COVAL

vacuum managers

GLOBAL CATALOG

vacuum components

ADVANCED VACUUM SOLUTIONS

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US3

COVAL
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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 30 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 products and services. It serves as an introduction to the interactions with our technical and sales teams around your projects.

Jérôme Vernet
Chief Executive Officer of COVAL S.A.S.

Michel Cecchin,
Chairman of COVAL S.A.S.

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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 3D 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

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QUALITY AND INNOVATION

COVAL applies an ambitious quality and innovation policy to all its product ranges. Our quality relies on a comprehensive approach, which brings together client focus, staff training, and teamwork.
All these elements foster a favorable environment and culture for each collaborator to contribute to innovation.
This commitment has led to several awards and certifications that reward both the products and their industrial applications.

▶ BROAD INNOVATION NETWORK

At COVAL, we believe that openness to public research centers, universities, and technology clusters is the primary qualification for being able to offer our clients products that make them more competitive. These collaborations complement and strengthen the internal resources of our Research and Innovation Center.

To drive this strategic intent, the Innovation Manager's focus is to develop COVAL interactions with its environment in order to innovate in technical, human, and organizational fields.

▶ ISO 9001 CERTIFICATION: V2015

With this standard, COVAL seeks to achieve the following:

- Satisfy its clients' quality requirements.
- Meet applicable regulatory conditions.
- Improve client satisfaction.
- Constantly optimize performance to achieve these goals.

LLOYD'S REGISTER · LRQA
ISO 9001
certified quality management system

To do this, COVAL teams focus on clients and rally behind a process of ongoing improvement. Our primary goal is to build a lasting relationship with our clients.

▶ AN EXAMPLE OF INNOVATION: TWIN TECH™, VACUUM INTELLIGENCE AT ITS CORE

At COVAL, innovation focuses on the user. It is our constant dialog with our clients that feeds our technological developments.

The TWIN TECH™ technology, which appeared as early as 2008, is a perfect example of how COVAL views innovation: favoring energy savings, ease-of-use, and compactness.

twin tech™
Integration & Intelligence

This technology is available in our main lines of vacuum pumps and allows for the integration of all necessary features in a single, compact and light unit that also improves man-machine communication.

COVAL thus perfectly meets the new expectations of robot manufacturers, system integrators, and users.

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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 : AIR SAVING REGULATOR

➔ 40% energy savings on average

The AIR SAVING REGULATOR (ASR) regulates the compressed air pressure to 3.5 bar in all circumstances to obtain a perfect mix of efficiency and consumption.

- No more unnecessary consumption of compressed air.
- No external regulator required, thus eliminating the risk of improper adjustment.

The following products feature this technology:

- LEM
- LEMAX
- LEM+
- LEMAX+
- LEMCOM…

AIR Saving Control : AIR SAVING CONTROL

➔ 90% energy savings on average

AIR SAVING CONTROL (ASC) is an intelligent 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.

The following products feature this technology:

- LEMAX
- LEMAX+
- LEMCOM…

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+, or LEMCOM vacuum pumps featuring the ASC technology compared with conventional vacuum pumps.

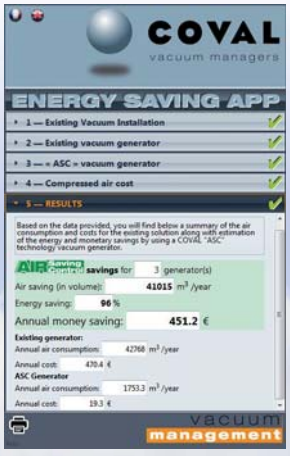
This unique app in the world of vacuum technology is very intuitive to use. Once you've entered the equipment's main characteristics (gripping cycle time, number of cycles, run time, volume to be evacuated), the savings are displayed automatically in euros, air volume, and savings percentage. In most 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.

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

Products concerned: ■ LEMAX ■ LEMAX+ ■ LEMCOM…



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MADE IN EXCELLENCE

For 30 years, COVAL has been working every day on offering its clients outstanding products and services. This is not merely a goal, it's a daily commitment that drives each of our teams: sales, engineering and design, production, logistics, innovation, and management.

To foster this spirit of excellence, COVAL constantly invests in the following areas:

- **MODERNIZING ITS INDUSTRIAL EQUIPMENT** to improve quality and productivity.
- **TRAINING** to enable each and everyone to update their skills, become more versatile, and advance within the company.
- **OPEN INNOVATION** to let our clients be the first to benefit from the most advanced technology.
- **RIGOROUS ORGANIZATION** to guarantee our clients obtain the quality, responsiveness, and flexibility they expect.

MADE IN FRANCE

COVAL is headquartered in the heart of the Auvergne-Rhône-Alpes region, a particularly powerful economic area in terms of research and industrial production. With their leading network of industrial subcontractors, proximity to university and research centers, and multiple business clusters linked directly to its core activity, COVAL's products and services are an obvious choice to be Made in France.

COVAL USA is the North American subsidiary of COVAL and is located in Raleigh, NC. This location was created to strengthen the global presence of their sales and distribution network and provide its customers with ever improving channels to discover and purchase COVAL products and services.
This subsidiary benefits its customers by offering:

- A nationwide network of authorized COVAL distributors.
- Regional sales representatives who can provide local, hands-on support.
- Easy access to a friendly and knowledgeable technical sales team.
- A fully stocked warehouse to reduce delivery times and improve efficiency.

Let the experienced team at COVAL support your vacuum needs and you will understand why we call ourselves "**vacuum managers**".

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YOU DESERVE MUCH MORE THAN JUST VACUUM

Being able to benefit from high-performance products for the vacuum handling of your workpieces, products, and packages is your main requirement, but that's not enough by itself: you want solutions that are comprehensive, performing, and perfectly suited for your industry.

In order to bring you more than just vacuum, we are committed to a comprehensive development approach:

▶ **SOLUTIONS** that take into account all your concerns:

- The constraints of your process.
- The specific features of your products.
- The safety of operators.
- The energy performance of your equipment.

▶ **KNOW-HOW** that meets your needs:

- A thorough analysis.
- Customized advice.
- Capacity for engineering and innovation.
- High-quality manufacturing and service.
- Ongoing follow-up throughout the entire life cycle of our products.

▶ **PRODUCTS** that you can trust:

- Reduced space requirements for better integration.
- Continuously improved performance.
- Reduced energy consumption.
- Easier communication and interaction with the machine.

▶ **TEAMS** that specialize in **YOUR INDUSTRY**:

At COVAL, technical and sales teams are dedicated to strategic industry sectors: packaging, food processing, plastics, automotive, aeronautics, and robotics.
The experience they've acquired with major brands and manufacturers allows them to provide quick and efficient answers.

Our goal is to be present wherever vacuum handling and automation is useful for the performance of the business.

Being located in France, the world's second largest exporter of food, COVAL enjoys an exclusive relationship with the food processing industry.

Whether this involves handling raw, prepared, or packaged goods, COVAL has continually developed and adapted its products to the food processing industry needs:

- Making production lines more versatile.
- Producing within a safe food environment.
- Increasing productivity while maintaining a high level of quality.
- Reducing production and maintenance costs.

Suction Cups with a Firm Grip on Your Products

▶ SILICONE SUCTION CUPS

They are compatible with FDA food standards (FDA 21 CFR 177.2600.) and in conformity with European directives EU 1935/2004 and available in a wide variety of models to adapt perfectly to your products.

- From 1 mm to 88 mm in diameter.
- Round and oblong shapes.
- Flat, 1.5 and 2.5 bellows.
- **Metal-detectable version available upon request.**

➔ **See chapter 2.**

▶ SPECIAL SUCTION CUPS

- Soft and flexible high-throughput suction cups: **MVS** series
- Suction cups for bakery applications: **VSD**, **VSE**, and **VSP** series.
- Suction cups for egg-handling: **VSO** series.

➔ **See chapter 3.**

▶ VACUUM PUMPS

COVAL vacuum pumps all have compactness, embedded intelligence, and low energy consumption in common.

- **LEM and LEM+ series** for handing all porous or airtight parts.
- **LEMAX and LEMAX+ series** for handing all airtight or slightly porous parts.
- **LEMCOM series**: a vacuum pump with fieldbus communication.
- **CMS series**: multi-stage vacuum generator.

➔ **See chapter 8.**

▶ VACUUM GRIPPERS

Vacuum grippers are used to grip several products (flow packs, tins, cans, etc.) or packages (palletization) at once.

- **MVG**: fully configurable vacuum gripper.
- **CVG**: vacuum gripper with many possible combinations.

➔ **See chapter 13.**

Packaging plays an important role in industrial production. Vacuum applications in this field range from grasping small bags to handling large-sized cardboard boxes.
Their extremely various size, shapes, weights, and materials are a result of the many functions they need to fulfill: hold, transport, and store products, but also inform, promote, and facilitate use, etc.

Regardless of the type of packaging, the handling constraints are always the same:
- Safety of goods and operators.
- Handling throughput.
- Versatility.
- Energy savings.

COVAL All Along the Line

▶ SUCTION CUPS

Suction cups meet a wide variety of specifications thanks to the large choice of shapes, diameters, and materials. COVAL offers a complete line of fastening fittings that are suitable for suction cups and compatible with all types of applications.
- Flat and extra-flat suction cups.
- 1.5 and 2.5 bellows.
- Oblong suction cups.
- High-performance suction cups.

➔ **See chapters 2 and 3.**

▶ VACUUM PUMPS

COVAL vacuum pumps all have compactness, embedded intelligence, and low energy consumption in common.
- Micro-ejectors.
- Modular vacuum pumps.
- Smart vacuum pumps.

➔ **See chapters 6 to 9.**

▶ VACUUM GRIPPERS

Vacuum grippers are used to grip several products (flow packs, tins, cans, etc.) or packages (palletization) at once.
- **MVG**: fully configurable vacuum gripper.
- **CVG**: vacuum gripper with many possible combinations.

➔ **See chapter 13.**

COVAL has been delivering simple, flexible, modular, compact, and energy-efficient vacuum handling and automation solutions to car manufacturers for more than 30 years:

- High-throughput handling of workpieces on stamping press lines.
- Workpiece transport and clamping for gluing and welding at welding stations.
- Handling of windshields or sheet steel parts for assembly.

Integration, Performance and Energy Savings

▶ C SERIES HIGH-PERFORMANCE SUCTION CUPS

These suction cups are available in a wide range of sizes and shapes and have been developed to meet the constraints of the automotive industry:

- Optimal placement of oily steel sheets: anti-slip cleats.
- Preservation of workpieces: nitrile suction cups and polyamide fittings.
- Airtight fastening: o-ring.

Versions made of SITON® are available for handling hot workpieces (plastic workpieces, hot stamping).

➔ **See page 2/55.**

LEMAX, LEMAX+, AND LEMCOM SERIES SMART VACUUM PUMPS WITH VACUUM CONTROL

- Optimized robot equipment: ultra-compact and lightweight.
- Reduced gripping times: powerful suction flow rate.
- Incoming pressure reduced to 3.5 bar: ASR technology.
- Up to 90% compressed air savings: ASC technology.
- Maintenance free: non-clogging.
- EtherNet/IP or CANopen fieldbus for the LEMCOM series.

➔ **See chapter 8.**

AIR Saving Control

Industry Solutions: AERONAUTICS

COVAL vacuum managers

In a growing industry, the ability to reduce production times while preserving a high level of quality is essential. COVAL has worked on the following specific solutions with major manufacturers:

- Gripping parts on laser-trimming machines.
- Referencing and holding aircraft parts during drilling, sanding, riveting, etc.
- Integrating vacuum components in demonstration tools.
- Gripping aircraft parts made of various materials: steel, stainless steel, aluminum, and composite materials.

Dedicated Solutions for your Industry

▶ C SERIES HIGH-PERFORMANCE SUCTION CUPS

- Gripping thin workpieces without deformation.
- Handling or holding in vertical position.
- Optimal positioning and holding: anti-slip cleats.

➔ **See page 2/55.**

▶ VPSC MARK-FREE ULTRA-FLAT SUCTION CUPS

- Gripping raw composite materials.
- No material migration.
- Non-marking on composite parts.

➔ **See page 3/8.**

▶ LEMAX, LEMAX+ AND LEMCOM SERIES VACUUM PUMPS

- Optimized robot equipment: ultra-compact and lightweight.
- Reduced gripping times: powerful suction flow rate.
- Incoming pressure reduced to 3.5 bar: ASR technology.
- Up to 90% compressed air savings: ASR technology.
- Maintenance free: non-clogging.
- EtherNet/IP or CANopen fieldbus for the LEMCOM series.

➔ **See chapter 8.**

▶ CONTROL BOX WITH INTEGRATION FUNCTIONS

- Integrated pneumatic or electric vacuum pumps.
- Control and monitoring panel allowing you to manually or automatically select the gripping areas on a structure.
- Indicator light for visual alarm.
- Vacuum sequencing to assist with placement of a curved panel.

➔ **Upon request..**

Hidden behind the generic term “plastics”, you will find materials that are very different in their composition, manufacturing, appearance, and applications.

For more than thirty years, COVAL has been developing vacuum handling solutions that are tailored to the constant technological developments of the processes and materials.
Our vacuum pumps and suction cups are able to handle plastics and composites for industries such as aeronautics, cosmetics, electronics/connectors, health, and transportation.

SITON®, A COVAL Exclusive

▶ SITON® SUCTION CUPS

SITON®, exclusively developed and manufactured by COVAL, is a silicone-free material especially created for handling hot workpieces as they are taken out of molds.

- Non-marking: clear mixture and silicone-free.
- SITON® supports peak temperatures up to 320 °F.
- SITON® features excellent abrasion resistance.

A wide variety of suction cup models are available in STN (Siton® 60 Shore A) in this catalog.
For greater flexibility, some models are available in STN5 (Siton® 50 Shore A) upon request.

➔ **See chapter 2.**

Intelligent Vacuum Pumps

▶ LEMAX, LEMAX+ AND LEMCOM SERIES

Mini-vacuum pumps with ASC are used for handling all airtight or slightly porous plastic parts.
- Ultra-compact and lightweight.
- More than 90% energy savings thanks to ASC technology.
- Silent operation.
- Auto-adjustment corresponding to the material handled.

➔ **See chapter 8.**

AIR Saving Control

COVAL
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NEW PRODUCTS

Always in touch with the latest market developments, COVAL is driven by constant innovation and regularly introduces new products and solutions that meet specific vacuum handling needs.

▶ LEMCOM series
The first fieldbus-communicating vacuum pump.

▶ LEM and LEM+ series
Mini-vacuum pumps and compact vacuum pumps that feature high flow rates, are intelligent, and come with **ASR** energy-saving technology.

▶ LEMAX and LEMAX+ series
Mini-vacuum pumps and compact vacuum pumps that feature high flow rates, are intelligent, and come with **ASC** energy saving technology.

▶ MVS series
High-throughput suction cups made of food grade silicone.

▶ VPSC series
Ultra-flat, mark-free suction cups for raw composite materials.

▶ PSD series
Mini-vacuum switches with 3-color display.

▶ PSK series
Miniature electronic vacuum switches.

▶ MVG series
Modular vacuum grippers.

These new products are already available today. Feel free to ask your COVAL preferred contact for more information.

NEW PRODUCTS

COVAL vacuum managers

Mini Vacuum Pumps
LEMCOM

1st mini vacuum pump on industrial fieldbus

CANopen®
EtherNet/IP™

AIR Saving Control

The best technology for increasing flexibility and productivity

- Maximum intelligence / minimal bulk.
- One “master” module controls 1 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™ / CANopen®…
- IP65 / M8 standard connectors.

A simple product to utilize

LEMCOM
master
EtherNet/IP™

- On-board 2-Port Ethernet Switch.
- On-board web server.
- Dedicated configuration software.
- M8/RJ45 standard connectors.
- RSLogix 5000 Add-On Instructions.

LEMCOM
master
CANopen®

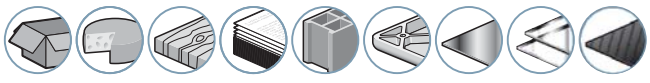
- Two CAN ports.
- From 20 to 1000 Kbps.
- Dedicated configuration software.
- Configuration by SDO.
- Adjustable PDO-TX transmission threshold.

LEMCOM
secondary module

- Universal secondary module, regardless of bus type.

➔ See page 8/27.

- For all types of porous or airtight workpieces:



NEW PRODUCTS

COVAL
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Compact Vacuum Pumps
LEM, LEM+

AIR Saving Regulator

40% automatic energy savings

- Suction flow rate from 1.02 to 9.71 SCFM.
- Nozzle diameter: 1, 1.2, 1.4, 2 and 2.5 mm.
- 60 or 85% of maximum vacuum.
- Easy implementation: Plug & Play, multiple choices.
- Compactness: LEM/LEM+ vacuum pumps are the most compact on the market.
- Short response times: Installation close to suction cups.
- Automatic blow-off (LEM+): Automation efficiency due to an automatic blow-off function configurable from 0 to 10 seconds.
- Dust resistant: Non-clogging through-type silencer.
- Safety: Product gripping is maintained even during power failure.

➔ **See pages 8/3 to 8/14.**

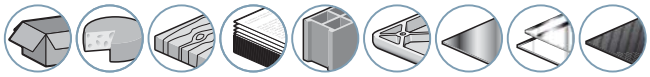
LEM+
Nozzle diameter:
- 2 and 2.5 mm.

Suction flow rate:
- from 4.41 to 9.71 SCFM.

LEM
Nozzle diameter:
- 1, 1.2 and 1.4 mm.

Suction flow rate:
- from 1.02 to 3.25 SCFM.

- For all types of porous or airtight workpieces:



Compact Vacuum Pumps
LEMAX, LEMAX+

AIR Saving Control

90% energy savings on airtight parts

- Suction flow rate from 1.02 to 7.06 SCFM.
- Nozzle diameter: 1, 1.2, 1.4, 2 and 2.5 mm.
- 85% of maximum vacuum.
- Easy implementation: Plug & Play, multiple choices.
- Compactness: LEMAX/LEMAX+ vacuum pumps are the most compact on the market.
- Short response times: Installation close to suction cups.
- Automatic blow-off (LEM+): Automation efficiency due to an automatic blow-off function configurable from 0 to 10 seconds.
- Dust resistant: Non-clogging through-type silencer.
- Safety: Product gripping is maintained even during power failure.

➔ **See pages 8/15 to 8/26.**

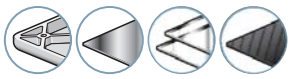
LEMAX+
Nozzle diameter:
- 2 and 2.5 mm.

Suction flow rate:
- from 4.41 to 7.06 SCFM.

LEMAX
Nozzle diameter:
- 1, 1.2 and 1.4 mm.

Suction flow rate:
- from 1.02 to 2.47 SCFM.

- For airtight parts:



NEW PRODUCTS

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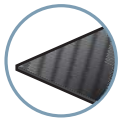
High-Throughput Suction Cups
MVS

These suction cups are made of food-grade silicone and have very soft lips. While the hardness of standard suction cups ranges from 50 to 60 Shore, MVS suction cups are offered in a much softer and more flexible 35 Shore.

This level of softness allows them to grip all types of materials at high speeds: bags of grated cheese, squeezable food pouches, baked goods or sausages, perfume bottle lids, etc. The throughput reaches up to 120 handling cycles (pick and place) per minute.

A wide range with extensive applications
All MVS suction cups from COVAL are available with 1.5 or 2.5 bellows and diameters of 20, 30 and 40 mm.

See page 3/3.



Mark-Free, Ultra-Flat Suction Cups
VPSC

- Gripping raw composite materials.
- No material migration.
- Non-marking on composite parts.

The COVAL **VPSC** suction cup has been developed in partnership with composite materials manufacturers to be able to grip uncured composites without leaving any traces or deformation.

Its ultra-flat design and innovative vacuum feeding system on the entire surface of the suction cup ensure maximum gripping power. The profile of the **VPSC**'s extra-thin lip enables it to fit the part's curve without any constraints.

This suction cup is made of a hydrocarbon-resistant material that guarantees a long lifetime.
It is also available in natural rubber and food grade silicone for a variety of applications.

See page 3/8.

NEW PRODUCTS

COVAL
vacuum managers

Vacuum Switch with 3-Color Display

PSD

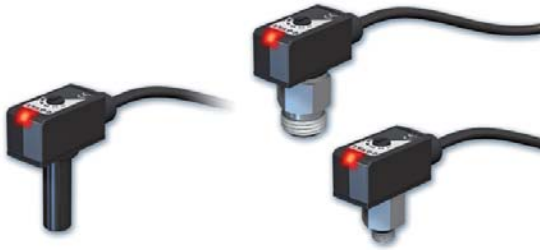
The **PSD** series miniature vacuum switch offers great reading comfort thanks to the size of its screen and 3-color display. It features a high-precision electronic vacuum-measuring sensor. Its compact and lightweight design make it easy-to-integrate on all machines. It comes with an M8 connector for easy hookup and is very simple to set up.

Measure, control, inform
3 functions in a small format: **30 x 30 x 25 mm** for easy integration on your machines.

See page 11/5.

Miniature Electronic Vacuum Switches

PSK



Thanks to their ultra-compact design and easy installation, **PSK** adjustable miniature vacuum switches can fit into the tightest spaces to be located as close as possible to the suction cups and thus reduce response times.
PSKs are recommended for applications that only require a "part present" signal and provide a cost-effective and efficient solution for applications with one vacuum generator per suction cup.

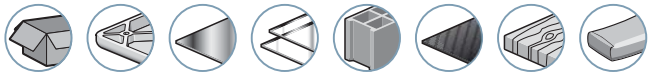
See page 11/3.

Modular Vacuum Grippers

MVG

The **MVG** modular vacuum gripper consists of standard subassemblies and provides a customized vacuum gripper solution for handling parts of various sizes, shapes, and weights.

- Customized dimensions.
- Selection of gripping areas.
- Compact and lightweight.
- Adaptable to products to be handled (choice of gripping interfaces).
- Adaptable to equipment (different types of vacuum generators).
- Universal fastener.
- Integrated functions.
- Easy installation and operation.



See page 13/2.

COVAL
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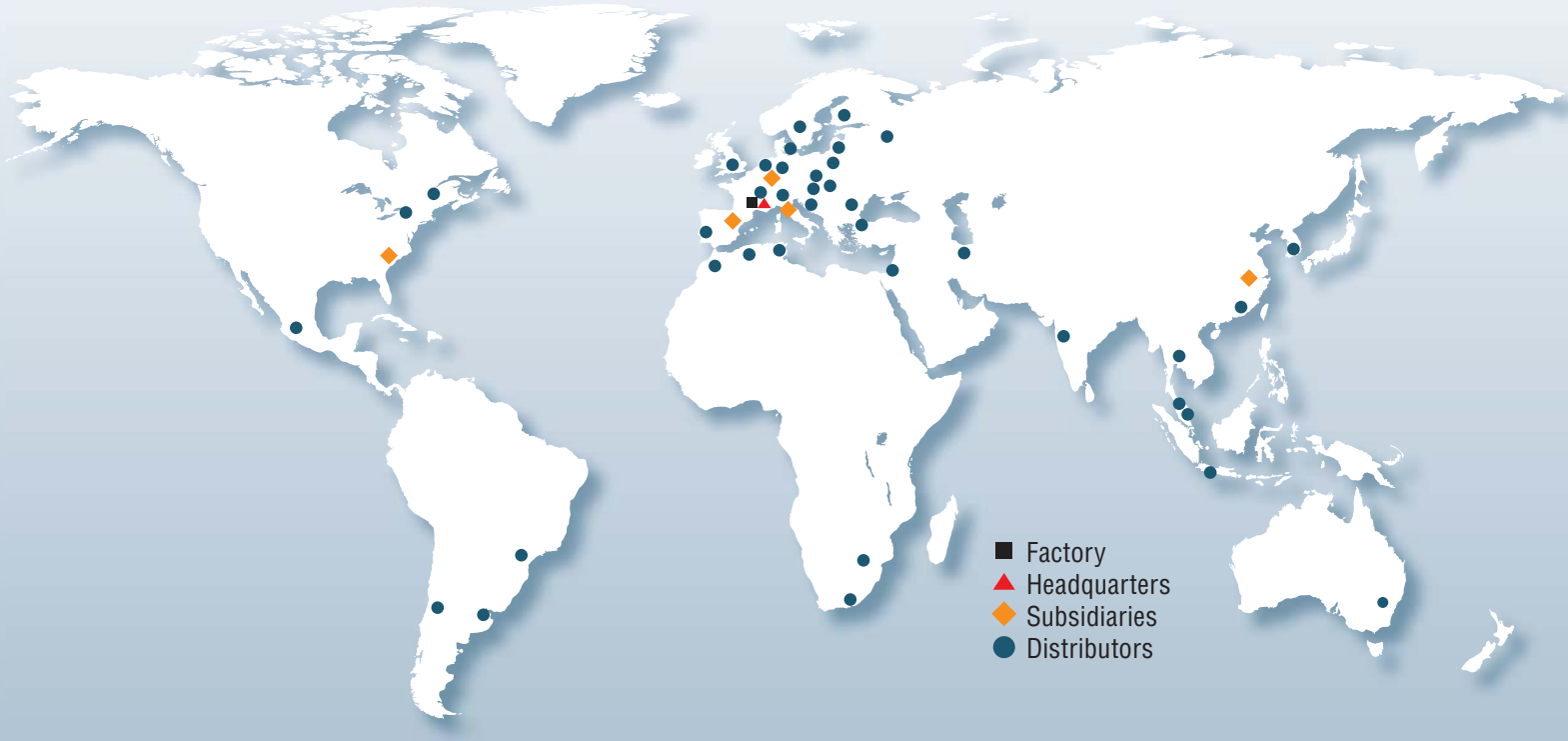
A TECHNOLOGICAL PARTNER ON A GLOBAL SCALE

Every year, we keep developing our network of partners (subsidiaries, distributors and independent agents) to assist our clients in their quest for local and international markets.



▶ **HEADQUARTERS** based in **FRANCE**

Since its creation in 1986, COVAL S.A.S. is established in Montélier in southern France.

▶ **5 SALES SUBSIDIARIES**

COVAL Inc. | COVAL Iberica | COVAL Germany | COVAL Italia | COVAL China

▶ A broad network:
- **25** authorized **DISTRIBUTORS in FRANCE**
- **30** authorized **DISTRIBUTORS outside FRANCE**

▶ Visit the following section on our **WEBSITE:**
Contact – Sales network,
to view the latest **UP-TO-DATE LIST**

Advanced Vacuum Solutions

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Vacuum Applications and Measurements

VACUUM HANDLING DEVELOPMENT

Industrial vacuum applied to suction cups is an efficient method for handling objects and materials.

This technique was developed to meet automation needs in the industry with applications in parts assembly, finishing, testing, transfer, packaging, etc.…

It is designed particularly for the automobile, wood and plastics industries, as well as all object transformation activities: food, electricals, furniture, etc.

Vacuum handling has become a key production technology, and this document will detail the rules, procedures and components involved.

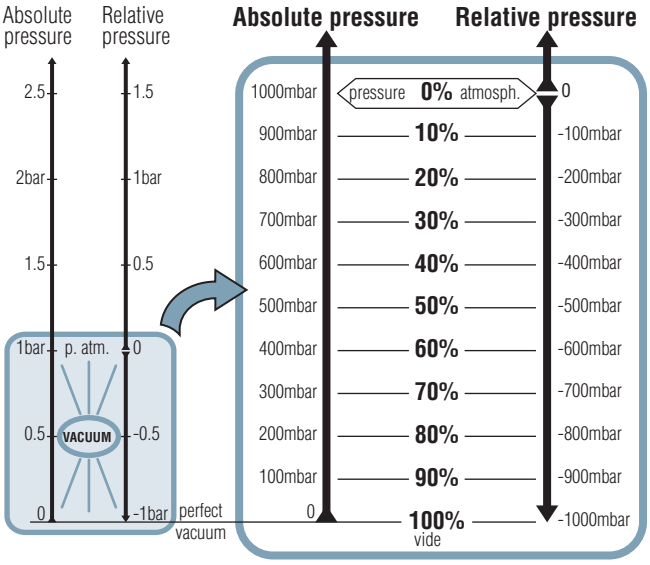
MEASURING VACUUM LEVEL

Scientists use absolute pressure, with a scale that starts at perfect vacuum, with atmospheric pressure measuring roughly 1 bar.

For industrial applications, relative pressure is preferred because it marks a clear distinction between vacuum (negative pressure) and positive pressure.

In gripping applications, vacuum is only effective by its difference compared with atmospheric pressure. However, atmospheric pressure varies slightly depending on the altitude of the application site. This is why it is more practical to express vacuum level as a percentage of the atmospheric pressure.

