistor.
The termination must be integrated on the last "secondary" module of the COVAL Bus, between the final M8 connector of the product and the 24V DC electric supply.

ACCESSORIES

Cat 5 shielded Ethernet cable: M8, straight, female, 4-pin – RJ45, straight, male, 8-pin – suitable for drag chain use

- **CDM8RJ45L2**: length 2 m.
- **CDM8RJ45L5**: length 5 m.
- **CDM8RJ45L10**: length 10 m.

Other lengths on request.

Cat 5 shielded Ethernet cable: M8, straight, female, 4-pin, on both ends – suitable for drag chain use

- **80003053**: length 1 m.

M8/M8 "COVAL bus" cable: M8, straight, female, 4-pin – M8, straight, female, 4-pin

- **CDM8FFL05**: length 0.5 m.
- **CDM8FFL1**: length 1 m.
- **CDM8FFL2**: length 2 m.
- **CDM8FFL4**: length 4 m.

Other lengths on request.

Power supply cable: M8, straight, female, 4-pin – open end

- **CDM8**: length 2 m.
- **CDM8N**: length 0.5 m.

120 Ω "COVAL bus" termination: M8, straight, female, 4-pin – M8, plug, male, 4-pin

- **80002303**: length 0.2 m.

The COVAL bus is based on a CAN architecture and requires the addition of a bus termination to ensure proper communication between the secondary and master modules. It takes the form of an M8 male/M8 female cable that includes a 120 Ω line termination resistor.

It must be integrated on the last secondary of the COVAL bus, between the module's rear connector and the 24 V DC power supply.

When using a stand-alone master module, this termination is not required.

LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Specifications

PROFINET EtherNet/IP

Common 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.
- 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: 85%.
- Suction flow rate: From 29 to 92 Nl/min.
- Air consumption: From 44 to 90 Nl/min, when operating "without ASC".
- Integrated non-clogging silencer.
- Noise level: approximately 68 dBA "ASC off". 0 dBA with ASC.
- Electric protection grade: IP65.
- Maximum operating frequency: 4 Hz.
- Service life: 30 million cycles.
- Weight: 150 g.
- Operating temperature: From 0 to 50°C.
- Materials: PA 6-6 15% FG, brass, aluminum, NBR.
- 4-pins M8 male connectors.

Self-Adaptation

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

Integrated electronics

- 24 V DC supply (regulated ± 10 %).
- Electric consumption: "master" < 150 mA, "secondary" < 100 mA, of which 30 mA (0.7W) per vacuum and blow-off pilot.
- Measurement range: 0 to 99% vacuum.
- Measurement accuracy: ±1.5 % of range, temperature compensated.
- Communication ports protected against wiring errors or reversed polarity.

Service Specifications

Settings

- Piece gripping (L1) and regulation (L2)thresholds.
- Automatic blow-off time configurable (0 to 10 seconds).
- Activation/deactivation of ASC regulation system.
- Activation/deactivation of the (DIAG ECO) leakage level monitoring system.
- Adjustable blue LED functioning mode
- Valve functioning mode in the event of loss of communication

Diagnosis

- Instantaneous vacuum level (0 to 99%).
- Gripped product, loss of product, regulation in process, regulation default information.
- Cycle counters (vacuum, blow-off, gripped piece, ASC, etc.).
- Supply voltage and internal temperature.
- Product reference and serial number.
- Firmware version.

Configuration and diagnosis tools

- LEMCOM Manager PC software (EtherNet/IP, PROFINET and CANopen universal application).
- Embedded web server (EtherNet/IP and PROFINET module).

Communication

EtherNet/IP:

- 2-port ethernet switch.
- Static IP address or DHCP.
- EDS file & RSLogix 5000 Add-On Instructions.

PROFINET:

- 2-port ethernet switch.
- Static IP address or PROFINET DCP.
- GSDML file

COVAL Bus:

- CAN link between "master" and "secondary" units / 1 Mbps.
- Connection by specific bridge for island assembly or unshielded female M8/female M8 cable.
- Max total length of the COVAL Bus: 20 meters.

COVAL
vacuum managers

series
LEM+

Compact High Flow Vacuum Pumps with "ASR"

- Nozzle Ø: 2 ; 2.5 mm
- 2 vacuum levels: 60% and 85%
- Suction flow rate up to 275 Nl/min
- Integrated pressure regulator (ASR)
- M12 connections

AIR Saving Regulator

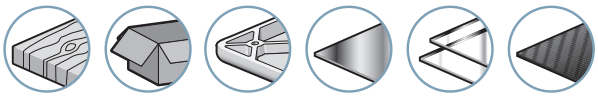
LEM+

Compact, High Flow Vacuum Pumps

General Information

LEM+ Series, compact, high flow vacuum pumps, integrate **ASR** (Air Saving Regulator) technology that allows up to 40% of energy savings. They are designed for gripping porous products or those with a rough surface.
For gripping airtight or semi-airtight products, it is recommended to use the **LEMAX+ Series**.

Industry-specific applications



Advantages

- Easy implementation: Plug & Play, multiple choices, every type of application.
- Maximum automatic energy savings:
  AIR Saving Regulator **ASR**: 40% savings for porous products.
- Compactness: LEM+ 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

- 60% or 85% of maximum vacuum.
- NC or NO, depending on safety.
- Combined **ASR** "venturi regulator".
- With or without visual display.
- With or without vacuum sensor.
- With or without controlled blow-off or automatic blow-off function.
- Powerful blow-off as option.
- Versions with 1 or 2 M12 connectors.
- Suction flow rate (Nl/min):

max. vacuum / nozzle Ø	60%	85%
2.0 mm	189	125
2.5 mm	275	200

Integration

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

❶ **3.5 bar** pressure regulator

❷ "Vacuum" solenoid valve

❸ **3.5 bar** optimized venturi

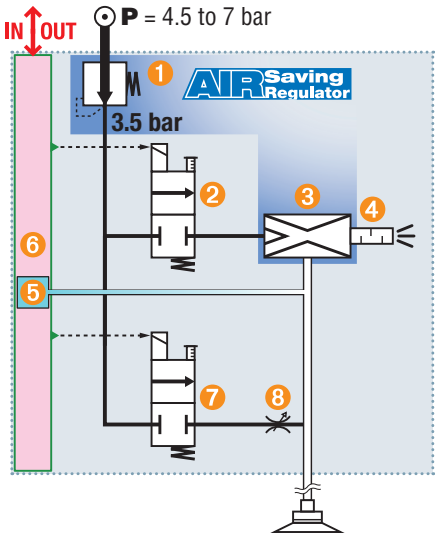
❹ Optimized silencer

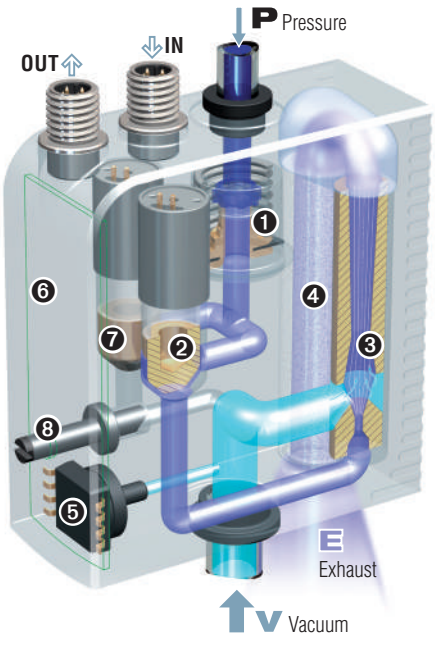
❺ Electronic vacuum sensor

❻ Integrated electronics

❼ "Blow-off" solenoid valve

❽ Blow-off flow rate regulator





Schematic representation

AIR Saving Regulator

40% **energy savings** (on average).

Combined "venturi regulator" **ASR**: pressure regulator ❶ feeds venturi ❸ with 3.5 bar, optimal for its operation.

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

LEM+

Compact, High Flow Vacuum Pumps

Energy Savings & Intelligence

AIR Saving Regulator (ASR): Air Saving Regulator

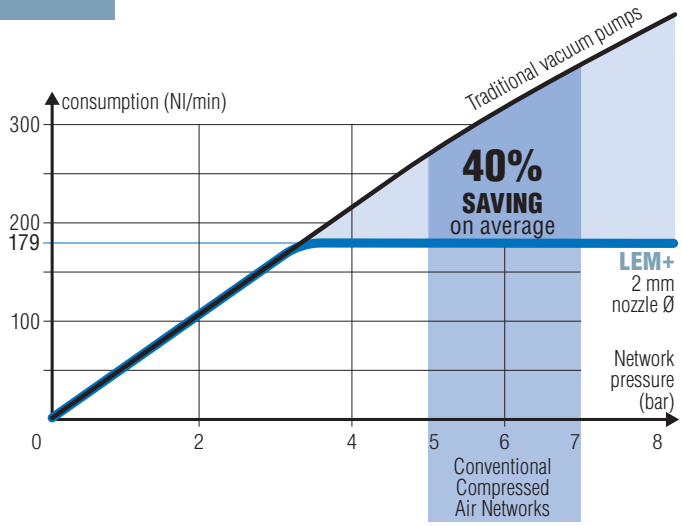
The LEM+ vacuum pumps, which integrate an **ASR** "venturi regulator" combination, maintain ideals that COVAL values greatly: reducing both compressed air consumption and noise generation.

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.



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.

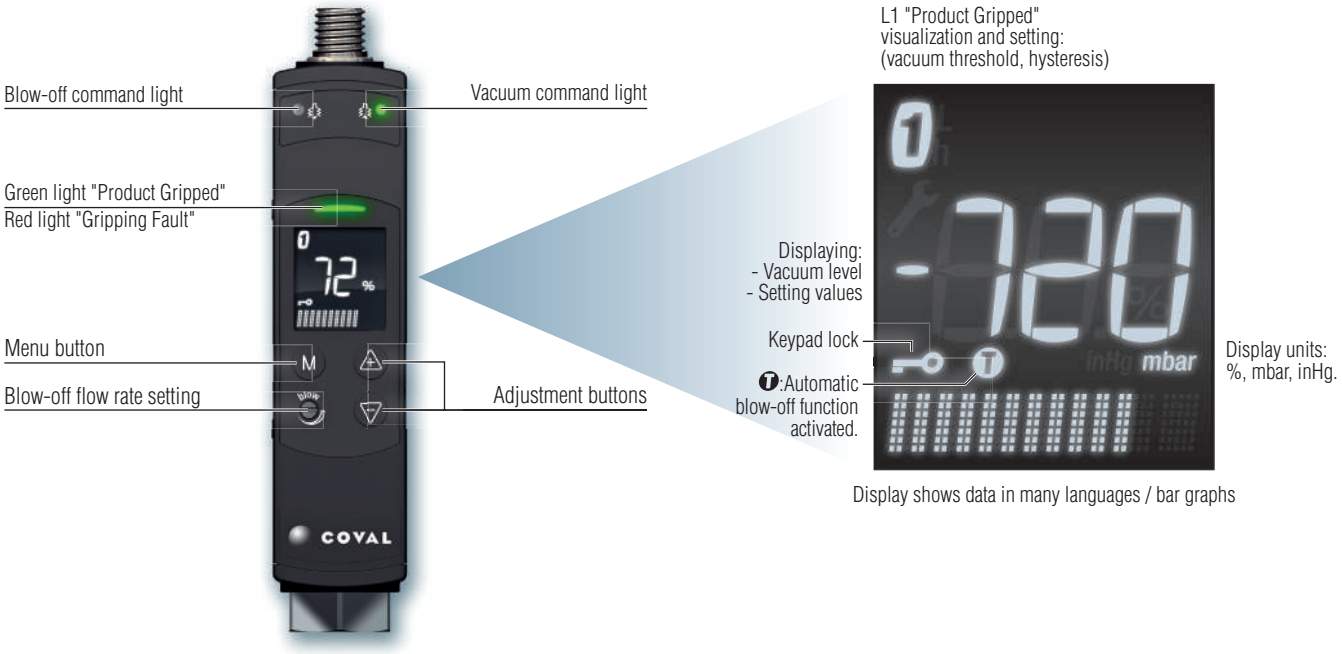
➔ **Simplified & Protected Installation and Operation.**

Due to the high visibility display of the **LEM+** 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.**



LEM+

Compact, High Flow Vacuum Pumps

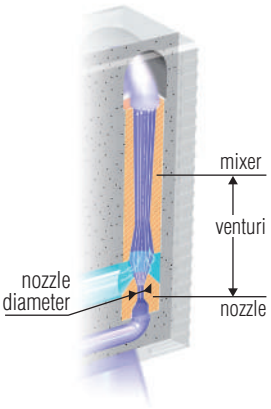
Selection Guide

AIR Saving Regulator

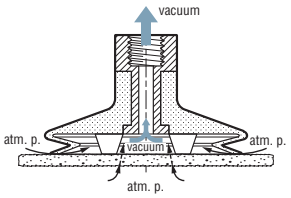
Select Vacuum Level and Nozzle Diameter

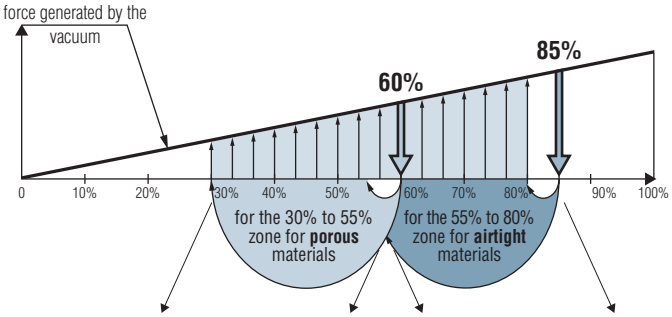
The introductory guide in this catalog shows that for porous objects, a 30-55% vacuum is economical and effective. This is obtained with a 60% maximum vacuum pump.
The table below helps to select the nozzle diameter which generates enough vacuumed air flow to respond in the time required by the application, 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, and 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.

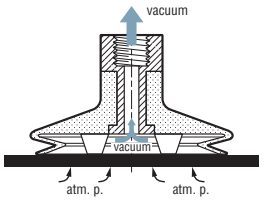


Porous materials:
cardboard, unfinished wood, pastries, etc.





Airtight materials:
glass, plastic, sheet metal, finished wood

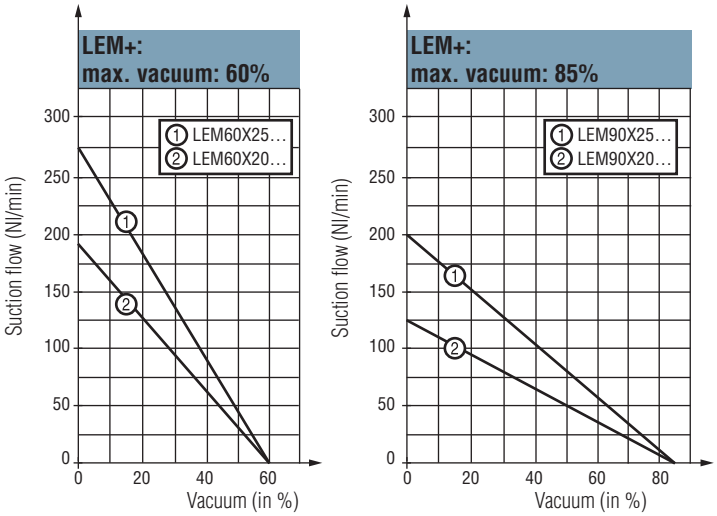


Porous Objects ▸ Maximum Vacuum Level: 60%					
Time to create vacuum (seconds) **for a volume of 1 liter**				**Air consumed** (Nl/min)	**Air drawn in** (Nl/min)
vacuum achieved / Ø nozzle	**35 %**	**45 %**	**55 %**		
2.0 mm	0.16	0.27	0.42	**179**	**189**
2.5 mm	0.11	0.18	0.31	**260**	**275**

Airtight Objects ▸ Maximum Vacuum Level: 85%					
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 %**	**65 %**	**75 %**		
2.0 mm	0.38	0.55	0.80	**179 ✱**	**125**
2.5 mm	0.26	0.35	0.50	**260 ✱**	**200**

✱ To save compressed air, choose **LEMAX+** ➔ **ASC** reduces the air consumption by **90**%

Suction Flow Rate / Vacuum Curves

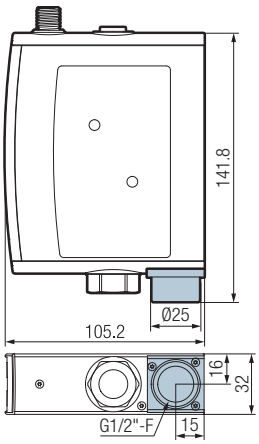


Exhaust manifold: option E

The LEM+ 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 workpiece. (LEM___**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.



LEM+

Compact, High Flow Vacuum Pumps

Configuring a Vacuum Pump

AIR Saving Regulator

LEM	60	X	25		S		VA	C15	P	G1		F	–

VACUUM LEVEL

60 % max. vacuum is optimal for porous materials	**60**
85 % max. vacuum is optimal for air-tight products	**90**

NOZZLE DIAMETER

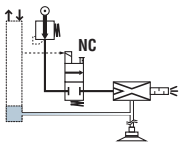
2 mm nozzle Ø	**20**
2.5 mm nozzle Ø	**25**

MODULE COMPOSITION

NC Vacuum Pump Without Blow-Off — **R**

LEM__X__**R**V_C__PG1

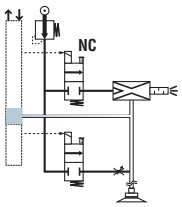
- Single command signal.
- **NC** vacuum command valve.



NC Vacuum Pump With Blow-Off — **S**

LEM__X__**S**V_C__PG1

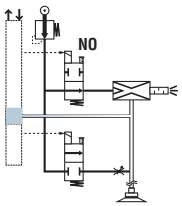
- 2 command signals.
- **NC** vacuum command valve.
- Blow-off configured on site, at choice:
  - Blow-off controlled by specific signal;
  - Automatic blow-off function (blow-off time configurable from 0 to 10s), only with VA option (advantage: reduced PLC I/O requirement).
- Adjustable blow-off flow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



NO Vacuum Pump With Blow-Off — **V**

LEM__X__**V**V_C__PG1

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



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.

VACUUM SENSOR DIALOGUE

Vacuum pump without vac. sensor — **VO C14** — one M12 connector 4 pins (C14)

LEM__X___**VOC14**PG1

- Simplified LEM+ without settings and dialogue.
- Automatic operation until maximum vacuum level.

Vacuum pump with vacuum sensor & dialogue — **VA C15** — one M12 connector 5 pins (C15)

LEM__X___**VAC15**PG1

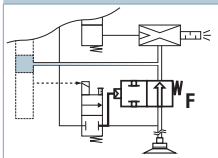
- Electronic vacuum sensor (VA).
- "Gripped product" switching output 24V DC / NO
- Front face panel and full dialogue.

Vacuum pump with vacuum sensor & dialogue — **VA C24** — two M12 connectors 4 pins (C24)

LEM__X___**VAC24**PG1

- Electronic vacuum sensor (VA).
- Stand alone I/O.
- "Gripped product" switching output 24V DC / NO.
- 1 auxiliary output: "Vacuum level" signal analogic 1 to 5V DC.
- Front face panel with full dialogue.

POWERFUL BLOW-OFF



Without	–
With	**F**

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.
The option is only available with LEM+ modules equipped with a blow-off regulation: Version LEM__X__**S**V... and LEM__X__**V**V...
NB: If option **F** is selected, no blow-off flow rate setting is available.

EXHAUST

Open (integrated silencer)	–
Exhaust manifold (G1/2''-F)	**E**

EXAMPLE OF COMPLETE PART NUMBER: LEM60X25SVAC15PG1

LEM+ vacuum pump, 60% maximum vacuum, 2.5 mm nozzle Ø, controlled by a NC (Normally Closed) solenoid valve with vacuum sensor and dialogue, connection by 1 M12 5-pin connector.

LEM+

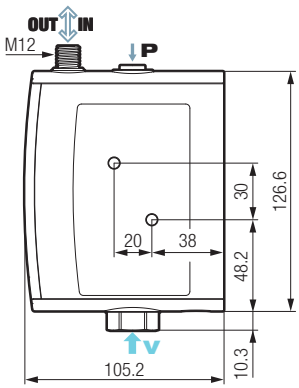
Compact, High Flow Vacuum Pumps

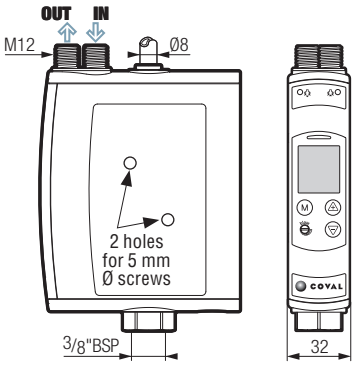
Dimensions, Mounting Options

AIR Saving Regulator

Side Mounting

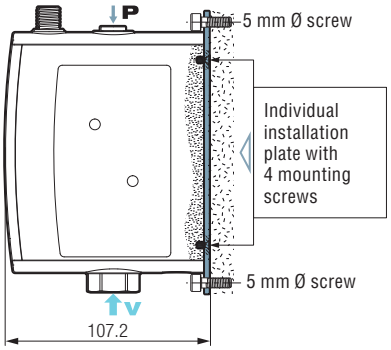
- Version: one M12 connector
- Version: two M12 connectors

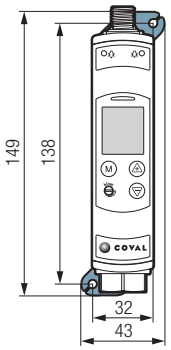




Mounting from the side is the simplest to implement: Two Ø 5 mm through screws or bolts with large washers.

Mounting from Front

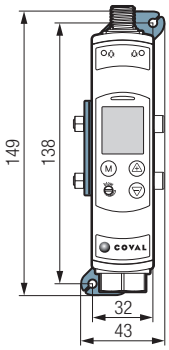


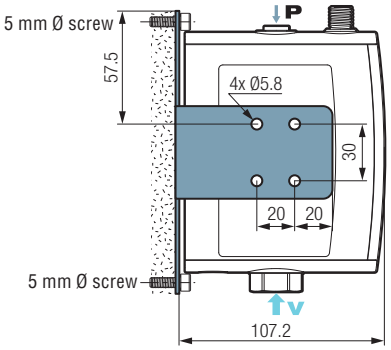


For mounting from the front, in addition to the module, you need to order an additional kit:

Mounting from front kit:
1 plate + 4 screws

Part No.: LEMFIX2A



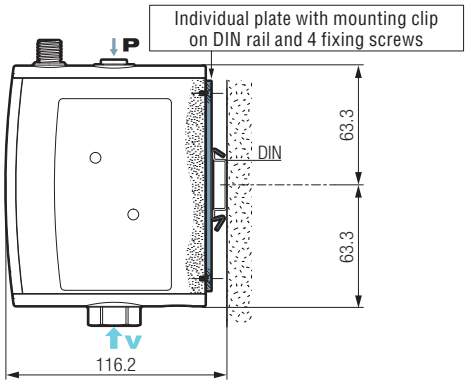


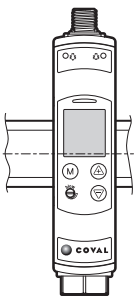
For front installation with side pump mounting this kit is needed in addition to the module:

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

LEM+

Compact, High Flow Vacuum Pumps

Specifications & Connections

AIR Saving Regulator

Specifications

COMMON SPECIFICATIONS

- Supply: Non-lubricated air 5 microns filtered, according to 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: 60% or 85% depending on model.
- Suction flow rate: From 125 to 275 Nl/min, depending on model.
- Air consumption: From 179 to 260 Nl/min, depending on model.
- Integrated non-clogging silencer.
- Sound level: From 72 to 75 dBA.
- 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 (±10% regulated).
- Current consumption: 30 mA (0.7W) by vacuum or blow-off solenoid valve.

VA MODEL SPECIAL SPECIFICATIONS

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 (±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: ±1.5% of range, temperature compensated.

"Gripped Product" Output Signal

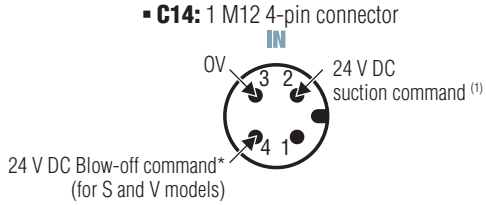
- 24V DC, switching output / NO, switching capacity: 125 mA PNP.

Auxiliary output (C24 model only, 2 x M12 4 pins)

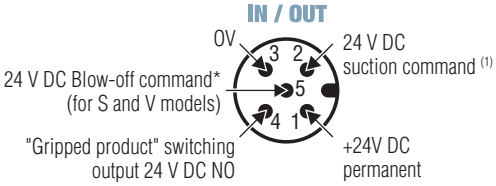
- "Vacuum level" signal, analogic 1 to 5V DC of measuring range.

Electrical Connections

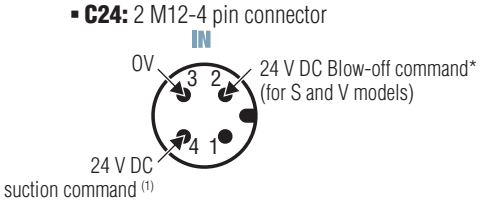
- **C14:** 1 M12 4-pin connector

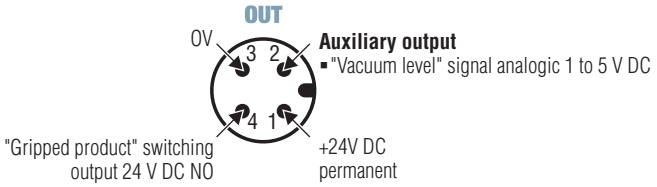


- **C15:** 1 M12 5-pin connector



- **C24:** 2 M12-4 pin connector





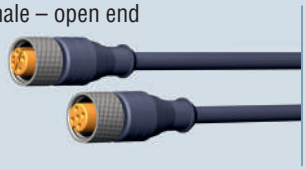
(1) 24 V DC suction command, depending on version:
*- for vacuum pumps model **R** and **S** (vacuum control NC valve): 24 V DC vacuum control*
*- for vacuum pumps Model **V** (vacuum control NO valve): 24 V DC vacuum off command*

** **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

series
LEMAX+

Compact High Flow Vacuum Pumps with "ASC"

- Nozzle Ø: 2 ; 2.5 mm
- Vacuum level: 85%
- Suction flow rate up to 200 Nl/min
- Integrated pressure regulator (ASR)
- Integrated vacuum regulation (ASC)
- M12 connections

AIR Saving Control

LEMAX+

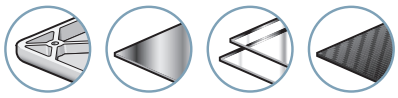
Compact, High Flow Vacuum Pumps

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:
  AIR Saving Regulator **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 (Nl/min):

max. vacuum / nozzle Ø	85%
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:

❶ **3.5 bar** pressure regulator

❷ "Vacuum" solenoid valve

❸ **3.5 bar** optimized venturi

❹ Optimized silencer

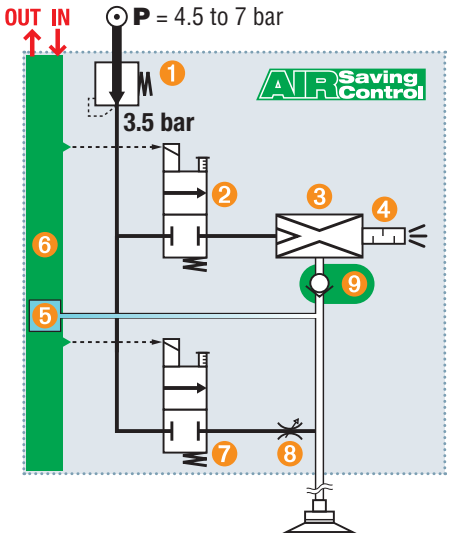
❺ Electronic vacuum sensor

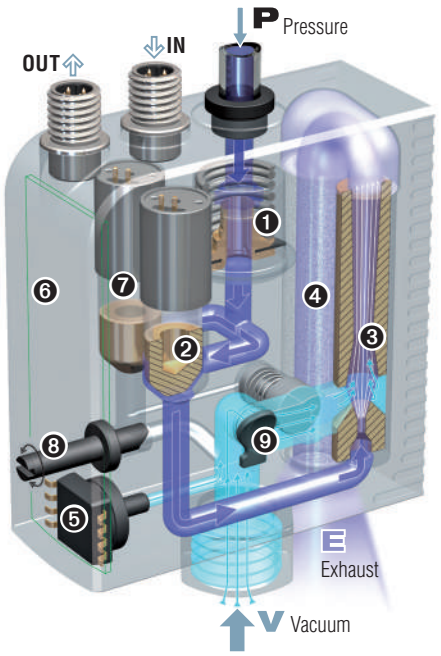
❻ Integrated electronics

❼ "Blow-off" solenoid valve

❽ Blow-off flow rate regulator

❾ Vacuum non-return valve





Schematic representation

AIR Saving Control

90% **energy savings** (on average).

Combination of non-return ❾ and advanced electronics ❻ ensures the ASC's automatic management.

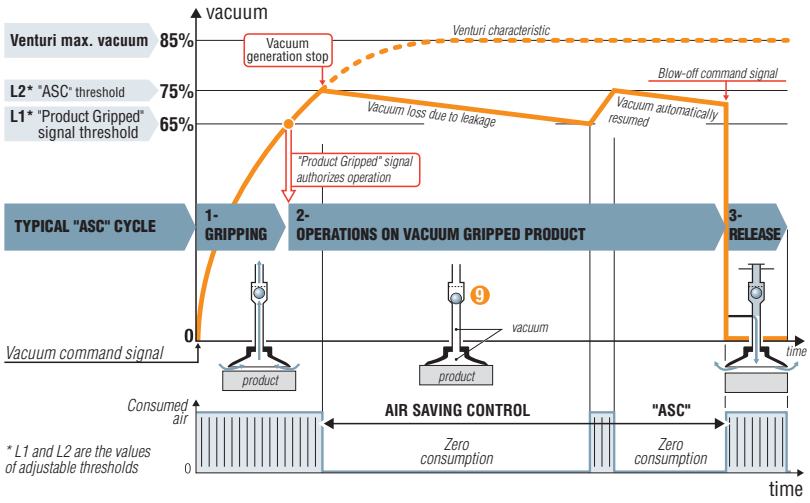
→ Once vacuum is established, the pump does not continue to consume air to hold the product.

LEMAX+

Compact, High Flow Vacuum Pumps

Energy Saving & Auto-adjustment

"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 ❷ starts the cycle by supplying the venturi ❸ 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 ❺. 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 ❷ is cut off ➔ consumption is halted. The object remains held by the vacuum maintained thanks to the closed valve ❾.

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 ❼ generates a stream of air which closes the isolation valve ❽, 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 without "ASC"	Air consumption with "ASC"	
Gripping	0.16 s	0.45 Nl	0.45 Nl	achieved
Transfer	1.20 s	3 Nl	0	economy
Release	0.14 s	0.3 Nl	0.3 Nl	
		3.75 Nl	0.75 Nl	→ 80 %

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

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

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.

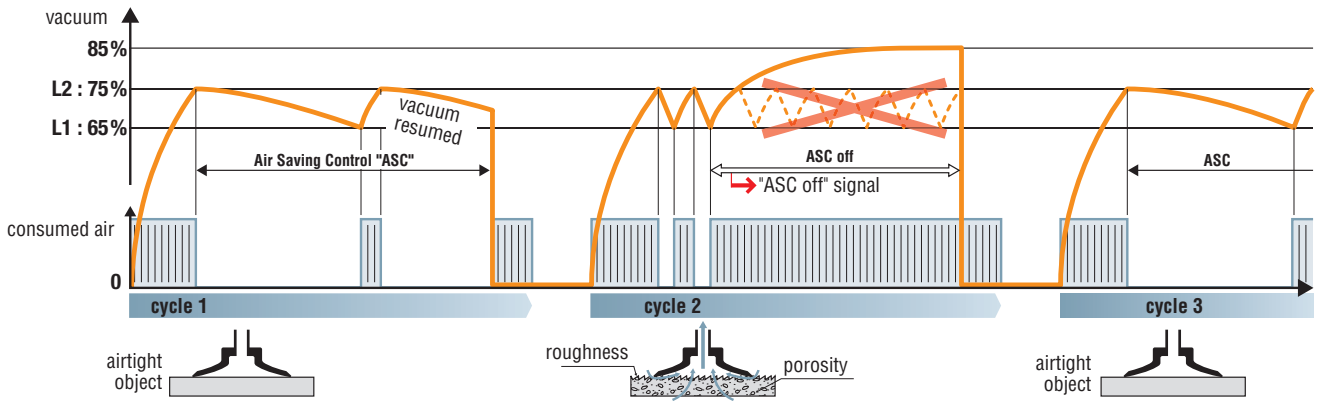
"ASC": AN ADVANTAGE WITHOUT LIMITATIONS

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.

LEMAX+

Compact, High Flow Vacuum Pumps

Intelligence & Selection Guide

AIR Saving Control

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.

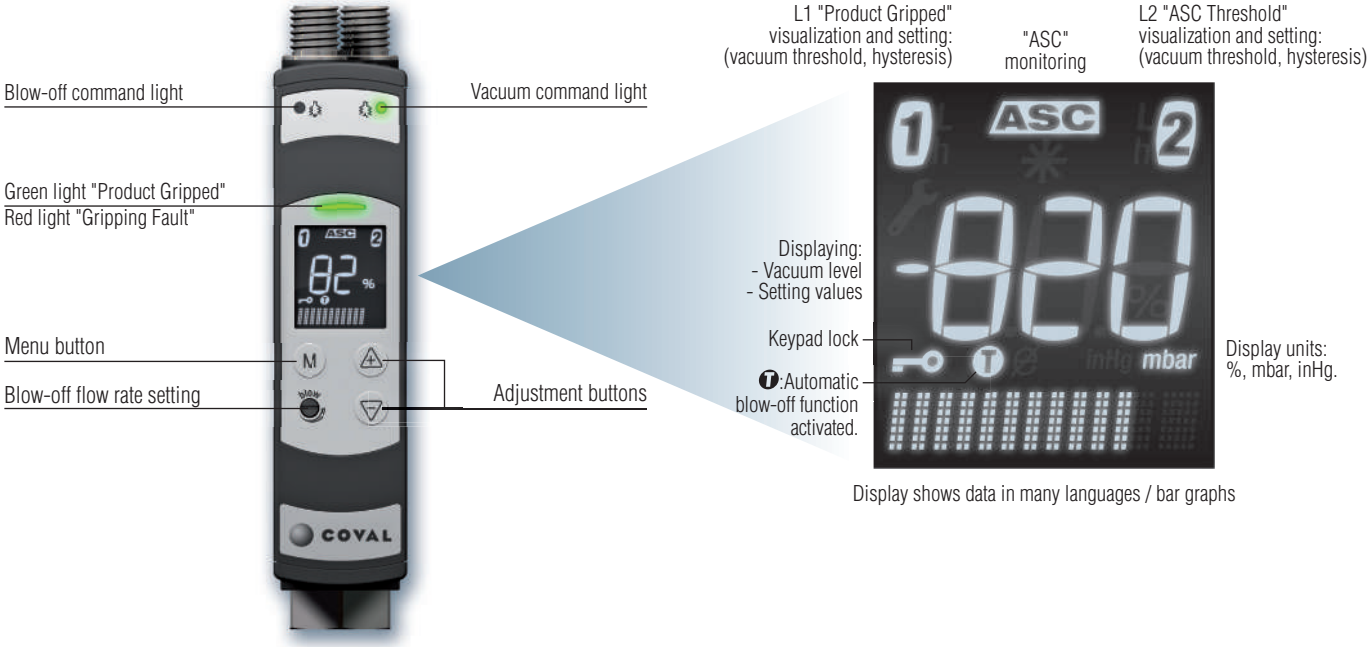
➔ **Simplified & Protected Installation and Operation.**

Due to the high visibility display of the **LEMAX+** 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.**



Display shows data in many languages / bar graphs

Power Determined by the Venturi Nozzle Diameter

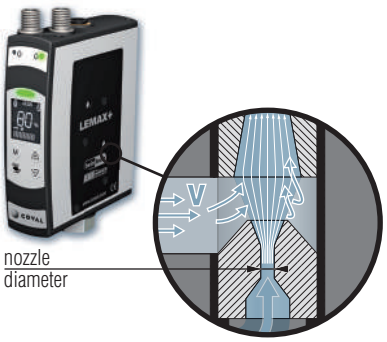
The table shows the power levels generated by each of the nozzle diameters available: when the module is operating "**ASC**" off, a larger nozzle draws and consumes more compressed air.

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

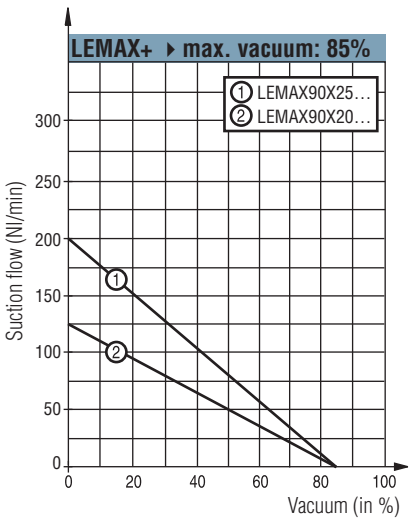
In conclusion:

- 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 Diameter Selection					
nozzle Ø	Venturi Specifications While Working Without "ASC"		Evacuation of 1L Volume. "ASC" Operation: - Gripping at 65% Vacuum - Stop Vacuum at 75%		
	Vacuum flow (Nl/min)	Consumed Air (Nl/min)	Gripping Time (65% Vacuum) (s)	Time Until 75% Vacuum (s)	Consumed Air (Nl)
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



LEMAX+

Compact, High Flow Vacuum Pumps

Configuring a Vacuum Pump

AIR Saving Control

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	**25**

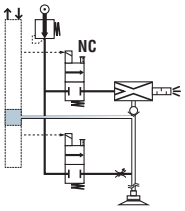
MODULE COMPOSITION

S

NC Vacuum Pump With Blow-Off

LEMAX__X__**S**V_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.

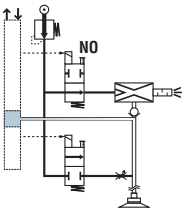


V

NO Vacuum Pump With Blow-Off

LEMAX__X__**V**V_C__PG1

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



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___**C15**PG1

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

C24 **Vacuum Pump with 2 M12 4-pin Connectors**
LEMAX90X___**C24**PG1

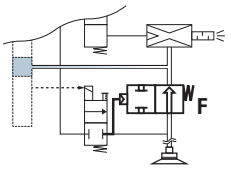
- Stand alone I/O.
- "Gripped product" switching output 24V DC / NO.
- 1 configurable auxiliary output:
  - either "Vacuum level" signal analogic 1 to 5V DC.
  - or "Without ASC" signal +5V DC switching output NO.

***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.

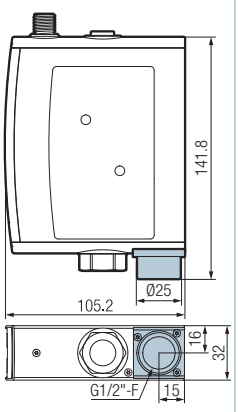
NB: If option **F** is selected, no blow-off flow rate setting is available.

EXHAUST

Open (integrated silencer)	–
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 workpiece. (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.