The scale shown on the right illustrates the relationship between pressures expressed in bar and mbar and the vacuum level shown as a percentage of the atmospheric pressure. This relationship is accurate for use at an altitude of 100m. This is the measurement that we will use when discussing suction cups, since this is the most common altitude of industrial sites



VACUUM UNITS CONVERSION

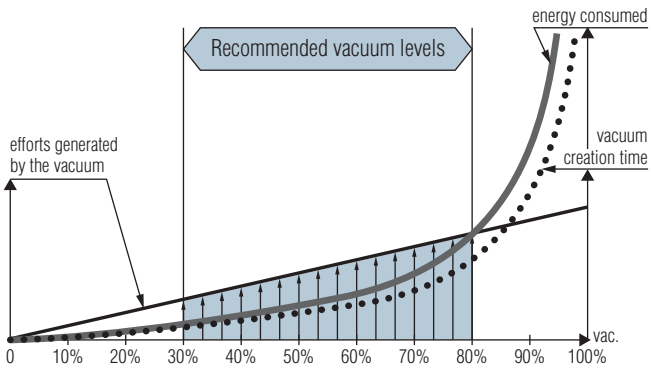
Relative vacuum

%	bar	mbar	Torr (mmHg)	inHg	kPa
0%	0	0	0	0	0
10%	-0.101	-101	-76	-2.98	-10.1
20%	-0.203	-203	-152	-5.99	-20.3
30%	-0.304	-304	-228	-8.97	-30.4
40%	-0.405	-405	-304	-11.96	-40.5
50%	-0.507	-507	-380	-14.97	-50.7
60%	-0.608	-608	-456	-17.95	-60.8
70%	-0.709	-709	-532	-20.93	-70.9
80%	-0.811	-811	-608	-23.94	-81.1
90%	-0.912	-912	-684	-26.93	-91.2
100%	-1.013	-1013	-760	-29.91	-101.3

RECOMMENDED VACUUM LEVELS

Gripping provides a level of effort that is proportional to the level of the vacuum that generates it (see curves below). For the most efficient operation, a maximum vacuum level is recommended. However, the curves also show that a high level of vacuum:
– has a high energy cost
– takes a long time to establish

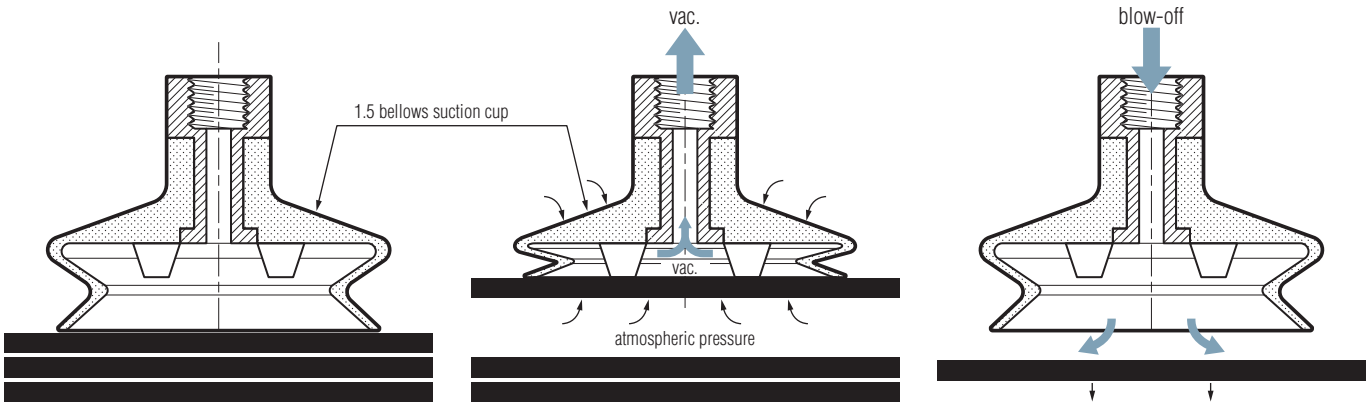
This is why the vacuum levels used should be limited, from 30% when a high flow of vacuum needs to be maintained, to 80% in an airtight circuit (no flow required to maintain the vacuum).



Vacuum Handling Guide

Suction Cup Performance

VACUUM HANDLING PHASES



1- Approach

For shock-free contact with the surface to be gripped, and to conform to its shape, the suction cup in this instance has 1.5 bellows.

Chapter 2 outlines a choice of suction cups and fittings to facilitate this phase.

2- Gripping

Vacuum is then applied to the suction cup, which lifts the object pushed by atmospheric pressure.

The suction cup and object then remain bound together throughout the entire process (transfer, packaging, etc).

3- Release

At the end of the suction process, the vacuum is interrupted to release the object.

Most often, an air blow-off will help this process and avoid sticking. This also helps to quickly move to the next cycle.

VACUUM LEVELS AND SUCTION CUP SIZING

In practice, the majority of surfaces requiring suction are not airtight. If the material is porous or the surface is rough, it is inevitable that air will escape into the vacuum through the material or under the edges of the suction cup. In this situation, a high flow of vacuum must be maintained to compensate for air leaks and to maintain gripping. This can be done economically and efficiently at a low level of vacuum.

Within the recommended vacuum range of 30% to 80%, two distinct zones must be distinguished, depending on the nature of the object to be gripped..

1. Porous materials

The 30 to 55% vacuum zone is both economical and efficient, given the amount of vacuum flow required. The suction cups should be sized appropriately to obtain the required holding force.

2. Airtight surfaces

In this case, the 55 to 80% zone gives excellent results. The holding force is greater(curves opposite), so that smaller suction cups may be used.

Chapter 2 outlines a method for sizing the suction cups, particularly in relation to the chosen vacuum level.

1. Porous materials

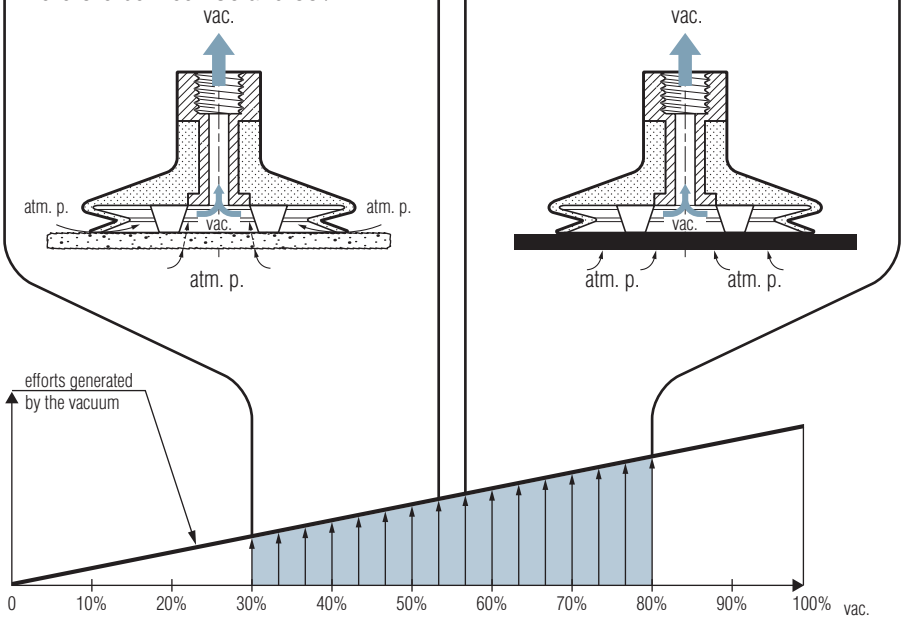
Greater vacuum flow must compensate for products and processes that cause air leaks such as cardbaord, agglomerated materials, rough wood, irregular surfaces, etc.

The most economic vacuum level is therefore between 30 and 55%.

2. Airtight surfaces

With metal, plastics, glass and any other smooth, airtight surface, the vacuum flow required remains low, or even zero.

The vacuum level can therefore be higher, between 55 and 85%.



Vacuum Handling Guide

Vacuum Generation Technologies

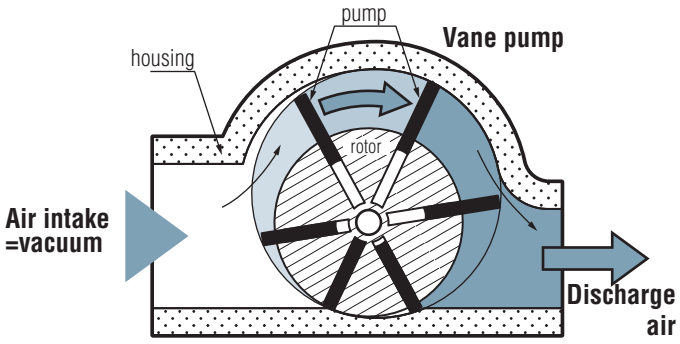
1- CONTINUOUS VACUUM, USING ROTARY VACUUM PUMPS

Rotary Vacuum Pump Principle

The most commonly used type of rotary pump is the vane pump (illustration).

The blades are spun at high speed by the rotor, and the centrifugal force pushes them against the pump housing. The air is displaced and pushed out, creating a vacuum at the inlet.

For low vacuum levels only, turbines (or regenerative blowers) are also used, which operate in a similar manner to vacuum cleaners: a rotor with blades that do not make contact with the housing, causing air to move at high speed.



Range of Rotary Vacuum Pumps

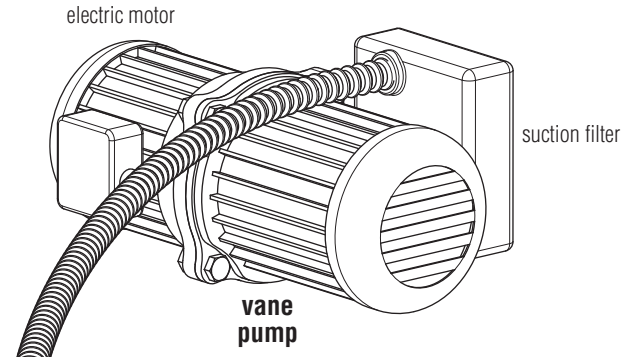
To maintain optimum output, rotary pumps must remain within average power levels: from 1 to 10 Kw. The suction capacity generated is much higher than the normal requirements of industrial suction cups.

Operation Applications and Practice

Rotary pumps are used where a constant, high level of suction flow rate is required. Vacuum packaging machines are a typical example of this.

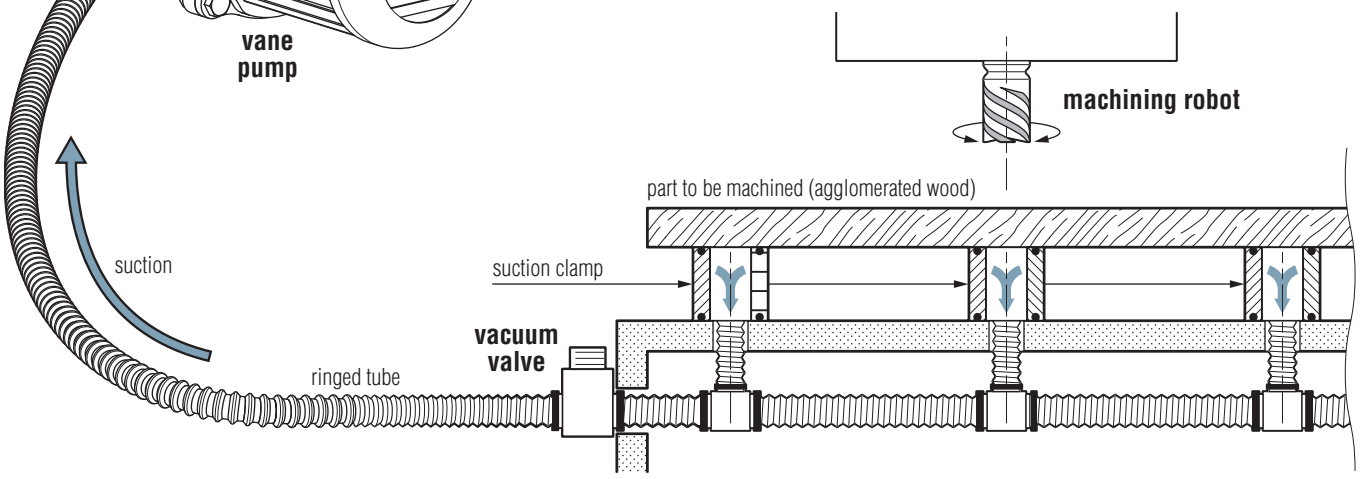
However, in the vast domain of vacuum gripping, rotary pumps are only used in rare instances, where an object requires a high level of suction flow rate that needs to be maintained for a long time during the cycle.

Rotary Vacuum Pumps	
• Constant consumption, continuous generation of vacuum, even for intermittent requirements: not suitable for intermittent vacuum generation requirements. • Located far from the suction cups.	**Applications :** • Vacuum sources for various processes such as vacuum packing, etc. • Clamping maintained throughout the cycle, with high suction flow rate (porous objects etc.)



A Typical Application

The example shown below is a digital control manufacturing robot, which uses suction cups to clamp porous parts. Note that the pump, which is bulky, noisy and causes vibrations, must be installed well away from the operational section of the machine. It is connected via a tube, which must have a large diameter (40 to 80 mm) to reduce the loss of vacuum, which can sometimes be dangerous.

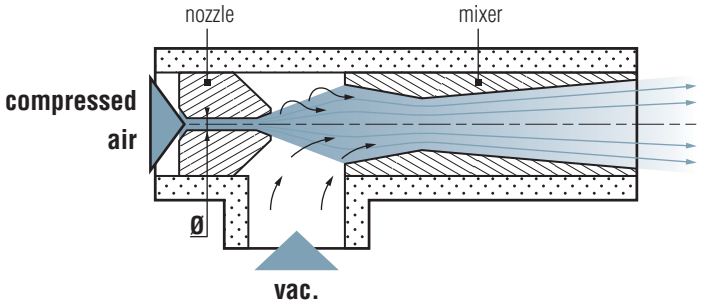


INTERMITTENT VACUUM, USING VENTURI VACUUM PUMPS

Venturi Vacuum Pump Principle

Using the "venturi" effect : a nozzle of diameter Ø is supplied with compressed air. The air jet carries along ambient air in its turbulence and then passes through the mixer on its way out. This suction effect of ambient air creates the depression that generates the vacuum.

Unlike rotary vacuum pumps which must turn continuously, venturi vacuum pumps can operate intermittently, only when the suction cups require vacuum.



Venturi Vacuum Pumps	
• Consumption only when needed, results in low air consumption. • Installation very close to the suction cups. • Suction flow rate and vacuum level optimized for each application.	**Applications :** • All intermittent gripping operations, i.e. which only last for a part of the full cycle of the machine

Venturi Vacuum Pump Ranges

The variations in nozzles and mixers offer an optimal range to meet all needs.

■ Nozzle diameter Ø

The diameter defines the force generated and therefore the suction capacity: Ø 0.5mm for micro suction cups, to Ø = 3mm with a suction capacity of 15.9 SCFM for several large suction cups.

■ Mixer profile

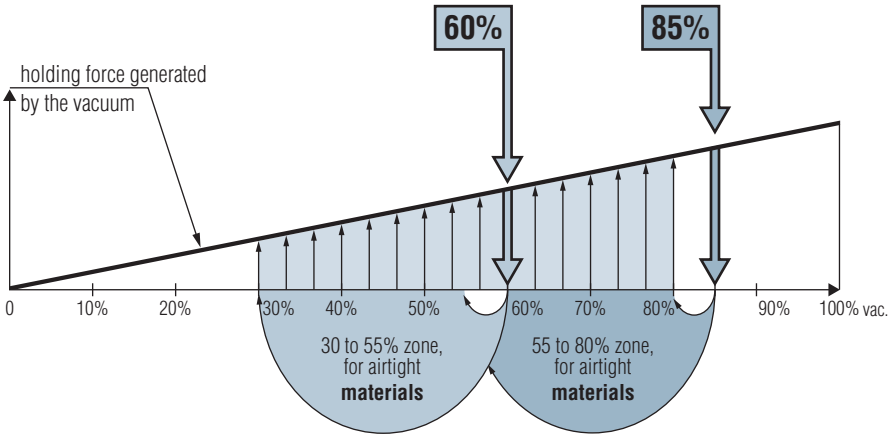
This profile defines the maximum level of vacuum achieved by the venturi.

Two standard levels offered by COVAL:

• 60% for porous material (30 to 55% vacuum)

• 85% for airtight materials (55 to 80% vacuum)

Max. vacuum ▸ 2 standard levels:



Applications and Practice

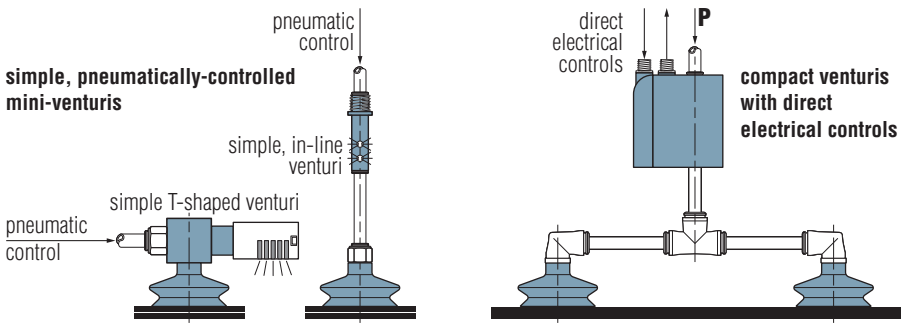
Venturi vacuum pumps are used for all normal vacuum gripping applications.

Compact and light, venturis are installed as close as possible to the suction cups: little pressure loss and a minimum volume to purge, resulting in short response times and minimum energy consumption.

The following distinguishes between:

■ simple, pneumatically-controlled venturi pumps, which are miniaturized for installation on suction cups.

■ complete, electrically-controlled venturi pumps, for installation as near as possible to the suction cups.



Vacuum Handling Guide

The Process of Defining an Installation

All vacuum handling systems require a three-stage approach:

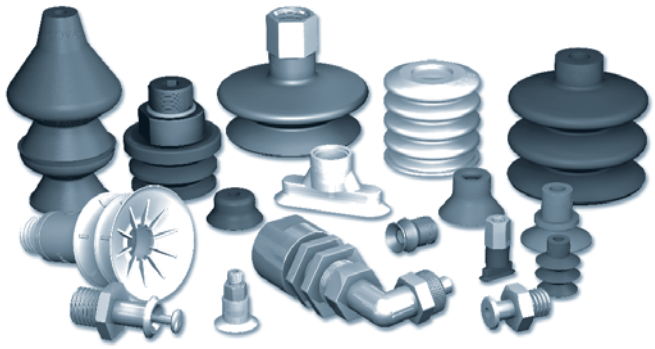
1. Defining the appropriate suction cups and attachments for the object to be gripped, the movements required, the type of object (airtight or porous), the holding force required, the cycle rate, the environment, etc.
2. Selecting the appropriate vacuum generator for the suction cups, the type of object (airtight or porous), the required response times, etc.
3. Identifying the additional components required to connect, supply and control the installation.

The 3 steps to follow:

STEP 1: SUCTION CUPS AND THEIR ATTACHMENTS

COVAL offers a wide range of suction cups, in two main groups: standard and special purpose. Tailored solutions can also be developed according to a set of custom requirements.

Chapter 1 provides a detailed guide on how to choose a suction cup for a given application, among the wide range presented in chapters 2 and 4.



STEP 2: VACUUM GENERATORS AND THEIR MEANS OF CONTROL

Selecting the perfect vacuum source for the suction cups used guarantees optimal productivity.

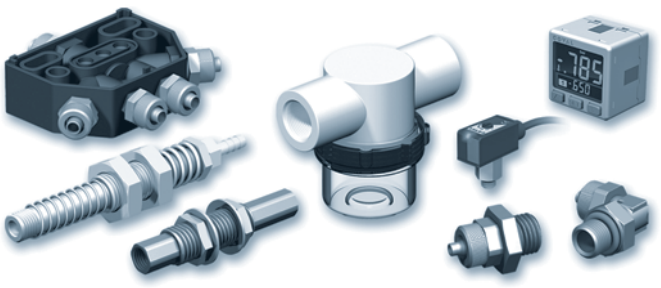
COVAL has developed a full range of venturi vacuum pumps using the most advanced technologies: optimized flow rates, low energy consumption, reduced weight and bulk, and silent operation. Numerous integrated functions mean they are easier and more economic to install and use.

Chapter 5 provides a guide starts with a guide to choose and configurate a venturi among the many possibilities presented in the catalogue, from vacuum pump chapter 6 to 9.

STEP 3: AUXILIARY COMPONENTS

Peripheral components are an essential addition to the vacuum network and guarantee reliable installation. The risks related to improper use are increased energy consumption and noise and decreased overall efficiency.

Chapters 4 and 12 present a wide variety of auxiliary components



Suction Cups

Chapter 1

Suction Cups

Selection Guide

1

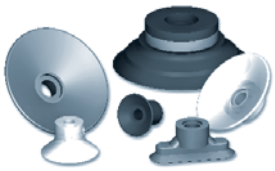
A suction cup is a gripper which can be used to handle all sorts of objects of different weights, surfaces, shapes and sizes.
For this reason we feel it would be helpful to explain all the parameters to be taken into consideration, in order to choose the right suction cup.

THE SHAPES

Flat Suction Cups

■ Flat suction cups without cleats

Used for handling flat or slightly rounded, rigid, smooth objects. They withstand lateral forces and can be used for vertical handling.



■ Flat suction cups with cleats

Used for handling thin, flexible, deformable objects. They increase resistance to lateral forces and horizontal handling.

Suction Cups with Bellows

Used to handle spherical, cylindrical or egg-shaped objects. The effect of the technical characteristics increases with the number of bellows.

They can be used for gripping objects with height differences, for a ball-joint effect, to lift and to grip corners or edges.

SUCTION CUP FORCE CALCULATION

The force of a suction cup is proportional to its surface under vacuum and also depends on its shape, flexibility, material and especially on the level of vacuum attained inside the suction cup.

Theoretical force

F(lbf) = S (cm^2) x V (Bar) / 0.2248*
S = Surface of the suction cup (cm^2)
V = Vacuum level (bar) (ex: 50% vacuum = -500 mbar = -0.5 bar, for calculation use 0.5)
(*) coefficient to convert daN (decanewton) to lbf (pound-force)

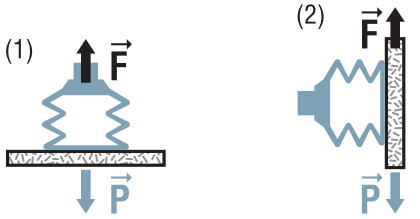
Actual force

As its name implies, this force represents the actual force of the suction cup when in use. In general this is 50% less than the calculated theoretical force.
This difference is explained by the distortion of the suction cup during handling (which reduces the gripping surface), and by the condition of the surface of the object being handled.

The safety factor

All holding forces are listed in the data tables for each range of suction cup. These are **actual values at 65% vacuum**, calculated with a safety factor of:

■ 2 for horizontal gripping (1),
■ 4 for vertical gripping (2).



For applications involving high acceleration, the safety factor will be calculated accordingly.

SUCTION CUP TECHNICAL DATA

Diameters

The force of the suction cup and the product's available gripping surface depend on this parameter. COVAL offers standard suction cups of 1 to 600mm in diameter across the product ranges.

Minimum bend radius

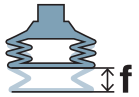
This indicates the minimum radius of a product to be reliably gripped by the suction cup.

Internal volume

This corresponds to the volume which must be evacuated during a vacuum cycle. It must accounted for in the total volume of the gripping system and thus in the suction time calculation.

Stroke

This corresponds to the compression of the suction cup during the vacuum cycle.



Suction Cups

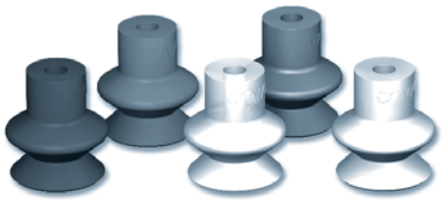
Selection Guide

Parameters to be taken into consideration when choosing a suction cup

Shape of the load	Flat • Rounded • Cylindrical • Egg-shaped • Spherical, etc.
Type of material of the load	Porous • Airtight • Deformable • Rigid • Fragile, etc.
Condition of the surface of the load	Smooth• Granular • Ridged • Abrasive, etc
Appearance of the load	Damp • Oily • Dusty • Viscous • Dry, etc
Weight of the load	Heavy • Light, etc.
Temperature of the load	From -40 to 482°F depending on the materials chosen.
Direction of gripping	Horizontal • Vertical • Over corners • Height differences, etc.
Type of grip	Handling • Lifting • Holding • Unfolding … objects.
Available surface	Depending on the load
Cycle time	Accelerations

COVAL MATERIALS

To meet the constraints of industrial applications, COVAL has a wide range of both standard and specific materials. COVAL can also study new materials based on specific requirements of your applications.



Properties of the materials

Materials	Shore Hardness A	Flexibility	Abrasion resistance	UV & weather resistance	Oil resistance	Heat resistance		Food compatibility	Color
						in °C	in °F		
NBR: Nitrile	60	+	+	–	+ +	0 to 80	32 to 176	–	Black
SI: Translucent Silicone	50	+ + +	–	+ + +	–	-40 to 220	-40 to 428	FDA and EC standard	Translucent
SIB: White Silicone	35	+ + + +	–	+ + +	–	-40 to 220	-40 to 428	FDA and EC standard	White
SIT5: Translucent Silicone	50	+ + +	–	+ + +	–	-40 to 220	-40 to 428	FDA and EC standard	Translucent
NR: Natural Rubber	50	+ + +	+ +	– –	– –	-20 to 70	-4 to 158	+	Grey
STN: Siton®	60	+	+ +	–	+ +	0 to 160	32 to 320	–	Blue
STN5: Siton®	50	+ +	+ +	–	+ +	0 to 160	32 to 320	–	Blue

SITON®

The COVAL laboratory has developed a new material: SITON®. SITON® is a silicone-free material which therefore does not leave a mark and was specially developed for handling hot objects that are waiting to be painted.

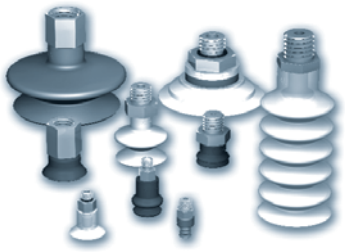
- SITON® can withstand a maximum temperature of 320°F
- SITON® has good resistance to abrasion.

Example of an application: Removal of plastic parts from injection mold machine.

Standard availability in 60 shore and on request in 50 shore (Part No: STN5) for VSA and VS series.

Suction Cups

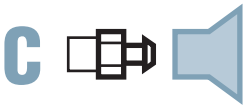
Suction Cup Fitting Options



1 Standard Configuration Options

COVAL suction cups offer versatile mounting and fitting options:

Version C:
Barbed fittings.



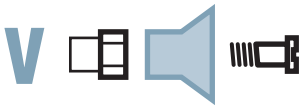
The suction cup is easily pressed onto the fitting.

The suction cups and their fittings are delivered unassembled.

Types of use:
- Lightweight products.
- Horizontal handling.
- For suction cups belonging to groups 1 and 2.

Advantages :
- Quickest changeout of suction cups without the need for tools, improving efficiency.
- Fitting can be reused, thus reducing replacement costs.

Version V :
2-piece removable fittings
(hollow screws and adapter)



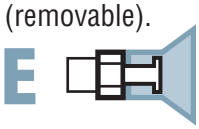
The V mounting utilizes a hollow screw passing through the suction cup and connecting to an adaptor on the opposite side, fixing the suction cup in place.

The suction cups and their fittings are delivered unassembled.

Types of use :
- Heavy and lightweight products.
- Horizontal, vertical and rotational handling.
- For suction cups belonging to groups 2 and 3.

Advantages :
- Excellent mechanical grip of the suction cup.
- Excellent vacuum sealing of the assembly.
- Fitting can be reused, thus reducing replacement costs.

Version E :
Pressed fitting
(removable).

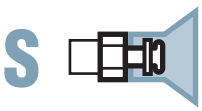


The fitting is factory pressed onto the suction cup.

Types of use :
- Lightweight and heavy products.
- Horizontal, vertical and rotational handling.
- Recommended for handling of porous products.
- For suction cups belonging to group 2.

Advantages :
- Excellent mechanical grip of the suction cup.
- Excellent vacuum sealing of the assembly.
- Greater potential vacuum flow rate when handling porous products.

Version S :
Factory-crimped fitting



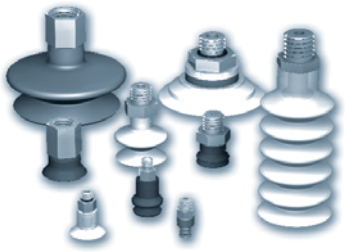
The fitting is factory-crimped onto the suction cup, ensuring a one-piece assembly.

Types of use :
- Heavy and lightweight products.
- Horizontal handling, vertical and rotational.
- Recommended for handling of porous products (when greater flow is required).
- For suction cups belonging to group 3.

Advantages :
- Excellent mechanical grip of the suction cup.
- Excellent vacuum sealing of the assembly.
- Greater potential vacuum flow rate when handling porous products.

Suction Cups

Configuration Reference "Suction Cup + Fitting"



Referencing

To simplify selection of fittings for standard suction cups, a male or female fitting option can be found in the example table, **"Choice of fittings"**.

To demonstrate assembly options, reference the example below, **Standard configurations** (suction cup + fitting) which indicates full part numbers as well as **non-standard configurations**.

Ex :

Choice of Fittings

(Ø)	Group	M3-M	M5-M	M6-M	M8-M	M10-M	G1/8"-F	G1/8"-M	10/32-M	G1/4"-F	G1/4"-M	G3/8"-M	G1/2"-M
5	1	■	-	-	-	-	-	-	-	-	-	-	-
11…25	1	-	■	■	-	-	■	■	□	-	-	-	-
26…63	2	-	□	□	□	□	■	■	-	■	■	-	-
78	3	-	-	-	-	□	-	■	-	■	■	□	□

■ Standard configurations (suction cup + fitting) □ Non-standard mounting configurations

Fitting: M = male F = female

Standard configurations (suction cup + fitting) now have a single part number, simplifying your stock managment and order fulfillment.