LEMAX+

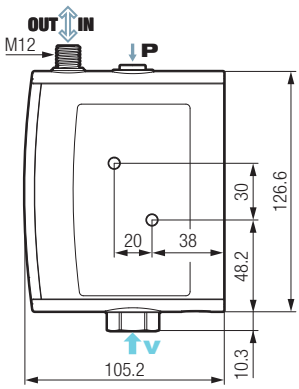
Compact, High Flow Vacuum Pumps

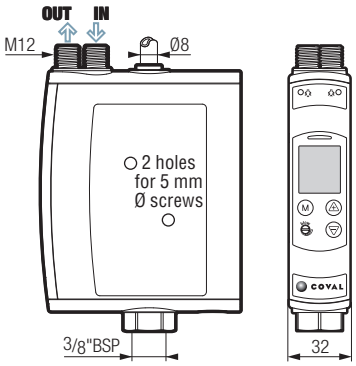
Dimensions, Mounting Options

AIR Saving Control

Side Mounting

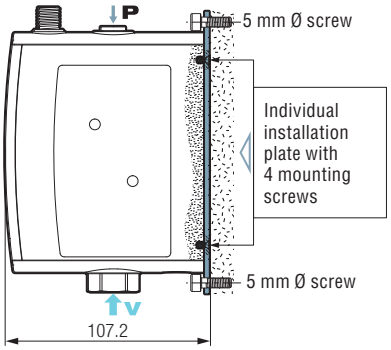
- Version: one M12 connector
- Version: two M12 connectors

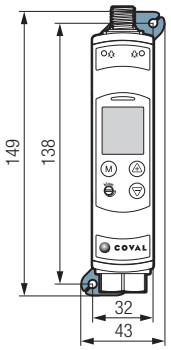




Mounting from the side is the simplest to implement: Two Ø 5 mm through screws or bolts with large washers.

Mounting from Front

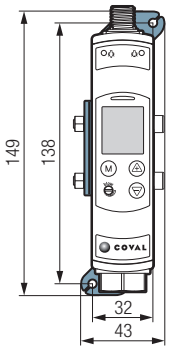


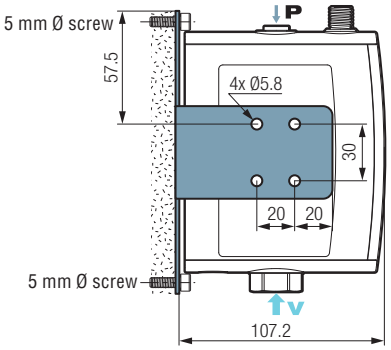


For mounting from the front, in addition to the module, you need to order an additional kit:

Mounting from front kit:
1 plate + 4 screws

Part No.: LEMFIX2A



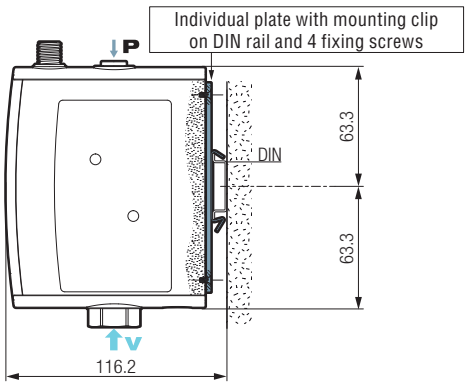


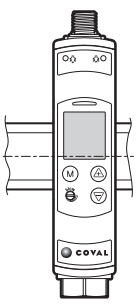
For front installation with side pump mounting this kit is needed in addition to the module:

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

LEMAX+

Compact, High Flow Vacuum Pumps

Specifications & Connections

AIR Saving Control

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 Nl/min, depending on model.
- Air consumption: From 179 to 260 Nl/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 (±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 (±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: ±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)

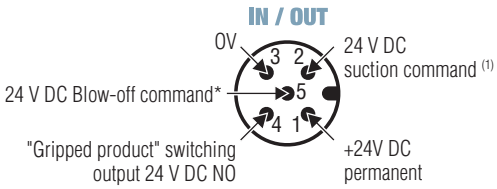
- either "Vacuum level" signal, analogic 1 to 5V DC of measuring range.
- or "without ASC" signal +5V DC NO switching output.

ASC: Regulation & Self-Adaptation

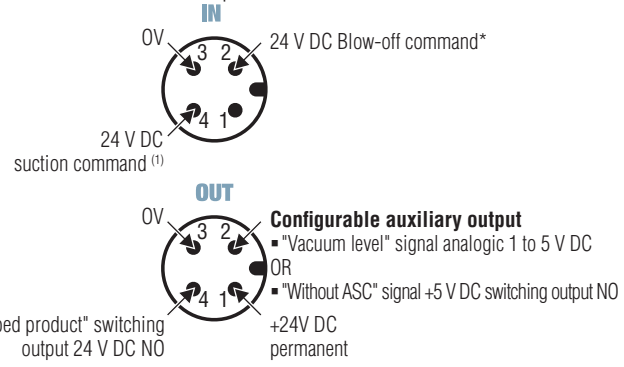
- Continuous monitoring of the leakage level: Back-off or automatic return to operation with ASC.

Electrical Connections

▪ **C15:** 1 M12 5-pin connector



▪ **C24:** 2 M12-4 pin connector



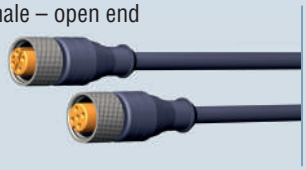
(1) 24 V DC suction command, depending on version:
*- for vacuum pumps model **S** (vacuum control NC valve): 24 V DC vacuum control*
*- for vacuum pumps Model **V** (vacuum control NO valve): 24 V DC vacuum off command*

** **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

series
GVMAX HD
HEAVY DUTY
Communicating Vacuum Pumps

- Nozzle Ø: 2.5 ; 3 mm
- Vacuum level: 85%
- Suction flow rate up to 230 Nl/min
- Integrated vacuum regulation (ASC)
- M12 connections
- Stand-alone or island module

NFC IO-Link AIR Saving Control

GVMAX HD

Heavy Duty Communicating Vacuum Pumps

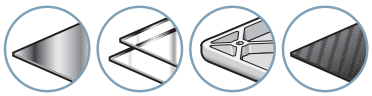
General Information

NFC
IO-Link
AIR Saving Control

COVAL's **GVMAX HD** series Heavy Duty communicating vacuum pumps are the result of many years of listening, discussions and feedback from manufacturers, integrators and users from the automotive, aerospace and packaging industries.

Our **GVMAX HD** vacuum pumps meet their expectations in terms of power, robustness, ease-of-configuration and use, communication and modularity, all while remaining compact and light for easy integration in a smart factory.

Industry-specific applications



NFC
IO-Link
AIR Saving Control

Advantages

- Robust: Resistant to the harsh environments of metal stamping and sheet metal production lines
- High performance: Optimized Venturi system that guarantees powerful suction flow rates and reduced evacuation times
- Modular: Easy maintenance; SMART SWAP quick-mounting system
- Communicating: Efficient communication system for all use levels, clear and easy-to-read HMI, NFC technology for mobile use, and IO-Link communications interface for straightforward networking

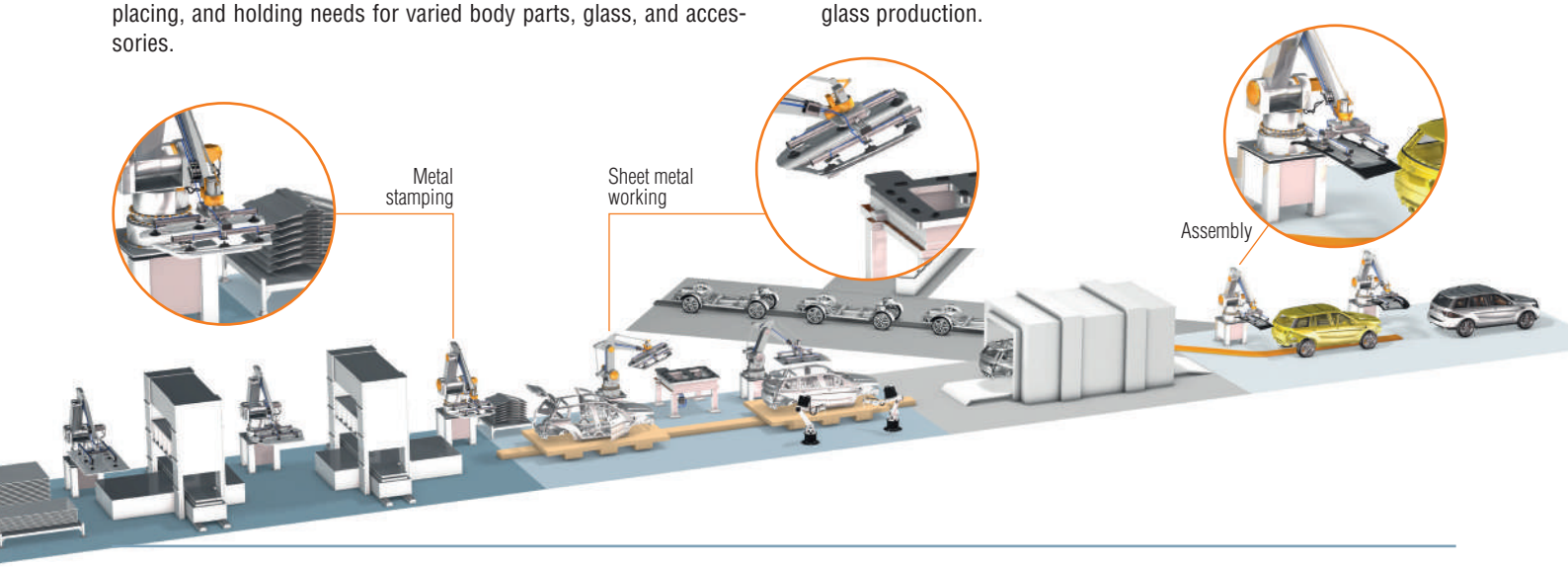
Main Specifications

- 85% vacuum
- Vacuum control: NC, NO or pulse-triggered bistable control
- Powerful suction flow rates:
  - Dia. 2.5 mm nozzle → 185 Nl/min
  - Dia. 3.0 mm nozzle → 230 Nl/min
- Blow-off: Standard or powerful, controlled or automatic timed
- Non-return valve
- 1 or 2 M12 connectors
- Degree of protection: IP65
- Standalone vacuum pumps or in island assemblies
- High-visibility color display with clear multi-lingual messages and straightforward settings menu
- Remote HMI available depending on version
- Easy set up made possible by NFC technology and COVAL Vacuum Manager mobile application
- IO-Link communications interface
- Air Saving Control (ASC) smart vacuum control system guarantees 90% energy savings on average
- Supply pressure monitoring (pressure sensor)
- Vacuum network status analysis and monitoring

Safety, Productivity, and Flexibility at every step of manufacturing

COVAL provides the various players in the automotive industry a global approach to vacuum handling for all their gripping, moving, placing, and holding needs for varied body parts, glass, and accessories.

COVAL solutions, such as vacuum pumps and suction cups, are equipped on robots for stamping presses, welding, assembly, and glass production.



GVMAX HD

Heavy Duty Communicating Vacuum Pumps

General Information

NFC
IO-Link
AIR Saving Control

GVMAX HD Makes Vacuum Management Easy

Onboard installation and diagnostic tools:
- Vacuum network sizing support and clogging detection
- Compressed air consumption monitoring
- Supply voltage monitoring

Inputs / Outputs
Digital (SIO) / IO-Link

M12 connectors available in 4 versions:
- One 5 or 8-pin connector
- or two 4 or 5*-pin connectors

**Version for use with remote HMI*

3-color status indicator light

1.54" high-visibility color LCD display with clear multilingual messages and straightforward settings menu

Settings keypad

NFC

Straightforward setup and diagnostics made possible by NFC technology and COVAL Vacuum Manager mobile application.

SMART SWAP Quick-mounting system: Allows you to mount the GVMAX HD module onto its pneumatic socket or remove it in the blink of an eye, without needing to disconnect compressed air and vacuum tubes.

Pressure P

Pneumatic socket: Combines the compressed air supply and the vacuum outlet

- NC, NO or pulse-triggered bistable vacuum control
- Blow-off: Standard or powerful, controlled or automatic timed

Vacuum generation with single-stage Venturi pump
- Short evacuation times
- No moving parts
- Dust resistant
- No maintenance required

AIR Saving Control
Air Saving Control (ASC), our smart vacuum control system: Averages 90% energy savings

E Exhaust

V Vacuum

Open clog-free silencer

GVMAX HD

Heavy Duty Communicating Vacuum Pumps

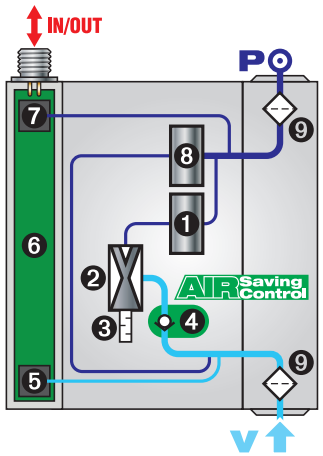
Integration and Performance

NFC
IO-Link
AIR Saving Control

Integrated Functions

GVMAX HD vacuum pumps include all the "vacuum" functions required for an easy, efficient and economical use of compressed air and suitable for any application:

❶ "Vacuum" solenoid valve
❷ Single-stage Venturi pump
❸ Open silencer
❹ "Vacuum" non-return valve
❺ Electronic vacuum switch
❻ Integrated electronics
❼ Pressure sensor
❽ "Blow-off" solenoid valve
❾ 350 µm filter screen



+ AIR Saving Control
90% energy savings *(on average, see p. 75)*

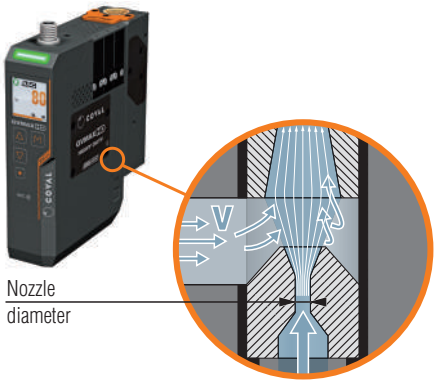
The combined action of the non-return valve ❹ and of the integrated electronics ❻ automatically ensures ASC management.
➔ **Once the vacuum has been established, the pump does not consume any more air to hold the object.**

Performance determined by the Venturi pump's nozzle diameter

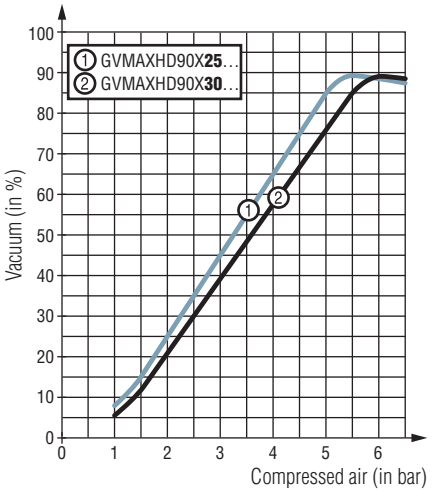
The table specifies the performance levels and evacuation times generated for each nozzle diameter available.

When handling airtight objects, the ASC vacuum control system can help to considerably reduce the consumption of compressed air.

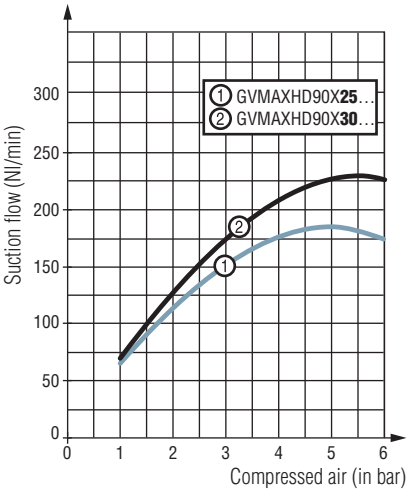
Nozzle dia. \ Vacuum reached	Evacuation time (seconds) of a volume of 1 liter 45 %	55 %	65 %	75 %	Max. vacuum (%)	Air drawn in (Nl/min)	Air consumed (Nl/min)	Air pressure level (bar)
2.5 mm	0.17	0.24	0.35	0.52	**85**	**185**	**294**	**5**
3.0 mm	0.15	0.20	0.27	0.42	**85**	**230**	**380**	**5.5**



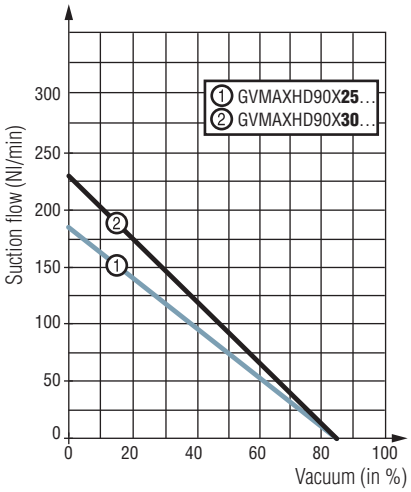
Vacuum Generated/Compressed Air



Suction Flow Rate/Compressed Air



Suction Flow Rate/Vacuum



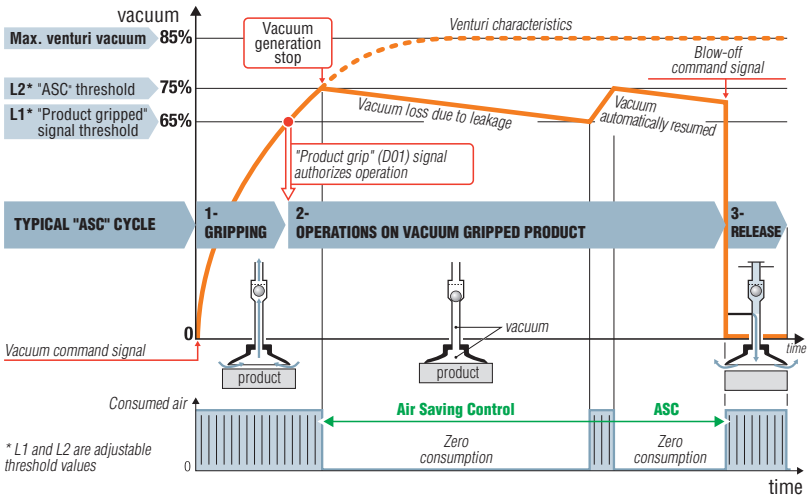
GVMAX HD

Heavy Duty Communicating Vacuum Pumps

Energy Savings and Smart Adaptation

NFC
IO-Link
AIR Saving Control

AIR Saving Control — Averages 90% energy savings



Air Saving Control (**ASC**) is a smart vacuum control system that stops the consumption of compressed air as soon as the required level of vacuum is reached, thus avoiding any unnecessary consumption and contributing to savings on the equipment's operating costs.

For airtight objects, the GVMAX HD vacuum pumps automatically execute the above "**ASC**" cycle, thus leading to maximal energy savings, according to the following 3 phases:

1- Object is gripped: vacuum generated by the Venturi pump

2- Operations on object held in place by vacuum: at the L2 vacuum threshold (75%), the supply of the Venturi pump is cut off → the consumption becomes zero; the object remains held in place owing to the non-return valve. If micro-leaks make the vacuum drop to threshold L2 less the defined hysteresis value, vacuum generation is briefly switched on again.

3- Object is released: by an external or an automatic timed blow-off command (according to the settings).

1- Gripping + transfer (nozzle dia. 2.5 mm, emptying 0.6 l)

Phase	Duration	Air consumption w/o "ASC"	Air consumption with "ASC"	
Gripping	0.50 s	2.42 Nl	2.42 Nl	Achieved economy
Transfer	2.00 s	9.67 Nl	0	
Release	0.14 s	0.68 Nl	0.68 Nl	
		12.77 Nl	3.10 Nl	→ 76 %

2- Clamping + operations (nozzle dia. 2.5 mm, emptying 1 l)

Phase	Duration	Air consumption w/o "ASC"	Air consumption with "ASC"	
Clamping	0.83 s	4.01 Nl	4.01 Nl	Achieved economy
Operations	60 s	290 Nl	0	
Release	0.14 s	0.68 Nl	0.68 Nl	
		294.69 Nl	4.69 Nl	→ 98 %

➔ Resulting savings

"**ASC**" energy savings are major as shown in the 2 examples below:

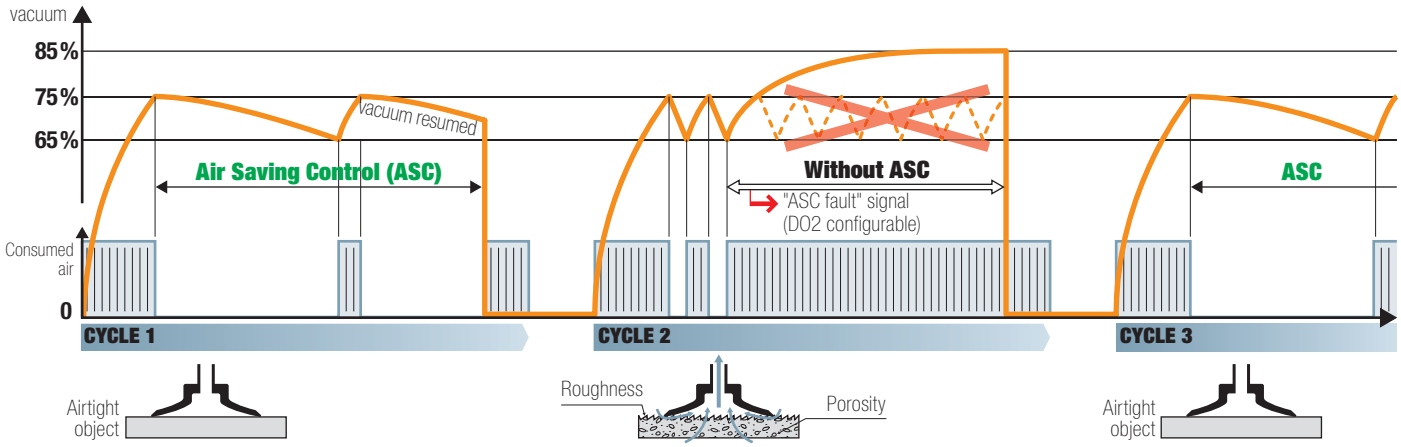
- 76% savings when transferring a object after gripping
- 98% savings when clamping a object during an operation lasting 1 min

The investment generally pays off within just a few months.

ENERGY SAVING APP

Calculate the savings you can generate with our ASC technology using our ENERGY SAVING APP available online.

Smart adaptation



The above illustration shows the GVMAX HD's ability to adapt. "**ASC**" operation is automatic for any object that is adequately airtight (cycle 1). Should a leakage occur (cycle 2), due to a rough or porous object, or due to a leak in the vacuum network, the vacuum pump would automatically detect the unwanted condition, complete the cycle without **ASC** in order to keep production running, and report the situation for possible maintenance. Production keeps running. As soon as everything returns to normal (cycle 3), operation with **ASC** is automatically restored.

GVMAX HD

Heavy Duty Communicating Vacuum Pumps

Straightforward Communication

NFC
IO-Link
AIR Saving Control

Easier Integration, Use, and Diagnostics

The GVMAX HD heavy duty vacuum pump series include various features that enable setup, use, and diagnostics in all situations and at all levels (operators, process, networked factory), with the aim in mind of keeping the use and management of the pumps as straightforward as possible and thus allowing for their easy integration in your smart factory.

Advantages:

- Straightforward wiring and installation
- Remote configuration, control, and diagnostics
- Installation and diagnostic tools

Settings, Diagnostics, and Process Data

CONFIGURABLE SETTINGS

- Choice of language: EN, FR, DE, IT or ES
- "Object gripped" and ASC control thresholds
- ASC vacuum control system management
- Automatic blow-off
- Vacuum measurement unit: kPa, %, mbar, inHg
- Pressure measurement unit: MPa, bar, Psi
- Software updates, and more

DIAGNOSTICS

- Cycle counters (vacuum and blow-off control, objects gripped, objects lost, etc.)
- Vacuum network sizing support to prevent pressure loss
- Clogging detection function
- Supply pressure monitoring
- Supply voltage monitoring
- Software version
- Product item number and serial number

PROCESS INPUT DATA

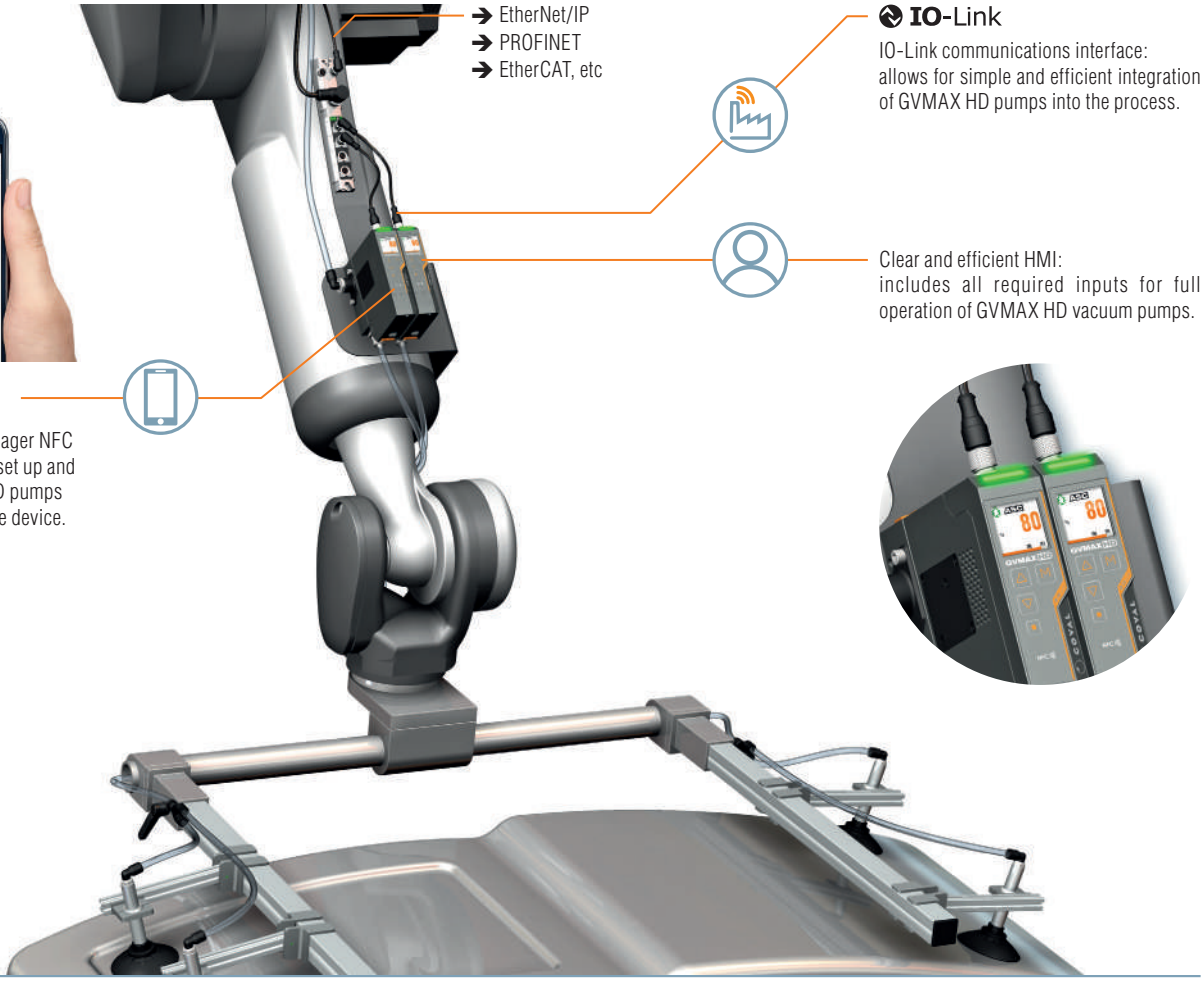
- Vacuum and blow-off control

PROCESS OUTPUT DATA

- Instantaneous vacuum level
- Object gripped and object lost information
- ASC vacuum control system status
- Alarms (high/low pressure, high/low voltage)
- Instantaneous pressure

NFC

COVAL Vacuum Manager NFC application: used to set up and diagnose GVMAX HD pumps directly from a mobile device.



→ EtherNet/IP
→ PROFINET
→ EtherCAT, etc

IO-Link

IO-Link communications interface: allows for simple and efficient integration of GVMAX HD pumps into the process.

Clear and efficient HMI: includes all required inputs for full operation of GVMAX HD vacuum pumps.

GVMAX HD

Heavy Duty Communicating Vacuum Pumps

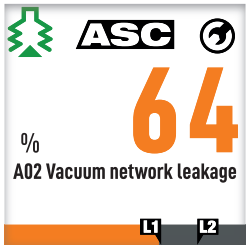
Straightforward Communication

NFC
IO-Link
AIR Saving Control

HMI

Gripping status indicator light:
- Green: object gripped
- Yellow: ASC disabled due to vacuum leakage (object held in place)
- Red: object lost

1.54" high-visibility color LCD display

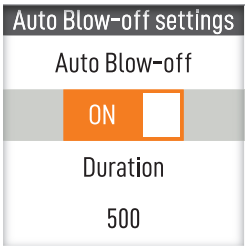


Settings keypad

The GVMAX HD HMI allows for easy and efficient reading of the pump's operation.
The high-visibility display includes all required inputs for full operation:

- Main information is easy to read
- Multilingual: EN - FR - DE - IT - ES
- Simple and clear event messages
- Intuitive settings and diagnostics menus
- Configurable display orientation: 0 – 90 – 180 – 270°
- Lockable to prevent undesired changes

Note: a version with remote HMI is available (see p. 78)



Multilingual

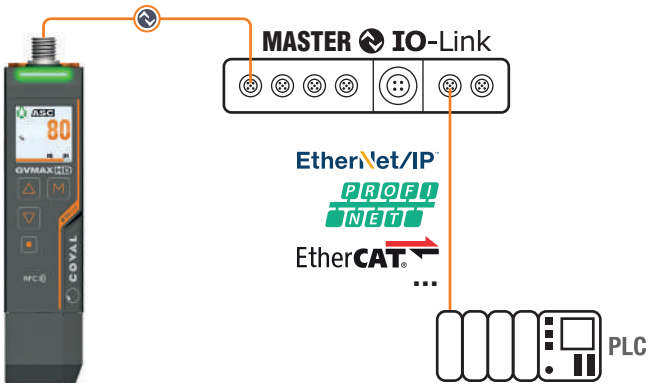
EN FR DE IT ES

IO-Link

The IO-Link system provides efficient real-time communication between GVMAX HD vacuum pumps and any higher-level protocol (EtherNet/IP, PROFINET, EtherCAT, etc.) required to monitor the production line. It can be used to control pumps, configure settings, and get feedback to ensure maximum productivity.

Advantages:

- Straightforward wiring, installation, and setup
- Availability of diagnostic status data
- Simpler preventive maintenance and vacuum pump replacement without manual setup, and more



NFC

The NFC wireless technology integrated in GVMAX HD and in the COVAL Vacuum Manager application makes all setup and diagnostic functions available and modifiable on your mobile devices.

Additional features:

- Read/write settings with the power on or off
- Copy settings from one GVMAX HD to another
- Backup up to 5 setting configurations
- COVAL support: send a report including the settings and diagnostic data to COVAL for technical support

GET IT ON Google Play

Download on the App Store

NFC App: COVAL Vacuum Manager
Available for Android and iOS

GVMAX HD

Heavy Duty Communicating Vacuum Pumps

Configuration

NFC
IO-Link
AIR Saving Control

Available Configurations

VA version (standalone)

GVMAX HD module screw-mounted onto its pneumatic socket

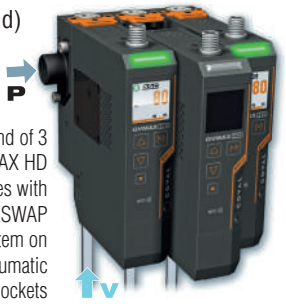
Versions with patented **SMART SWAP** system to quickly mount the GVMAX HD module onto its pneumatic socket

SMART SWAP

RA version (standalone)

GVMAX HD standalone module with SMART SWAP system and pneumatic socket

RB version (island)



Island of 3 GVMAX HD modules with SMART SWAP system on pneumatic sockets

Remote HMI

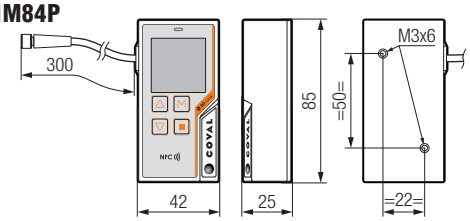
To make it easier to use and set up vacuum pumps in certain use cases, the GVMAX HD range includes a version without a front dialog panel that can be used with a remote HMI.

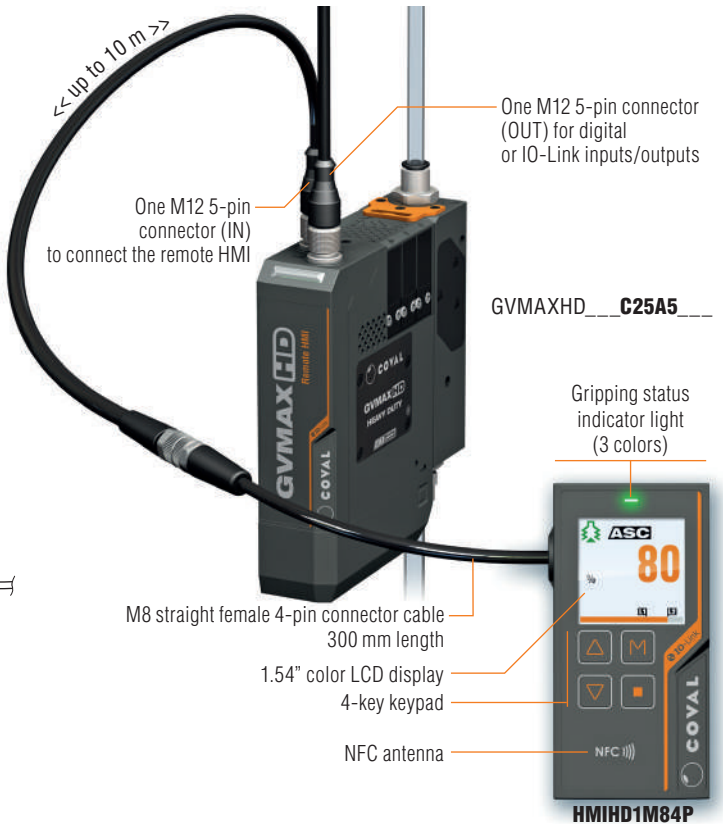
Advantages:

- Place the HMI in an easily accessible and visible area
- Use one HMI for several GVMAX HD vacuum pumps
- Copy settings from one pump to another
- Use the GVMAX HD vacuum pump without any HMI connected

➔ **GVMAX HD vacuum pump without HMI**
Part No.: GVMAXHD___**C25A5**___
- Two M12 5-pin connectors
- M12 blanking plug provided for use without HMI

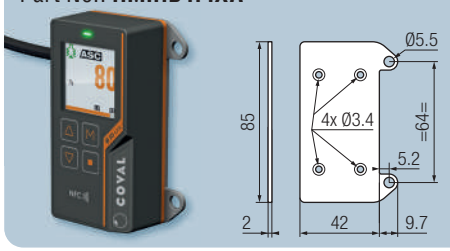
➔ **Remote HMI**
Part No.: **HMIHD1M84P**



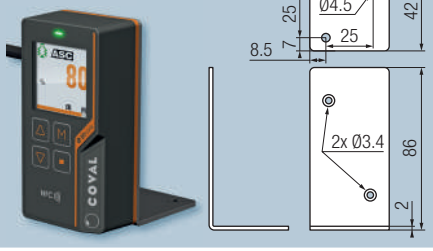


Accessories for remote HMI

Front mounting plate
+ 2 x M3x6 TORX
+ 2 x M5x50 CHC
Part No.: **HMIHD1FIXA**



90° angled mounting plate
+ 2 x M3x6 TORX
Part No.: **HMIHD1FIXB**



Connector cable
M12 4-pin, female / M8 4-pin, male
- 2 m length: Part No. **CDM8MM12F4PL2**
- 5 m length: Part No. **CDM8MM12F4PL5**
- Other lengths available upon request.

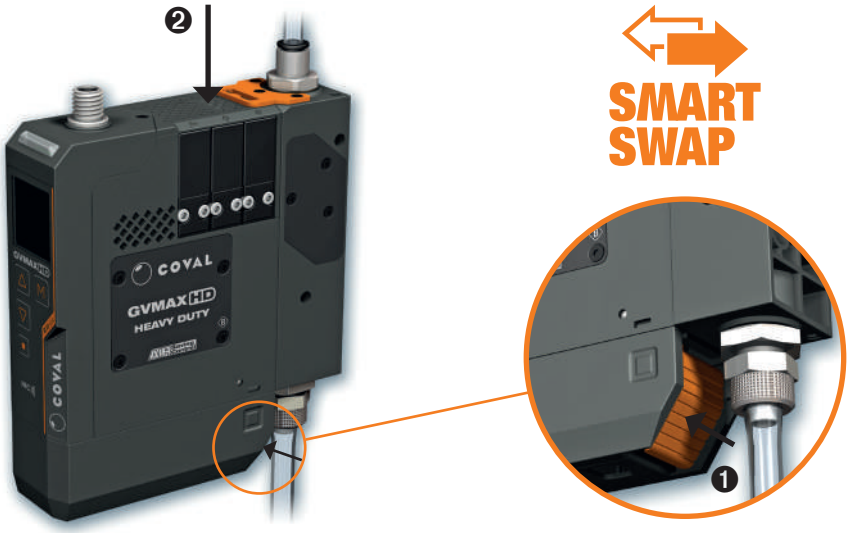
GVMAX HD

Heavy Duty Communicating Vacuum Pumps

Modularity and Maintenance

NFC
IO-Link
AIR Saving Control

SMART SWAP Quick-Mounting System



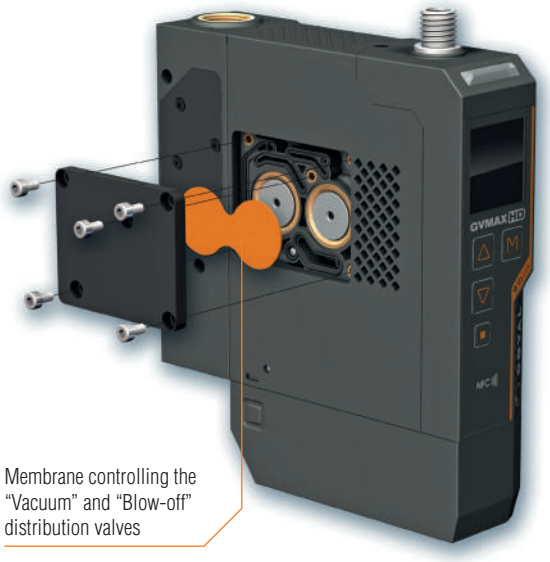
COVAL's patented SMART SWAP quick-mounting system allows you to mount the GVMAX HD module onto its pneumatic socket or remove it in the blink of an eye, without needing to disconnect compressed air and vacuum tubes.

No tools required, just two steps by operator to release: press release tab ❶ at back of silencer and apply pressure to upper housing ❷ of GVMAX HD.