Ex:

Group 3		V			S	
ø 78 mm	THREAD	G1/8"-M	G1/4"-M	G1/4"-F	G1/4"-M	G1/4"-F
	VSA78NBR	VSA78NBRIM18V	VSA78NBRIM14V	VSA78NBRIF14V	VSA78NBRIM14	VSA78NBRIF14
	VSA78NR	VSA78NRIM18V	VSA78NRIM14V	VSA78NRIF14V	VSA78NRIM14	VSA78NRIF14
	VSA78SIT5	VSA78SIT5IM18V	VSA78SIT5IM14V	VSA78SIT5IF14V	VSA78SIT5IM14	VSA78SIT5IF14
	VSA78STN	VSA78STNIM18V	VSA78STNIM14V	VSA78STNIF14V	VSA78STNIM14	VSA78STNIF14

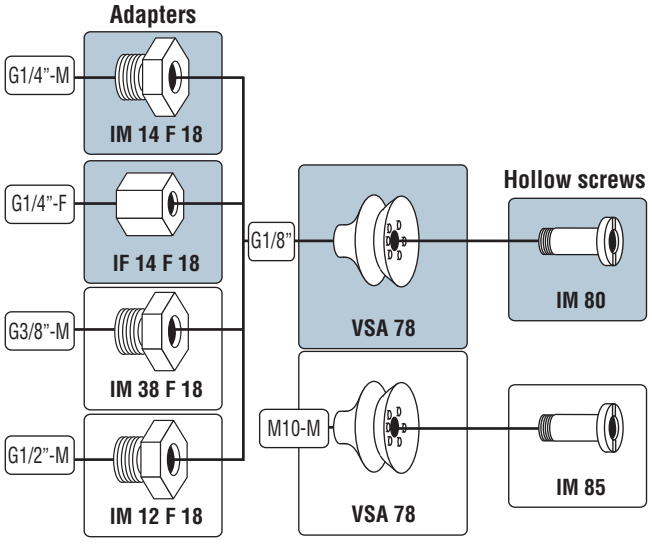
Note :

For standard configurations (suction cup + fittings), the C and V versions are delivered unassembled.

Additional mounting configurations are available. You can find all options on pages "assembly diagrams"

Ex:

Removable fittings V



■ Standard configurations (suction cup + fitting).

□ Non-standard configurations must be ordered in seperate part numbers.

Suction Cups

The COVAL Range

1

Standard Suction Cups

See chapter 2

Standard suction cups are suitable for all types of applications in various sectors like packaging, plastics, agri-food, sheet-metal working, etc.

These suction cups satisfy very diverse specifications thanks to a wide range of shapes, diameters and materials.

COVAL offers a full range of fittings adapted to suction cups and compatible with all types of applications.

Flat Suction Cups		
VP 	■ Ø 8 to 75 mm ■ 4 standard materials	■ High tensile force and precise gripping and releasing ■ High resistance to lateral forces allowing vertical handling ■ Full range of fittings and shut-off valves
VPG 	■ Extra-flat suction cups ■ Ø 2 to 200 mm ■ 3 standard materials	■ Highly precise gripping and releasing of the load ■ High throughput rates
VPU 	■ Ø 6 to 50 mm ■ 3 standard materials	■ Suitable for gripping rigid and flat products
VPF 	■ Flat suction cups with cleats ■ Ø 15 to 50 mm ■ 3 standard materials	■ Suitable for gripping rigid and flat products ■ Cleats prevent the deformation of the product and provide excellent non-slip properties
VPO 	■ Flat oblong suction cuts ■ From 2x4 mm to 30x90 mm ■ 3 standard materials	■ Used for handling elongated products such as pens, tubes, bottles, bulbs and flat or cylindrical objects etc.
Suction Cups with 1.5 Bellows		
VSA 	■ Ø 5 to 78 mm ■ 5 standard materials	■ Combines the advantages of flat suction cups with added angle, flexibility and precision ■ Used for gripping slightly concave or convex parts ■ Full range of fittings
VSAB 	■ Ø 5 to 50 mm ■ 3 standard materials	■ Used for gripping slightly concave or convex parts ■ Suitable for gripping products of various heights
VSAG 	■ Ø 10 to 150 mm ■ 3 standard materials	■ Recommended for gripping sensitive products due to the cushioning effect of the bellows ■ Used for gripping slightly concave or convex parts
VSAJ 	■ Ø 15 to 30 mm ■ 2 standard materials	■ Used for gripping slightly concave or convex parts ■ Suitable for gripping products of various heights
Suction Cups with 2.5 Bellows		
VS 	■ Ø 5 to 88 mm ■ 4 standard materials	■ Recommended for gripping products on different planes (wide deflection) or cylindrical objects gripped at an angle (ball-joint effect). ■ Full range of fittings
VSG 	■ Ø 5 and 7mm ■ 3 standard materials	■ Suitable for gripping small products, concave or convex ■ Ideal for handling sensitive products
Long Stroke Suction Cups		
VSD 	■ Suction cups with 4.5 and 5.5 bellows ■ 2 standard materials	■ Strongly recommended for handling spherical or cylindrical products requiring a large height adjustment.
High-performance Suction Cups		
C 	■ Full range of shapes (flat, bellows, oblongs) ■ Ø 35 to 125mm and 25x65mm to 70x140mm ■ Integrated M38G, F38G or Square 32 fittings ■ Structure and internal cleats	■ Textured suction cups for gripping thin sheets ■ Non-slip cleats ensure optimum positioning of oily sheet metal ■ Extreme resistance to slipping, ■ Airtight integrated fittings ■ Ideal for automated applications
Suction Cups with Foam Rings		
VSA-VS BM / VSBM 	■ Foam rings ■ Can be adapted to standard suction cups ■ 2 standard materials	■ Bonded under a suction cup to allow products with an irregular or even-ridged surface to be gripped ■ Sawn wood, sheet metal, flat surfaces with bumps or hollows (all types of granular surface)

Suction Cups

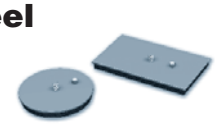
The COVAL Range

Special Purpose Suction Cups

See chapter 3

Thanks to a technological mastery and collaboration with its customers in different branches, COVAL supplies solutions for vacuum handling via a wide range of special purpose suction cups.

E.g. handling eggs, flexible bags, raw composite, bottles, paper, cakes, etc.

Suction Cups for Opening Bags			
MVS		■ Suction cups with 1.5 and 2.5 bellows ■ 9 models available ■ Silicone: FDA and EC standard	■ Used to grip delicate objects. Very flexible lip (opening bags, gripping tins and flexible aluminum or plastic bottles, etc.) ■ High throughput rate ■ Gripping of flexible products
Suction Cups for Bakery Applications			
VSD **VSE** **VSP**		■ Suction cups with 2.5 to 5.5 bellows ■ 11 models available ■ Silicone: FDA and EC standard	■ Range specially developed for gripping delicate objects such as cakes (buns, biscuits, etc.) ■ Specific shapes and shore hardness depending on the applications ■ Temperature resistance: -40°F to 428°F.
Suction Cups for Egg-handling			
VSO		■ Suction cups with 2.5 and 3.5 bellows ■ 3 models available ■ Silicone: FDA and EC standard	■ Range specially designed for handling eggs ■ Very flexible lip ■ Different shapes of suction cup
Ultra-flat Suction Cups, Non-marking			
VPSC		■ Ultra-flat suction cups ■ Ø 80 mm ■ 3 materials	■ Suction cup specially designed not to deform the product being handled. ■ Vacuum distributed across the entire surface of the suction cup for an optimal gripping force. ■ Extra-thin sealing lip designed to contour to the shape of the product being handled
Bottle Suction Cups			
VSBO **VSBO+**		■ Suction cups with 4.5 bellows ■ 3 models available ■ High tensile force ■ Highly flexible and long stroke	■ Used to grip 750 ml bottles and Magnums. ■ Bottles gripped from the side, vertical and horizontal handling ■ Suction cup with stainless steel reinforcement in the bellows ■ Available with integrated sensing valve
Paper Suction Cups			
VPA		■ Flat suction cups ■ 9 models ■ Very flexible lip ■ Natural rubber and silicone (FDA and CE standard)	■ Range of suction cups with very flexible lip used to handle very flexible materials ■ Very resistant to abration (for paper, cardboard) ■ Very flexible gripping lip which molds to the shape of the object to be handled
VPR		■ Flat suction cups ■ 4 models ■ Natural rubber	■ Range of suction cups designed for mailing applications ■ Envelope filling, film-wrapping, mailing (picking) ■ Very resistant to abrabion
VPAG		■ Curved suction cups ■ 2 models ■ Natural rubber	■ Thanks to very flexible lips and a curved shape, the VPAG range is adapted to gripping flexible materials such as labels or sheets of paper or shaped objects ■ Very resistant to abrasion
VPYR		■ Flat suction cups with ball-joint system ■ 4 models (Ø 50 to 100mm) ■ Materials: nitrile and silicone	■ The range of ball-joint suction cups is recommended for gripping curved or rotating products which require a lot a lot of force and mechanical resistance
SPL		■ "Heavy load" flat suction cups ■ 5 models (Ø 240 to 600mm) ■ Materials: nitrile and silicone	■ SPL suction cups are used to handle heavy loads such as sheet metal or glass panels. They have internal cleats allowing them to handle thin sheet metal without distorting them and for vertical handling (non-slip)
Steel		■ Flat suction cups with a bonded foam seal ■ 9 cylindrical models (Ø 150 to 580 mm) ■ 9 oblong models (175x115 to 705x385mm)	■ For horizontal handling of heavy loads (thick sheet metal) or objects with an uneven surface such as concrete slabs or wood,etc. ■ Wide choice of dimensions

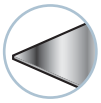
Suction Cups

Index of Symbols and Pictograms

1

You will find the symbols and pictograms described below in the "Suction cups" chapters to help you select the range of suction cups best suited to your application.

Industry-specific Applications



Metal

For handling rigid, smooth, flat objects (e.g. Sheet metal, glass or plastic panels).

- Heavy loads
- Oily objects
- High throughput
- High acceleration

Plastic

For handling plastic objects and requiring resistance to high temperatures, mark-free (e.g. COVAL-developed material, Siton®).

Eggs

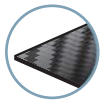
For handling requiring food compatibility, a very flexible lip and a specific shape of suction cup.

- Gripping eggs

Bottles

Gripping concave shapes and requiring strong vertical lifting force.

- For handling 750 ml bottles or Magnums



Composite materials

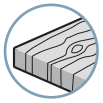
Gripping of raw composite materials.

- No material migration
- No marking of the composite product

Packaging

For handling wrapped products for packaging, cardboard products. Cardboard shaping, palletization, transfer, Pick & Place.

- Precision
- Abrasion



Wood

For handling materials with a slightly deformed, rough gripping surface requiring a foam seal to compensate for the unevenness and ensure airtightness.

Cakes

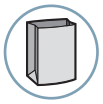
For handling requiring food compatibility, a very flexible lip and a specific shape of suction cup.

- Gripping buns, biscuits, etc.

Paper/picking

For handling paper, and labels and requiring high resistance to abrasion and a very flexible lip to grip flexible materials.

- Envelope filling, film-wrapping



Bags

Gripping very flexible, deformable materials (plastic or paper).

- e.g. blister pack, bagging, etc.

Types of Use

Flat surfaces, all thicknesses

Flat surfaces, thin layers

Rounded surfaces

Sheet metal (unstacking)

Flexible materials

Vertical handling

Granular surfaces

Tables

Model or reference	Internal volume	Tensile force	Slipping forace	Minimum convex curve radius	Minimum concave curve radius	Weight	See page

Standard Suction Cups

Chapter 2

Standard Suction Cups

Chapter 2

2

COVAL QUALITY

Standard suction cups are suitable for all types of applications in areas of activity such as packaging, plastics, agri-food, sheet-metal working, etc.
These suction cups satisfy very diverse specifications thanks to a wide range of shapes, diameters and materials.
COVAL offers a full range of fittings adapted to suction cups and compatible with all types of applications.

VP

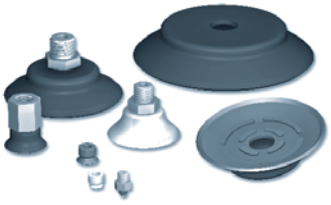
Flat Suction Cups Ø 8 to 75 mm

4 standard materials
- Nitrile
- Silicone
- Natural rubber
- Siton®

- High tensile force and precise gripping and releasing
- High resistance to lateral forces enabling vertical handling
- A full range of fittings and shut-off valves

P 2/3

VPG



Extra-flat Suction Cups Ø 1 to 200 mm

3 standard materials
- Nitrile
- Silicone
- Siton®

- Highly precise gripping and releasing of the load
- High throughput rates

P 2/9

VPU

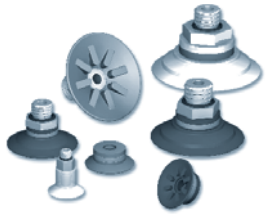
Flat Suction Cups Ø 6 to 50 mm

3 standard materials
- Nitrile
- Silicone
- Siton®

- Suitable for gripping smooth, rigid and flat products

P 2/17

VPF



Flat Suction Cups with Cleats Ø 15 to 50 mm

3 standard materials
- Nitrile
- Silicone
- Siton®

- Suitable for gripping smooth, rigid and flat products
- Cleats prevent the deformation of the product

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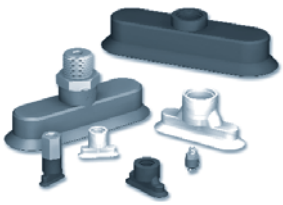
VPO



Oblong Flat Suction Cups

3 standard materials
- Nitrile
- Silicone
- Siton®

- Used for handling elongated products such as pens, tubes, bottles, bulbs and flat or cylindrical objects etc.

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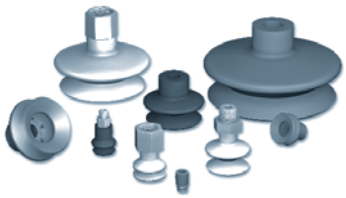
VSA



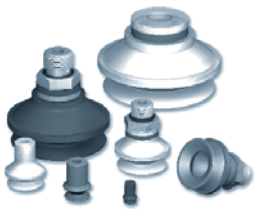
Suction Cups with 1.5 Bellows Ø 5 to 78 mm

5 standard materials
- Nitrile
- Translucent silicone
- 35 shore A white silicone
- Natural rubber
- Siton®

- VSA series suction cups with bellows combine the advantages of flat suction cups with more deflection, flexibility and precision
- Used for gripping slightly concave or convex parts
- Full range of fittings

P 2/25

VSAB



Suction Cups with 1.5 Bellows Ø 5 to 50 mm

3 standard materials
- Nitrile
- Silicone
- Siton®

- Used for gripping slightly concave or convex parts
- Suitable for gripping products of various heights

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Standard Suction Cups

Chapter 2

VSAG

Suction Cups with 1.5 Bellows Ø 10 to 150 mm

3 standard materials
- Nitrile
- Silicone
- Siton®

- Recommended for gripping products sensitive to the cushioning effect of the bellows
- Used for gripping slightly concave or convex parts

P 2/33

VSAJ

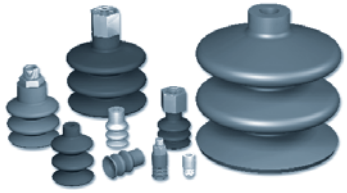
Suction Cups with 1.5 Bellows Ø 15 to 30 mm

2 standard materials
- Nitrile
- Silicone

- Used for gripping slightly concave or convex parts
- Suitable for gripping products of various heights

P 2/39

VS



Suction Cups with 2.5 Bellows Ø 5 to 88 mm

4 standard materials
- Nitrile
- Natural rubber
- Translucent silicone
- Siton®

- VS series suction cups with bellows are recommended for gripping products on different planes (wide deflection) or cylindrical objects gripped at an angle (ball-joint effect).
- Full range of fittings

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VSG

Suction Cups with 2.5 Bellows Ø 5 and 7 mm

3 standard materials
- Nitrile
- Silicone
- Siton®

- Suitable for gripping small products, concave or convex
- Ideal for handling sensitive products

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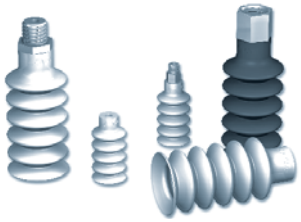
VSD



Long Stroke Suction Cups

2 standard materials
- Nitrile
- Silicone

- Strongly recommended for handling spherical or cylindrical products requiring a large height adjustment.

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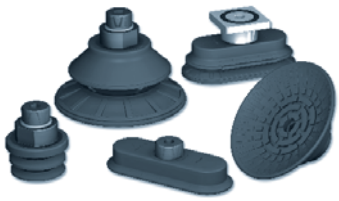
C



High-performance Suction Cups

- Full range of shapes (flat, bellows, oblongs)
- Ø 35 to 125mm and 25x65mm to 70x140mm
- Integrated M3/8G, F38G or Square 32 fittings
- Structure and internal cleats
- Textured suction cups for gripping thin sheet metal
- Non-slip cleats ensure optimum positioning of oily sheet metal
- Extreme resistance to slipping
- Air-tight integrated fittings
- Ideal for automated applications

P 2/55

VSA-VS BM
VSBM

Foam Rings

2 standard materials
- Nitrile
- Silicone

- The foam ring is designed for gripping products with an uneven or ridged surface, e.g.
- Sawn wood, sheet metal, flat surfaces with bumps or hollows.
- All granular surfaces to which suction cups cannot adhere correctly and therefore cannot be airtight.
- Foam rings can be adapted to VSA and VS series.

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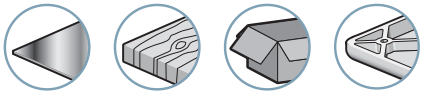
VP
Flat Suction Cups Ø 8 to 75 mm

VP series flat suction cups are specially recommended for handling flat, rigid, smooth products.

- High tensile force
- High resistance to lateral forces enabling vertical handling.
- High degree of precision

Industry-specific applications



Types of use

Materials

NBR Nitrile
NR Natural rubber
SIT5 Translucent silicone
STN Siton®

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	(lbf) (1)	R_{min} (mm)	NBR	SIT5	NR	STN
VP 8	7.5	0.04	0.24	0.12	10	**VP8NBR**	**VP8SIT5**	-	**VP8STN**
VP 10	10	0.05	0.36	0.18	13	**VP10NBR**	**VP10SIT5**	-	-
VP 15	15	0.18	0.83	0.41	13	**VP15NBR**	**VP15SIT5**	-	**VP15STN**
VP 20	20	0.44	1.38	0.68	20	**VP20NBR**	**VP20SIT5**	-	**VP20STN**
VP 25	25	0.7	2.11	1.06	25	**VP25NBR**	**VP25SIT5**	-	**VP25STN**
VP 26	26	1.5	2.52	1.25	35	**VP26NBR**	**VP26SIT5**	-	-
VP 30	30	2.9	3.57	1.79	40	**VP30NBR**	**VP30SIT5**	-	**VP30STN**
VP 35	35	2.7	5.20	2.60	50	**VP35NBR**	**VP35SIT5**	-	-
VP 40	40	4	6.01	3.00	50	**VP40NBR**	**VP40SIT5**	**VP40NR**	**VP40STN**
VP 50	52	7	8.60	4.30	75	**VP50NBR**	**VP50SIT**	-	**VP50STN**
VP 60	60	7.3	12.99	6.49	100	**VP60NBR**	**VP60SIT5**	-	-
VP 75	75	16	22.73	11.36	130	**VP75NBR**	**VP75SIT5**	**VP75NR**	-

(1) Actual force of the suction cup in use with 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.

Choice of Fittings

(Ø)	Group	M5-M	M6-M	M8-M	M10-M	G1/8"-F	G1/8"-M	10/32-M	G1/4"-F	G1/4"-M	G3/8"-M	G1/2"-M
8…25	**1**	■	■	-	-	■	■	□	-	-	-	-
26…60	**2**	□	□	□	□	■	■	-	■	■	-	-
75	**3**	-	-	-	□	-	■	-	■	■	□	□

■ Standard available configurations (suction cup + fitting) refer to page 2/4

□ Additional mounting configurations see page 2/7

Fitting: M = male F = female

Types of Assembly

COVAL suction cups can be assembled in a wide variety of configurations.

C  **Version C:** Barbed fitting

S  **Version S:** Factory-crimped fitting

V  **Version V:** Removable fitting: (adapter and hollow screw)

E  **Version E:** Pressed fitting

Please specify the part n°. e.g. VP40STNIM14C
Refer to page 2/4

Accessories
To optimize the use of your suction cups, Coval offers a comprehensive range of accessories (feelers, nozzle fittings, spring extensions, and feeder systems, etc.), see chapters **4** and **12**.

VP

Flat Suction Cups Ø 8 to 75 mm

References "Suction Cup + Fitting"

Group 1 — C

	THREAD	M5-M	M6-M	G1/8"-M	G1/8"-F
Ø 8 - 25 mm	**VP8NBR**	VP8NBRIMM5C	VP8NBRIMM6C	VP8NBRIM18C	VP8NBRIF18C
	VP8SIT5	VP8SIT5IMM5C	VP8SIT5IMM6C	VP8SIT5IM18C	VP8SIT5IF18C
	VP8STN	VP8STNIMM5C	VP8STNIMM6C	VP8STNIM18C	VP8STNIF18C
	VP10NBR	VP10NBRIMM5C	VP10NBRIMM6C	VP10NBRIM18C	VP10NBRIF18C
	VP10SIT5	VP10SIT5IMM5C	VP10SIT5IMM6C	VP10SIT5IM18C	VP10SIT5IF18C
	VP15NBR	VP15NBRIMM5C	VP15NBRIMM6C	VP15NBRIM18C	VP15NBRIF18C
	VP15SIT5	VP15SIT5IMM5C	VP15SIT5IMM6C	VP15SIT5IM18C	VP15SIT5IF18C
	VP15STN	VP15STNIMM5C	VP15STNIMM6C	VP15STNIM18C	VP15STNIF18C
	VP20NBR	VP20NBRIMM5C	VP20NBRIMM6C	VP20NBRIM18C	VP20NBRIF18C
	VP20SIT5	VP20SIT5IMM5C	VP20SIT5IMM6C	VP20SIT5IM18C	VP20SIT5IF18C
	VP20STN	VP20STNIMM5C	VP20STNIMM6C	VP20STNIM18C	VP20STNIF18C
	VP25NBR	VP25NBRIMM5C	VP25NBRIMM6C	VP25NBRIM18C	VP25NBRIF18C
	VP25SIT5	VP25SIT5IMM5C	VP25SIT5IMM6C	VP25SIT5IM18C	VP25SIT5IF18C
	VP25STN	VP25STNIMM5C	VP25STNIMM6C	VP25STNIM18C	VP25STNIF18C
	VP25SIT5	VP25SIT5IMM5C	VP25SIT5IMM6C	VP25SIT5IM18C	VP25SIT5IF18C
	VP25STN	VP25STNIMM5C	VP25STNIMM6C	VP25STNIM18C	VP25STNIF18C

Group 2 — C / E / V

	THREAD	G1/4"-M	G1/4"-F	G1/4"-M	G1/4"-F	G1/8"-M	G1/8"-F	G1/4"-M	G1/4"-F
Ø 26 - 60 mm	**VP26NBR**	VP26NBRIM14C	VP26NBRIF14C	VP26NBRIM14	VP26NBRIF14	VP26NBRIM18V	VP26NBRIF18V	VP26NBRIM14V	VP26NBRIF14V
	VP26SIT5	VP26SIT5IM14C	VP26SIT5IF14C	VP26SIT5IM14	VP26SIT5IF14	VP26SIT5IM18V	VP26SIT5IF18V	VP26SIT5IM14V	VP26SIT5IF14V
	VP30NBR	VP30NBRIM14C	VP30NBRIF14C	VP30NBRIM14	VP30NBRIF14	VP30NBRIM18V	VP30NBRIF18V	VP30NBRIM14V	VP30NBRIF14V
	VP30SIT5	VP30SIT5IM14C	VP30SIT5IF14C	VP30SIT5IM14	VP30SIT5IF14	VP30SIT5IM18V	VP30SIT5IF18V	VP30SIT5IM14V	VP30SIT5IF14V
	VP30STN	VP30STNIM14C	VP30STNIF14C	VP30STNIM14	VP30STNIF14	VP30STNIM18V	VP30STNIF18V	VP30STNIM14V	VP30STNIF14V
	VP35NBR	VP35NBRIM14C	VP35NBRIF14C	VP35NBRIM14	VP35NBRIF14	VP35NBRIM18V	VP35NBRIF18V	VP35NBRIM14V	VP35NBRIF14V
	VP35SIT5	VP35SIT5IM14C	VP35SIT5IF14C	VP35SIT5IM14	VP35SIT5IF14	VP35SIT5IM18V	VP35SIT5IF18V	VP35SIT5IM14V	VP35SIT5IF14V
	VP40NBR	VP40NBRIM14C	VP40NBRIF14C	VP40NBRIM14	VP40NBRIF14	VP40NBRIM18V	VP40NBRIF18V	VP40NBRIM14V	VP40NBRIF14V
	VP40NR	VP40NRIM14C	VP40NRIF14C	VP40NRIM14	VP40NRIF14	VP40NRIM18V	VP40NRIF18V	VP40NRIM14V	VP40NRIF14V
	VP40SIT5	VP40SIT5IM14C	VP40SIT5IF14C	VP40SIT5IM14	VP40SIT5IF14	VP40SIT5IM18V	VP40SIT5IF18V	VP40SIT5IM14V	VP40SIT5IF14V
	VP40STN	VP40STNIM14C	VP40STNIF14C	VP40STNIM14	VP40STNIF14	VP40STNIM18V	VP40STNIF18V	VP40STNIM14V	VP40STNIF14V
	VP50NBR	VP50NBRIM14C	VP50NBRIF14C	VP50NBRIM14	VP50NBRIF14	VP50NBRIM18V	VP50NBRIF18V	VP50NBRIM14V	VP50NBRIF14V
	VP50SIT5	VP50SIT5IM14C	VP50SIT5IF14C	VP50SIT5IM14	VP50SIT5IF14	VP50SIT5IM18V	VP50SIT5IF18V	VP50SIT5IM14V	VP50SIT5IF14V
	VP50STN	VP50STNIM14C	VP50STNIF14C	VP50STNIM14	VP50STNIF14	VP50STNIM18V	VP50STNIF18V	VP50STNIM14V	VP50STNIF14V
	VP60NBR	VP60NBRIM14C	VP60NBRIF14C	VP60NBRIM14	VP60NBRIF14	VP60NBRIM18V	VP60NBRIF18V	VP60NBRIM14V	VP60NBRIF14V
	VP60SIT5	VP60SIT5IM14C	VP60SIT5IF14C	VP60SIT5IM14	VP60SIT5IF14	VP60SIT5IM18V	VP60SIT5IF18V	VP60SIT5IM14V	VP60SIT5IF14V
	VP60SIT5	VP60SIT5IM14C	VP60SIT5IF14C	VP60SIT5IM14	VP60SIT5IF14	VP60SIT5IM18V	VP60SIT5IF18V	VP60SIT5IM14V	VP60SIT5IF14V

Group 3 — V / S

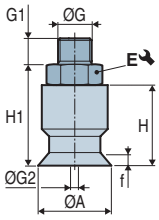
	THREAD	G1/8"-M	G1/4"-M	G1/4"-F	G1/4"-M	G1/4"-F
Ø 75 mm	**VP75NBR**	VP75NBRIM18V	VP75NBRIM14V	VP75NBRIF14V	VP75NBRIM14	VP75NBRIF14
	VP75NR	VP75NRIM18V	VP75NRIM14V	VP75NRIF14V	VP75NRIM14	VP75NRIF14
	VP75SIT5	VP75SIT5IM18V	VP75SIT5IM14V	VP75SIT5IF14V	VP75SIT5IM14	VP75SIT5IF14

Additional mounting configurations are available (see page 2/7).
For standard configurations (suction cup+fitting), the C and V versions are delivered unassembled.

VP
Flat Suction Cups Ø 8 to 75 mm
Dimensions "Suction Cup + Fitting"

VP 8 - 10 | Group 1

1



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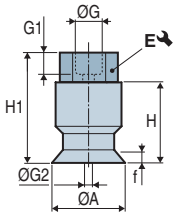
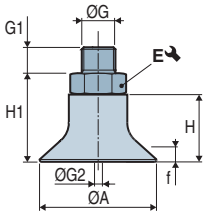


VP 15 - 25 | Group 1

3



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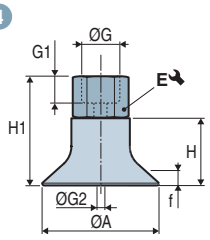
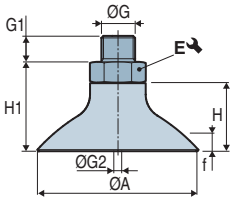


VP 26 - 60 | Group 2

5



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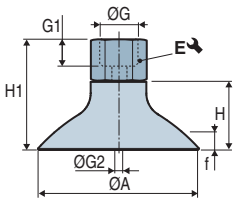
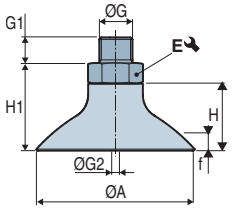


VP 75 | Group 3

7



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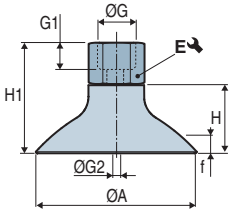

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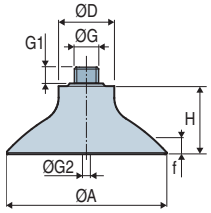


Group 1		Diagram	ØA	ØD	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
Ø 8 - 25 mm	VP8---IMM5C	1	7.5	-	1.3	10	15	M5-M	4.5	2.5	7	3.5
	VP8---IMM6C	1	7.5	-	1.3	10	15	M6-M	5	3.5	7	3.1
	VP8---IM18C	1	7.5	-	1.3	10	16	G1/8"-M	7.5	3.5	14	4.5
	VP8---IF18C	2	7.5	-	1.3	10	22	G1/8"-F	8	3.5	14	4.4
	VP10---IMM5C	1	10	-	1.5	10.5	15.5	M5-M	4.5	2.5	7	3.6
	VP10---IMM6C	1	10	-	1.5	10.5	15.5	M6-M	5	3.5	7	3.2
	VP10---IM18C	1	10	-	1.5	10.5	16.5	G1/8"-M	7.5	3.5	14	4.6
	VP10---IF18C	2	10	-	1.5	10.5	22.5	G1/8"-F	8	3.5	14	4.5
	VP15---IMM5C	3	15	-	2.25	11	16	M5-M	4.5	2.5	7	3.8
	VP15---IMM6C	3	15	-	2.25	11	16	M6-M	5	3.5	7	3.4
	VP15---IM18C	3	15	-	2.25	11	17	G1/8"-M	7.5	3.5	14	4.8
	VP15---IF18C	4	15	-	2.25	11	23	G1/8"-F	8	3.5	14	4.7
	VP20---IMM5C	3	20	-	3	11.5	17.5	M5-M	4.5	2.5	7	4.2
	VP20---IMM6C	3	20	-	3	11.5	23.5	M6-M	5	3.5	7	3.8
	VP20---IM18C	3	20	-	3	11.5	16.5	G1/8"-M	7.5	3.5	14	5.2
	VP20---IF18C	4	20	-	3	11.5	16.5	G1/8"-F	8	3.5	14	5.1
	VP25---IMM5C	3	25	-	3	12	17	M5-M	4.5	2.5	7	4.6
	VP25---IMM6C	3	25	-	3	12	17	M6-M	5	3.5	7	4.2
	VP25---IM18C	3	25	-	3	12	18	G1/8"-M	7.5	3.5	14	5.6
	VP25---IF18C	4	25	-	3	12	24	G1/8"-F	8	3.5	14	5.5

Note: All dimensions are in mm

(1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

VP

Flat Suction Cups Ø 8 to 75 mm

Dimensions "Suction Cup + Fitting"

Group 2		Diagram	ØA	ØD	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
Ø 26 - 60 mm	VP26---IM18V	5	26	-	3	19.5	24	G1/8"-M	6	3.5	13	17.9
	VP26---IF18V	6	26	-	3	19.5	32.5	G1/8"-F	7.5	3.5	13	21.2
	VP26---IM14	5	26	-	3	19.5	23.5	G1/4"-M	11	4.4	17	11.6
	VP26---IM14C	5	26	-	3	19.5	27.5	G1/4"-M	10	7	17	12.5
	VP26---IM14V	5	26	-	3	19.5	24.5	G1/4"-M	8	3.5	17	27.2
	VP26---IF14	6	26	-	3	19.5	34.5	G1/4"-F	10	4.4	17	12.2
	VP26---IF14C	6	26	-	3	19.5	34.5	G1/4"-F	12	6.9	17	11.8
	VP26---IF14V	6	26	-	3	19.5	35.5	G1/4"-F	11	3.5	17	31.8
	VP30---IM18V	5	30	-	2.5	19	23.5	G1/8"-M	6	3.5	13	17.3
	VP30---IF18V	6	30	-	2.5	19	32	G1/8"-F	7.5	3.5	13	21.6
	VP30---IM14	5	30	-	2.5	19	23	G1/4"-M	11	4.4	17	12.0
	VP30---IM14C	5	30	-	2.5	19	27	G1/4"-M	10	7	17	12.9
	VP30---IM14V	5	30	-	2.5	19	24	G1/4"-M	8	3.5	17	27.6
	VP30---IF14	6	30	-	2.5	19	34	G1/4"-F	10	4.4	17	12.6
	VP30---IF14C	6	30	-	2.5	19	34	G1/4"-F	12	6.9	17	12.2
	VP30---IF14V	6	30	-	2.5	19	35	G1/4"-F	11	3.5	17	32.2
	VP35---IM18V	5	35	-	3	20	24.5	G1/8"-M	6	3.5	13	20.1
	VP35---IF18V	6	35	-	3	20	33	G1/8"-F	7.5	3.5	13	23.4
	VP35---IM14	5	35	-	3	20	24	G1/4"-M	11	4.4	17	13.8
	VP35---IM14C	5	35	-	3	20	28	G1/4"-M	10	7	17	14.7
	VP35---IM14V	5	35	-	3	20	25	G1/4"-M	8	3.5	17	29.4
	VP35---IF14	6	35	-	3	20	35	G1/4"-F	10	4.4	17	14.4
	VP35---IF14C	6	35	-	3	20	35	G1/4"-F	12	6.9	17	14.0
	VP35---IF14V	6	35	-	3	20	36	G1/4"-F	11	3.5	17	34.0
	VP40---IM18V	5	40	-	3	20	24.5	G1/8"-M	6	3.5	13	20.6
	VP40---IF18V	6	40	-	3	20	33	G1/8"-F	7.5	3.5	13	23.9
	VP40---IM14	5	40	-	3	20	24	G1/4"-M	11	4.4	17	14.3
	VP40---IM14C	5	40	-	3	20	28	G1/4"-M	10	7	17	15.2
	VP40---IM14V	5	40	-	3	20	25	G1/4"-M	8	3.5	17	29.9
	VP40---IF14	6	40	-	3	20	35	G1/4"-F	10	4.4	17	14.9
	VP40---IF14C	6	40	-	3	20	35	G1/4"-F	12	6.9	17	14.5
	VP40---IF14V	6	40	-	3	20	36	G1/4"-F	11	3.5	17	34.5
	VP50---IM18V	5	52	-	4.5	22	26.5	G1/8"-M	6	3.5	13	26.4
	VP50---IF18V	6	52	-	4.5	22	35	G1/8"-F	7.5	3.5	13	29.7
	VP50---IM14	5	52	-	4.5	22	26	G1/4"-M	11	4.4	17	20.1
	VP50---IM14C	5	52	-	4.5	22	30	G1/4"-M	10	7	17	21.0
	VP50---IM14V	5	52	-	4.5	22	27	G1/4"-M	8	3.5	17	35.7
	VP50---IF14	6	52	-	4.5	22	37	G1/4"-F	10	4.4	17	20.7
	VP50---IF14C	6	52	-	4.5	22	37	G1/4"-F	12	6.9	17	20.3
	VP50---IF14V	6	52	-	4.5	22	38	G1/4"-F	11	3.5	17	40.3
	VP60---IM18V	5	60	-	4.5	22	26.5	G1/8"-M	6	3.5	13	30.1
	VP60---IF18V	6	60	-	4.5	22	35	G1/8"-F	7.5	3.5	13	33.4
	VP60---IM14	5	60	-	4.5	22	26	G1/4"-M	11	4.4	17	23.8
	VP60---IM14C	5	60	-	4.5	22	30	G1/4"-M	10	7	17	24.7
	VP60---IM14V	5	60	-	4.5	22	27	G1/4"-M	8	3.5	17	39.4
	VP60---IF14	6	60	-	4.5	22	37	G1/4"-F	10	4.4	17	24.4
	VP60---IF14C	6	60	-	4.5	22	37	G1/4"-F	12	6.9	17	24.0
	VP60---IF14V	6	60	-	4.5	22	38	G1/4"-F	11	3.5	17	44.0
Group 3												
Ø 75 mm	VP75---IM18V	9	75	23	4.5	32	-	G1/8"-M	8	6	-	58.3
	VP75---IM14	7	75	-	4.5	32	38	G1/4"-M	11	8	21	46.4
	VP75---IM14V	7	75	-	4.5	32	37	G1/4"-M	8	6	17	68.9
	VP75---IF14	8	75	-	4.5	32	47	G1/4"-F	10	8	21	50.3
	VP75---IF14V	8	75	-	4.5	32	51	G1/4"-F	9	6	17	78.5

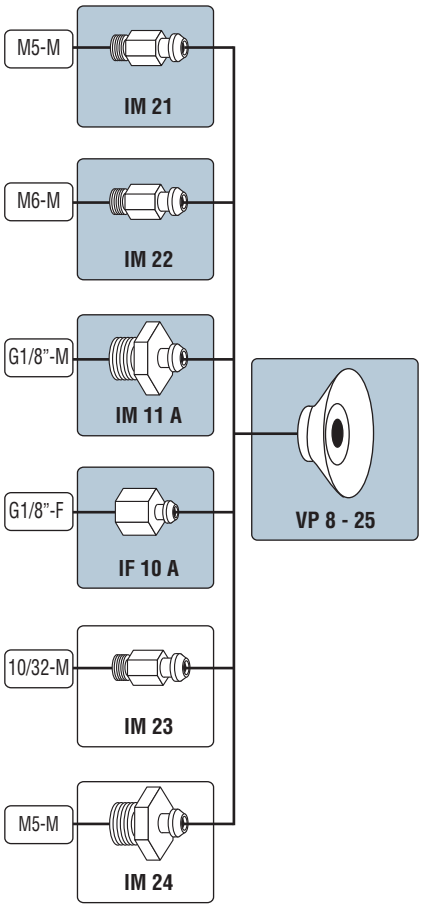
Note: All dimensions are in mm

(1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

VP
Flat Suction Cups Ø 8 to 75 mm
Assembly Diagrams

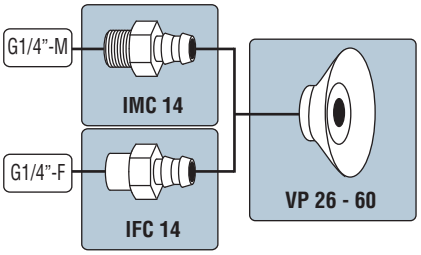
VP 8 - 25 | Group 1

Barbed fittings C

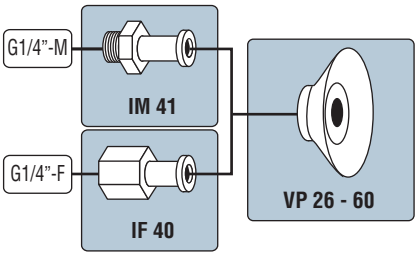


VP 26 - 60 | Group 2

Barbed fittings C

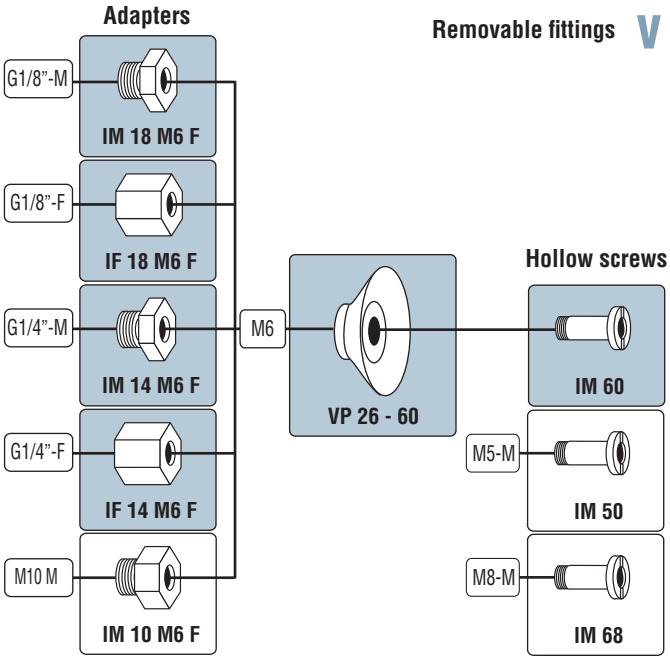


Pressed fittings E



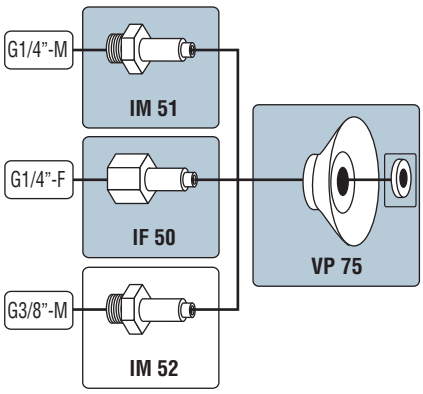
Adapters

Removable fittings V



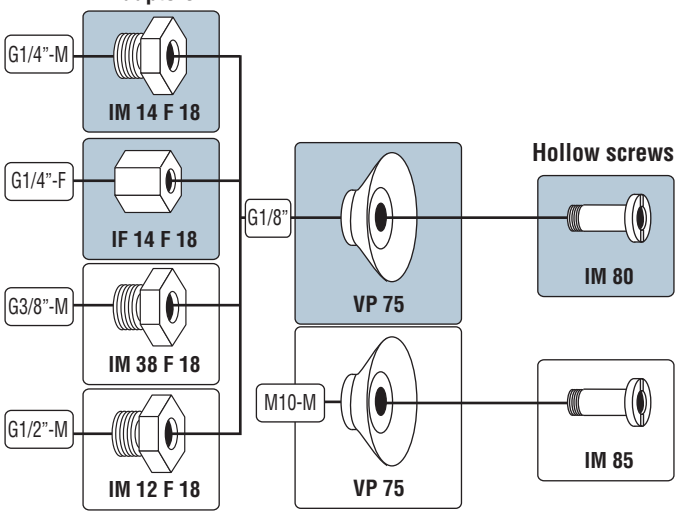
VP 75 | Group 3

Factory-crimped fittings S



Removable fittings V

Adapters



Configurations (suction cup + fitting) refer to page 2/4

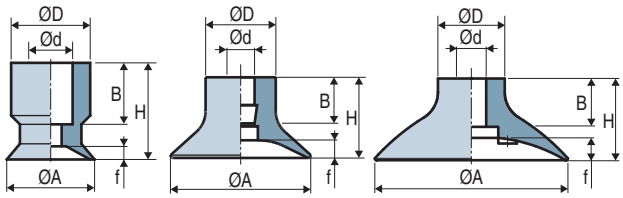
Non-standard configurations must be ordered in seperate part numbers.

Fittings and suction cups dimensions: see page 2/8.

VP
Flat Suction Cups Ø 8 to 75 mm
Dimensions

Suction Cups

VP 8... 10 VP 15... 25 VP 26... 75

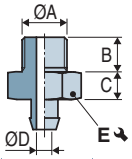


	ØA	H	Ød	ØD	f (1)	B	(g)
VP 8	7.5	10	5	9	1.3	7	0.4
VP 10	10	10.5	4.4	9	1.5	7	0.5
VP 15	15	11	4	9	2.25	7	0.7
VP 20	20	11.5	4	10	3	7	1.2
VP 25	25	12	4	10	3	7	1.4
VP 26	26	19.5	8	16	3	13	3.7
VP 30	30	19	8	16	2.5	13	4
VP 35	35	20	8	16	3	13	5.6
VP 40	40	20	8	16	3	13	9
VP 50	52	22	8	18	4.5	13	14
VP 60	60	22	8	18	4.5	13	16
VP 75	75	32	12	23	4.5	20	33

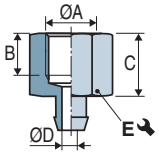
(1) f = Deflection of the suction cup.

Barbed Fittings

Male - IM



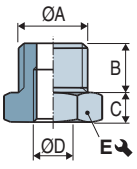
Female - IF



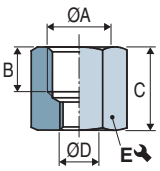
	ØA	B	C	ØD	E	Material	(g)
IM 11 A	G1/8"-M	7.5	6	3.5	14	Aluminum	4.1
IMC 14	G1/4"-M	10	8	7	17	Aluminum	8.7
IM 21 (2)	M5-M	4.5	5	2.5	7	Nickel-plated brass	3.1
IM 22 (2)	M6-M	5	5	3.5	7	Nickel-plated brass	2.7
IM 23	10/32-M	4.5	5	2.5	7	Brass	3
IM 24	M5-M	4.5	2.5	2.5	10	Nickel-plated brass	3.2
IF 10 A	G1/8"-F	8	12	3.5	14	Aluminum	4
IFC 14	G1/4"-F	12	15	6.9	17	Aluminum	8

Adapters for Hollow Screws

Male - IM



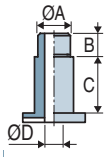
Female- IF



	ØA	B	C	ØD	E	Material	(g)
IM 10 M6F	M10-M	7	3.5	M6-F	13	Brass	5.9
IM 12 F18	G1/2"-M	14	6	G1/8"-F	22	Nickel-plated brass	46.8
IM 14 M6F	G1/4"-M	8	5	M6-F	17	Nickel-plated brass	15.9
IM 14 F18	G1/4"-M	8	5	G1/8"-F	17	Nickel-plated brass	10.6
IM 18 M6F	G1/8"-M	6	4.5	M6-F	13	Nickel-plated brass	6.6
IM 38 F18	G3/8"-M	9	5	G1/8"-F	19	Nickel-plated brass	18.8
IF 14 M6F	G1/4"-F	11	16	M6-F	17	Nickel-plated brass	20.5
IF 18 M6F	G1/8"-F	7.5	13	M6-F	13	Nickel-plated brass	9.9
IF 14 F18	G1/4"-F	9	19	G1/8"-F	17	Nickel-plated brass	20.2

The values represent the average characteristics of our products.
Note: All dimensions are in mm.
(2) Flow restrictor version available: orifice calibrated to reduce leaks when used with a multi-cup gripper (see page 4/9).
(3) Available in stainless steel.

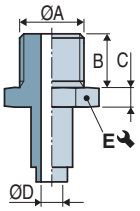
Hollow Screws



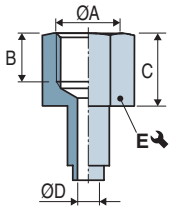
	ØA	B	C	ØD	Material	(g)
IM 50	M5-M	5	11	2.8	Brass	7.4
IM 60 (2) (3)	M6-M	7	11	3.5	Nickel-plated brass	7.5
IM 68	M8-M	8	11	5.2	Nickel-plated brass	6.4
IM 80	G1/8"-M	8	18	6	Nickel-plated brass	23.7
IM 85	M10x150-M	8	18	6	Nickel-plated brass	23.5

Factory-crimped Fittings

Male - IM



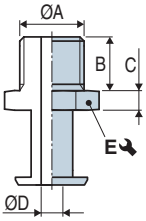
Female- IF



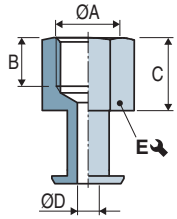
	ØA	B	C	ØD	E	Material	(g)
IM 51	G1/4"-M	11	6	4.4	17	Aluminum	11.8
IF 50	G1/4"-F	10	15	8	21	Aluminum	15.7
IM 52	G3/8"-M	11	6	8	21	Aluminum	14

Pressed Fitting

Male - IM

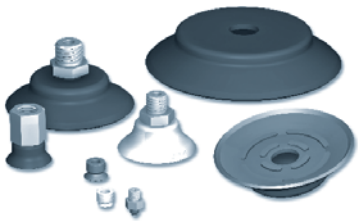


Female - IF



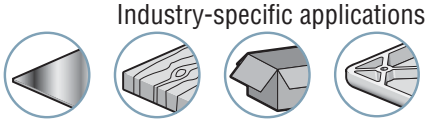
	ØA	B	C	ØD	E	Material	(g)
IM 41	G1/4"-M	11	4	4.4	17	Aluminum	7.8
IF 40	G1/4"-F	10	15	4.4	17	Aluminum	8.4

VPG
Extra-flat Suction Cups Ø 2 to 200 mm



The profile of the VPG series extra-flat suction cups provides for accuracy in load gripping and speeds up throughput rates. These suction cups are used for flat surfaces only.

Industry-specific applications



Types of use

Materials

NBR Nitrile
SI Silicone
STN Siton®

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	(lbf) (1)	R_{min} (mm)	NBR	SI	STN
VPG 2	2	0.00073	0.02	0.01	2	**VPG2NBR**	**VPG2SI**	-
VPG 3.5	3.5	0.0022	0.06	0.03	8	**VPG3.5NBR**	**VPG3.5SI**	-
VPG 5	5	0.005	0.11	0.06	8	**VPG5NBR**	**VPG5SI**	**VPG5STN**
VPG 6	6	0.008	0.16	0.08	8	**VPG6NBR**	**VPG6SI**	**VPG6STN**
VPG 8	8	0.03	0.28	0.14	10	**VPG8NBR**	**VPG8SI**	**VPG8STN**
VPG 10	10	0.07	0.45	0.23	13	**VPG10NBR**	**VPG10SI**	**VPG10STN**
VPG 15	15	0.2	1.06	0.54	13	**VPG15NBR**	**VPG15SI**	**VPG15STN**
VPG 20	20	0.5	1.98	0.99	20	**VPG20NBR**	**VPG20SI**	**VPG20STN**
VPG 25	25	1.1	2.71	1.36	25	**VPG25NBR**	**VPG25SI**	**VPG25STN**
VPG 30	30	1.4	3.69	1.85	40	**VPG30NBR**	**VPG30SI**	**VPG30STN**
VPG 35	35	2.9	5.36	2.68	50	**VPG35NBR**	**VPG35SI**	**VPG35STN**
VPG 40	40	3.8	7.79	3.90	50	**VPG40NBR**	**VPG40SI**	**VPG40STN**
VPG 50	50	5.3	12.18	6.09	75	**VPG50NBR**	**VPG50SI**	**VPG50STN**
VPG 60	60	12	19.97	9.98	100	**VPG60NBR**	**VPG60SI**	**VPG60STN**
VPG 60S	60	12	19.97	9.98	100	**VPG60SNBR**	**VPG60SSI**	**VPG60SSTN**
VPG 80	80	26.9	32.15	16.07	150	**VPG80NBR**	**VPG80SI**	**VPG80STN**
VPG 80S	80	26.9	32.15	16.07	150	**VPG80SNBR**	**VPG80SSI**	**VPG80SSTN**
VPG 95	95	41	45.46	22.73	200	**VPG95NBR**	**VPG95SI**	**VPG95STN**
VPG 95S	95	41	45.46	22.73	200	**VPG95SNBR**	**VPG95SSI**	**VPG95SSTN**
VPG 120	120	141	59.26	29.63	365	**VPG120NBR**	**VPG120SI**	**VPG120STN**
VPG 150	150	230	95.79	47.89	380	**VPG150NBR**	**VPG150SI**	**VPG150STN**
VPG 200	200	384	170.47	85.24	430	**VPG200NBR**	**VPG200SI**	**VPG200STN**

(1) Actual force of the suction cup in use with 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.

Choice of Fittings

(Ø)	M3-M	M5-M	M5-F	M6-M	M8-M	M10-M	M10x125-F	G1/8"-F	G1/8"-M	G1/4"-F	G1/4"-M	G1/2"-F
2, 3.5	■	■	-	-	-	-	-	-	-	-	-	-
5… 10	-	■	■	-	-	-	-	■	■	-	-	-
15, 20	-	■	-	-	-	-	-	■	■	-	-	-
25… 50	-	-	-	■	□	□	-	■	■	■	■	-
60… 95	-	-	-	-	-	-	■	-	-	■	■	-
60S… 95S	-	-	-	-	-	-	-	-	-	■	-	-
120… 200	-	-	-	-	-	-	-	-	-	-	-	■

■ Standard available configurations (suction cup + fitting) see page reference 2/10
□ Additional mounting configurations See pages 2/13 - 2/14
Fitting: M = male F = female

Types of Assembly

COVAL suction cups can be assembled in a wide variety of configurations.

C **Version C:** Barbed fitting

V **Version V:** Removable fitting: (adapter and hollow screw)

Accessories

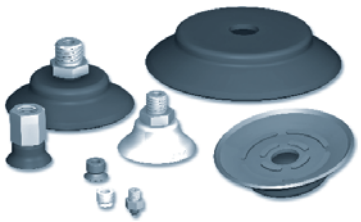
To optimize the use of your suction cups, Coval offers a comprehensive range of accessories (nozzle fittings,spring extensions, and feeder systems, etc.), see chapters **4** and **12**.

Please specify the part n°. e.g. VPG25STNIF18C
Refer to page 2/10

VPG

Extra-flat Suction Cups Ø 2 to 200 mm

Reference "Suction Cup + Fitting"



Ø 2 - 10 mm

	C				
THREAD	M3-M	M5-M	M5-F	G1/8"-M	G1/8"-F
VPG2NBR	VPG2NBRIMM3C	VPG2NBRIMM5C	-	-	-
VPG2SI	VPG2SIIMM3C	VPG2SIIMM5C	-	-	-
VPG3.5NBR	VPG3.5NBRIMM3C	VPG3.5NBRIMM5C	-	-	-
VPG3.5SI	VPG3.5SIIMM3C	VPG3.5SIIMM5C	-	-	-
VPG5NBR	-	VPG5NBRIMM5C	VPG5NBRIFM5C	VPG5NBRIM18C	VPG5NBRIF18C
VPG5SI	-	VPG5SIIMM5C	VPG5SIIFM5C	VPG5SIIM18C	VPG5SIIF18C
VPG5STN	-	VPG5STNIMM5C	VPG5STNIFM5C	VPG5STNIM18C	VPG5STNIF18C
VPG6NBR	-	VPG6NBRIMM5C	VPG6NBRIFM5C	VPG6NBRIM18C	VPG6NBRIF18C
VPG6SI	-	VPG6SIIMM5C	VPG6SIIFM5C	VPG6SIIM18C	VPG6SIIF18C
VPG6STN	-	VPG6STNIMM5C	VPG6STNIFM5C	VPG6STNIM18C	VPG6STNIF18C
VPG8NBR	-	VPG8NBRIMM5C	VPG8NBRIFM5C	VPG8NBRIM18C	VPG8NBRIF18C
VPG8SI	-	VPG8SIIMM5C	VPG8SIIFM5C	VPG8SIIM18C	VPG8SIIF18C
VPG8STN	-	VPG8STNIMM5C	VPG8STNIFM5C	VPG8STNIM18C	VPG8STNIF18C
VPG10NBR	-	VPG10NBRIMM5C	VPG10NBRIFM5C	VPG10NBRIM18C	VPG10NBRIF18C
VPG10SI	-	VPG10SIIMM5C	VPG10SIIFM5C	VPG10SIIM18C	VPG10SIIF18C
VPG10STN	-	VPG10STNIMM5C	VPG10STNIFM5C	VPG10STNIM18C	VPG10STNIF18C

Ø 15 - 20 mm

	C		V		
THREAD	G1/8"-M	G1/8"-F	M5-M	G1/8"-M	G1/8"-F
VPG15NBR	VPG15NBRIM18C	VPG15NBRIF18C	VPG15NBRIMM5V	VPG15NBRIM18V	VPG15NBRIF18V
VPG15SI	VPG15SIIM18C	VPG15SIIF18C	VPG15SIIMM5V	VPG15SIIM18V	VPG15SIIF18V
VPG15STN	VPG15STNIM18C	VPG15STNIF18C	VPG15STNIMM5V	VPG15STNIM18V	VPG15STNIF18V
VPG20NBR	VPG20NBRIM18C	VPG20NBRIF18C	VPG20NBRIMM5V	VPG20NBRIM18V	VPG20NBRIF18V
VPG20SI	VPG20SIIM18C	VPG20SIIF18C	VPG20SIIMM5V	VPG20SIIM18V	VPG20SIIF18V
VPG20STN	VPG20STNIM18C	VPG20STNIF18C	VPG20STNIMM5V	VPG20STNIM18V	VPG20STNIF18V

Ø 25 - 50 mm

	C		V				
THREAD	G1/8"-M	G1/8"-F	M6-M	G1/8"-M	G1/8"-F	G1/4"-M	G1/4"F
VPG25NBR	VPG25NBRIM18C	VPG25NBRIF18C	VPG25NBRIMM6V	VPG25NBRIM18V	VPG25NBRIF18V	VPG25NBRIM14V	VPG25NBRIF14V
VPG25SI	VPG25SIIM18C	VPG25SIIF18C	VPG25SIIMM6V	VPG25SIIM18V	VPG25SIIF18V	VPG25SIIM14V	VPG25SIIF14V
VPG25STN	VPG25STNIM18C	VPG25STNIF18C	VPG25STNIMM6V	VPG25STNIM18V	VPG25STNIF18V	VPG25STNIM14V	VPG25STNIF14V
VPG30NBR	VPG30NBRIM18C	VPG30NBRIF18C	VPG30NBRIMM6V	VPG30NBRIM18V	VPG30NBRIF18V	VPG30NBRIM14V	VPG30NBRIF14V
VPG30SI	VPG30SIIM18C	VPG30SIIF18C	VPG30SIIMM6V	VPG30SIIM18V	VPG30SIIF18V	VPG30SIIM14V	VPG30SIIF14V
VPG30STN	VPG30STNIM18C	VPG30STNIF18C	VPG30STNIMM6V	VPG30STNIM18V	VPG30STNIF18V	VPG30STNIM14V	VPG30STNIF14V
VPG35NBR	VPG35NBRIM18C	VPG35NBRIF18C	VPG35NBRIMM6V	VPG35NBRIM18V	VPG35NBRIF18V	VPG35NBRIM14V	VPG35NBRIF14V
VPG35SI	VPG35SIIM18C	VPG35SIIF18C	VPG35SIIMM6V	VPG35SIIM18V	VPG35SIIF18V	VPG35SIIM14V	VPG35SIIF14V
VPG35STN	VPG35STNIM18C	VPG35STNIF18C	VPG35STNIMM6V	VPG35STNIM18V	VPG35STNIF18V	VPG35STNIM14V	VPG35STNIF14V
VPG40NBR	VPG40NBRIM18C	VPG40NBRIF18C	VPG40NBRIMM6V	VPG40NBRIM18V	VPG40NBRIF18V	VPG40NBRIM14V	VPG40NBRIF14V
VPG40SI	VPG40SIIM18C	VPG40SIIF18C	VPG40SIIMM6V	VPG40SIIM18V	VPG40SIIF18V	VPG40SIIM14V	VPG40SIIF14V
VPG40STN	VPG40STNIM18C	VPG40STNIF18C	VPG40STNIMM6V	VPG40STNIM18V	VPG40STNIF18V	VPG40STNIM14V	VPG40STNIF14V
VPG50NBR	VPG50NBRIM18C	VPG50NBRIF18C	VPG50NBRIMM6V	VPG50NBRIM18V	VPG50NBRIF18V	VPG50NBRIM14V	VPG50NBRIF14V
VPG50SI	VPG50SIIM18C	VPG50SIIF18C	VPG50SIIMM6V	VPG50SIIM18V	VPG50SIIF18V	VPG50SIIM14V	VPG50SIIF14V
VPG50STN	VPG50STNIM18C	VPG50STNIF18C	VPG50STNIMM6V	VPG50STNIM18V	VPG50STNIF18V	VPG50STNIM14V	VPG50STNIF14V

Ø 60 - 95 mm

	V			
THREAD	M10x125-F	G1/4"-F	G1/4"-M	G1/4"-F
VPG60NBR	VPG60NBR	-	VPG60NBRIM14V	VPG60NBRIF14V
VPG60SNBR	-	VPG60SNBR	-	-
VPG60SI	VPG60SI	-	VPG60SIIM14V	VPG60SIIF14V
VPG60SSI	-	VPG60SSI	-	-
VPG60STN	VPG60STN	-	VPG60STNIM14V	VPG60STNIF14V
VPG60SSTN	-	VPG60SSTN	-	-
VPG80NBR	VPG80NBR	-	VPG80NBRIM14V	VPG80NBRIF14V
VPG80SNBR	-	VPG80SNBR	-	-
VPG80SI	VPG80SI	-	VPG80SIIM14V	VPG80SIIF14V
VPG80SSI	-	VPG80SSI	-	-
VPG80STN	VPG80STN	-	VPG80STNIM14V	VPG80STNIF14V
VPG80SSTN	-	VPG80SSTN	-	-
VPG95NBR	VPG95NBR	-	VPG95NBRIM14V	VPG95NBRIF14V
VPG95SNBR	-	VPG95SNBR	-	-
VPG95SI	VPG95SI	-	VPG95SIIM14V	VPG95SIIF14V
VPG95SSI	-	VPG95SSI	-	-
VPG95STN	VPG95STN	-	VPG95STNIM14V	VPG95STNIF14V
VPG95SSTN	-	VPG95SSTN	-	-

Ø 120 - 200 mm

	V		
THREAD	G1/2"-F *	G1/2"-F **
VPG120NBR	VPG120NBRIFS12V	VPG120NBRIF12V
VPG120SI	VPG120SIIFS12V	VPG120SIIF12V
VPG120STN	VPG120STNIFS12V	VPG120STNIF12V
VPG150NBR	VPG150NBRIFS12V	VPG150NBRIF12V
VPG150SI	VPG150SIIFS12V	VPG150SIIF12V
VPG150STN	VPG150STNIFS12V	VPG150STNIF12V
VPG200NBR	VPG200NBRIFS12V	VPG200NBRIF12V
VPG200SI	VPG200SIIFS12V	VPG200SIIF12V
VPG200STN	VPG200STNIFS12V	VPG200STNIF12V

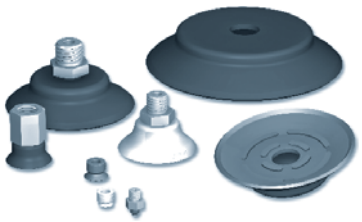
*Configured using fitting n° IFS12120
** Configured using fitting n° IF12120

Non-standard configurations are available (see page 2/13 and 2/14). For standard configurations (suction cup+fitting), the C and V versions are delivered unassembled.