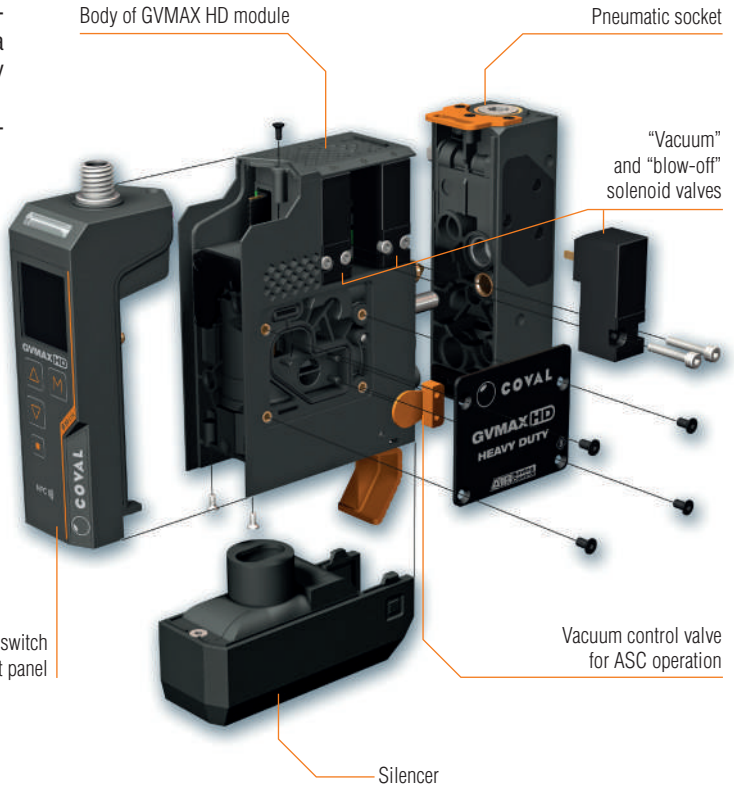
- ➔ There is a locking screw on the release tab, which can be tightened to require operators to use a screwdriver to remove the module.
- ➔ Removal under pressure is made possible by the integrated non-return valve.

Modularity/Maintenance

The GVMAX HD vacuum pumps have been designed to withstand the demands from all your applications and to guarantee a high level of performance. However, handling certain objects may require replacement or cleaning.
The modular design of the GVMAX HD pumps ensures easy maintenance as the functions are all easily accessible.



Membrane controlling the "Vacuum" and "Blow-off" distribution valves



GVMAX HD

Heavy Duty Communicating Vacuum Pumps

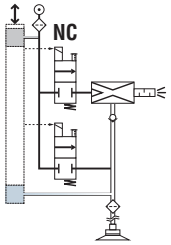
Selection guide

NFC
IO-Link
AIR Saving Control

Vacuum Control: 3 Solutions

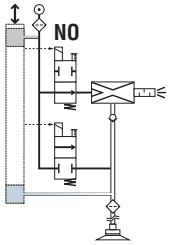
Model GVMAXHD__S: vacuum pump with **NC** vacuum control and **NC** blow-off
In the event of power failure, vacuum is no longer generated. In the event of compressed air failure, the vacuum is no longer maintained.

- NC blow-off and vacuum control: solenoid valves
- Choice of blow-off settings:
  - Controlled by external signal
  - Automatic timer from 50 to 9999 ms (advantage: saves one controller output)



Model GVMAXHD__V: vacuum pump with **NO** vacuum control and **NC blow-off**
In the event of power failure, vacuum is still generated: object is held in place
➔ fail-safe.
In the event of compressed air failure, the vacuum is no longer maintained.

- NO vacuum control solenoid valve
- NC blow-off control solenoid valve
- Blow-off controlled by external signal



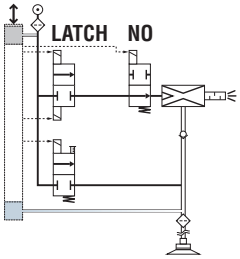
Model GVMAXHD__L: vacuum pump with **pulse-triggered bistable** vacuum control and **NC** blow-off (patented system)
In the event of power failure, the vacuum pump maintains its previous state.
More specifically, one of the following two scenarios will take place should the failure occur:

- During vacuum generation, the vacuum is maintained ➔ fail-safe
- During blow-off or when the pump is off, the pump remains "Off"

Vacuum control is automatically stopped when the blow-off command is activated.
The vacuum can only be stopped with the blow-off command.

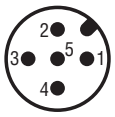
In the event of compressed air failure, the vacuum is no longer maintained.

- Pulse-triggered bistable vacuum control solenoid valve (50 ms min.)
- NC blow-off control solenoid valve
- Blow-off controlled by external signal



Electrical Connections

▪ **C15A1**: One M12 5-pin male connector

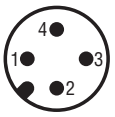


⇆	1	24 V DC
	2	24 V DC suction command (1)
⇆	3	0 V - GND
⇆	4	24 V DC object gripped DO1 - C/Q
	5	24 V DC blow-off command

▪ **C18A1**: One M12 8-pin male connector

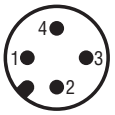
	1	24 V DC object gripped DO1
⇆	2	24 V DC
	3	/
	4	24 V DC suction command (1)
⇆	5	24 V DC ASC Status DO2 - C/Q (2)
	6	24 V DC blow-off command
⇆	7	0 V - GND
	8	/

▪ **C24A2**: Two M12 4-pin male connectors



Rear connector: IN

	1	/
	2	24 V DC blow-off command
	3	0 V - GND
	4	24 V DC suction command (1)



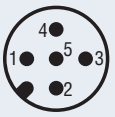
Front connector: OUT

⇆	1	24 V DC
	2	24 V DC ASC Status DO2 (2)
⇆	3	0 V - GND
⇆	4	24 V DC object gripped DO1 - C/Q

Note: The Digital Outputs 1 and 2 signals can be swapped in the parameter settings.

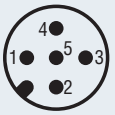
Version for use with remote HMI

▪ **C25A5**: Two M12 5-pin male connectors



Rear connector: IN

	1	24 V DC
	2	RS485 +
	3	0 V - GND
	4	RS485 -
	5	/



Front connector: OUT

⇆	1	24 V DC
	2	24 V DC suction command (1)
⇆	3	0 V - GND
⇆	4	24 V DC object gripped DO1 - C/Q
	5	24 V DC blow-off command

⇆ : *Connections for* IO-Link

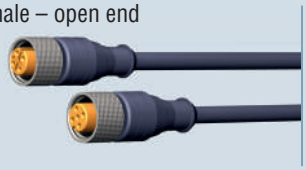
(1) 24 V DC suction command, depending on version:
*- **S**: 24 V DC vacuum control*
*- **V**: 24 V DC vacuum off command*
*- **L**: 24 V DC vacuum control with min. pulse-triggering of 50 ms*

(2) DO2 configurable: - ASC status (default)
- or Pressure fault (below 5 bar or above 8 bar)
- or Power supply fault (below 21.6 V or above 26.4 V)
- or ASC fault
- or Object lost

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.

GVMAX HD

Heavy Duty Communicating Vacuum Pumps

Selection guide

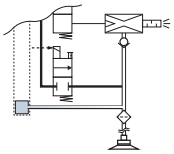
NFC
IO-Link
AIR Saving Control

Blow-off Function

There are 2 different versions of GVMAX HD vacuum pumps that feature different blow-off types to meet the requirements of any application:

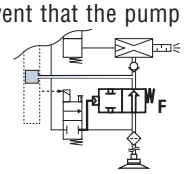
- Standard blow-off (version GVMAXHD…**F1**)

The blow-off flow is directed into the vacuum network and ensures the object is released in most applications.



- Powerful blow-off (version GVMAXHD…**F2**)

This type of blow-off allows for objects to be quickly released in the event that the pump cannot be placed as close as possible to the suction cups, or to reduce the cycle time as much as possible.
The isolation valve **F** directs the entire blow-off flow towards the suction cups. In this case, the blow-off pressure is identical to the vacuum pump's compressed air supply pressure.



The blow-off control mode is configurable on GVMAX HD___**S** pumps:

- Controlled by external signal
- Automatic timer, adjustable from 50 to 9999 ms (advantage: saves one controller output)

On GVMAX HD___**V** and **L** pumps, the blow-off control mode is controlled by an external signal.

Standalone Vacuum Pumps or in Island Assemblies?

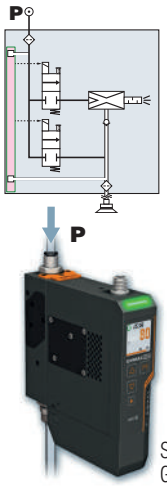
Standalone GVMAX HD vacuum pumps meet the needs of most common applications: a GVMAX HD controls one or several suction cups, which all operate according to the same sequence. Whenever several suction cups operate according to different sequences, several vacuum pumps are required. The choices are as follows:

- Several standalone pumps
- An island assembly including 1 to 4 vacuum pumps and a shared internal pressure supply

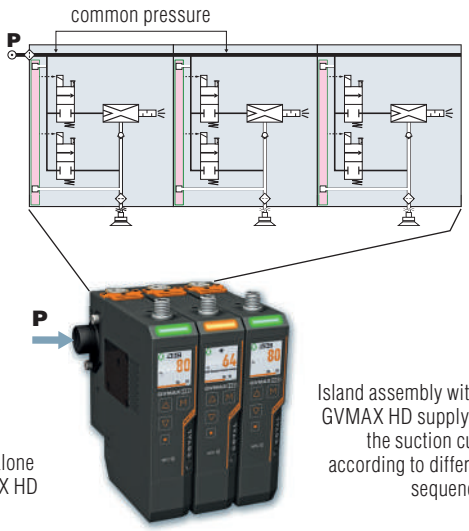
Standalone vacuum pumps are available in 2 versions:

- GVMAXHD__**VA**: pneumatic socket forms an integral part of the GVMAX HD module
- GVMAXHD__**RA**: patented SMART SWAP to quickly mount the GVMAX HD module on its pneumatic socket

GVMAXHD__RB1/2/3/4 mounted on an island: equipped as standard with the SMART SWAP system to quickly mount the GVMAX HD module on its pneumatic socket



Standalone GVMAX HD



Island assembly with 3 GVMAX HD supplying the suction cups according to different sequences

Configuration of Island Assemblies

Configuration of an island assembly with 3 identical vacuum pumps GVMAXHD___RB3L

Standard island assemblies consist of 1 to 4 identical GVMAX HD vacuum modules and a pneumatic socket(*). They have specific part numbers and are delivered assembled.

For island assemblies consisting of different GVMAX HD vacuum modules, sub-assemblies must be ordered separately:

- Pneumatic socket in versions with 1, 2, 3, or 4 slots (*)
- GVMAX HD modules with SMART SWAP quick-mounting system (version R) depending on the selected configurations

Custom island assemblies are delivered unassembled.

(*) Assembled pneumatic sockets are supplied as standard with the pressure connection on the left side (version L). On request, an R version with right-hand pressure connection or a T version with top pressure connection is available.

Adding to an island assembly

A GVMAX HD vacuum pump can be added to an existing island assembly by ordering the pneumatic socket: for islands **GVMAXHDPBG1RB** and version **R** of the desired GVMAX HD module.

Reminder: 4 GVMAX HD/island

GVMAX HD

Heavy Duty Communicating Vacuum Pumps

Configuring a Vacuum Pump

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GVMAXHD90X	25	L	C15A1	X	G1		F1	D	RB3L

NOZZLE DIA.

2.5 mm dia	25
3.0 mm dia	30

GENERATOR CONTROL

Vacuum pump with **NC** vacuum control and **NC** blow-off Choice of blow-off settings: ▪ Controlled by external signal ▪ Automatic timer from 50 to 9999 ms (advantage: saves one controller output)	S
Vacuum pump with **NO** vacuum control and **NC** blow-off ▪ Blow-off controlled by external signal	V
Vacuum pump with **pulse-triggered bistable** vacuum control and **NC** blow-off ▪ Blow-off controlled by external signal	L

BLOW-OFF

Standard blow-off	F1
Powerful blow-off *The powerful blow-off option is used when the object needs to be released quickly.*	F2

CONNECTOR(S)

C15A1	1 x M12 5-pin male
C18A1	1 x M12 8-pin male
C24A2	2 x M12 4-pin male
C25A5	2 x M12 5-pin male **For use with remote HMI**

CONFIGURATIONS

Standalone vacuum pumps

VA — **GVMAXHD90X __XG1_D_VA**
GVMAX HD module screwed onto its pneumatic socket

RA — **GVMAXHD90X __XG1_D_RA**
Standalone GVMAX HD module with SMART SWAP quick-mounting system and pneumatic socket

Vacuum pumps mounted on an island (with SMART SWAP quick-mounting system)

RB1L* — **GVMAXHD90X__XG1_D_RB1L**
1 x GVMAX HD module with SMART SWAP quick-mounting system and pneumatic socket with 1 slot
▪ Left lateral pressure connection

RB2L* — **GVMAXHD90X__XG1_D_RB2L**
Island consisting of 2 GVMAX HD modules with SMART SWAP quick-mounting system and pneumatic socket with 2 slots
▪ Common pressure supply
▪ Left lateral pressure connection

RB3L* — **GVMAXHD90X__XG1_D_RB3L**
Island consisting of 3 GVMAX HD modules with SMART SWAP quick-mounting system and pneumatic socket with 3 slots
▪ Common pressure supply
▪ Left lateral pressure connection

RB4L* — **GVMAXHD90X__XG1_D_RB4L**
Island consisting of 4 GVMAX HD modules with SMART SWAP quick-mounting system and pneumatic socket with 4 slots
▪ Common pressure supply
▪ Left lateral pressure connection

** On request, an RB_**R** version with right-hand pressure connection or a RB_**T** version with top pressure connection is available.*

Sample Part number consisting of a standalone vacuum pump:
GVMAXHD90X30VC24A2XG1F1DVA

Standalone GVMAX HD module screw-mounted onto a pneumatic socket, max. vacuum 85%, 3.0 mm nozzle, controlled by an NO vacuum solenoid valve, 2 M12 4-pin connectors, with standard blow-off.

Sample Part number consisting of an island:
GVMAXHD90X25LC18A1XG1F2DRB3L

Island assembly consisting of 3 GVMAX HD modules with SMART SWAP quick-mounting system and 1 pneumatic socket with 3 slots, left lateral pressure connection, max. vacuum 85%, 2.5 mm nozzle, pulse-triggered bistable vacuum control, 1 M12 8-pin connector, with powerful blow-off.

Mounting accessories for GVMAX HD

- **GVMAXHDFIXA**: front panel installation kit (1 plate + 4 fastening screws)
- **GVMAXHDFIXB**: DIN rail installation kit (1 clip + 2 fastening screws)

Remote HMI

Only to be used with GVMAXHD___**C25A5**___

- **Part No. HMIHD1M84P**
  With M8 4-pin female connector cable, 0.3 m length

Accessories for remote HMI

- Front mounting plate: Part No. **HMIHD1FIXA**
- 90° angled mounting plate: Part No. **HMIHD1FIXB**
- M12 4-pin female / M8 4-pin male connector cable
  - 2 m length: Part No. **CDM8MM12F4PL2**
  - 5 m length: Part No. **CDM8MM12F4PL5**
  - Other lengths available upon request.

GVMAX HD

Heavy Duty Communicating Vacuum Pumps

Build your own island assembly

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AIR Saving Control

To build a custom island assembly containing different GVMAX HD vacuum modules, you need to order the parts below separately:

Note: Custom island assemblies come unassembled.

1 Select the Pneumatic Socket

GVMAXHDPBG1RB_L sockets come assembled with the corresponding set of end pieces and the pressure connection on the left side.

SMART SWAP

GVMAXHDPBG1RB1L*
Pneumatic socket
with 1 slot

GVMAXHDPBG1RB2L*
Pneumatic socket
with 2 slots

GVMAXHDPBG1RB3L*
Pneumatic socket
with 3 slots

GVMAXHDPBG1RB4L*
Pneumatic socket
with 4 slots

** On request, an R version with right-hand pressure connection or a T version with top pressure connection is available.*

2 Select the GVMAX HD Modules *(1 module for each slot in the socket)*

GVMAXHD90X	25	L	C15A1	X	G1		F1	D	R

NOZZLE DIA.

2.5 mm dia	25
3.0 mm dia	30

GENERATOR CONTROL

Vacuum pump with **NC** vacuum control and **NC** blow-off Choice of blow-off settings: ▪ Controlled by external signal ▪ Automatic timed from 50 to 9999 ms (advantage: saves one controller output)	S
Vacuum pump with **NO** vacuum control and **NC** blow-off ▪ Blow-off controlled by external signal	V
Vacuum pump with **pulse-triggered bistable** vacuum control and **NC** blow-off ▪ Blow-off controlled by external signal	L

CONNECTOR(S)

C15A1	1 x M12 5-pin male
C18A1	1 x M12 8-pin male
C24A2	2 x M12 4-pin male
C25A5	2 x M12 5-pin male **For use with remote HMI**

BLOW-OFF

F1	Standard blow-off
F2	**Powerful blow-off** *The powerful blow-off option is used when the object needs to be released quickly.*

Example of a custom island assembly:

- 1 X GVMAXHDPBG1RB3 → 1 pneumatic socket with 3 slots and SMART SWAP quick-mounting system
- 1 X GVMAXHD90X25SC18A1XG1F1DR
- 1 X GVMAXHD90X30VC18A1XG1F2DR
- 1 X GVMAXHD90X25LC15A1XG1F1DR

} 3 GVMAX HD modules of different types for island assembly

Accessories for island assemblies

Part No. GVMAXHDPBG1RB

Single-slot pneumatic socket with SMART SWAP quick-mounting system to add a GVMAX HD vacuum pump to an existing island assembly.

Part No. 80005594

Complete set of island assembly end pieces (version **R**) containing the following items:
- **Right** flange with G1/2''-F pressure connection + 350 µm filter screen.
- Left sealing flange.
- Flange fastening screws.

Part No. 80005413

Complete set of island assembly end pieces (version **L**) containing the following items:
- **Left** flange with G1/2''-F pressure connection + 350 µm filter screen.
- Right sealing flange.
- Flange fastening screws.

Part No. 80005960

Complete set of island assembly end pieces (version **T**), containing the following items:
- 2 sealing flanges.
- Flange fastening screws.

GVMAX HD

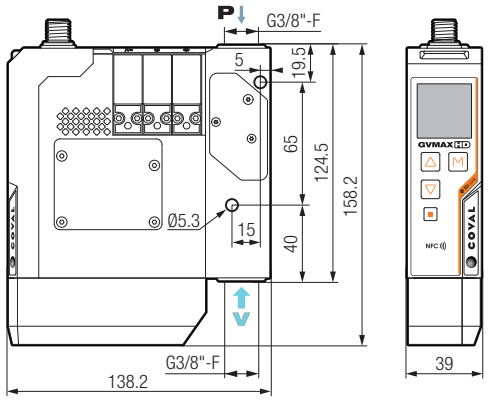
Heavy Duty Communicating Vacuum Pumps

Dimensions and Installation Options

NFC
IO-Link
AIR Saving Control

Lateral installation (standalone version)

2 x 5.3 mm dia. (for two Ø 5 mm through screws or bolts with large washers).



Note: All dimensions are in mm.

You can access 3D files of all our products in formats compatible with the main CAD software on our website

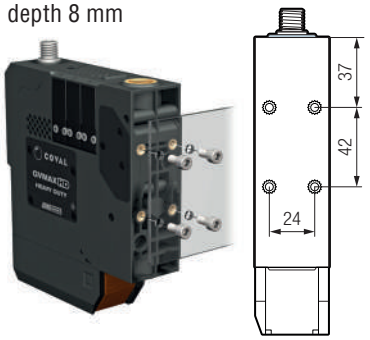
www.coval.com

3D COVAL Data

Front Panel Installation

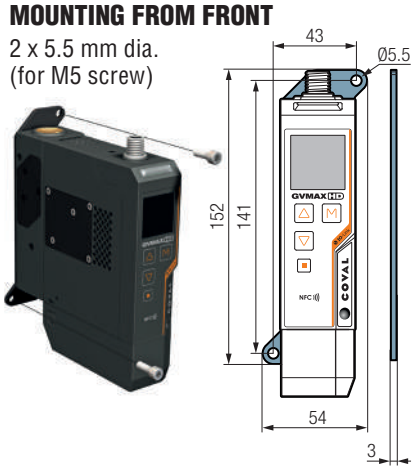
MOUNTING FROM REAR

4 x M5 screw threads, depth 8 mm



MOUNTING FROM FRONT

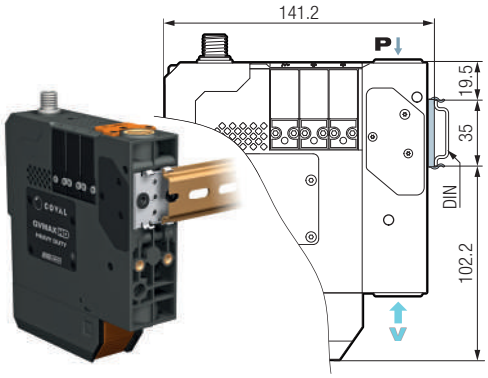
2 x 5.5 mm dia. (for M5 screw)



For front panel installation, order the following installation kit:

Part No.: **GVMAXHDFIXA**
(1 plate + 4 fastening screws)

Installation on DIN Rail



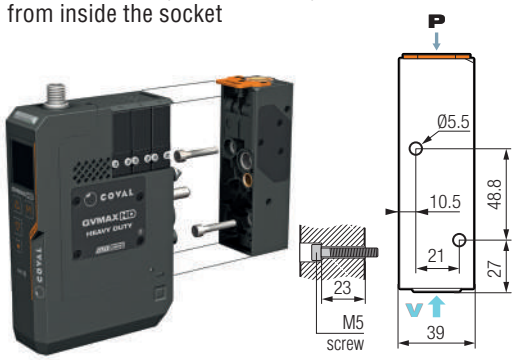
The pump can be mounted on a DIN rail for a static installation (e.g. in a cabinet).
In this case, it must be equipped with an installation clip that is to be ordered separately:

Part No.: **GVMAXHDFIXB**
(1 clip + 2 fastening screws) *Note: For an island assembly, you need to order 2 installation kits.*

Front Panel Installation for Modules with SMART SWAP Quick-mounting System

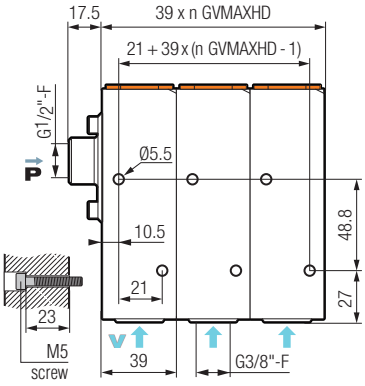
STANDALONE VERSION

2 x 5.5 mm dia. (for M5 screws) from inside the socket



ISLAND VERSION

2 x 5.5 mm dia. (for M5 screws) from inside the socket



GVMAX HD

Heavy Duty Communicating Vacuum Pumps

Technical specifications

NFC
IO-Link
AIR Saving Control

- Supply: non-lubricated air, filtered to 5 microns, according to standard ISO 8573-1:2010 [3:4:4]
- Operating pressure: from 2 to 8 bar
- Optimal dynamic pressure: • 5 bar for dia. 2.5 mm nozzle
  • 5.5 bar for dia. 3.0 mm nozzle
- Powerful blow-off (option F2): network pressure
- Pressure connection:
  - Standalone vacuum pump: G3/8"-F with removable 350 µm filter screen
  - Island assembly: G1/2"-F with 350 µm filter screen
- Vacuum connection: G3/8"-F with removable 350 µm filter screen
- Max. vacuum: 85%
- Air suction flow rate: 185 / 230 Nl/min
- Air consumption: 294 / 380 Nl/min, when operating "without ASC"
- Integrated non-clogging silencer
- Noise level: approx. 71 dBA "without ASC" 0 dBA with ASC
- Degree of protection: IP65
- Max. operating frequency: 4 Hz
- Endurance: 50 million cycles
- Weight: 870 g
- Operating temperature: from 0 to 50 °C
- Materials: PA GF, brass, aluminum, steel, NBR, PU, FKM
- M12 male connectors

Analysis of ASC vacuum control system

- Permanent monitoring of leakage level: abort or automatically return to ASC operation

Integrated electronics

- 24 V DC power supply (regulated ±10 %)
- Vacuum measuring range: 0 to 99 %
- Pressure measuring range: 0 to 10 bar
- Vacuum and pressure measurement accuracy: ±1.5% of the range, compensated for temperature
- Inputs/outputs protected against reversed wiring and polarity
- Consumption: 170 mA max. (without load)
- Configurable input/output switching mode: PNP or NPN
- IO-Link or SIO (Standard Inputs Outputs) operation

DO1/DO2 output signals

- Configurable as PNP or NPN
- NO or NC
- Breaking capacity: 330 mA
- DO2 configurable (see Parameter settings)

Diagnostics

- Instantaneous vacuum level (unit transmitted over IO-Link: mbar)
- Available information: Object gripped, object lost, control in progress, and control fault
- Cycle counters (vacuum, blow-off, object gripped, object lost, ASC, etc.)
- Vacuum network sizing support to prevent head losses
- Clogging detection function
- Supply pressure monitoring
- Supply voltage monitoring
- Product item number and serial number
- Software version

Information displayed

- LED gripping status indicator on front panel (green: object gripped ; yellow: ASC disabled due to vacuum leakage (object held in place) ; red: object lost)
- 1.54" high-visibility color LCD display:
  - Displays vacuum level with bar graph and thresholds
  - Warns when service life has been exceeded (> 50 million cycles)
  - Explicit fault messages
  - "Suction cup" icon indicating the control status of control functions:
    - Green suction cup: vacuum control
    - Orange suction cup: blow-off control
    - Red suction cup: simultaneous vacuum and blow-off controls
  - Configurable display orientation: 0 – 90 – 180 – 270°

Parameter settings

- Performed with 4-key membrane keyboard
- Choice of language: EN, FR, DE, IT, or ES
- Choice of blow-off type:
  - Controlled
  - Automatic timed, adjustable from 50 to 9999 ms
- Choice of vacuum measurement unit (kPa, %, mbar, inHg)
- Choice of pressure measurement unit (MPa, bar, Psi)
- Monostable electrical manual controls
- Object gripped (L1) and L2 control thresholds
- Whenever required by the application, specific threshold and hysteresis settings that are different from the initial factory settings can be defined: L1=65%, h1=10%, L2=75%, h2=10%
- DO2 configurable (24 V DC) (only on C18A1 et C24A2 models):
  - ASC status (default)
  - or Pressure fault (below 5 bar or above 8 bar)
  - or Power supply fault (below 21.6 V or above 26.4 V)
  - or ASC fault
  - or Object lost
- Activation/deactivation of the ASC control system
- Activation/deactivation of the leakage level monitoring system (DIAG ECO) + adjustment of monitoring parameters

Communication

IO-Link

- Revision: 1.1
- Transmission rate: COM3 - 230.4 kbit/s
- Min. cycle time: 1 ms
- SIO mode: Yes
- Process Data Input (PDI): 6 bytes
- Process Data Output (PDO): 1 byte
- IO device description file (IODD) available for download

NFC

- COVAL VACUUM MANAGER Mobile app available:
  - Android, version 8.1 and higher
  - iOS, version 13 and higher

COVAL
vacuum managers

series
CMS HD
HEAVY DUTY
Multi-stage Vacuum Pumps

- 3 suction flow rates from 700 Nl/min to 1600 Nl/min
- Vacuum level: 80%
- With or without vacuum and blow-off control
- M12 connections
- Digital inputs/outputs mode (SIO) / IO-Link
- 3 exhaust configurations

NFC IO-Link

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

General Information

NFC

IO-Link

Industry-specific applications

COVAL's **CMS HD** series of multi-stage Heavy Duty vacuum pumps for industry specific applications are the result of many years of listening to and getting feedback from manufacturers, integrators, and users in the food, packaging, and robotics industries.

The **CMS HD** multi-stage vacuum pumps meet their expectations in terms of power, robustness, ease of configuration and use, communication, and modularity, while remaining compact and light for a simplified integration in a smart factory.

Advantages

- Robust: resistant to the harsh environments of production lines
- High performance: optimized multi-stage Venturi system that guarantees powerful suction flow rates and reduced compressed air consumption.
- Modular: configurable according to needs and easy maintenance.
- Communicating: efficient communication system for all use levels, clear and easy to read HMI, NFC technology for mobile use, and IO-Link communications interface for straightforward networking.

Main Specifications (depending on version)

- 80% vacuum
- 3 powerful suction flow rates:
  - CMSHD90X50__ → 700 Nl/min
  - CMSHD90X100__ → 1100 Nl/min
  - CMSHD90X150__ → 1600 Nl/min
- With or without vacuum and blow-off control
- Vacuum control: NC, NO
- With or without vacuum switch
- Blow-off controlled or automatic timed
- 1 or 2 M12 connectors
- Digital inputs/outputs mode (SIO) / IO-Link
- 3 exhaust configurations
- Degree of protection: IP65
- PNP / NPN
- Supply pressure monitoring (pressure sensor)
- Supply voltage monitoring
- Vacuum network status analysis and monitoring with a network sizing tool to prevent pressure loss, as well as a clogging detection function
- Remote HMI option features the following:
  - High-visibility color display with clear multi-lingual messages and straightforward settings menu
  - Easy set up made possible by NFC technology and COVAL Vacuum Manager mobile application

A Complete Range

For each application, a suitable CMS HD:

CMSHD__NVO
- without control

CMSHD__SVOC15P / VVOC15P
- with vacuum and blow-off control
- without vacuum switch
- one M12 5-pin connector
- Digital inputs/outputs mode
- visual indicators of vacuum and blow-off controls

CMSHD__SVX_ / VVX_
- with vacuum and blow-off control
- with vacuum switch, and pressure sensor
- M12 connectors available in 3 versions:
  - one 5 or 8-pin connector
  - or two 4-pin connectors
- Digital inputs/outputs (SIO) / IO-Link Mode

Accessory: remote HMI

Part No.: HMIHD1M84P

Compatible with CMSHD___**VX**__

- 1.54" color LCD display
- 4-key keypad
- Can be moved up to 10 m
- NFC

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

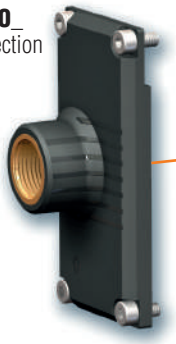
General Information

NFC

IO-Link

CMS HD, "tailor-made" solution

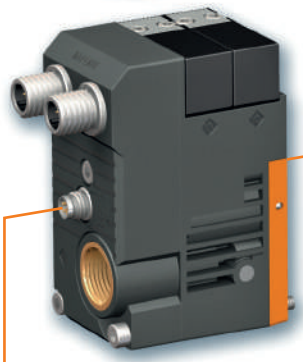
CMSHD__NVO_
Pressure connection end plate



CMSHD90X50_ / CMSHD90X100_
Simple body

CMSHD__SVO / VVO_
Control valve block for vacuum and blow-off without vacuum switch

CMSHD90X150_
Double body

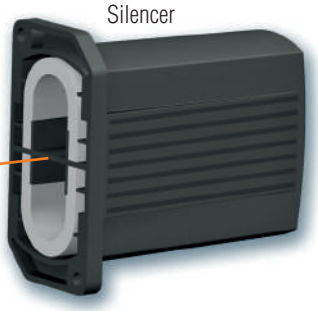


CMSHD_SVX / VVX_
Control valve block for vacuum and blow-off with vacuum switch, pressure sensor, compatible with remote HMI

Remote HMI
Part No.: **HMIHD1M84P**

Different configurations available for the exhaust:

CMSHD____K
Silencer



CMSHD____F
Diffuser

CMSHD____E
Collector exhaust

Note: Exhaust options are delivered mounted in line. They can be mounted by the user at 90° on the front panel of the CMS HD.

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

General Information

NFC

IO-Link

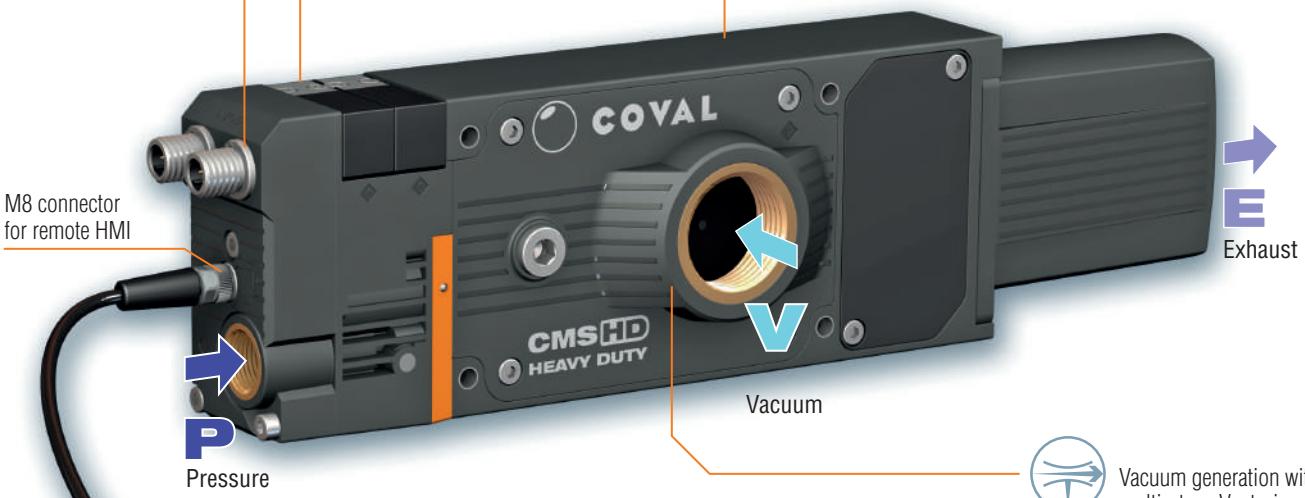
CMS HD with control and vacuum switch

Digital inputs/outputs (SIO) / IO-Link

M12 connectors available in 3 versions:
- one 5 or 8-pin connector
- or two 4-pin connectors

- NC, NO vacuum control
- Blow-off controlled or automatic timed

Onboard installation and diagnostic tools:
- Vacuum network sizing support and clogging detection
- Supply pressure and voltage monitoring



M8 connector for remote HMI

Pressure

Vacuum

Exhaust

Vacuum generation with multi-stage Venturi pump:
- high suction rates
- silent operation

Accessory: remote HMI
Part No.: HMIHD1M84P

Gripping status indicator light (2 colors)

1.54" high-visibility color LCD display with clear multilingual messages and straightforward settings menu

Settings keypad

Clear and efficient HMI:
includes all required inputs for full operation of CMS HD multi-stage vacuum pumps.

NFC

Straightforward setup and diagnostics made possible by NFC technology and COVAL Vacuum Manager mobile application.

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

Integration and Performance

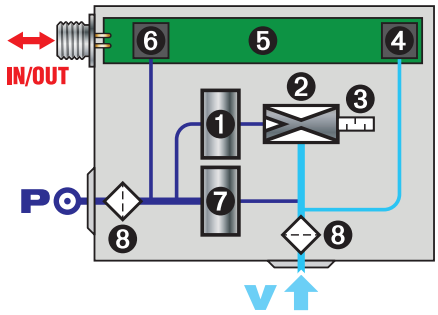
NFC

IO-Link

Integrated Functions

CMS HD multi-stage vacuum pumps include all the "vacuum" functions required for an easy, efficient and economical use of compressed air and suitable for any application:

❶ "Vacuum" solenoid valve
❷ Multi-stage Venturi pump
❸ Through-type silencer
❹ Electronic vacuum switch
❺ Integrated electronics
❻ Pressure sensor
❼ "Blow-off" solenoid valve
❽ Removable filter screens

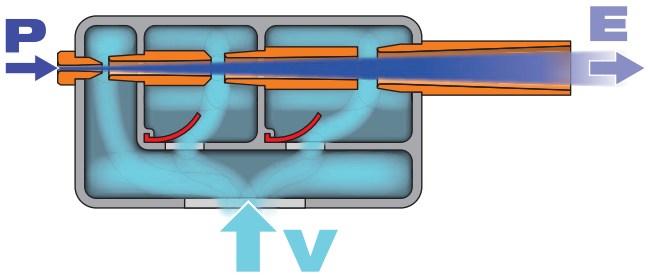


Primary Functions

Multi-stage technology consists of maximizing the energy input of the compressed air by cascading several stages of Venturi profiles and by combining their respective flows.

Intermediate valves allow the progressive isolation of each stage to obtain a maximum vacuum level.

This technology makes it possible to generate a high suction flow rate at a low vacuum level.

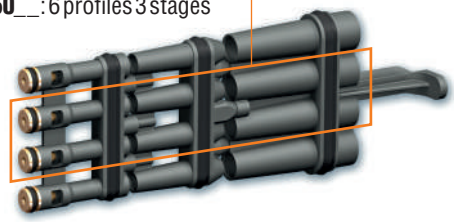


Performance Determined by CMS HD Model

Model	Max. vacuum (%)	Air drawn in (Nl/min)	Air consumed (Nl/min)	Air pressure level* (bar)
CMSHD90X50	80	700	220	5.5
CMSHD90X100	80	1100	420	5.5
CMSHD90X150	80	1600	620	5.5

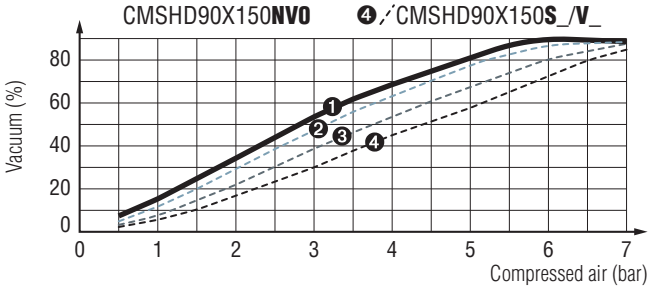
** 6 bar for versions with control:*
*CMSHD90X**50S**_ / CMSHD90X**50V**_ / CMSHD90X**100S**_ / CMSHD90X**100V**_*
** 6.5 bar for versions with control:*
*CMSHD90X**150S**_ / CMSHD90X**150V**_*

- CMSHD90X**50**__: 2 profiles 3 stages
- CMSHD90X**100**__: 4 profiles 3 stages
- CMSHD90X**150**__: 6 profiles 3 stages



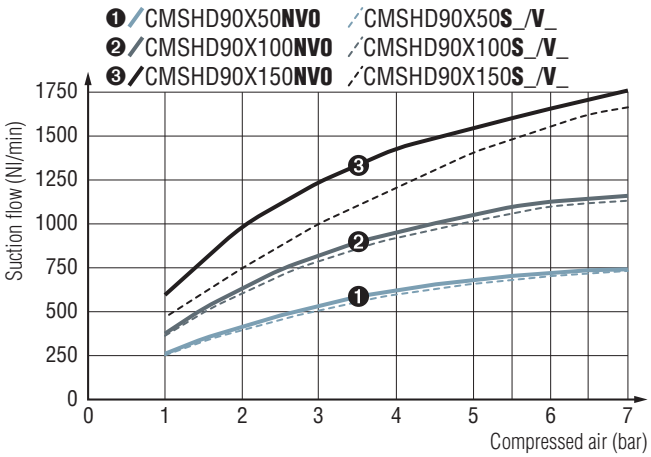
Vacuum / Compressed air

❶ / CMSHD90X50**NVO** ❷ / CMSHD90X50**S**_/**V**_
CMSHD90X100**NVO** ❸ / CMSHD90X100**S**_/**V**_
CMSHD90X150**NVO** ❹ / CMSHD90X150**S**_/**V**_

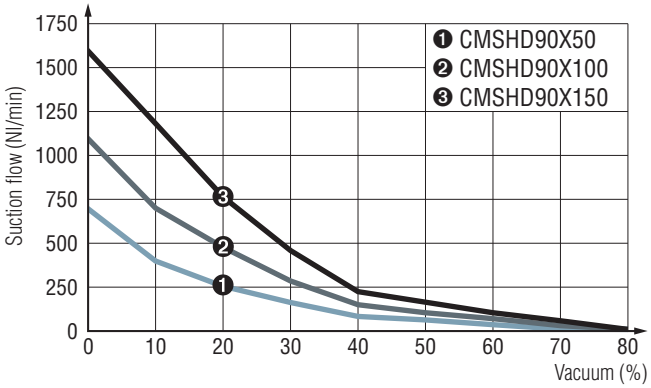


Suction flow / Compressed air

❶ / CMSHD90X50**NVO** / CMSHD90X50**S**_/**V**_
❷ / CMSHD90X100**NVO** / CMSHD90X100**S**_/**V**_
❸ / CMSHD90X150**NVO** / CMSHD90X150**S**_/**V**_



Suction Flow / Vacuum



The values represent the average characteristics of our products.