VPG

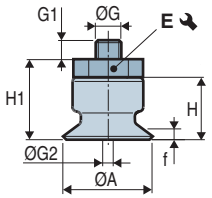
Extra-flat Suction Cups Ø 2 to 200 mm

Dimensions "Suction Cup + Fitting"



VPG 2 - 10

1



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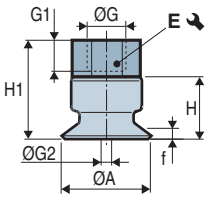
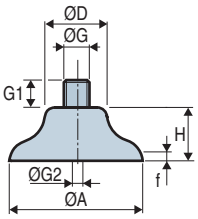
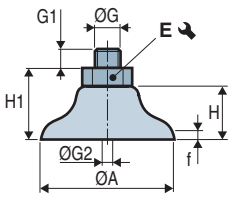


VPG 15 - 50

3



4



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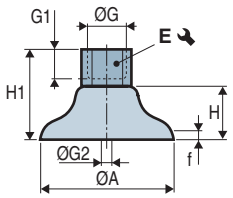
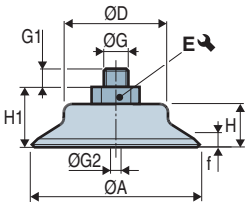


VPG 60 - 95

6



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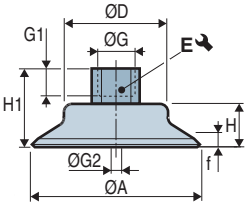
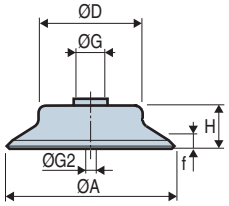
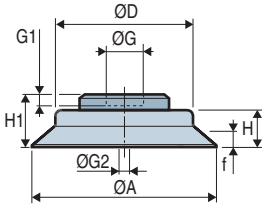


8



VPG 120 - 200

9



10

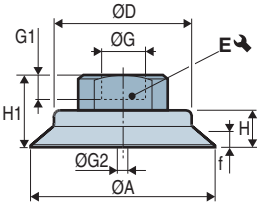


		Diagram	ØA	ØD	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
Ø 2 - 10 mm	VPG2---IMM3C	1	2	-	0.5	4	6	M3-M	3	1	5	0.21
	VPG2---IMM5C	1	2	-	0.5	4	7.5	M5-M	4.5	1	7	0.91
	VPG3.5---IMM3C	1	3.5	-	0.5	4	6	M3-M	3	1	5	0.22
	VGP3.5---IMM5C	1	3.5	-	0.5	4	7.5	M5-M	4.5	1	7	0.65
	VPG5---IMM5C	1	5	-	0.8	6.5	10	M5-M	4.5	2.2	7	0.86
	VPG5---IFM5C	2	5	-	0.8	6.5	15.5	M5-F	6	2.2	14	1.3
	VPG5---IM18C	1	5	-	0.8	6.5	11.5	G1/8"-M	8	2.2	14	4.1
	VPG5---IF18C	2	5	-	0.8	6.5	21.5	G1/8"-F	9	2.2	14	5.3
	VPG6---IMM5C	1	6	-	0.8	6.5	10	M5-M	4.5	2.2	7	0.9
	VPG6---IFM5C	2	6	-	0.8	6.5	15.5	M5-F	6	2.2	14	1.3
	VPG6---IM18C	1	6	-	0.8	6.5	11.5	G1/8"-M	8	2.2	14	4.1
	VPG6---IF18C	2	6	-	0.8	6.5	21.5	G1/8"-F	9	2.2	14	5.3
	VPG8---IMM5C	1	8	-	1.2	7	10.5	M5-M	4.5	2.2	7	0.9
	VPG8---IFM5C	2	8	-	1.2	7	16	M5-F	6	2.2	14	1.4
	VPG8---IM18C	1	8	-	1.2	7	12	G1/8"-M	8	2.2	14	4.1
	VPG8---IF18C	2	8	-	1.2	7	22	G1/8"-F	9	2.2	14	5.33
	VPG10---IMM5C	1	10	-	1.5	7.5	11	M5-M	4.5	2.2	7	1
	VPG10---IFM5C	2	10	-	1.5	7.5	16.5	M5-F	6	2.2	14	1.5
	VPG10---IM18C	1	10	-	1.5	7.5	12.5	G1/8"-M	8	2.2	14	4.2
	VPG10---IF18C	2	10	-	1.5	7.5	21.5	G1/8"-F	9	2.2	14	5.4
Ø 15 - 20 mm	VPG15---IM18C	4	15	-	1.9	8	13	G1/8"-M	8	2.2	14	4.7
	VPG15---IF18C	5	15	-	1.9	8	23	G1/8"-F	9	2.5	14	5.9
	VPG15---IMM5V	3	15	-	1.9	8	-	M5-M	5	2.5	-	2
	VPG15---IM18V	4	15	-	1.9	8	12.5	G1/8"-M	6	2.5	13	9.3
	VPG15---IF18V	5	15	-	1.9	8	21	G1/8"-F	7.5	2.5	13	12.5
	VPG20---IM18C	4	20	-	2.3	10	15	G1/8"-M	8	3	14	5.6
	VPG20---IF18C	5	20	-	2.3	10	25	G1/8"-F	9	3	14	6.9
	VPG20---IMM5V	3	20	-	2.3	10	-	M5-M	5	2.5	-	3.7
	VPG20---IM18V	4	20	-	2.3	10	14.5	G1/8"-M	6	2.5	13	11
	VPG20---IF18V	5	20	-	2.3	10	23	G1/8"-F	7.5	2.5	13	14.2

Note: All dimensions are in mm.

(1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

VPG

Extra-flat Suction Cups Ø 2 to 200 mm

Dimensions "Suction Cup + Fitting"

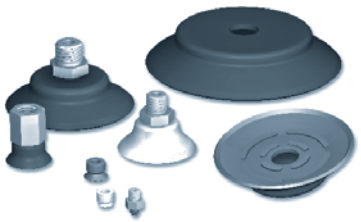
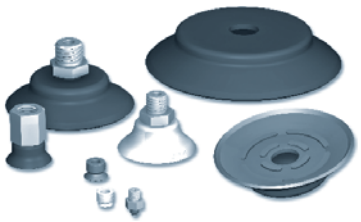


		Diagram	ØA	ØD	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
Ø 25 - 50 mm	VPG25---IM18C	4	25	-	3	14	19	G1/8"-M	8	4	14	6.9
	VPG25---IF18C	5	25	-	3	14	29	G1/8"-F	9	4	14	7.9
	VPG25---IMM6V	3	25	-	3	14	-	M6-M	6	3.5	-	5.5
	VPG25---IM18V	4	25	-	3	14	18.5	G1/8"-M	6	3.5	13	12.1
	VPG25---IF18V	5	25	-	3	14	27	G1/8"-F	7.5	3.5	13	15.4
	VPG25---IM14V	4	25	-	3	14	19	G1/4"-M	8	3.5	17	21.4
	VPG25---IF14V	5	25	-	3	14	30	G1/4"-F	11	3.5	17	26
	VPG30---IM18C	4	30	-	2	12	17	G1/8"-M	8	4	14	7.4
	VPG30---IF18C	5	30	-	2	12	27	G1/8"-F	9	4	14	8.4
	VPG30---IMM6V	3	30	-	2	12	-	M6-M	6	3.5	-	6
	VPG30---IM18V	4	30	-	2	12	16.5	G1/8"-M	6	3.5	13	12.6
	VPG30---IF18V	5	30	-	2	12	25	G1/8"-F	7.5	3.5	13	15.9
	VPG30---IM14V	4	30	-	2	12	17	G1/4"-M	8	3.5	17	21.9
	VPG30---IF14V	5	30	-	2	12	28	G1/4"-F	11	3.5	17	26.5
	VPG35---IM18C	4	35	-	3	14	19	G1/8"-M	8	4	14	9.9
	VPG35---IF18C	5	35	-	3	14	29	G1/8"-F	9	4	14	10.9
	VPG35---IMM6V	3	35	-	3	14	-	M6-M	6	3.5	-	8.5
	VPG35---IM18V	4	35	-	3	14	18.5	G1/8"-M	6	3.5	13	15.1
	VPG35---IF18V	5	35	-	3	14	27	G1/8"-F	7.5	3.5	13	18.4
	VPG35---IM14V	4	35	-	3	14	19	G1/4"-M	8	3.5	17	24.4
	VPG35---IF14V	5	35	-	3	14	30	G1/4"-F	11	3.5	17	29
	VPG40---IM18C	4	40	-	3.5	14	19	G1/8"-M	8	4	14	11.4
	VPG40---IF18C	5	40	-	3.5	14	29	G1/8"-F	9	4	14	12.4
	VPG40---IMM6V	3	40	-	3.5	14	-	M6-M	6	3.5	-	10
	VPG40---IM18V	4	40	-	3.5	14	18.5	G1/8"-M	6	3.5	13	16.6
	VPG40---IF18V	5	40	-	3.5	14	27	G1/8"-F	7.5	3.5	13	19.9
	VPG40---IM14V	4	40	-	3.5	14	19	G1/4"-M	8	3.5	17	25.9
	VPG40---IF14V	5	40	-	3.5	14	30	G1/4"-F	11	3.5	17	30.5
	VPG50---IM18C	4	50	-	4	15	20	G1/8"-M	8	4	14	16
	VPG50---IF18C	5	50	-	4	15	30	G1/8"-F	9	4	14	17.4
	VPG50---IMM6V	3	50	-	4	15	-	M6-M	6	3.5	-	18.6
	VPG50---IM18V	4	50	-	4	15	19.5	G1/8"-M	6	3.5	13	25.2
	VPG50---IF18V	5	50	-	4	15	28	G1/8"-F	7.5	3.5	13	28.5
	VPG50---IM14V	4	50	-	4	15	20	G1/4"-M	8	3.5	17	34.5
	VPG50---IF14V	5	50	-	4	15	31	G1/4"-F	11	3.5	17	39.1
Ø 60 - 95 mm	VPG60---	8	60	38	5	16	-	M10x125-F	-	-	-	25.4
	VPG60---IM14V	6	60	38	5	16	21	G1/4"-M	10	5	17	32.4
	VPG60---IF14V	7	60	38	5	16	33	G1/4"-F	10	5	17	33.7
	VPG60S---	8	60	38	5	16	-	G1/4"-F	-	-	-	25.4
	VPG80---	8	80	53	6	18	-	M10x125-F	-	-	-	53
	VPG80---IM14V	6	80	53	6	18	23	G1/4"-M	10	5	17	60
	VPG80---IF14V	7	80	53	6	18	35	G1/4"-F	10	5	17	61.3
	VPG80S---	8	80	53	6	18	-	G1/4"-F	-	-	-	53
	VPG95---	8	95	68	6	19	-	M10x125-F	-	-	-	93.2
	VPG95---IM14V	6	95	68	6	19	24	G1/4"-M	10	5	17	100.2
	VPG95---IF14V	7	95	68	6	19	36	G1/4"-F	10	5	17	101.5
	VPG95S---	8	95	68	6	19	-	G1/4"-F	-	-	-	93.2
Ø 120 - 200 mm	VPG120---IF12V	10	120	89.5	6	24.5	54.5	G1/2"-F	24	19	48	454.8
	VPG120---IFS12V	9	120	89.5	6	24.5	37.5	G1/2"-F	13	-	-	373.5
	VPG150---IF12V	10	150	105	9	30.5	60.5	G1/2"-F	24	19	48	624.8
	VPG150---IFS12V	9	150	105	9	30.5	43.5	G1/2"-F	13	-	-	543.5
	VPG200---IF12V	10	200	143	12.5	35.5	65.5	G1/2"-F	24	19	48	914.8
	VPG200---IFS12V	9	200	143	12.5	35.5	48.5	G1/2"-F	13	-	-	833.5

Note: All dimensions are in mm.

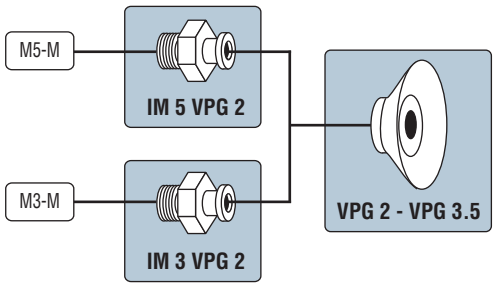
(1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

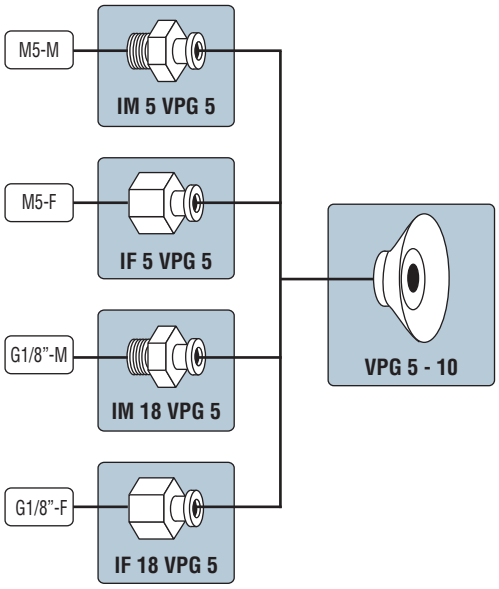
VPG
Extra-flat Suction Cups Ø 2 to 200 mm
Assembly Diagrams



VPG 2 - 10

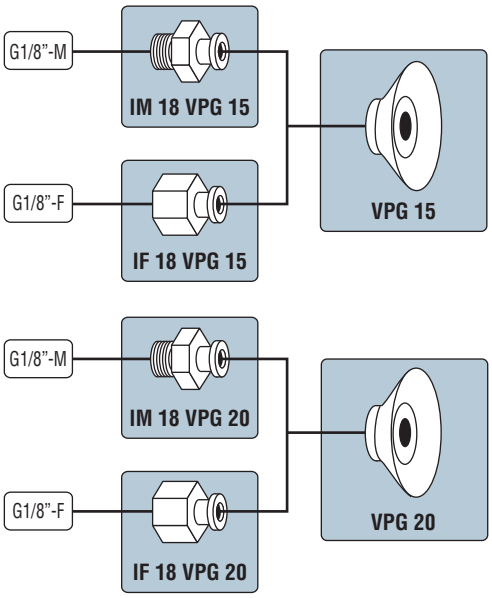
Barbed fittings C



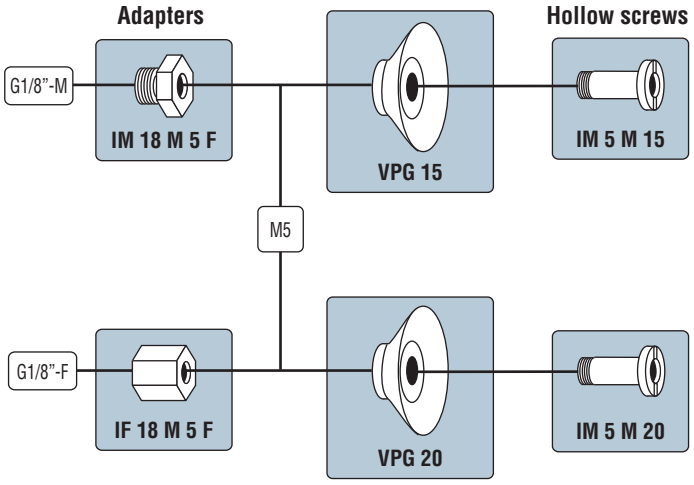


VPG 15 - 20

Barbed fittings C



Removable fittings V



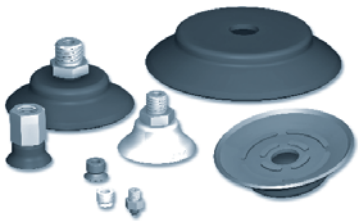
Configurations (suction cup + fitting) refer to page 2/10

Fittings and suction cups dimensions: see page 2/15 and 2/16.

VPG

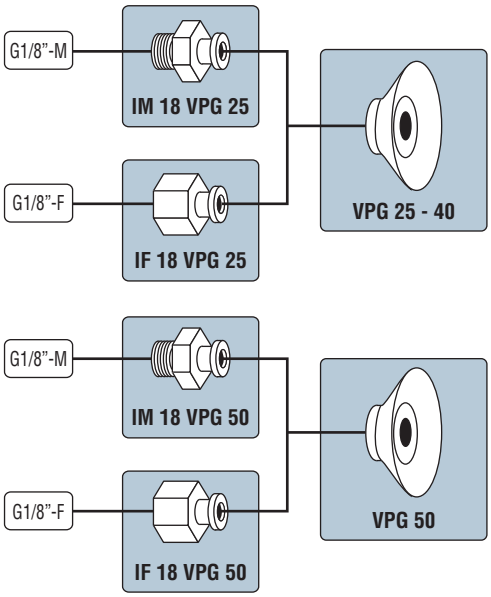
Extra-flat Suction Cups Ø 2 to 200 mm

Assembly Diagrams

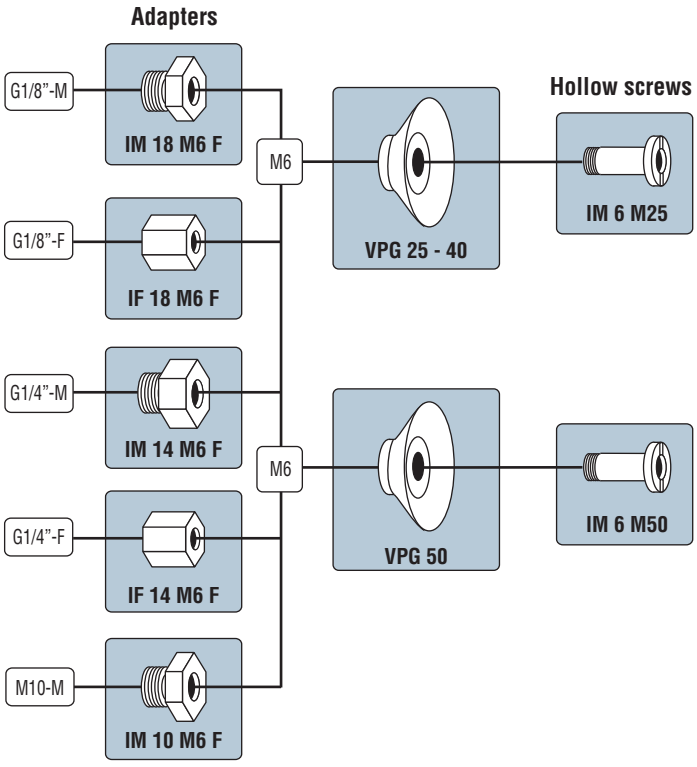


VPG 25 - 50

Barbed fittings C

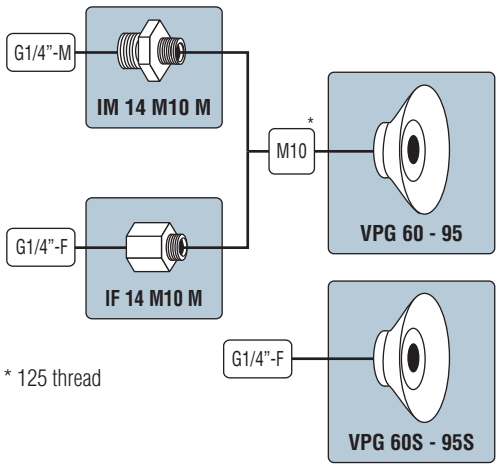


Removable fittings V



VPG 60 - 95

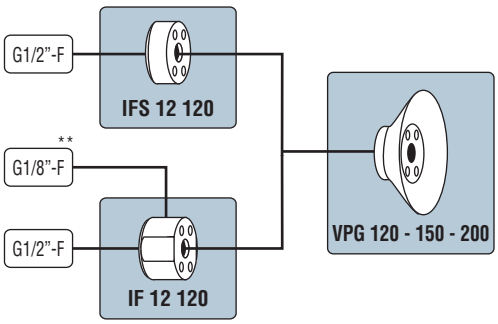
Removable fittings V



* 125 thread

VPG 120 - 200

Removable fittings V



** Female auxiliary radial output

Configurations (suction cup + fitting) refer to page 2/10.

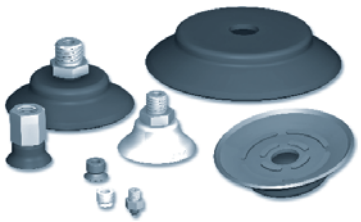
Non-standard configurations must be ordered in seperate part numbers.

Fittings and suction cups dimensions: see page 2/15 and 2/16.

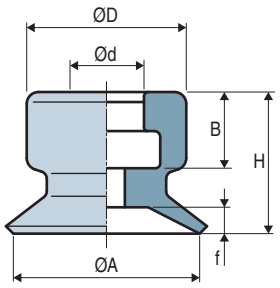
VPG

Extra-flat Suction Cups Ø 2 to 200 mm

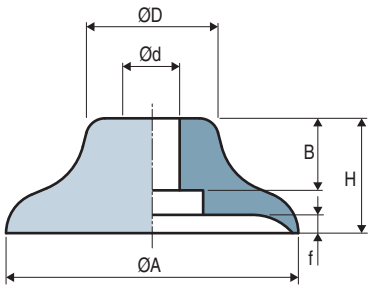
Dimensions - Suction Cups



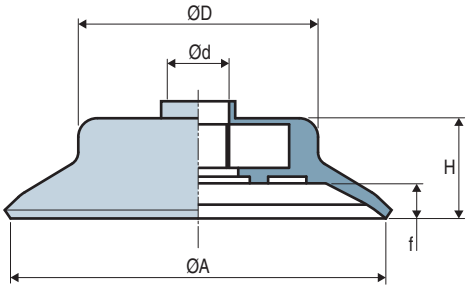
VPG 2 - 10



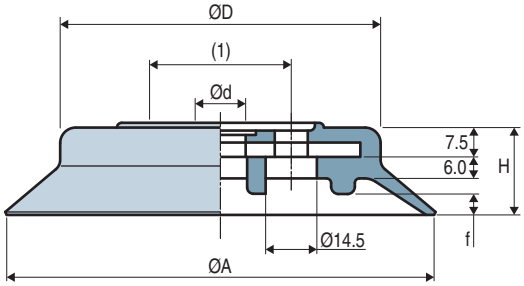
VPG 15 - 50



VPG 60 - 95



VPG 120 - 200



(1) 4 holes Ø 9 on Ø 40

(Ø)	ØA	H	Ød	ØD	f (1)	B	(g)
VPG 2	2	4	2	4	0.5	2.5	0.03
VPG 3.5	3.5	4	2	4	0.5	2.5	0.04
VPG 5	5	6.5	4	7.5	0.8	4	0.16
VPG 6	6	6.5	4	7.5	0.8	4	0.17
VPG 8	8	7	4	8	1.2	4	0.23
VPG 10	10	7.5	4	8.7	1.5	4	0.3
VPG 15	15	8	4.5	12	1.9	2.5	0.7
VPG 20	20	10	4.5	15	2.3	4.5	1.5
VPG 25	25	14	6	16	3	7	2.8
VPG 30	30	12	6	15	2	7	3.3
VPG 35	35	14	6	20.5	3	7	5.8
VPG 40	40	14	6	23.5	3.5	7	7.3
VPG 50	50	15	8	29	4	7	11.1
VPG 60	60	16	M10x125-F	38	5	-	25.4
VPG 60S	60	16	G1/4"-F	38	5	-	25.4
VPG 80	80	18	M10x125-F	53	6	-	53
VPG 80S	80	18	G1/4"-F	53	6	-	53
VPG 95	95	19	M10x125-F	68	6	-	93.2
VPG 95S	95	19	G1/4"-F	68	6	-	93.2
VPG 120	120	24.5	14.5	89.5	6	-	230
VPG 150	150	30.5	13	105	9	-	400
VPG 200	200	35.5	13	143	12.5	-	690

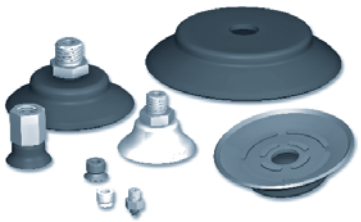
The values represent the average characteristics of our products.
Note: All dimensions are in mm.

(1) f = Deflection of the suction cup.

VPG

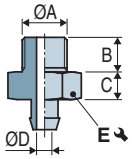
Extra-flat Suction Cups Ø 2 to 200 mm

Dimensions - Fittings

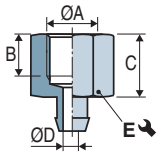


Barbed Fittings

Male - IM

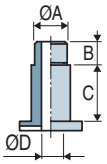


Female - IF



	ØA	B	C	ØD	E	Material	(g)
IM 3 VPG2	M3-M	3	2	1	5	Aluminum	0.18
IM 5 VPG2	M5-M	4.5	3.5	1	7	Aluminum	0.61
IM 5 VPG5	M5-M	4.5	3.5	2.2	7	Aluminum	0.7
IM 18 VPG5	G1/8"-M	8	5	2.2	14	Aluminum	3.9
IM 18 VPG15	G1/8"-M	8	5	2.2	14	Aluminum	4
IM 18 VPG20	G1/8"-M	8	5	3	14	Aluminum	4.06
IM 18 VPG25	G1/8"-M	8	5	4	14	Aluminum	4.08
IM 18 VPG50	G1/8"-M	8	5	4	14	Aluminum	4.9
IF 5 VPG5	M5-F	6	9	2.2	14	Aluminum	1.2
IF 18 VPG5	G1/8"-F	9	15	2.2	14	Aluminum	5.1
IF 18 VPG15	G1/8"-F	9	15	2.5	14	Aluminum	5.2
IF 18 VPG20	G1/8"-F	9	15	3	14	Aluminum	5.4
IF 18 VPG25	G1/8"-F	9	15	4	14	Aluminum	5.5
IF 18 VPG50	G1/8"-F	9	15	4	14	Aluminum	6.3

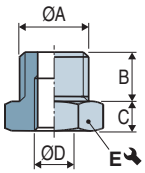
Hollow Screws



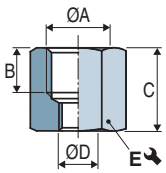
	ØA	B	C	ØD	Material	(g)
IM 5 M15	M5-M	5	2	2.5	Nickel-plated brass	1.3
IM 5 M20	M5-M	5	4	2.5	Nickel-plated brass	2.2
IM 6 M25	M6-M	6	6	3.5	Nickel-plated brass	2.7
IM 6 M50	M6-M	6	6	3.5	Nickel-plated brass	7.5

Adapters for Hollow Screws

Male - IM



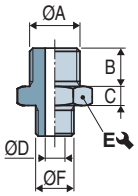
Female - IF



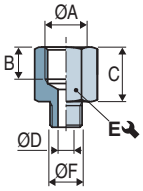
	ØA	B	C	ØD	E	Material	(g)
IM 10 M6F	M10-M	7	3.5	M6-F	13	Nickel-plated brass	5.9
IM 14 M6F	G1/4"-M	8	5	M6-F	17	Nickel-plated brass	15.9
IM 18 M5F	G1/8"-M	6	4.5	M5-F	13	Nickel-plated brass	7.3
IM 18 M6F	G1/8"-M	6	4.5	M6-F	13	Nickel-plated brass	6.6
IF 14 M6F	G1/4"-F	11	16	M6-F	17	Nickel-plated brass	20.5
IF 18 M5F	G1/8"-F	7.5	13	M5-F	13	Nickel-plated brass	10.5
IF 18 M6F	G1/8"-F	7.5	13	M6-F	13	Nickel-plated brass	9.9

Screwed

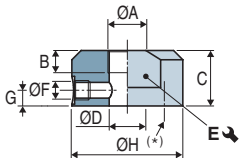
Male - IM



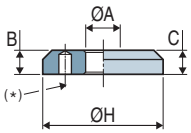
Female - IF



Female - IF 12120



Female - IFS 12120



(*) 4 M8 holes at 90°on Ø40 (screws provided)

	ØA	B	C	ØD	E	ØF	G	H	Material	(g)
IM 14 M10M	G1/4"-M	10	5	5	17	M10x125-M	-	-	Aluminum	7
IF 14 M10M	G1/4"-F	10	17	5	17	M10x125-M	-	-	Aluminum	8.3
IF 12120	G1/2"-F	24	30	19	48	G1/8"-F	8.7	60	Aluminum	224.8
IFS 12120	G1/2"-F	13	13	-	-	-	-	65	Aluminum	143.5

Note: All dimensions are in mm.

VPU
Flat Suction Cups Ø 6 to 50 mm

VPU series suction cups are suitable for gripping flat, smooth and rigid products.

Industry-specific applications

Types of use

Materials

NBR Nitrile
SI Translucent Silicone
STN Siton®

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	(lbf) (1)	R_{min} (mm)	NBR	SI	STN
VPU 6	7	0.05	0.21	0.10	5	**VPU6NBR**	**VPU6SI**	**VPU6STN**
VPU 8	9	0.1	0.32	0.16	6	**VPU8NBR**	**VPU8SI**	**VPU8STN**
VPU 10	11	0.018	0.57	0.28	8	**VPU10NBR**	**VPU10SI**	**VPU10STN**
VPU 15	16.5	0.5	0.97	0.49	8	**VPU15NBR**	**VPU15SI**	**VPU15STN**
VPU 20	22	1	1.46	0.73	13	**VPU20NBR**	**VPU20SI**	**VPU20STN**
VPU 30	32	2	2.92	1.46	20	**VPU30NBR**	**VPU30SI**	**VPU30STN**
VPU 40	41	5.5	4.22	2.11	30	**VPU40NBR**	**VPU40SI**	**VPU40STN**
VPU 50	51.4	12	7.47	3.73	35	**VPU50NBR**	**VPU50SI**	**VPU50STN**

(1) Actual force of the suction cup in use with 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.

Choice of Fittings

(Ø)	M5-M	G1/8"-M	G1/4"-M
6…15	■	-	-
20…30		■	
40…50	-	-	■

■ Standard available configurations (suction cup + fitting) Fittings: M = Male
See part n° schedule as below

Type of Assembly

C **Version C:** Barbed fitting

References - "Section Cup + Fitting"

	THREAD	C M5-M
Ø 6 - 15 mm	**VPU6NBR**	VPU6NBRIMM5C
	VPU6SI	VPU6SIIMM5C
	VPU6STN	VPU6STNIMM5C
	VPU8NBR	VPU8NBRIMM5C
	VPU8SI	VPU8SIIMM5C
	VPU8STN	VPU8STNIMM5C
	VPU10NBR	VPU10NBRIMM5C
	VPU10SI	VPU10SIIMM5C
	VPU10STN	VPU10STNIMM5C
	VPU15NBR	VPU15NBRIMM5C
	VPU15SI	VPU15SIIMM5C
	VPU15STN	VPU15STNIMM5C

	THREAD	C G1/8"-M
Ø 20 - 30 mm	**VPU20NBR**	VPU20NBRIM18C
	VPU20SI	VPU20SIIM18C
	VPU20STN	VPU20STNIM18C
	VPU30NBR	VPU30NBRIM18C
	VPU30SI	VPU30SIIM18C
	VPU30STN	VPU30STNIM18C

	THREAD	C G1/4"-M
Ø 40 - 50 mm	**VPU40NBR**	VPU40NBRIM14C
	VPU40SI	VPU40SIIM14C
	VPU40STN	VPU40STNIM14C
	VPU50NBR	VPU50NBRIM14C
	VPU50SI	VPU50SIIM14C
	VPU50STN	VPU50STNIM14C

Please specify the part n°. e.g. VPU20NBRIM18C
See part n° table above

Accessories
To optimize use of your suction cups, Coval offers a comprehensive range of accessories (sensors, spring extensions, and feeder systems, etc.)
see chapters **4** and **12**.

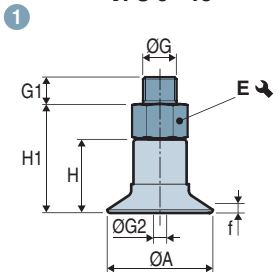
VPU

Flat Suction Cups Ø 6 to 50 mm

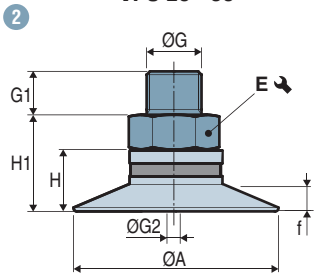
Assembly Diagrams

Suction Cups + Fittings

VPU 6 - 15



VPU 20 - 30



VPU 40 - 50

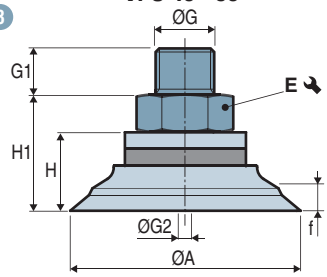
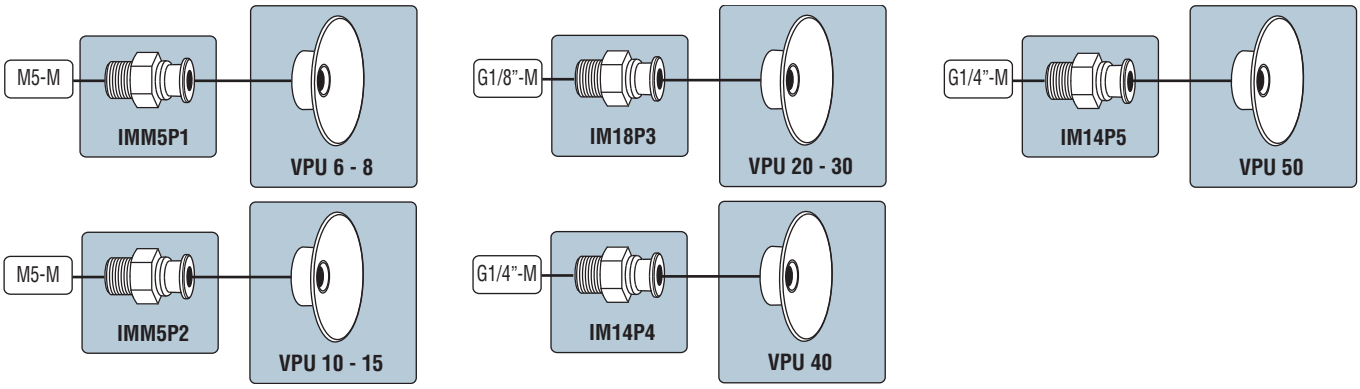


	Diagram	ØA	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
VPU6---IMM5C	**1**	7	0.3	6.5	10	M5-M	4	1.5	7	1.8
VPU8---IMM5C	**1**	9	0.5	7	10.5	M5-M	4	1.5	7	1.9
VPU10---IMM5C	**1**	11	0.5	10.5	15	M5-M	4	2.7	7	1.3
VPU15---IMM5C	**1**	16.5	1.5	11.5	16	M5-M	4	2.7	7	1.6
VPU20---IM18C	**2**	22	2.5	8	11.5	G1/8"-M	7	4	14	4.2
VPU30---IM18C	**2**	32	3.5	9.5	13	G1/8"-M	7	4	14	4.9
VPU40---IM14C	**3**	41	4.5	13	19	G1/4"-M	9	5	17	11.3
VPU50---IM14C	**3**	51.4	6	17.5	23.5	G1/4"-M	9	5	21	22

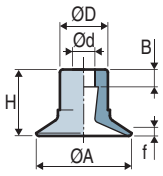
Note: All dimensions are in mm. (1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

Assembly Diagrams

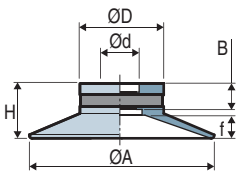


Suction Cups

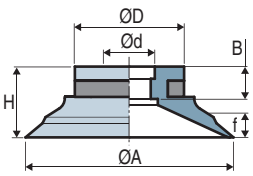
VPU 6 - 15



VPU 20 - 30



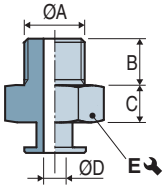
VPU 40 - 50



	ØA	H	Ød	ØD	f (1)	B	(g)
VPU 6	7	6.5	2	5	0.3	3.5	0.12
VPU 8	9	7	2	5	0.5	3.5	0.15
VPU 10	11	10.5	3.8	9	0.5	3	0.51
VPU 15	16.5	11.5	3.8	8.3	1.5	3	0.75
VPU 20	22	8	5	14.5	2.5	4.5	1.2
VPU 30	32	9.5	5	14.5	3.5	4.5	1.9
VPU 40	41	13	6.5	20	4.5	6	5
VPU 50	51.4	17.5	10.5	27	6	8	12

Note: All dimensions are in mm. (1) f = Deflection of the suction cup.
The values represent the average characteristics of our products.

Barbed Fittings



	ØA	B	C	ØD	E	Material	(g)
IMM5P1	M5-M	4	3.5	1.5	7	Brass	1.7
IMM5P2	M5-M	4	4.5	2.7	7	Aluminum	0.8
IM18P3	G1/8"-M	7	3.5	4	14	Aluminum	3
IM14P4	G1/4"-M	9	6	5	17	Aluminum	6.3
IM14P5	G1/4"-M	9	6	5	21	Aluminum	10

VPF
Flat Suction Cups with Cleats Ø 15 to 50 mm

VPF series suction cups are suitable for gripping flat, smooth and rigid products. Cleats prevent the deformation of the product and provide excellent non-slip properties.

Industry-specific applications

Types of use

Materials

NBR Nitrile
SIT5 Translucent Silicone
STN Siton®

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	(lbf) (1)	Rmin (mm)	NBR	SI	STN
VPF 15	15.7	0.37	0.81	0.41	13	**VPF15NBR**	**VPF15SI**	**VPF15STN**
VPF 20	22	1.00	1.62	0.81	18	**VPF20NBR**	**VPF20SI**	**VPF20STN**
VPF 25	26.8	1.10	2.11	1.06	22	**VPF25NBR**	**VPF25SI**	**VPF25STN**
VPF 30	32	2.00	2.60	1.30	25	**VPF30NBR**	**VPF30SI**	**VPF30STN**
VPF 40	42.5	1.80	4.06	2.03	52	**VPF40NBR**	**VPF40SI**	**VPF40STN**
VPF 50	53	10.00	7.79	3.90	55	**VPF50NBR**	**VPF50SI**	**VPF50STN**

(1) Actual force of the suction cup in use with 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.

Choice of Fittings

(Ø)	M5-M	G1/8"-M	G1/4"-M
15	■	-	-
20 - 30	-	■	-
40 - 50	-	-	■

■ Standard available configurations (suction cup + fitting) refer to n° table above

Fittings: M = Male

Types of Assembly

C 

Version C: Barbed fitting

References "Suction Cup + Fitting"

	C
	THREAD	**M5-M**
Ø 15 mm	**VPF5NBR**	VPF15NBRIMM5C
	VPF5SI	VPF15SIIMM5C
	VPF15STN	VPF15STNIMM5C

	C
	THREAD	**G1/8"-M**
Ø 20 - 30 mm	**VPF20NBR**	VPF20NBRIM18C
	VPF20SI	VPF20SIIM18C
	VPF20STN	VPF20STNIM18C
	VPF25NBR	VPF25NBRIM18C
	VPF25SI	VPF25SIIM18C
	VPF25STN	VPF25STNIM18C
	VPF30NBR	VPF30NBRIM18C
	VPF30SI	VPF30SIIM18C
	VPF30STN	VPF30STNIM18C

	C
	THREAD	**G1/4"-M**
Ø 40 - 50 mm	**VPF40NBR**	VPF40NBRIM14C
	VPF40SI	VPF40SIIM14C
	VPF40STN	VPF40STNIM14C
	VPF50NBR	VPF50NBRIM14C
	VPF50SI	VPF50SIIM14C
	VPF50STN	VPF50STNIM14C

Please specify the part n°. e.g. VPF20NBRIM18C
See part n° table above

Accessories
To optimize use of your suction cups, Coval offers a comprehensive range of accessories (sensors, spring extensions, and feeder systems, etc.)
see chapters **4** and **12**.

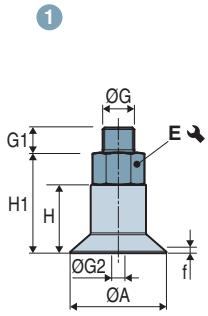
VPF

Flat Suction Cups with Cleats Ø 15 to 50 mm

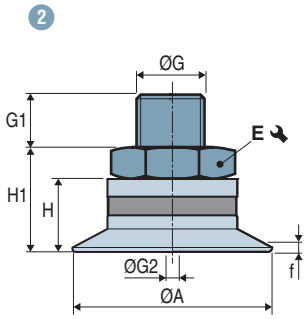
Assembly Diagrams

Suction Cup + Fitting

VPF 15



VPF 20…30



VPF 40…50

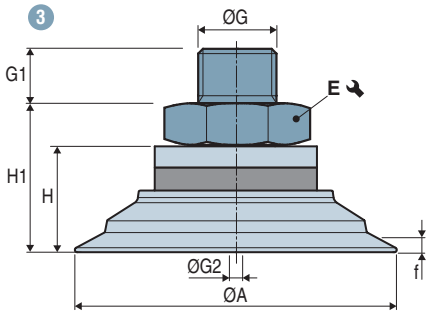
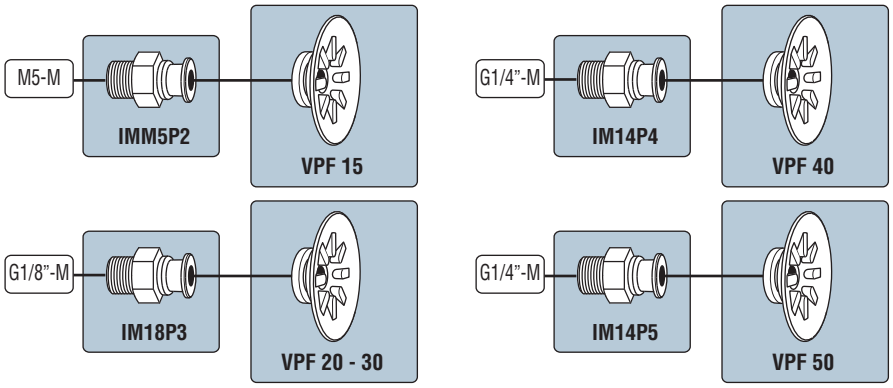


	Diagram	ØA	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
VPF15---IMM5C	**1**	15.7	1	11	15.5	M5-M	4	2.7	7	1.5
VPF20---IM18C	**2**	22	1	8	11.5	G1/8"-M	7	4	14	4.2
VPF25---IM18C	**2**	26.8	1.3	9	12.5	G1/8"-M	7	4	14	4.7
VPF30---IM18C	**2**	32	1.8	10	13.5	G1/8"-M	7	4	14	5.2
VPF40---IM14C	**3**	42.5	1.9	13	19	G1/4"-M	9	5	17	11.9
VPF50---IM14C	**3**	53	2.4	17.5	23.5	G1/4"-M	9	5	21	22.7

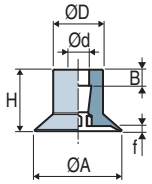
Note: All dimensions are in mm. (1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

Assembly Diagrams

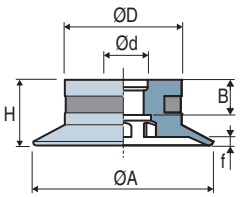


Suction Cups

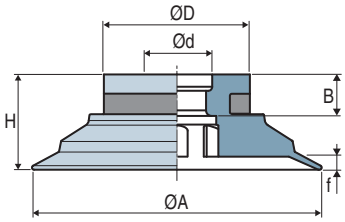
VPF 15



VPF 20…30



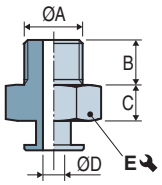
VPF 40…50



	Ø A	H	Ø d	Ø D	f (1)	B	(g)
VPF 15	15.7	11	4	9	1	3	0.7
VPF 20	22	8	5	14.3	1	4.5	1.2
VPF 25	26.8	9	5	14.3	1.3	4.5	1.7
VPF 30	32	10	5	14.3	1.8	4.5	2.2
VPF 40	42.5	13	7	20	1.9	6	5.6
VPF 50	53	17.5	10.5	27	2.4	7.5	12.7

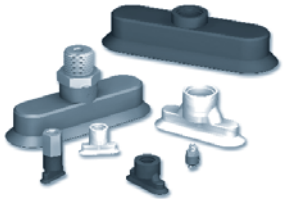
Note: All dimensions are in mm. (1) f = Deflection of the suction cup.
The values represent the average characteristics of our products.

Barbed Male Fitting



	ØA	B	C	ØD	E	Material	(g)
IMM5P2	M5-M	4	4.5	2.7	7	Aluminum	0.8
IM18P3	G1/8"-M	7	3.5	4	14	Aluminum	3
IM14P4	G1/4"-M	9	6	5	17	Aluminum	6.3
IM14P5	G1/4"-M	9	6	5	21	Aluminum	10

VPO
Oblong Flat Suction Cups



The VPO series of flat suction cups is used for handling oblong products,such as pens, tubes and bottles, and flat or cylindrical objects.

Types of use

Industry-specific applications

Materials

NBR Nitrile **STN** Siton® **SI** Silicone

Suction Cup Properties

	l x L (mm)	(cm³)	(lbf) (1)	R_{min} (mm)	NBR	SI	STN
VPO 24	2x4	0.004	0.05	1	**VPO24NBR**	**VPO24SI**	**VPO24STN**
VPO 357	3.5x7	0.019	0.12	3	**VPO357NBR**	**VPO357SI**	**VPO357STN**
VPO 515	5x15	0.036	0.38	4	**VPO515NBR**	**VPO515SI**	**VPO515STN**
VPO 618	6x18	0.058	0.55	4	**VPO618NBR**	**VPO618SI**	**VPO618STN**
VPO 824	8x24	0.138	0.97	8	**VPO824NBR**	**VPO824SI**	**VPO824STN**
VPO 1030	10x30	0.28	1.49	8	**VPO1030NBR**	**VPO1030SI**	**VPO1030STN**
VPO 1545	15x45	0.98	3.43	10	**VPO1545NBR**	**VPO1545SI**	**VPO1545STN**
VPO 2060	20x60	2.3	6.10	20	**VPO2060NBR**	**VPO2060SI**	**VPO2060STN**
VPO 2575	25x75	4.7	9.53	30	**VPO2575NBR**	**VPO2575SI**	**VPO2575STN**
VPO 3090	30x90	8.5	13.72	35	**VPO3090NBR**	**VPO3090SI**	**VPO3090STN**

(1) Actual force of the suction cup with 65% vacuum and a safety factor of 2 included.

Choice of Fittings

(Ø)	M3-M	M5-M	M5-F	G1/8"-M	G1/8"-F	G1/4"-M	G1/4"-F
24, 357	■	- -	- -	- -	- -	- -	- -
515, 618	- -	■	■	- -	- -	- -	- -
824, 1030	- -	- -	- -	■	■	- -	- -
1545… 3090	- -	- -	- -	- -	- -	■	■

Collar must be used from 8 x 24 upwards to prevent unintentional rotation when in use.

■ Standard available configurations (suction cup + fitting): refer to n° table above Fitting: M = male F = female

Type of Assembly

C 

Version C: Barbed fitting

References - "Suction Cup + Fitting"

2x4, 3.5x7

THREAD	C M3-M
VPO24NBR	VPO24NBRIMM3C
VPO24SI	VPO24SIIMM3C
VPO24STN	VPO24STNIMM3C
VPO357NBR	VPO357NBRIMM3C
VPO357SI	VPO357SIIMM3C
VPO357STN	VPO357STNIMM3C

5x15 - 6x18

THREAD	C M5-M	M5-F
VPO515NBR	VPO515NBRIMM5C	VPO515NBRIFM5C
VPO515SI	VPO515SIIMM5C	VPO515SIIFM5C
VPO515STN	VPO515STNIMM5C	VPO515STNIFM5C
VPO618NBR	VPO618NBRIMM5C	VPO618NBRIFM5C
VPO618SI	VPO618SIIMM5C	VPO618SIIFM5C
VPO618STN	VPO618STNIMM5C	VPO618STNIFM5C

8x24 - 10x30

THREAD	C G1/8"-M	G1/8"-F
VPO824NBR	VPO824NBRIM18C	VPO824NBRIF18C
VPO824SI	VPO824SIIM18C	VPO824SIIF18C
VPO824STN	VPO824STNIM18C	VPO824STNIF18C
VPO1030NBR	VPO1030NBRIM18C	VPO1030NBRIF18C
VPO1030SI	VPO1030SIIM18C	VPO1030SIIF18C
VPO1030STN	VPO1030STNIM18C	VPO1030STNIF18C

15x45 - 30x90

THREAD	C G1/4"-M	G1/4"-F
VPO1545NBR	VPO1545NBRIM14C	VPO1545NBRIF14C
VPO1545SI	VPO1545SIIM14C	VPO1545SIIF14C
VPO1545STN	VPO1545STNIM14C	VPO1545STNIF14C
VPO2060NBR	VPO2060NBRIM14C	VPO2060NBRIF14C
VPO2060SI	VPO2060SIIM14C	VPO2060SIIF14C
VPO2060STN	VPO2060STNIM14C	VPO2060STNIF14C
VPO2575NBR	VPO2575NBRIM14C	VPO2575NBRIF14C
VPO2575SI	VPO2575SIIM14C	VPO2575SIIF14C
VPO2575STN	VPO2575STNIM14C	VPO2575STNIF14C
VPO3090NBR	VPO3090NBRIM14C	VPO3090NBRIF14C
VPO3090SI	VPO3090SIIM14C	VPO3090SIIF14C
VPO3090STN	VPO3090STNIM14C	VPO3090STNIF14C

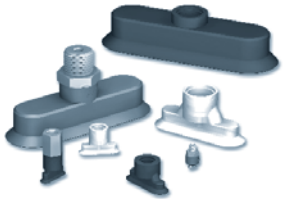
Accessories
Anti-rotation spring system, see page 4/6

Please specify the part n°. e.g. VPO618NBRIFM5C
See part n° table above

VPO

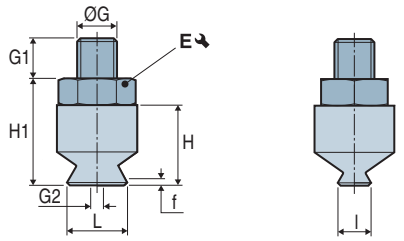
Oblong Flat Suction Cups

Dimensions - "Suction Cup + Fitting"



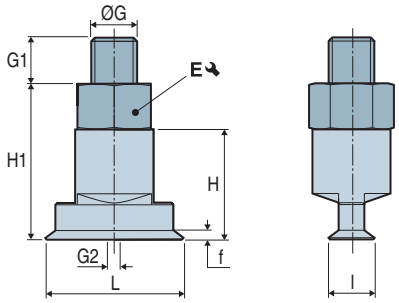
VPO 2x4 - 3.5x7

1



VPO 5x15 - 6x18

2



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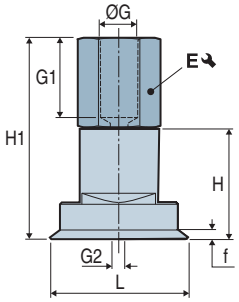
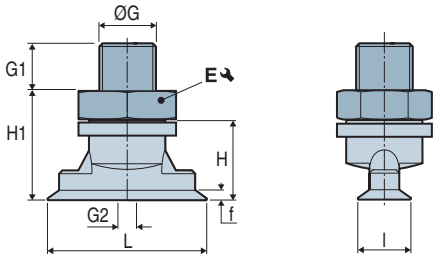


VPO 8x24 - 10x30

4



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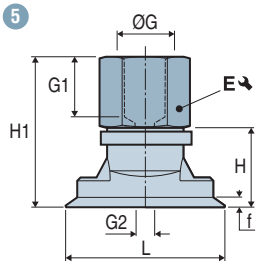
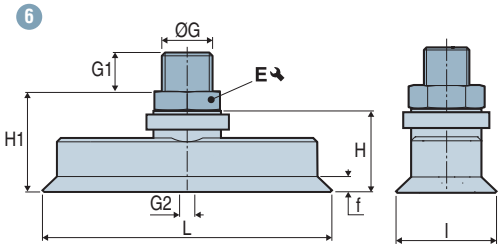


VPO 15x45 - 20x60 - 25x75 - 30x90

6



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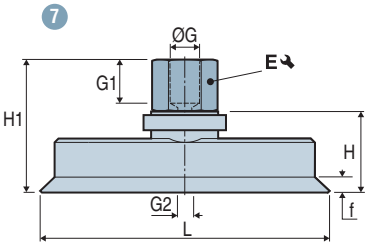


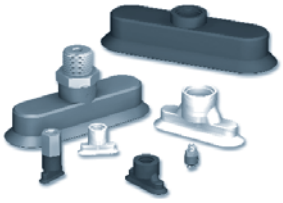
	Diagram	L	l	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
VPO24---IMM3C	1	4	2	0.5	6	8	M3-M	3	1	5	0.4
VPO357---IMM3C	1	7	3.5	0.8	6	8	M3-M	3	1	5	0.3
VPO515---IMM5C	2	15	5	0.7	12	17	M5-M	5	2	8	1.8
VPO515---IFM5C	3	15	5	0.7	12	22	M5-F	8.5	2	8	1.8
VPO618---IMM5C	2	18	6	0.8	12	17	M5-M	5	2	8	1.8
VPO618---IFM5C	3	18	6	0.8	12	22	M5-F	8.5	2	8	1.8
VPO824---IM18C	4	24	8	1	12	17	G1/8"-M	8	3.5	14	6.6
VPO824---IF18C	5	24	8	1	12	25	G1/8"-F	9	3.5	14	7.3
VPO1030---IM18C	4	30	10	1.5	12	17	G1/8"-M	8	3.5	14	6.8
VPO1030---IF18C	5	30	10	1.5	12	25	G1/8"-F	9	3.5	14	7.5
VPO1545---IM14C	6	45	15	2	21	26	G1/4"-M	10	3.5	17	16.5
VPO1545---IF14C	7	45	15	2	21	36	G1/4"-F	12	3.5	17	16.5
VPO2060---IM14C	6	60	20	2.5	21	26	G1/4"-M	10	3.5	17	19.7
VPO2060---IF14C	7	60	20	2.5	21	36	G1/4"-F	12	3.5	17	19.7
VPO2575---IM14C	6	75	25	2.8	21	26	G1/4"-M	10	3.5	17	27.9
VPO2575---IF14C	7	75	25	2.8	21	36	G1/4"-F	12	3.5	17	27.9
VPO3090---IM14C	6	90	30	3.5	21	26	G1/4"-M	10	3.5	17	36.3
VPO3090---IF14C	7	90	30	3.5	21	36	G1/4"-F	12	3.5	17	36.3

Note: All dimensions are in mm.

(1) f = Deflection of the suction cup.

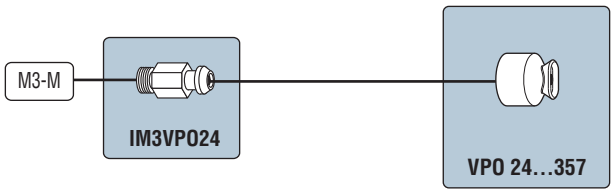
(2) Ø G2 = Ø internal orifice of the fitting.