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

Straightforward Communication

NFC

IO-Link

Easier Integration, Use, and Diagnostics

The **CMSHD__VX** Heavy Duty multi-stage vacuum pump series includes various features that enable setup, use, and diagnostics in all situations and at all levels (operators, process, networked factory), with the aim in mind of keeping the use and management of the pumps as straightforward as possible and thus allowing for their easy integration in your smart factory.

Settings, Diagnostics and Process Data

CONFIGURABLE SETTINGS

- Choice of language: EN, FR, DE, IT or ES
- "Object gripped" thresholds
- Automatic blow-off
- Vacuum measurement unit: kPa, %, mbar, inHg
- Pressure measurement unit: MPa, bar, psi
- Software updates, and more

DIAGNOSTICS

- Cycle counters (vacuum and blow-off control, objects gripped, objects lost, etc.)
- Vacuum network sizing support to prevent pressure loss
- Clogging detection function
- Supply pressure and voltage monitoring
- Software version
- Product part number and serial number

PROCESS INPUT DATA

- Vacuum and blow-off control

PROCESS OUTPUT DATA

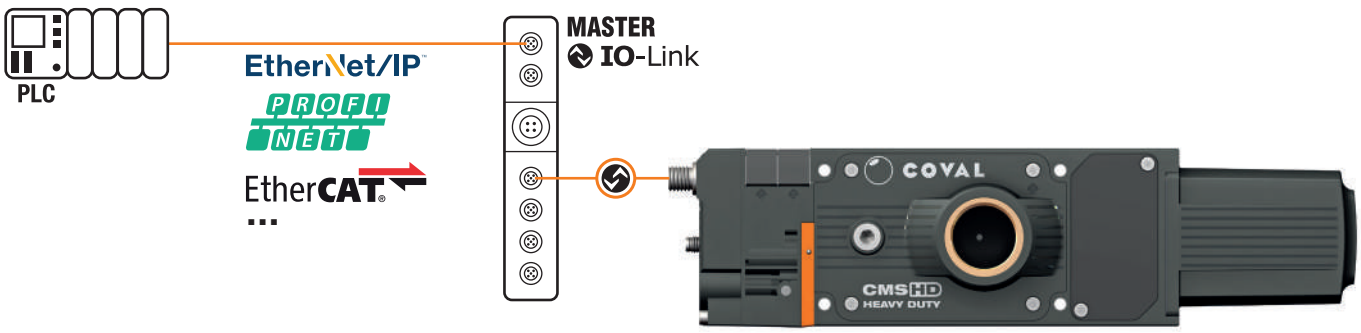
- Instantaneous vacuum level
- Object gripped and object lost information
- Alarms (high/low pressure, high/low voltage)
- Instantaneous pressure

IO-Link

The IO-Link system provides efficient real-time communication between **CMSHD__VX_** multi-stage vacuum pumps and any higher-level protocol (EtherNet/IP, PROFINET, EtherCAT, etc.) required to monitor the production line. It can be used to control pumps, configure settings, and get feedback to ensure maximum productivity.

Advantages:

- Straightforward wiring, installation, and setup
- Availability of diagnostic status data
- Simpler preventive maintenance and vacuum pump replacement without manual setup, and more
- Onboard installation and diagnostic tools



CMS HD

Heavy Duty Multi-stage Vacuum Pumps

Straightforward Communication

NFC

IO-Link

Remote HMI (accessory)

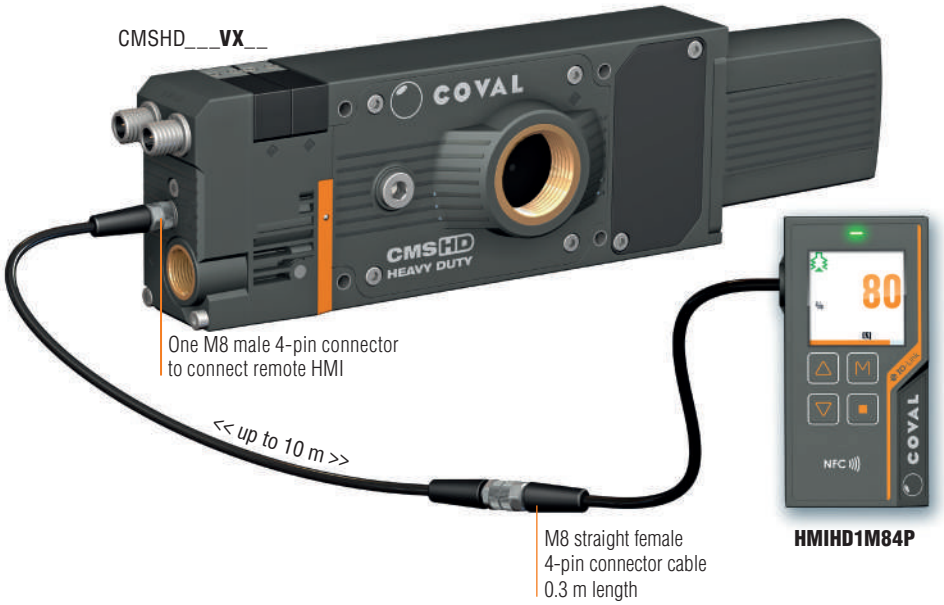
To make it easier to use and set up multi-stage piloted vacuum pumps, the CMS HD series has a remote HMI as an accessory.

Advantages:

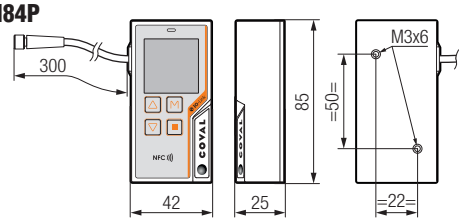
- Place the HMI in an easily accessible and visible area
- Use one HMI for several CMS HD multi-stage vacuum pumps
- Copy settings from one pump to another
- Use the CMS HD multi-stage vacuum pump without any HMI connected

CMS HD multi-stage vacuum pumps compatible with the remote HMI:

→ CMSHD___**VX**__ versions with M8 connector (electrical connections: see p. 96)



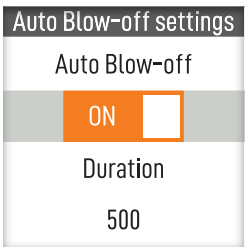
→ **Remote HMI**
Part No.: **HMIHD1M84P**



Remote HMI Dialog Front Panel

The remote HMI allows for easy and efficient reading of the pump's operation.
The high-visibility display includes all required inputs for full operation:

- Main information is easy to read
- Multilingual: EN - FR - DE - IT - ES
- Simple and clear event messages
- Intuitive settings and diagnostics menus
- Configurable display orientation: 0 - 90 - 180 - 270°
- Lockable to prevent undesired changes



Multilingual

EN FR DE IT ES

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

Straightforward Communication

NFC

IO-Link

NFC

The NFC wireless technology integrated in remote HMI and in the COVAL Vacuum Manager application makes all setup and diagnostic functions available and modifiable on your mobile devices.

Additional features:

- Read/write settings with the power on or off
- Copy settings from one CMS HD to another
- Backup up to 5 setting configurations
- COVAL support: send a report including the settings and diagnostic data to COVAL for technical support

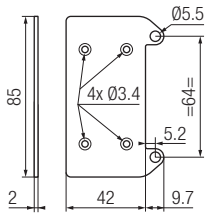
GET IT ON Google Play

Download on the App Store

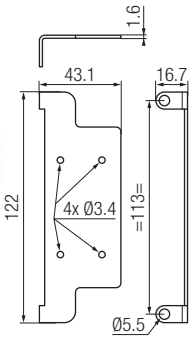
NFC APP: COVAL Vacuum Manager
Available for Android and iOS

Accessories for remote HMI

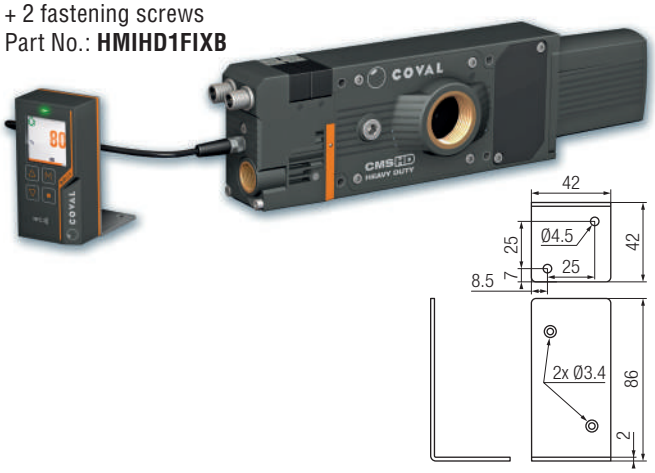
Front mounting plate
+ 2 fastening screws
Part No.: **HMIHD1FIXA**



Side mounting plate
+ 2 fastening screws
Part No.: **HMIHD1FIXC**



90° angled mounting plate
+ 2 fastening screws
Part No.: **HMIHD1FIXB**



Connecting cable
M8 4-pin, female / M8 4-pin, male, compatible with cable chain

- 2 m length: Part No. **CDM8MF4PL2**
- 5 m length: Part No. **CDM8MF4PL5**
- Other lengths available upon request.

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

Modularity and Maintenance

NFC

IO-Link

Choice of 3 equipment options for the exhaust

Various configuration options are available for the CMS HD exhaust:

Through-type silencer
CMSHD___K version
- reduction of the noise level (-10 dBA compared to a diffuser)
- non-clogging

Diffuser
CMSHD___F version
- ultra-compact

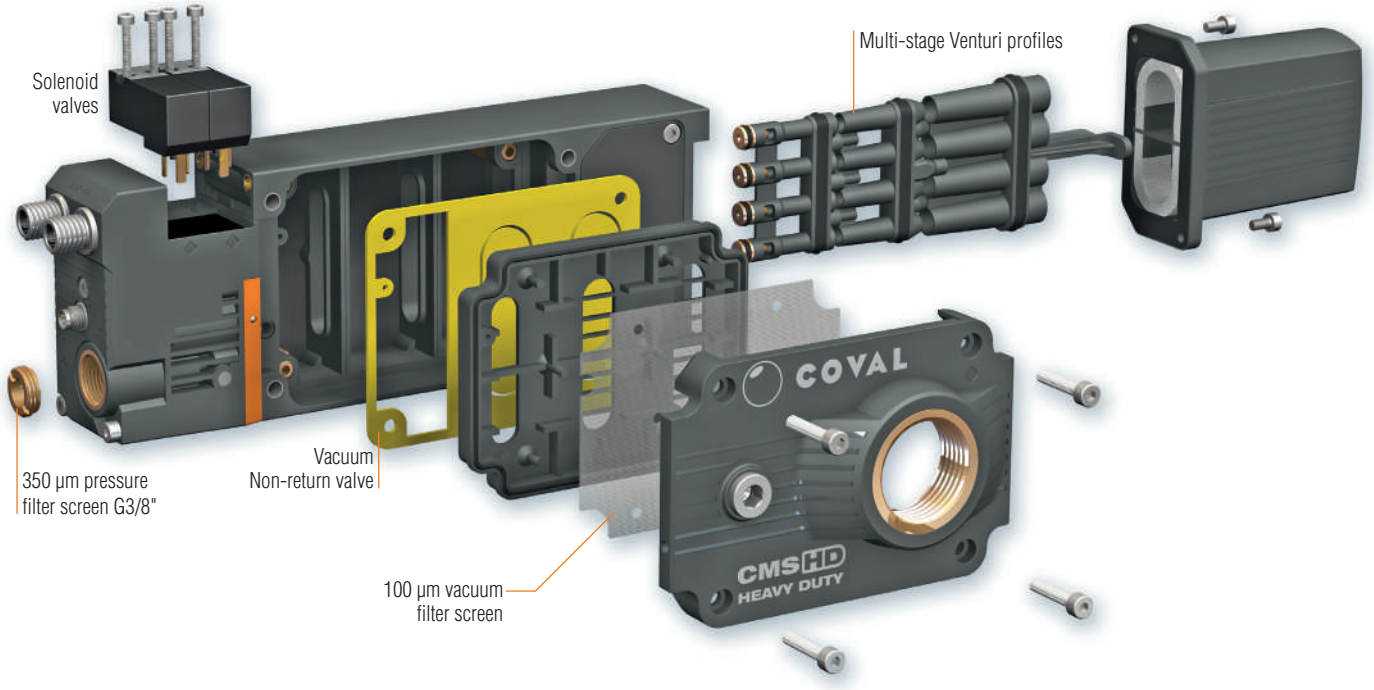
Exhaust collector
CMSHD___E version
- G1" female connection

The exhaust options are delivered in-line but, depending on the environment, they can be positioned by the user on the front panel.

Modularity/Maintenance

The CMS HD multi-stage vacuum pumps have been designed to withstand the demands from all your applications and to guarantee a high level of performance. However, handling certain parts may require replacement or cleaning.

The modular design of the CMS HD multi-stage pumps ensures easy maintenance as the functions are all easily accessible.



CMS HD

Heavy Duty Multi-stage Vacuum Pumps

Selection guide

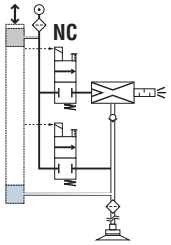
NFC

IO-Link

Vacuum Control: 2 Solutions

Model CMSHD__S: vacuum pump with **NC** vacuum control and **NC** blow-off control. In the event of power failure, vacuum is no longer generated. In the event of compressed air failure, the vacuum is no longer maintained.

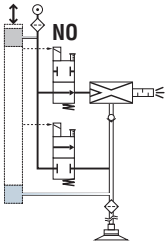
- NC blow-off and vacuum control: solenoid valves
- Choice of blow-off settings (only on CMSHD___**SVX**_ models):
  - controlled by external signal
  - automatic timer from 50 to 9999 ms (advantage: saves one controller output)



Model CMSHD__V: vacuum pump with **NO** vacuum control and **NC** blow-off control. In the event of power failure, vacuum is still generated: part is held in place ➔ fail-safe.

In the event of compressed air failure, the vacuum is no longer maintained.

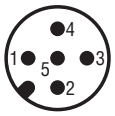
- NO vacuum control solenoid valve
- NC blow-off control solenoid valve
- Blow-off controlled by external signal



Electrical Connections

VOC15P:

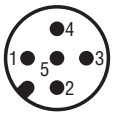
- One M12 5-pin male connector



1	/
2	24 V DC suction command (1)
3	0 V - GND
4	24 V DC blow-off command
5	/

VXC15X:

- One M12 5-pin male connector



1	24 V DC
2	24 V DC suction command (1)
3	0 V - GND
4	24 V DC object gripped DO1 - C/Q
5	24 V DC blow-off command

- One M8 4-pin male connector → remote HMI

1	24 V DC
2	RS485 (DATA+)
3	0 V - GND
4	RS485 (DATA-)

VXC18X:

- One M12 8-pin male connector

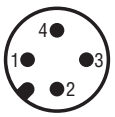
1	24 V DC object gripped DO1
2	24 V DC
3	/
4	24 V DC suction command (1)
5	24 V DC object lost DO2 - C/Q (2)
6	24 V DC blow-off command
7	0 V - GND
8	/

- One M8 4-pin male connector → remote HMI

1	24 V DC
2	RS485 (DATA+)
3	0 V - GND
4	RS485 (DATA-)

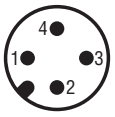
VXC24X:

- Two M12 4-pin male connectors



IN

1	/
2	24 V DC blow-off command
3	0 V - GND
4	24 V DC suction command (1)



OUT

1	24 V DC
2	24 V DC object lost DO2 (2)
3	0 V - GND
4	24 V DC object gripped DO1 - C/Q
5	/

- One M8 4-pin male connector → remote HMI

1	24 V DC
2	RS485 (DATA+)
3	0 V - GND
4	RS485 (DATA-)

: *connections for* IO-Link

(1) 24 V DC suction command, depending on version:
*- **S**: 24 V DC vacuum control*
*- **V**: 24 V DC vacuum off command*

(2) DO2 configurable:
- Object lost (default)
- or Power supply fault (below 21.6 V or above 26.4 V)
- or Pressure fault (below 5 bar or above 8 bar)

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

Configuring a Vacuum Pump

NFC

IO-Link

CMS HD Without Control

CMSHD90X	100	N	V0	G4	K

SUCTION FLOW RATE	
700 Nl/min	50
1100 Nl/min	100
1600 Nl/min	150

EXHAUST	
K	Through-type silencer
E	Exhaust collector
F	Diffuser

Sample part number consisting of a multi-stage vacuum pump without control:

CMSHD90X100NV0G4K

Multi-stage vacuum pump without control, max. vacuum 80%, suction flow rate 1100 Nl/min with Through-type silencer

CMS HD With Control

CMSHD90X	100	S	VX	C15X	G4	K	D

SUCTION FLOW RATE	
700 Nl/min	50
1100 Nl/min	100
1600 Nl/min	150

GENERATOR CONTROL	
Vacuum pump with **NC** vacuum control and **NC** blow-off control. Choice of blow-off settings (only on CMSHD__**SVX**_models): ▪ Controlled by external signal ▪ Automatic timer from 50 to 9999 ms (advantage: saves one controller output).	S
Vacuum pump with **NO** vacuum control and **NC** blow-off control. ▪ Blow-off controlled by external signal	V

VACUUM SWITCH / HMI		CONNECTORS	
Multi-stage vacuum pump without vacuum switch and HMI	V0	C15P	▪ One M12 5-pin male PNP
▪ Simplified CMS HD with control, without settings and dialogs ▪ Digital inputs/outputs mode (SIO)			
Multi-stage vacuum pump with integrated vacuum switch and pressure sensor, without HMI	VX	C15X	▪ One M12 5-pin male configurable as PNP or NPN ▪ One M8 4-pin male for remote HMI
▪ Electronic vacuum switch ▪ Digital Output DO1 "object gripped" 24 V DC / NO ▪ Digital input/outputs mode (SIO) / IO-Link ▪ Compatible with remote HMI			 IO-Link
		C18X	▪ One M12 8-pin male configurable as PNP or NPN ▪ One M8 4-pin male for remote HMI ▪ Digital Output DO2 configurable 24 V DC / NO
			 IO-Link
		C24X	▪ Two M12 4-pin male configurable as PNP or NPN ▪ One M8 4-pin male for remote HMI ▪ Digital Output DO2 configurable 24 V DC / NO
			 IO-Link

EXHAUST*	
K	Through-type silencer
E	Exhaust collector
F	Diffuser

** Exhaust accessories are delivered mounted in line by default.*

PRESSURE SENSOR	
None on **V0** versions	–
Standard on **VX** versions	D

Sample part number consisting of a multi-stage vacuum pump with control:

CMSHD90X100SVXC15XG4FD

Multi-stage vacuum pump with control, max. vacuum 80%, suction flow rate 1100 Nl/min, NC vacuum and blow-off control, one M12 5-pin connector and one M8 4-pin connector, with diffuser.

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

Examples of Composed Part Numbers

NFC

IO-Link

CMSHD90X50NV0G4E

Multi-stage vacuum pump without control, max. vacuum 80%, suction flow rate 700 Nl/min with exhaust collector.

CMSHD90X150NV0G4K

Multi-stage vacuum pump without control, max. vacuum 80%, suction flow rate 1600 Nl/min with through-type silencer.

CMSHD90X100SV0C15PG4F

Multi-stage vacuum pump with control, max. vacuum 80%, suction flow rate 1100 Nl/min, NC vacuum and blow-off control, one M12 5-pin connector, with diffuser.

CMSHD90X100VVXC15XG4ED + HMIHD1M84P + HMIHD1FIXA

Multi-stage vacuum pump with control, max. vacuum 80%, suction flow rate 1100 Nl/min, NO vacuum control and NC blow-off control, one M12 5-pin connector and one M8 4-pin connector, with exhaust collector + remote HMI and front mounting plate.