VPO
Oblong Flat Suction Cups
Assembly Diagrams



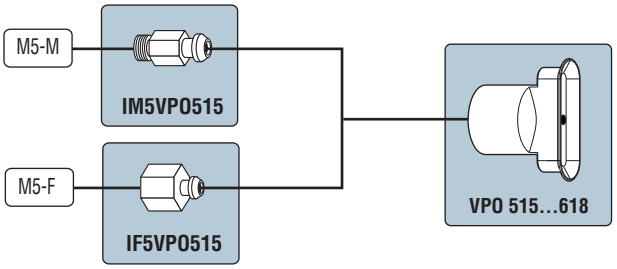
VPO 24 - 357

Barbed fittings C



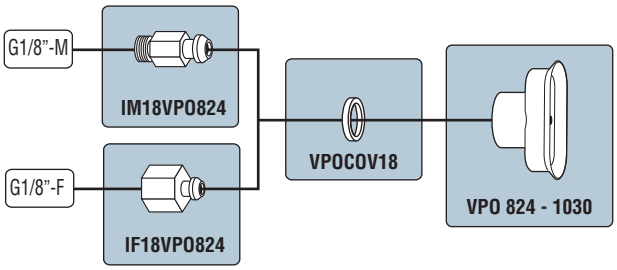
VPO 515 - 618

Barbed fittings C



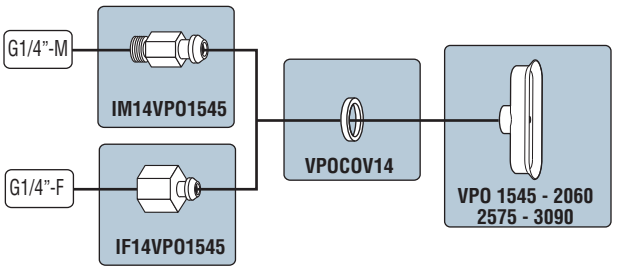
VPO 824 - 1030

Barbed fittings C

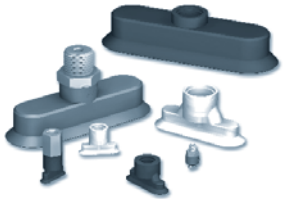


VPO 1545 - 2060 - 2575 - 3090

Barbed fittings C

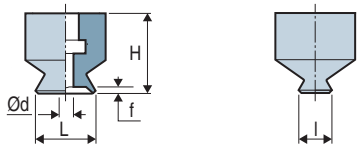


VPO
Oblong Flat Suction Cups
Dimensions

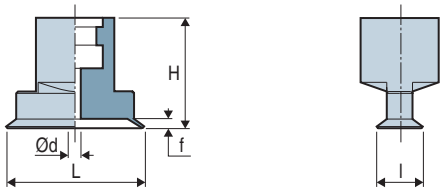


Dimensions Suction Cups

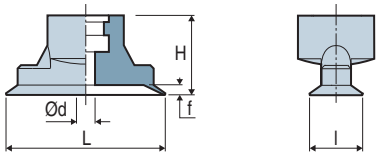
VPO 24 - 357



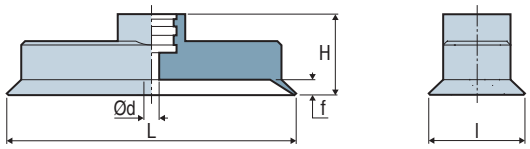
VPO 515 - 618



VPO 824 - 1030



VPO 1545 - 2060 - 2575 - 3090



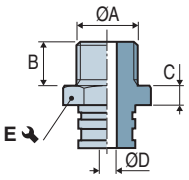
Suction Cups

	L	l	Ø d	H	f (1)	(g)
VPO24	4	2	0.7	6	0.5	0.12
VPO357	7	3.5	1	6	0.8	0.15
VPO515	15	5	1.2	12	0.7	0.51
VPO618	18	6	1.5	12	0.8	0.53
VPO824	24	8	1.5	12	1	1.1
VPO1030	30	10	2.5	12	1.5	1.3
VPO1545	45	15	3	21	2	4.1
VPO2060	60	20	4	21	2.5	7.3
VPO2575	75	25	4	21	2.8	15.5
VPO3090	90	30	4	21	3.5	23.9

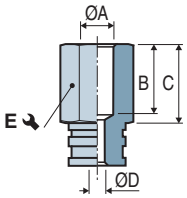
(1) f = Deflection of the suction cup.

Barbed Fitting

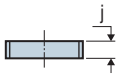
Male - IM



Female - IF



Collar

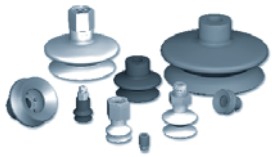


	ØA	B	C	ØD	E	j	Matierial	(g)
IM3VPO24	M3-M	3	2	1	5	-	Aluminum	0.2
IM5VPO515	M5-M	5	5	2	8	-	Aluminum	1.3
IM18VPO824	G1/8"-M	8	5	3.5	14	-	Aluminum	3.9
IM14VPO1545	G1/4"-M	10	5	3.5	17	-	Aluminum	9.7
IF5VPO515	M5-F	8.5	10	2	8	-	Aluminum	1.3
IF18VPO824	G1/8"-F	9	13	3.5	14	-	Aluminum	4.6
IF14VPO1545	G1/4"-F	12	15	3.5	17	-	Aluminum	9.7
VPO COV18	-	-	-	-	-	4	Aluminum	1.6
VPO COV14	-	-	-	-	-	4	Aluminum	2.7

The values represent the average characteristics of our products.
Note: All dimensions are in mm.

(1) f = Deflection of the suction cup.

VSA
Suction Cups with 1.5 Bellows Ø 5 to 78 mm

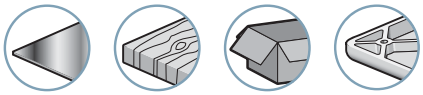


VSA series suction cups with bellows combine the advantages of flat suction cups with increased deflection, flexibility and precision.
Used for gripping slightly concave or convex objects.

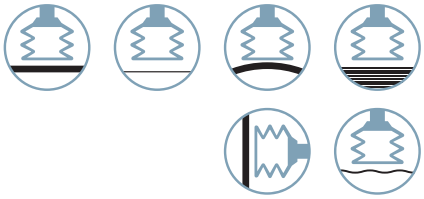
■ Flexibility ■ Precision ■ Deflection

For delicate gripping requiring a very flexible lip (opening bags, gripping tins and flexible aluminum or plastic bottles, etc.), we recommend using 35 Shore A white silicone, SIB. For larger diameters, see page 3/2, MVS series.

Industry-specific applications



Types of use



Materials

NBR	Nitrile	**SIT5**	Translucent silicone
NR	Natural rubber	**SIB**	35 shore A white silicone
STN	Siton® 60 ShoreA	**STN5**	Siton® 50 ShoreA (on request)

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	(lbf) (1)	R_{min} (mm)	NBR	SIT5	SIB	NR	STN (2)
VSA 5	5.5	0.04	0.11	0.06	10	**VSA5NBR**	**VSA5SIT5**	-	-	**VSA5STN**
VSA 11	11	0.225	0.39	0.19	10	**VSA11NBR**	**VSA11SIT5**	-	**VSA11NR**	**VSA11STN**
VSA 14	13	0.42	0.57	0.28	13	**VSA14NBR**	**VSA14SIT5**	-	**VSA14NR**	**VSA14STN**
VSA 16	16	0.75	0.60	0.30	20	**VSA16NBR**	**VSA16SIT5**	**VSA16SIB**	**VSA16NR**	**VSA16STN**
VSA 18	18	0.76	0.99	0.50	25	**VSA18NBR**	**VSA18SIT5**	**VSA18SIB**	**VSA18NR**	**VSA18STN**
VSA 20	19	1.15	1.25	0.63	30	**VSA20NBR**	**VSA20SIT5**	**VSA20SIB**	**VSA20NR**	**VSA20STN**
VSA 22	22	1.4	1.38	0.69	25	**VSA22NBR**	**VSA22SIT5**	**VSA22SIB**	**VSA22NR**	**VSA22STN**
VSA 25	24	3.15	1.79	0.89	20	**VSA25NBR**	**VSA25SIT5**	**VSA25SIB**	**VSA25NR**	**VSA25STN**
VSA 26	25	3.9	2.44	1.22	30	**VSA26NBR**	**VSA26SIT5**	-	**VSA26NR**	**VSA26STN**
VSA 33	33	4.75	3.12	1.56	40	**VSA33NBR**	**VSA33SIT5**	-	**VSA33NR**	**VSA33STN**
VSA 43	43	9.25	4.55	2.27	60	**VSA43NBR**	**VSA43SIT5**	-	**VSA43NR**	**VSA43STN**
VSA 53	53	26.25	9.58	4.79	75	**VSA53NBR**	**VSA53SIT5**	-	**VSA53NR**	**VSA53STN**
VSA 63	63	39.0	13.31	6.66	75	**VSA63NBR**	**VSA63SIT5**	-	**VSA63NR**	**VSA63STN**
VSA 78	78	76.0	24.68	12.34	70	**VSA78NBR**	**VSA78SIT5**	-	**VSA78NR**	**VSA78STN**

(1) Actual force of the suction cup in use with 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.
(2) On request, some models are available in STN5 (Siton® 50 shore A)

Choice of Fittings

(Ø)	Group	M3-M	M5-M	M6-M	M8-M	M10-M	G1/8"-F	G1/8"-M	10/32-M	G1/4"-F	G1/4"-M	G3/8"-M	G1/2"-M
5	**1**	■	-	-	-	-	-	-	-	-	-	-	-
11…25	**1**	-	■	■	-	-	■	■	□	-	-	-	-
26…63	**2**	-	□	□	□	□	■	■	-	■	■	-	-
78	**3**	-	-	-	-	□	-	■	-	■	■	□	□

■ Standard available configurations (suction cup + fitting): see page 2/26 □ Additional mounting configurations: see page 2/29 Fitting: M = male F = female

Types of Assembly

COVAL suction cups can be assembled in a wide variety of configurations.

C **Version C**
Barbed fitting

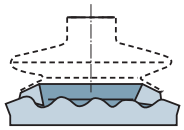
S **Version S**
Factory-crimped fitting

V **Version V**
Removable fitting:
(adapter and hollow screw)

E **Version E**
Pressed fitting

Textured Surfaces

For handling objects with a granular or textured gripping surface, use VSA suction cups with the VSBM foam strip option (see page 2/59).



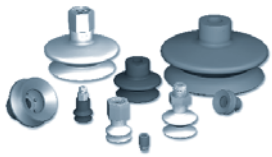
Please specify the part n°. e.g. VSA78NBRIM14C
Refer to page 2/26

Accessories
To optimize the use of your suction cups, Coval offers a comprehensive range of accessories (nozzle fittings, spring extensions, and feeder systems, etc.), see chapters **4** and **12**.

VSA

Suction Cups with 1.5 Bellows Ø 5 to 78 mm

References - "Suction Cup + Fitting"



Group 1 — C

	THREAD	M3-M	M5-M	M6-M	G1/8"-M	G1/8"-F
Ø 5 - 25 mm	**VSA5NBR**	VSA5NBRIMM3C	-	-	-	-
	VSA5SIT5	VSA5SIT5IMM3C	-	-	-	-
	VSA5STN	VSA5STNIMM3C	-	-	-	-
	VSA11NBR	-	VSA11NBRIMM5C	VSA11NBRIMM6C	VSA11NBRIM18C	VSA11NBRIF18C
	VSA11NR	-	VSA11NRIMM5C	VSA11NRIMM6C	VSA11NRIM18C	VSA11NRIF18C
	VSA11SIT5	-	VSA11SIT5IMM5C	VSA11SIT5IMM6C	VSA11SIT5IM18C	VSA11SIT5IF18C
	VSA11STN	-	VSA11STNIMM5C	VSA11STNIMM6C	VSA11STNIM18C	VSA11STNIF18C
	VSA14NBR	-	VSA14NBRIMM5C	VSA14NBRIMM6C	VSA14NBRIM18C	VSA14NBRIF18C
	VSA14NR	-	VSA14NRIMM5C	VSA14NRIMM6C	VSA14NRIM18C	VSA14NRIF18C
	VSA14SIT5	-	VSA14SIT5IMM5C	VSA14SIT5IMM6C	VSA14SIT5IM18C	VSA14SIT5IF18C
	VSA14STN	-	VSA14STNIMM5C	VSA14STNIMM6C	VSA14STNIM18C	VSA14STNIF18C
	VSA16NBR	-	VSA16NBRIMM5C	VSA16NBRIMM6C	VSA16NBRIM18C	VSA16NBRIF18C
	VSA16NR	-	VSA16NRIMM5C	VSA16NRIMM6C	VSA16NRIM18C	VSA16NRIF18C
	VSA16SIB	-	VSA16SIBIMM5C	VSA16SIBIMM6C	VSA16SIBIM18C	VSA16SIBIF18C
	VSA16SIT5	-	VSA16SIT5IMM5C	VSA16SIT5IMM6C	VSA16SIT5IM18C	VSA16SIT5IF18C
	VSA16STN	-	VSA16STNIMM5C	VSA16STNIMM6C	VSA16STNIM18C	VSA16STNIF18C
	VSA18NBR	-	VSA18NBRIMM5C	VSA18NBRIMM6C	VSA18NBRIM18C	VSA18NBRIF18C
	VSA18NR	-	VSA18NRIMM5C	VSA18NRIMM6C	VSA18NRIM18C	VSA18NRIF18C
	VSA18SIB	-	VSA18SIBIMM5C	VSA18SIBIMM6C	VSA18SIBIM18C	VSA18SIBIF18C
	VSA18SIT5	-	VSA18SIT5IMM5C	VSA18SIT5IMM6C	VSA18SIT5IM18C	VSA18SIT5IF18C
	VSA18STN	-	VSA18STNIMM5C	VSA18STNIMM6C	VSA18STNIM18C	VSA18STNIF18C
	VSA20NBR	-	VSA20NBRIMM5C	VSA20NBRIMM6C	VSA20NBRIM18C	VSA20NBRIF18C
	VSA20NR	-	VSA20NRIMM5C	VSA20NRIMM6C	VSA20NRIM18C	VSA20NRIF18C
	VSA20SIB	-	VSA20SIBIMM5C	VSA20SIBIMM6C	VSA20SIBIM18C	VSA20SIBIF18C
	VSA20SIT5	-	VSA20SIT5IMM5C	VSA20SIT5IMM6C	VSA20SIT5IM18C	VSA20SIT5IF18C
	VSA20STN	-	VSA20STNIMM5C	VSA20STNIMM6C	VSA20STNIM18C	VSA20STNIF18C
	VSA22NBR	-	VSA22NBRIMM5C	VSA22NBRIMM6C	VSA22NBRIM18C	VSA22NBRIF18C
	VSA22NR	-	VSA22NRIMM5C	VSA22NRIMM6C	VSA22NRIM18C	VSA22NRIF18C
	VSA22SIB	-	VSA22SIBIMM5C	VSA22SIBIMM6C	VSA22SIBIM18C	VSA22SIBIF18C
	VSA22SIT5	-	VSA22SIT5IMM5C	VSA22SIT5IMM6C	VSA22SIT5IM18C	VSA22SIT5IF18C
	VSA22STN	-	VSA22STNIMM5C	VSA22STNIMM6C	VSA22STNIM18C	VSA22STNIF18C
	VSA25NBR	-	VSA25NBRIMM5C	VSA25NBRIMM6C	VSA25NBRIM18C	VSA25NBRIF18C
	VSA25NR	-	VSA25NRIMM5C	VSA25NRIMM6C	VSA25NRIM18C	VSA25NRIF18C
	VSA25SIB	-	VSA25SIBIMM5C	VSA25SIBIMM6C	VSA25SIBIM18C	VSA25SIBIF18C
	VSA25SIT5	-	VSA25SIT5IMM5C	VSA25SIT5IMM6C	VSA25SIT5IM18C	VSA25SIT5IF18C
	VSA25STN	-	VSA25STNIMM5C	VSA25STNIMM6C	VSA25STNIM18C	VSA25STNIF18C

Group 2 — C / E / V

	THREAD	G1/4"-M	G1/4"-F	G1/4"-M	G1/4"-F	G1/8"-M	G1/8"-F	G1/4"-M	G1/4"-F
Ø 26 - 63 mm	**VSA26NBR**	VSA26NBRIM14C	VSA26NBRIF14C	VSA26NBRIM14	VSA26NBRIF14	VSA26NBRIM18V	VSA26NBRIF18V	VSA26NBRIM14V	VSA26NBRIF14V
	VSA26NR	VSA26NRIM14C	VSA26NRIF14C	VSA26NRIM14	VSA26NRIF14	VSA26NRIM18V	VSA26NRIF18V	VSA26NRIM14V	VSA26NRIF14V
	VSA26SIT5	VSA26SIT5IM14C	VSA26SIT5IF14C	VSA26SIT5IM14	VSA26SIT5IF14	VSA26SIT5IM18V	VSA26SIT5IF18V	VSA26SIT5IM14V	VSA26SIT5IF14V
	VSA26STN	VSA26STNIM14C	VSA26STNIF14C	VSA26STNIM14	VSA26STNIF14	VSA26STNIM18V	VSA26STNIF18V	VSA26STNIM14V	VSA26STNIF14V
	VSA33NBR	VSA33NBRIM14C	VSA33NBRIF14C	VSA33NBRIM14	VSA33NBRIF14	VSA33NBRIM18V	VSA33NBRIF18V	VSA33NBRIM14V	VSA33NBRIF14V
	VSA33NR	VSA33NRIM14C	VSA33NRIF14C	VSA33NRIM14	VSA33NRIF14	VSA33NRIM18V	VSA33NRIF18V	VSA33NRIM14V	VSA33NRIF14V
	VSA33SIT5	VSA33SIT5IM14C	VSA33SIT5IF14C	VSA33SIT5IM14	VSA33SIT5IF14	VSA33SIT5IM18V	VSA33SIT5IF18V	VSA33SIT5IM14V	VSA33SIT5IF14V
	VSA33STN	VSA33STNIM14C	VSA33STNIF14C	VSA33STNIM14	VSA33STNIF14	VSA33STNIM18V	VSA33STNIF18V	VSA33STNIM14V	VSA33STNIF14V
	VSA43NBR	VSA43NBRIM14C	VSA43NBRIF14C	VSA43NBRIM14	VSA43NBRIF14	VSA43NBRIM18V	VSA43NBRIF18V	VSA43NBRIM14V	VSA43NBRIF14V
	VSA43NR	VSA43NRIM14C	VSA43NRIF14C	VSA43NRIM14	VSA43NRIF14	VSA43NRIM18V	VSA43NRIF18V	VSA43NRIM14V	VSA43NRIF14V
	VSA43SIT5	VSA43SIT5IM14C	VSA43SIT5IF14C	VSA43SIT5IM14	VSA43SIT5IF14	VSA43SIT5IM18V	VSA43SIT5IF18V	VSA43SIT5IM14V	VSA43SIT5IF14V
	VSA43STN	VSA43STNIM14C	VSA43STNIF14C	VSA43STNIM14	VSA43STNIF14	VSA43STNIM18V	VSA43STNIF18V	VSA43STNIM14V	VSA43STNIF14V
	VSA53NBR	VSA53NBRIM14C	VSA53NBRIF14C	VSA53NBRIM14	VSA53NBRIF14	VSA53NBRIM18V	VSA53NBRIF18V	VSA53NBRIM14V	VSA53NBRIF14V
	VSA53NR	VSA53NRIM14C	VSA53NRIF14C	VSA53NRIM14	VSA53NRIF14	VSA53NRIM18V	VSA53NRIF18V	VSA53NRIM14V	VSA53NRIF14V
	VSA53SIT5	VSA53SIT5IM14C	VSA53SIT5IF14C	VSA53SIT5IM14	VSA53SIT5IF14	VSA53SIT5IM18V	VSA53SIT5IF18V	VSA53SIT5IM14V	VSA53SIT5IF14V
	VSA53STN	VSA53STNIM14C	VSA53STNIF14C	VSA53STNIM14	VSA53STNIF14	VSA53STNIM18V	VSA53STNIF18V	VSA53STNIM14V	VSA53STNIF14V
	VSA63NBR	VSA63NBRIM14C	VSA63NBRIF14C	VSA63NBRIM14	VSA63NBRIF14	VSA63NBRIM18V	VSA63NBRIF18V	VSA63NBRIM14V	VSA63NBRIF14V
	VSA63NR	VSA63NRIM14C	VSA63NRIF14C	VSA63NRIM14	VSA63NRIF14	VSA63NRIM18V	VSA63NRIF18V	VSA63NRIM14V	VSA63NRIF14V
	VSA63SIT	VSA63SITIM14C	VSA63SITIF14C	VSA63SITIM14	VSA63SITIF14	VSA63SITIM18V	VSA63SITIF18V	VSA63SITIM14V	VSA63SITIF14V
	VSA63STN	VSA63STNIM14C	VSA63STNIF14C	VSA63STNIM14	VSA63STNIF14	VSA63STNIM18V	VSA63STNIF18V	VSA63STNIM14V	VSA63STNIF14V

Group 3 — V / S

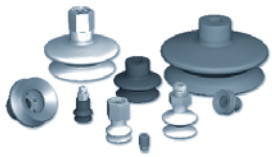
	THREAD	G1/8"-M	G1/4"-M	G1/4"-F	G1/4"-M	G1/4"-F
Ø 78 mm	**VSA78NBR**	VSA78NBRIM18V	VSA78NBRIM14V	VSA78NBRIF14V	VSA78NBRIM14	VSA78NBRIF14
	VSA78NR	VSA78NRIM18V	VSA78NRIM14V	VSA78NRIF14V	VSA78NRIM14	VSA78NRIF14
	VSA78SIT5	VSA78SIT5IM18V	VSA78SIT5IM14V	VSA78SIT5IF14V	VSA78SIT5IM14	VSA78SIT5IF14
	VSA78STN	VSA78STNIM18V	VSA78STNIM14V	VSA78STNIF14V	VSA78STNIM14	VSA78STNIF14

Additional mounting configurations are available (see page 2/29). For standard configurations (suction cup+fitting), the C and V versions are delivered unassembled.

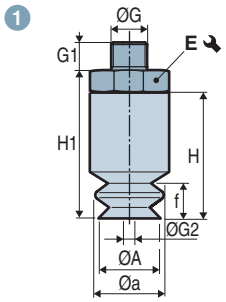
VSA

Suction Cups with 1.5 Bellows Ø 5 to 78 mm

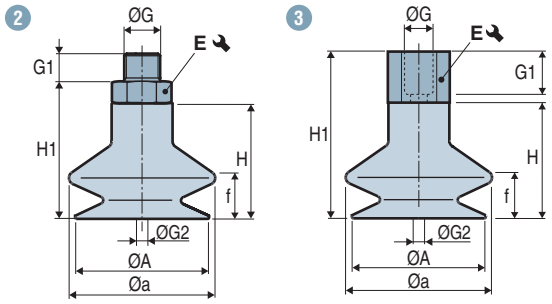
Dimensions - "Suction Cup + Fitting"



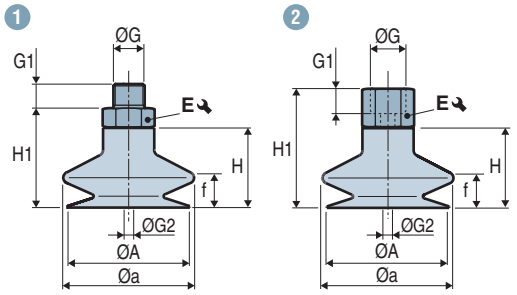
VSA 5 | Group 1



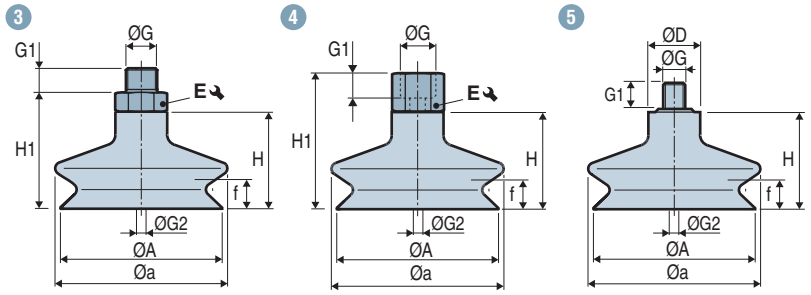
VSA 11 - 25 | Group 1



VSA 26 - 43 | Group 2



VSA 53 - 63 Group 2 / VSA 78 Group 3



Group 1		Diagram	ØA	Øa	ØD	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
Ø 5 - 25 mm	VSA5---IMM3C	1	5.5	6	-	2	11	13	M3-M	3	1.4	5	0.7
	VSA11---IMM5C	2	11	12.2	-	5.5	16	21	M5-M	4.5	2.5	7	4
	VSA11---IMM6C	2	11	12.2	-	5.5	16	21	M6-M	5	3.5	7	3.6
	VSA11---IM18C	2	11	12.2	-	5.5	16	22	G1/8"-M	7.5	3.5	14	5
	VSA11---IF18C	3	11	12.2	-	5.5	16	28	G1/8"-F	8	3.5	14	4.9
	VSA14---IMM5C	2	13	14	-	5	16	21	M5-M	4.5	2.5	7	4.2
	VSA14---IMM6C	2	13	14	-	5	16	21	M6-M	5	3.5	7	3.8
	VSA14---IM18C	2	13	14	-	5	16	22	G1/8"-M	7.5	3.5	14	5.2
	VSA14---IF18C	3	13	14	-	5	16	28	G1/8"-F	8	3.5	14	5.1
	VSA16---IMM5C	2	16	17.3	-	8.5	19	24	M5-M	4.5	2.5	7	4.4
	VSA16---IMM6C	2	16	17.3	-	8.5	19	24	M6-M	5	3.5	7	4
	VSA16---IM18C	2	16	17.3	-	8.5	19	25	G1/8"-M	7.5	3.5	14	5.4
	VSA16---IF18C	3	16	17.3	-	8.5	19	31	G1/8"-F	8	3.5	14	5.3
	VSA18---IMM5C	2	18	18	-	5	16.5	21.5	M5-M	4.5	2.5	7	4.6
	VSA18---IMM6C	2	18	18	-	5	16.5	21.5	M6-M	5	3.5	7	4.2
	VSA18---IM18C	2	18	18	-	5	16.5	22.5	G1/8"-M	7.5	3.5	14	5.6
	VSA18---IF18C	3	18	18	-	5	16.5	28.5	G1/8"-F	8	3.5	14	5.5
	VSA20---IMM5C	2	19	20	-	5	16	21	M5-M	4.5	2.5	7	4.8
	VSA20---IMM6C	2	19	20	-	5	16	21	M6-M	5	3.5	7	5.8
	VSA20---IM18C	2	19	20	-	5	16	22	G1/8"-M	7.5	3.5	14	5.8
	VSA20---IF18C	3	19	20	-	5	16	28	G1/8"-F	8	3.5	14	5.7
	VSA22---IMM5C	2	22	24	-	8	19	24	M5-M	4.5	2.5	7	5.2
	VSA22---IMM6C	2	22	24	-	8	19	24	M6-M	5	3.5	7	4.8
	VSA22---IM18C	2	22	24	-	8	19	25	G1/8"-M	7.5	3.5	14	6.2
	VSA22---IF18C	3	22	24	-	8	19	31	G1/8"-F	8	3.5	14	6.1
	VSA25---IMM5C	2	24	25	-	12	23	28	M5-M	4.5	2.5	7	6
	VSA25---IMM6C	2	24	25	-	12	23	28	M6-M	5	3.5	7	5.8
	VSA25---IM18C	2	24	25	-	12	23	29	G1/8"-M	7.5	3.5	14	7
	VSA25---IF18C	3	24	25	-	12	23	35	G1/8"-F	8	3.5	14	6.9

Note: All dimensions are in mm.

(1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

VSA

Suction Cups with 1.5 Bellows Ø 5 to 78 mm

Dimensions - "Suction Cup + Fitting"

Group 2		Diagram	ØA	Øa	ØD	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
Ø 26 - 63 mm	VSA26---IM18V	4	25	30	-	6	25	29.5	G1/8"-M	6	3.5	13	18.7
	VSA26---IF18V	5	25	30	-	6	25	38	G1/8"-F	7.5	3.5	13	22
	VSA26---IM14	4	25	30	-	6	25	29	G1/4"-M	11	4.4	17	12.4
	VSA26---IM14C	4	25	30	-	6	25	33	G1/4"-M	10	7	17	13.3
	VSA26---IM14V	4	25	30	-	6	25	30	G1/4"-M	8	3.5	17	28
	VSA26---IF14	5	25	30	-	6	25	40	G1/4"-F	10	4.4	17	13
	VSA26---IF14C	5	25	30	-	6	25	40	G1/4"-F	12	6.9	17	12.6
	VSA26---IF14V	5	25	30	-	6	25	41	G1/4"-F	11	3.5	17	32.6
	VSA33---IM18V	4	33	36.2	-	11	27.5	32	G1/8"-M	6	3.5	13	21.1
	VSA33---IF18V	5	33	36.2	-	11	27.5	40.5	G1/8"-F	7.5	3.5	13	24.4
	VSA33---IM14	4	33	36.2	-	11	27.5	31.5	G1/4"-M	11	4.4	17	14.8
	VSA33---IM14C	4	33	36.2	-	11	27.5	35.5	G1/4"-M	10	7	17	15.7
	VSA33---IM14V	4	33	36.2	-	11	27.5	32.5	G1/4"-M	8	3.5	17	30.4
	VSA33---IF14	5	33	36.2	-	11	27.5	42.5	G1/4"-F	10	4.4	17	15.4
	VSA33---IF14C	5	33	36.2	-	11	27.5	42.5	G1/4"-F	12	6.9	17	15
	VSA33---IF14V	5	33	36.2	-	11	27.5	43.5	G1/4"-F	11	3.5	17	35
	VSA43---IM18V	4	43	46	-	12.5	28	32.5	G1/8"-M	6	3.5	13	25.9
	VSA43---IF18V	5	43	46	-	12.5	28	41	G1/8"-F	7.5	3.5	13	29.2
	VSA43---IM14	4	43	46	-	12.5	28	32	G1/4"-M	11	4.4	17	19.6
	VSA43---IM14C	4	43	46	-	12.5	28	36	G1/4"-M	10	7	17	20.5
	VSA43---IM14V	4	43	46	-	12.5	28	33	G1/4"-M	8	3.5	17	35.2
	VSA43---IF14	5	43	46	-	12.5	28	43	G1/4"-F	10	4.4	17	20.2
	VSA43---IF14C	5	43	46	-	12.5	28	43	G1/4"-F	12	6.9	17	19.8
	VSA43---IF14V	5	43	46	-	12.5	28	44	G1/4"-F	11	3.5	17	39.8
	VSA53---IM18V	6	53	59	-	15	34	38.5	G1/8"-M	6	3.5	13	35
	VSA53---IF18V	7	53	59	-	15	34	47	G1/8"-F	7.5	3.5	13	38.3
	VSA53---IM14	6	53	59	-	15	34	38	G1/4"-M	11	4.4	17	28.7
	VSA53---IM14C	6	53	59	-	15	34	42	G1/4"-M	10	7	17	29.6
	VSA53---IM14V	6	53	59	-	15	34	39	G1/4"-M	8	3.5	17	44.3
	VSA53---IF14	7	53	59	-	15	34	49	G1/4"-F	10	4.4	17	29.3
	VSA53---IF14C	7	53	59	-	15	34	49	G1/4"-F	12	6.9	17	28.9
	VSA53---IF14V	7	53	59	-	15	34	50	G1/4"-F	11	3.5	17	48.9
	VSA63---IM18V	6	63	67	-	15	34	38.5	G1/8"-M	6	3.5	13	39.1
	VSA63---IF18V	7	63	67	-	15	34	47	G1/8"-F	7.5	3.5	13	42.4
	VSA63---IM14	6	63	67	-	15	34	38	G1/4"-M	11	4.4	17	32.8
	VSA63---IM14C	6	63	67	-	15	34	42	G1/4"-M	10	7	17	33.7
	VSA63---IM14V	6	63	67	-	15	34	39	G1/4"-M	8	3.5	17	48.4
	VSA63---IF14	7	63	67	-	15	34	49	G1/4"-F	10	4.4	17	33.4
	VSA63---IF14C	7	63	67	-	15	34	49	G1/4"-F	12	6.9	17	33
	VSA63---IF14V	7	63	67	-	15	34	50	G1/4"-F	11	3.5	17	53
Group 3													
Ø 78 mm	VSA78---IM18V	8	78	83	25	14	46.8	-	G1/8"-M	8	6	-	85.4
	VSA78---IM14	6	78	83	-	14	46.8	52.8	G1/4"-M	11	8	21	70.2
	VSA78---IM14V	6	78	83	-	14	46.8	51.8	G1/4"-M	8	6	17	92.7
	VSA78---IF14	7	78	83	-	14	46.8	61.8	G1/4"-F	10	8	21	74.1
	VSA78---IF14V	7	78	83	-	14	46.8	65.8	G1/4"-F	9	6	17	102.3

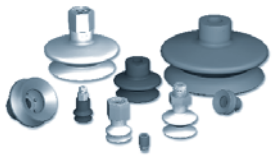
Note: All dimensions are in mm.