CMSHD90X150SVXC24XG4KD

Multi-stage vacuum pump with control, max. vacuum 80%, suction flow rate 1600 Nl/min, NC vacuum and blow-off control, one M12 5-pin connector and one M8 4-pin connector, with through-type silencer.

CMS HD

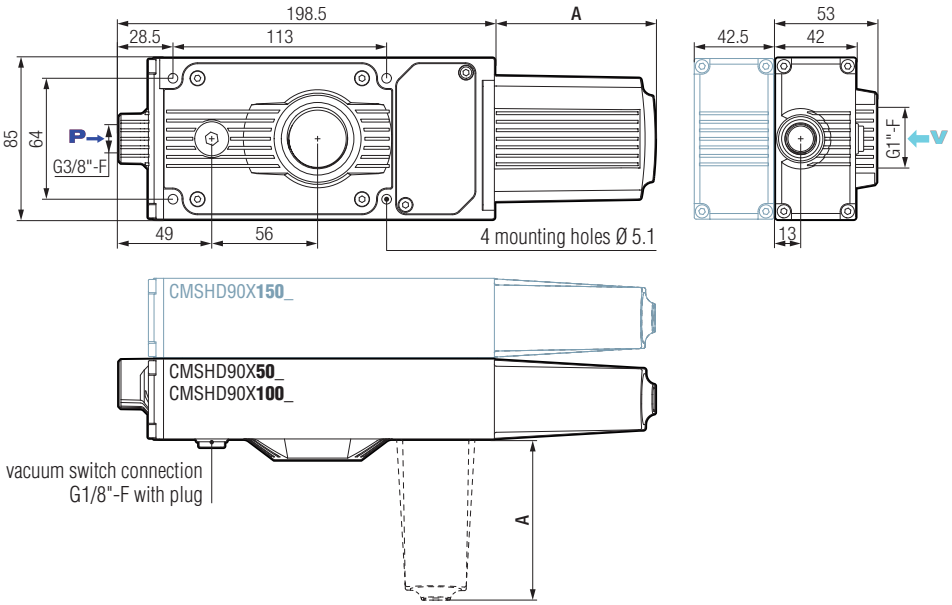
Heavy Duty Multi-stage Vacuum Pumps

Dimensions

NFC

IO-Link

CMS HD Without Control



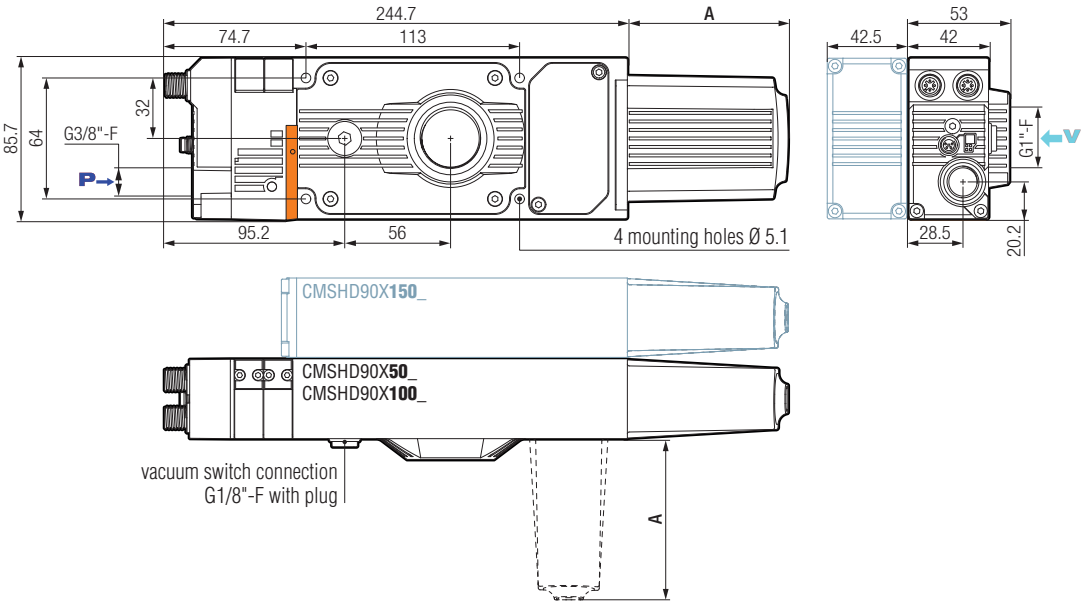
Note: all dimensions are in mm.

3D COVAL Data

You can access 3D files of all our products in formats compatible with the main CAD software on our website

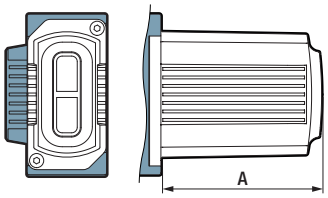
www.coval.com

CMS HD With Control

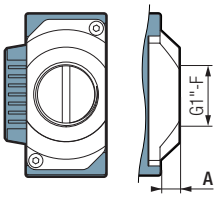


Exhaust Options

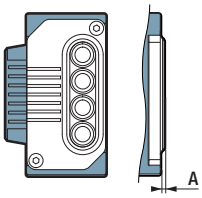
Through-type silencer
CMSHD___**K** version



Exhaust collector
CMSHD___**E** version



Diffuser
CMSHD___**F** version



Exhaust Type	A
Silencer	85
Collector	10
Diffuser	2

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

Technical specifications

NFC

IO-Link

- Supply: non-lubricated air, filtered to 5 microns, according to standard ISO 8573-1:2010 [3:4:4]
- Operating pressure: from 2 to 8 bar
- Optimal dynamic pressure:
  - CMSHD_**NVO** (without control): 5.5 bar
  - CMSHD90X50**S**/50**V**/100**S**/100**V**_ (with control) : 6 bar
  - CMSHD90X150**S**/150**V**_ (with control) : 6,5 bar
- Pressure connection: G3/8"-F with removable 350 µm filter screen
- Vacuum connection: G1"-F with removable 100 µm filter screen
- Connection for version with exhaust collector: G1"-F
- Vacuum switch connection G1/8"-F
- Max. vacuum: 80%
- Air suction flow rate: 700 to 1600 Nl/min
- Air consumption: 220 to 620 Nl/min
- Noise level:
  - with silencer:
    - CMSHD90X**50**__**K**: 59 dBA
    - CMSHD90X**100**__**K**: 62 dBA
    - CMSHD90X**150**__**K**: 67 dBA
  - with diffuser (CMSHD__**F** version): + 10 dBA to the silencer version
- Degree of protection: IP65
- Max. operating frequency: 4 Hz
- Endurance: 50 million cycles
- Weight:
  - CMSHD without control:
    - CMSHD__**50**/**100**: 645 g
    - CMSHD__**150**: 1330 g
  - CMSHD with control:
    - CMSHD__**50**/**100**: 890 g
    - CMSHD__**150**: 1575 g
- Operating temperature: from 0 to 50° C
- Materials: PA GF, brass, aluminum, steel, NBR, PU, FKM
- M12 and M8 male connectors (depending on version)

Integrated electronics

- 24 V DC power supply (regulated ±10%)
- Vacuum measuring range: 0 to 99%
- Pressure measuring range: 0 to 10 bar
- Vacuum and pressure measurement accuracy: ±1.5% of the range, compensated for temperature
- Inputs/outputs protected against reversed wiring and polarity
- Consumption: 170 mA max. (without load)
- Input/Output switching mode: PNP or PNP/NPN configurable
- Digital inputs/outputs mode (SIO) / IO-Link

DO1/DO2 output signals (only on CMSHD___**VX**__ models)

- Configurable as PNP or NPN
- NO or NC
- Breaking capacity: 330 mA
- DO1: object gripped output (factory setting 40%)
- DO2 configurable (see parameter settings)

Diagnostics

- Instantaneous vacuum level (unit transmitted over IO-Link: mbar)
- Available information: Object gripped, object lost
- Cycle counters (vacuum, blow-off, object gripped, object lost, etc.)
- Vacuum network sizing support to prevent head losses
- Clogging detection function
- Supply pressure monitoring
- Supply voltage monitoring
- Product part number and serial number
- Software version

Indicator on model CMSHD__**VOC15P**___

- Status LED for control functions:
  - green LED: vacuum control
  - orange LED: blow-off control

Information displayed on remote HMI

- LED gripping status indicator on front panel
  - Green: object gripped
  - Red: object lost
- 1.54" high-visibility color LCD display:
  - Displays vacuum level with bar graph and thresholds
  - Warns when service life has been exceeded (> 50 million cycles)
  - Explicit fault messages
  - "Suction cup" icon indicating the status of control functions:
    - Green suction cup: vacuum control
    - Orange suction cup: blow-off control
    - Red suction cup: simultaneous vacuum and blow-off control
  - Configurable display orientation: 0 - 90 - 180 - 270°

Parameter settings available with the remote HMI or IO-Link (only on CMSHD___**VX**__ models)

- Choice of blow-off type:
  - Controlled
  - Automatic timed, adjustable from 50 to 9999 ms
- Object gripped (L1) control thresholds
- Whenever required by the application, specific threshold and hysteresis settings that are different from the initial factory settings can be defined: L1 = 40%, h1 = 10%
- DO2 configurable (24 V DC) (only on CMSHD___**VXC24X**_ and **VXC18X**_ models):
  - Object lost (default)
  - or Power supply fault (below 21.6 V or above 26.4 V)
  - or Pressure fault (below 5 bar or above 8 bar)

+ Additional settings available with the remote HMI

(performed with 4-key membrane keyboard):

- Choice of language: EN, FR, DE, IT, or ES
- Choice of vacuum measurement unit (kPa, %, mbar, inHg)
- Choice of pressure measurement unit (MPa, bar, psi)
- Monostable electrical manual controls

Communication

IO-Link

- Revision: 1.1
- Transmission rate: COM3 - 230.4 kbit/s
- Min. cycle time: 1 ms
- SIO mode: Yes
- Process Data Input (PDI): 6 bytes
- Process Data Output (PDO): 1 byte
- IO device description file (IODD) available for download

NFC

- COVAL VACUUM MANAGER Mobile app available:
  - Android, version 8.1 and higher
  - iOS, version 13 and higher

CMS HD

Heavy Duty Multi-stage Vacuum Pumps

Accessories

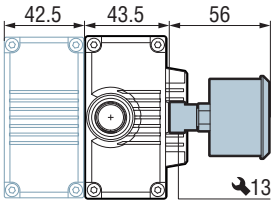
NFC

IO-Link

To visualize the vacuum level

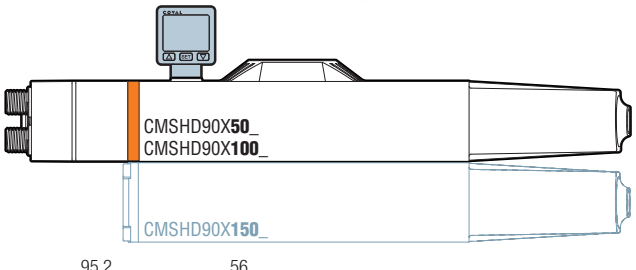
Vacuum gauge Ø 40 mm
Part No. VAF11140RDM18G

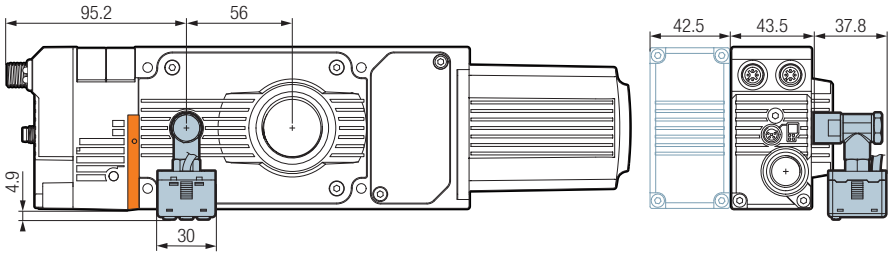
- Damping: by silicone movement (patented).
- Measuring: Bourdon tube in CuSn.
- Precision: cl. 2.5 (+/- 2.5% of max. scale value).
- Frame: black ABS
- Vacuum connection: G1/8"-M



Electronic vacuum switch with 3-color display with adjustable elbow connection
Part No. PSD100CPNPRCOM18G

- One M8 4-pin connector.
- 1 PNP digital output (NO or NC). Max. load current: 125 mA, Max. supply voltage: 24 VDC, Residual voltage: ≤ 1.5 V.
- 1 analog output (Output voltage: 1 to 5 V ≤ ± 2.5% F.S. (within rated pressure range), linearity: ≤ ± 1% F.S. / Output impedance: approx. 1 kΩ)
- Pressure rating range: 0 ~ -101.3 kPa.
- Pressure setting range: 10 ~ -101.3 kPa.
- Max. pressure: 300 kPa.
- Fluid: Air, non-corrosive/non-flammable gas.
- Hysteresis: adjustable.
- Response time: ≤ 2.5ms, with anti-vibration function.
- 7 segment LCD display : 2 color (red/green) main display, orange sub-display (refresh rate: 5 times/1sec.).
- Choice of pressure unit display: kPa, MPa, kgf/cm², bar, psi, InHg, mmHg.
- Power supply voltage: 12 to 24 V DC ±10%.
- Current consumption: ≤ 40mA (without load).
- Repeatability (switch ouptut): ≤ ±0.2% F.S. ±1 digit.
- Protection: IP40.
- Ambient temperature range: 0 – 50° C (operation).
- Adjustable elbow connection 360°: G1/8"-M

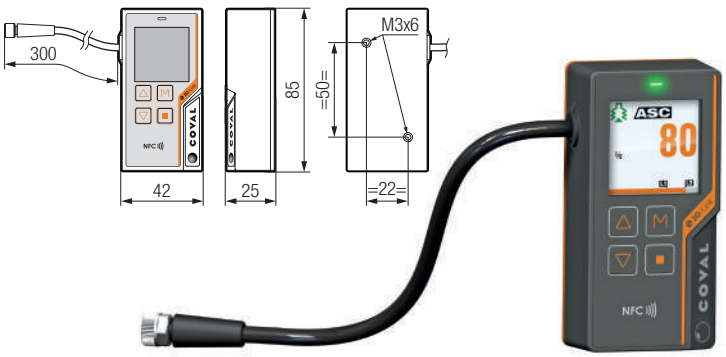




Remote HMI

(for CMSHD___**VX**__ only)
Part No. HMIHD1M84P

- With M8 4-pin female connector, 0.3m length

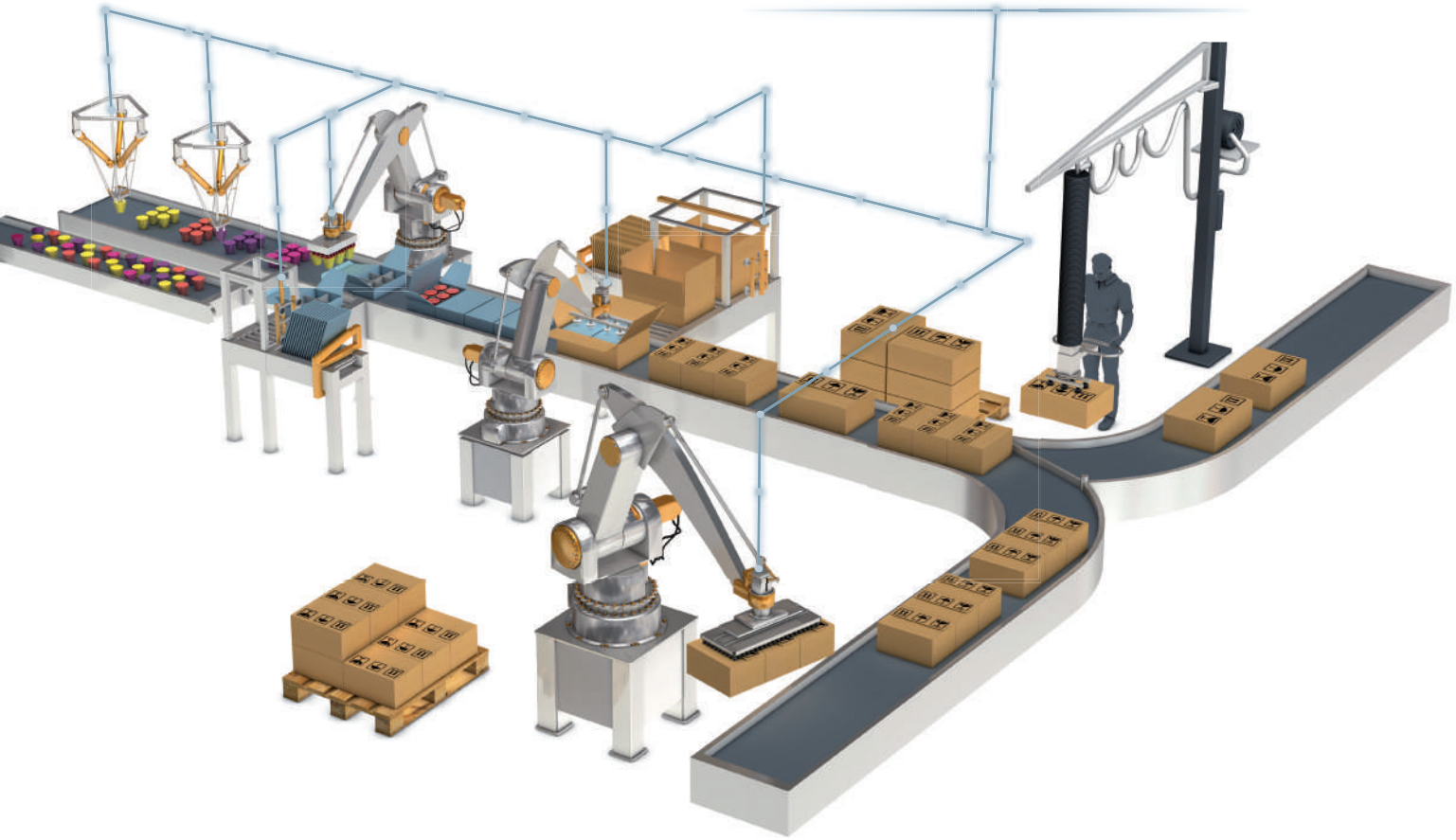


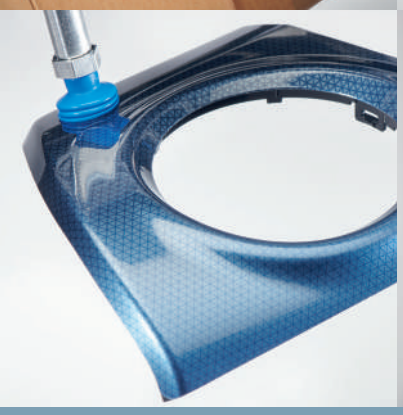
Accessories for remote HMI (see details on p. 94)

- Front mounting plate: Part No. **HMIHD1FIXA**
- 90° angled mounting plate: Part No. **HMIHD1FIXB**
- Side mounting plate: Part No. **HMIHD1FIXC**
- M8 4-pin, female / M8 4-pin, male, connecting cable:
  - 2 m length: Part No **CDM8MF4PL2**
  - 5 m length: Part No **CDM8MF4PL5**
  - Other lengths available upon request.

COVAL
vacuum managers

COVAL ALL ALONG THE LINE





Advanced Vacuum Solutions

COVAL
vacuum managers

vacuum components

A TECHNOLOGICAL PARTNER ON A GLOBAL SCALE

Located in the South of France, COVAL SAS designs, produces, and markets high-performance vacuum components and systems for industrial applications in all sectors worldwide.

An ISO 9001: V2015 certified company, COVAL innovates globally in vacuum handling. Our optimized components integrate intelligent and reliable functionalities, adapt to your industrial context, and safely improve your productivity.

With a strong spirit of innovation and technological advancements, the COVAL team is now recognized as an expert in developing reliable, economical, and productive custom solutions.

COVAL's references are found in major industrial sectors such as packaging, food processing, automotive, plastics, aerospace, and robotics, where vacuum handling is crucial for efficiency and productivity.

COVAL markets its products and services worldwide through its subsidiaries and authorized distributor network. Always attentive to its customers, COVAL supports the implementation of its solutions with a continuous and attentive relationship.

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