(1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

VSA

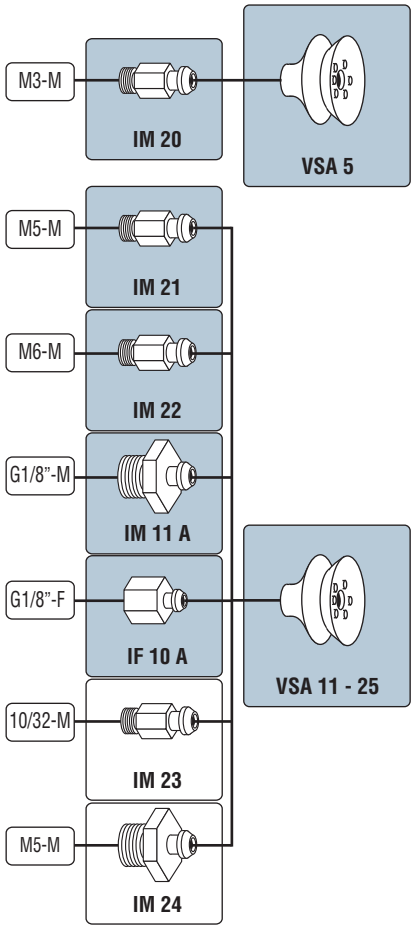
Suction Cups with 1.5 Bellows Ø 5 to 78 mm

Assembly Diagrams



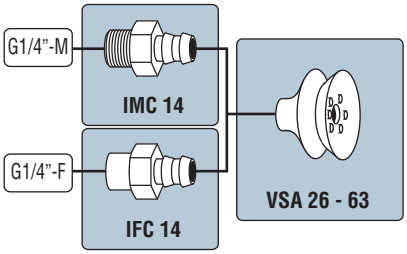
VSA 5 - 25 | Group 1

Barbed fittings C

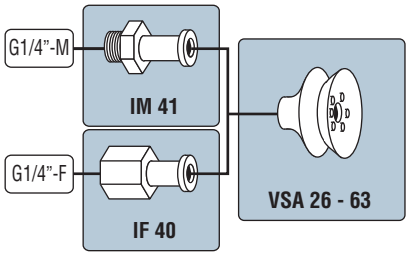


VSA 26 - 63 | Group 2

Barbed fittings C

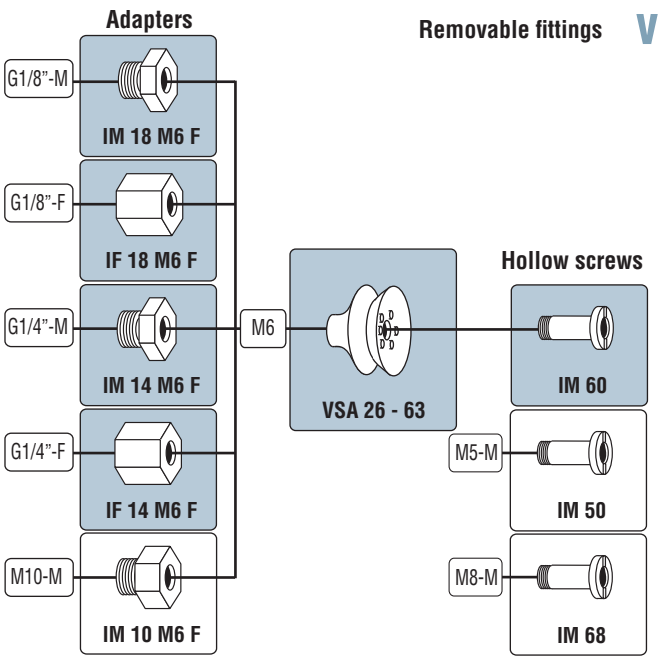


Pressed fittings E



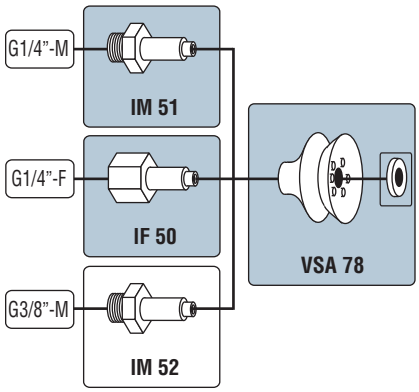
Adapters

Removable fittings V



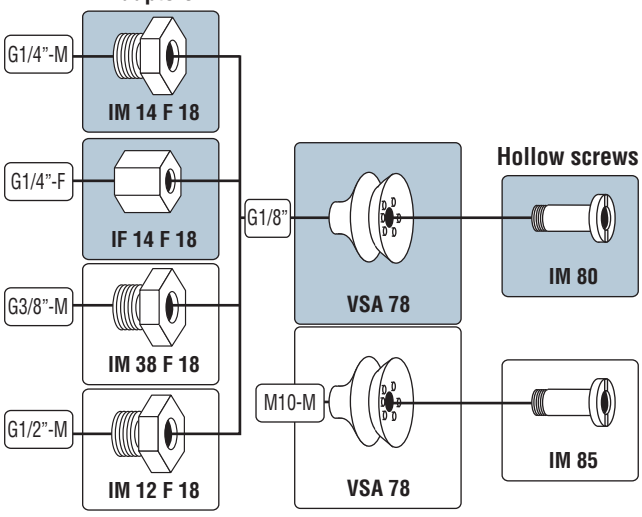
VSA 78 | Group 3

Factory-crimped fittings S



Removable fittings V

Adapters



Configurations (suction cup + fitting) refer to pages 2/26

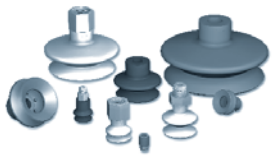
Non-standard configurations must be ordered in seperate part numbers.

Fittings and suction cups dimension: see page 2/30.

VSA

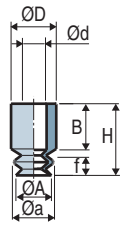
Suction Cups with 1.5 Bellows Ø 5 to 78 mm

Dimensions

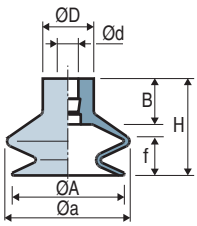


Suction Cups

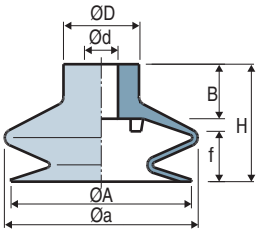
VSA 5



VSA 11 - 25



VSA 26 - 78

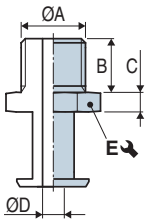


	Ø A	H	Ø a	Ø d	Ø D	f (1)	B	(g)
VSA 5	5.5	11	6	4	7	2	7	0.3
VSA 11	11	16	12.2	4	10	5.5	9	0.9
VSA 14	13	16	14	4	10	5	9	1.1
VSA 16	16	19	17.3	4	10	8.5	9	1.3
VSA 18	18	16.5	18	4	10	5	9	1.5
VSA 20	19	16	20	4	10	5	9	1.7
VSA 22	22	19	24	4	10	8	9	2.1
VSA 25	24	23	25	4	10	12	9	2.9
VSA 26	25	25	30	8	16	6	13	4.6
VSA 33	33	27.5	36.2	8	18	11	13	7
VSA 43	43	28	46	8	18	12.5	13	11.8
VSA 53	53	34	59	8	18	15	13	20.9
VSA 63	63	34	67	8	18	15	13	25
VSA 78	78	46.8	83	12	25	14	20	58.4

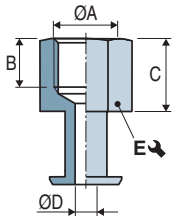
(1) f = Deflection of the suction cup.

Pressed Fittings

Male - IM



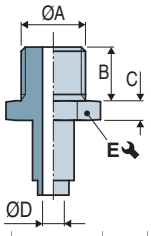
Female - IF



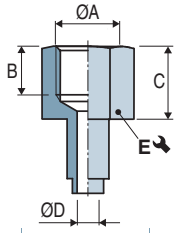
	ØA	B	C	ØD	E	Material	(g)
IM41	G1/4"-M	11	4	4.4	17	Aluminum	7.8
IF40	G1/4"-F	10	15	4.4	17	Aluminum	8.4

Factory-Crimped Fittings

Male - IM

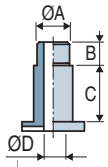


Female - IF



	ØA	B	C	ØD	E	Material	(g)
IM 51	G1/4"-M	11	6	4.4	17	Aluminum	11.8
IF 50	G1/4"-F	10	15	8	21	Aluminum	15.7
IM 52	G3/8"-M	11	6	8	21	Aluminum	14

Hollow Screws

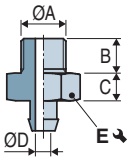


	ØA	B	C	ØD	Material	(g)
IM 50	M5-M	5	11	2.8	Brass	7.4
IM 60 (2) (3)	M6-M	7	11	3.5	Nickel-plated brass	7.5
IM 68	M8-M	8	11	5.2	Nickel-plated brass	6.4
IM 80	G1/8"-M	8	18	6	Nickel-plated brass	23.7
IM 85	M10x150-M	8	18	6	Nickel-plated brass	23.5

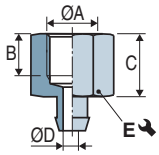
The values represent the average characteristics of our products.
(2) Flow restrictor version available: orifice calibrated to reduce leaks when used with a multi-cup gripper (see page 4/9)
(3) Available in stainless steel

Barbed Fittings

Male - IM



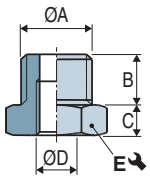
Female - IF



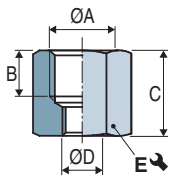
	ØA	B	C	ØD	E	Material	(g)
IM 11 A	G1/8"-M	7.5	6	3.5	14	Aluminum	4.1
IMC 14	G1/4"-M	10	8	7	17	Aluminum	8.7
IM20	M3-M	3	2	1.4	5	Aluminum	0.4
IM 21 (2)	M5-M	4.5	5	2.5	7	Nickel-plated brass	3.1
IM 22 (2)	M6-M	5	5	3.5	7	Nickel-plated brass	2.7
IM 23	10/32-M	4.5	5	2.5	7	Brass	3
IM 24	M5-M	4.5	2.5	2.5	10	Nickel-plated brass	3.2
IF 10 A	G1/8"-F	8	12	3.5	14	Aluminum	4
IFC 14	G1/4"-F	12	15	6.9	17	Aluminum	8

Adapters for Hollow Screws

Male - IM



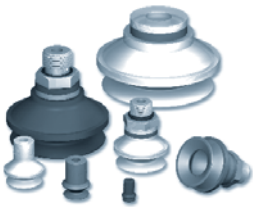
Female - IF



	ØA	B	C	ØD	E	Material	(g)
IM 10 M6F	M10-M	7	3.5	M6-F	13	Brass	5.9
IM 12 F18	G1/2"-M	14	6	M6-F	22	Nickel-plated brass	46.5
IM 14 M6F	G1/4"-M	8	5	M6-F	17	Nickel-plated brass	15.9
IM 14 F18	G1/4"-M	8	5	G1/8"-F	17	Nickel-plated brass	10.6
IM 18 M6F	G1/8"-M	6	4.5	M6-F	13	Nickel-plated brass	6.6
IM 38 F18	G3/8"-M	9	5	G1/8"-F	19	Nickel-plated brass	18.8
IF 14 M6F	G1/4"-F	11	16	M6-F	17	Nickel-plated brass	20.5
IF 18 M6F	G1/8"-F	7.5	13	M6-F	13	Nickel-plated brass	9.9
IF 14 F18	G1/4"-F	9	19	G1/8"-F	17	Nickel-plated brass	20.2

Note: All dimensions are in mm.

VSAB
Suction Cups with 1.5 Bellows Ø 5 to 50 mm



The VSAB series 1.5 bellows suction cups are suitable for gripping slightly concave or convex products. And due to their stroke, VSAB cups are capable of gripping products at varying heights.

Industry-specific applications

Types of use

Materials

NBR Nitrile **STN** Siton® **SI** Translucent silicone

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	(lbf) (1)	Rmin (mm)	NBR	Si	STN
VSAB 5	5.6	0.05	0.08	0.03	1.5	**VSAB5NBR**	**VSAB5SI**	**VSAB5STN**
VSAB 8	8.8	0.15	0.21	0.10	1.9	**VSAB8NBR**	**VSAB8SI**	**VSAB8STN**
VSAB 10	11	0.48	0.39	0.19	4	**VSAB10NBR**	**VSAB10SI**	**VSAB10STN**
VSAB 15	15.7	1.1	0.68	0.34	5	**VSAB15NBR**	**VSAB15SI**	**VSAB15STN**
VSAB 20	22	2.7	1.14	0.57	10	**VSAB20NBR**	**VSAB20SI**	**VSAB20STN**
VSAB 30	34	10	2.60	1.30	15	**VSAB30NBR**	**VSAB30SI**	**VSAB30STN**
VSAB 40	43	15	4.22	2.11	20	**VSAB40NBR**	**VSAB40SI**	**VSAB40STN**
VSAB 50	53	32	7.14	3.57	30	**VSAB50NBR**	**VSAB50SI**	**VSAB50STN**

(1) Actual force of the suction cup in use with a 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.

Choice of Fittings

(Ø)	M5-M	G1/8"-M	G1/4"-M
5…15	■	-	-
20	-	■	-
30…50	-	-	■

Types of Assembly

Version C: Barbed fitting

■ Standard available configurations (suction cup + fitting) Fitting: M = male
See part n° table below

References - "Suction Cup + Fitting"

Ø 5 - 15 mm

THREAD	C M5-M
VSAB5NBR	VSAB5NBRIMM5C
VSAB5SI	VSAB5SIIMM5C
VSAB5STN	VSAB5STNIMM5C
VSAB8NBR	VSAB8NBRIMM5C
VSAB8SI	VSAB8SIIMM5C
VSAB8STN	VSAB8STNIMM5C
VSAB10NBR	VSAB10NBRIMM5C
VSAB10SI	VSAB10SIIMM5C
VSAB10STN	VSAB10STNIMM5C
VSAB15NBR	VSAB15NBRIMM5C
VSAB15SI	VSAB15SIIMM5C
VSAB15STN	VSAB15STNIMM5C

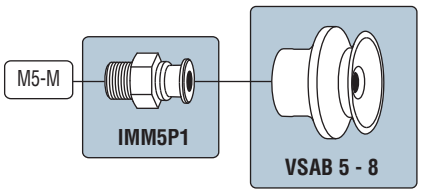
Ø 20 mm

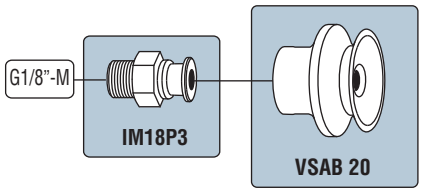
THREAD	C G1/8"-M
VSAB20NBR	VSAB20NBRIM18C
VSAB20SI	VSAB20SIIM18C
VSAB20STN	VSAB20STNIM18C

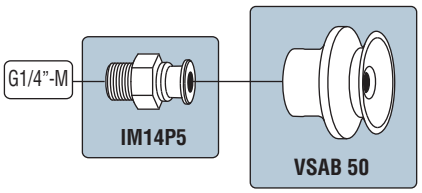
Ø 30 - 50 mm

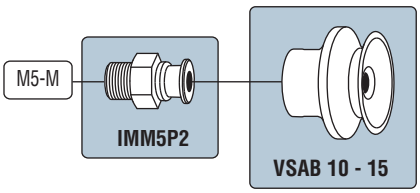
THREAD	C G1/4"-M
VSAB30NBR	VSAB30NBRIM14C
VSAB30SI	VSAB30SIIM14C
VSAB30STN	VSAB30STNIM14C
VSAB40NBR	VSAB40NBRIM14C
VSAB40SI	VSAB40SIIM14C
VSAB40STN	VSAB40STNIM14C
VSAB50NBR	VSAB50NBRIM14C
VSAB50SI	VSAB50SIIM14C
VSAB50SSTN	VSAB50STNIM14C

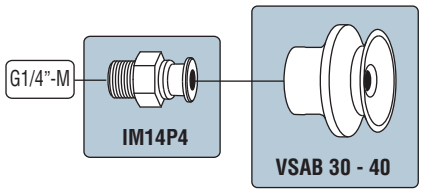
Assembly Diagrams











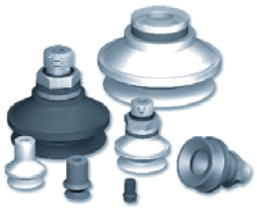
Please specify the part n°. e.g. VSAB30NBRIM14C
See part n° table above

Accessories
To optimize use of your suction cups, Coval offers a comprehensive range of accessories (sensors, spring extensions, and feeder systems, etc.)
see chapters **4** and **12**.

VSAB

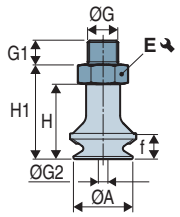
Suction Cups with 1.5 Bellows Ø 5 to 50 mm

Dimensions

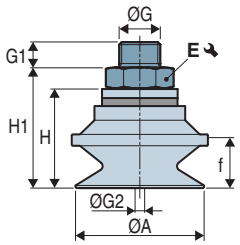


Suction Cup + Fitting

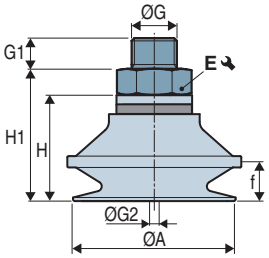
VSAB 5…15



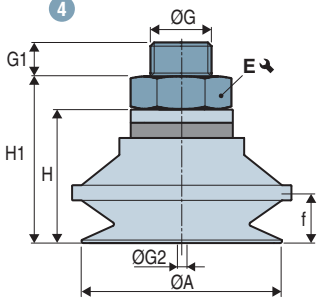
VSAB 20…30



VSAB 40



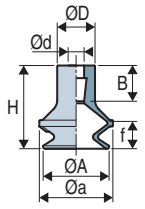
VSAB 50



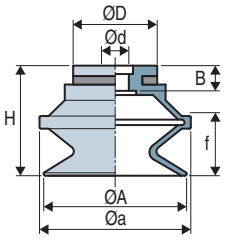
	Diagrams	ØA	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
VSAB5---IMM5C	1	5.6	1.5	9.2	12.7	M5-M	4	1.5	7	1.8
VSAB8---IMM5C	1	8.8	3.5	11.9	15.4	M5-M	4	1.5	7	2
VSAB10---IMM5C	1	11	4.5	16.4	20.9	M5-M	4	2.7	7	1.6
VSAB15---IMM5C	1	15.7	6.5	19.8	24.3	M5-M	4	2.7	7	2.1
VSAB20---IM18C	2	22	10	19	22.5	G1/8"-M	7	4	14	5.5
VSAB30---IM14C	2	34	15	26.2	32.2	G1/4"-M	9	5	17	13.2
VSAB40---IM14C	3	43	15	28	34	G1/4"-M	9	5	17	18.9
VSAB50---IM14C	4	53	13	35.3	41.3	G1/4"-M	9	5	21	31.7

Suction Cups

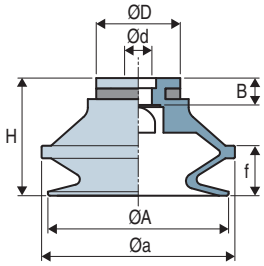
VSAB 5…15



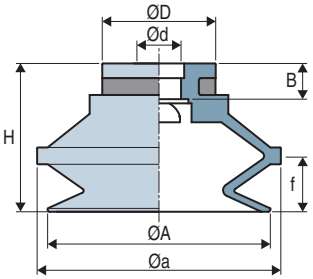
VSAB 20…30



VSAB 40

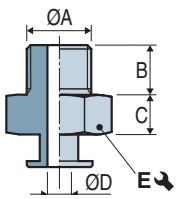


VSAB 50



	ØA	H	Øa	Ød	ØD	f (1)	B	(g)
VSAB 5	5.6	9.2	6.2	2	4.5	1.5	3.5	0.12
VSAB 8	8.8	11.9	9.6	2	5.5	3.5	3.5	0.27
VSAB 10	11	16.4	12	3.8	9	4.5	5	0.8
VSAB 15	15.7	19.8	17.5	3.8	9	6.5	3	1.3
VSAB 20	22	19	24	5	14.5	10	4.5	2.5
VSAB 30	34	26.2	36	6.5	20	15	6	6.9
VSAB 40	43	28	46	6.5	20	15	6.4	12.6
VSAB 50	53	35.3	58	10.5	27	13	8.5	21.7

Barbed Fittings

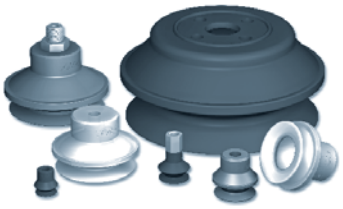


	ØA	B	C	ØD	E	Material	(g)
IMM5P1	M5-M	4	3.5	1.5	7	Brass	1.7
IMM5P2	M5-M	4	4.5	2.7	7	Aluminum	0.8
IM18P3	G1/8"-M	7	3.5	4	14	Aluminum	3
IM14P4	G1/4"-M	9	6	5	17	Aluminum	6.3
IM14P5	G1/4"-M	9	6	5	21	Aluminum	10

The values represent the average characteristics of our products.
Note: All dimensions are in mm.

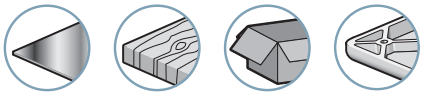
(1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

VSAG
Suction Cups with 1.5 Bellows Ø 10 to 150 mm



The VSAG series 1.5 bellows suction cups are recommended for gripping concave of convex products as well as sensitive products due to the cushioning effect of the bellows. The bellows also compensate for height variations in product gripping.

Industry-specific applications



Types of use

Materials

NBR Nitrile
SI Translucent silicone
STN Siton®

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	(lbf) (1)	Rmin (mm)	NBR	SI	STN
VSAG 10	10.7	0.2	0.41	0.21	4	**VSAG10NBR**	**VSAG10SI**	**VSAG10STN**
VSAG 15	15	0.7	0.57	0.29	6	**VSAG15NBR**	**VSAG15SI**	**VSAG15STN**
VSAG 20B	20	1	1.07	0.54	8	**VSAG20BNBR**	**VSAG20BSI**	**VSAG20BSTN**
VSAG 30	30	4	3.41	1.70	15	**VSAG30NBR**	**VSAG30SI**	-
VSAG 40	40	9	5.20	2.60	30	**VSAG40NBR**	**VSAG40SI**	-
VSAG 50	50	26	8.60	4.22	40	**VSAG50NBR**	**VSAG50SI**	-
VSAG 75	75	76	20.29	10.07	70	**VSAG75NBR**	**VSAG75SI**	**VSAG75STN**
VSAG 110	110	280	43.02	21.11	100	**VSAG110NBR**	**VSAG110SI**	**VSAG110STN**
VSAG 150	150	640	84.91	42.21	130	**VSAG150NBR**	**VSAG150SI**	-

(1) Actual force of the suction cup in use with a 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.

Choice of Fittings

(Ø)	M5-F	M5-M	M6-M	M10-M	M10x125F	G1/8"-M	G1/8"-F	G1/4"-M	G1/4"-F	G1/2"-F
10…15	■	■	-	-	-	■	■	-	-	-
20…50	-	-	■	□	-	■	■	■	■	-
75	-	-	-	-	■	-	-	■	■	-
110…150	-	-	-	-	-	-	-	-	-	■

■ Standard available configurations (suction cup + fitting) refer to page 2/34
□ Additional mounting configurations see page 2/36
Fitting: M = male F = female

Types of Assembly

COVAL suction cups can be assembled in a wide variety of configurations:

C **Version C**
Barbed fitting

V **Version V**
Removable fitting
(adapter and hollow screw)

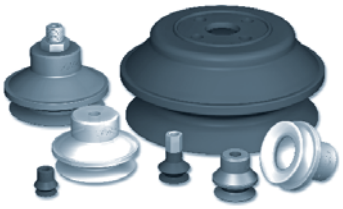
Please specify the part n°. e.g. VSAG10NBRIM18C
Refer to page 2/34

Accessories
To optimize use of your suction cups, Coval offers a comprehensive range of accessories (sensors, spring extensions, and feeder systems, etc.) see chapters **4** and **12**.

VSAG

Suction Cups with 1.5 Bellows Ø 5 to 50 mm

Suction Cup + Fitting



References - "Suction Cup + Fitting"

		C			
	THREAD	M5-M	M5-F	G1/8"-M	G1/8"-F
Ø 10 - 15 mm	VSAG10NBR	VSAG10NBRIMM5C	VSAG10NBRIFM5C	VSAG10NBRIM18C	VSAG10NBRIF18C
	VSAG10SI	VSAG10SIIMM5C	VSAG10SIIFM5C	VSAG10SIIM18C	VSAG10SIIF18C
	VSAG10STN	VSAG10STNIMM5C	VSAG10STNIFM5C	VSAG10STNIM18C	VSAG10STNIF18C
	VSAG15NBR	VSAG15NBRIMM5C	VSAG15NBRIFM5C	VSAG15NBRIM18C	VSAG15NBRIF18C
	VSAG15SI	VSAG15SIIMM5C	VSAG15SIIFM5C	VSAG15SIIM18C	VSAG15SIIF18C
	VSAG15STN	VSAG15STNIMM5C	VSAG15STNIFM5C	VSAG15STNIM18C	VSAG15STNIF18C

		C		V				
	THREAD	G1/8"-M	G1/8"-F	M6-M	G1/8"-M	G1/8"-F	G1/4"-M	G1/4"-F
Ø 20 - 50 mm	VSAG20BNBR	VSAG20BNBRIM18C	VSAG20BNBRIF18C	VSAG20BNBRIMM6V	VSAG20BNBRIM18V	VSAG20BNBRIF18V	VSAG20BNBRIM14V	VSAG20BNBRIF14V
	VSAG20BSI	VSAG20BSIIM18C	VSAG20BSIIF18C	VSAG20BSIIMM6V	VSAG20BSIIM18V	VSAG20BSIIF18V	VSAG20BSIIM14V	VSAG20BSIIF14V
	VSAG20BSTN	VSAG20BSTNIM18C	VSAG20BSTNIF18C	VSAG20BSTNIMM6V	VSAG20BSTNIM18V	VSAG20BSTNIF18V	VSAG20BSTNIM14V	VSAG20BSTNIF14V
	VSAG30NBR	VSAG30NBRIM18C	VSAG30NBRIF18C	VSAG30NBRIMM6V	VSAG30NBRIM18V	VSAG30NBRIF18V	VSAG30NBRIM14V	VSAG30NBRIF14V
	VSAG30SI	VSAG30SIIM18C	VSAG30SIIF18C	VSAG30SIIMM6V	VSAG30SIIM18V	VSAG30SIIF18V	VSAG30SIIM14V	VSAG30SIIF14V
	VSAG40NBR	VSAG40NBRIM18C	VSAG40NBRIF18C	VSAG40NBRIMM6V	VSAG40NBRIM18V	VSAG40NBRIF18V	VSAG40NBRIM14V	VSAG40NBRIF14V
	VSAG40SI	VSAG40SIIM18C	VSAG40SIIF18C	VSAG40SIIMM6V	VSAG40SIIM18V	VSAG40SIIF18V	VSAG40SIIM14V	VSAG40SIIF14V
	VSAG50NBR	VSAG50NBRIM18C	VSAG50NBRIF18C	VSAG50NBRIMM6V	VSAG50NBRIM18V	VSAG50NBRIF18V	VSAG50NBRIM14V	VSAG50NBRIF14V
	VSAG50SI	VSAG50SIIM18C	VSAG50SIIF18C	VSAG50SIIMM6V	VSAG50SIIM18V	VSAG50SIIF18V	VSAG50SIIM14V	VSAG50SIIF14V

		V		
	THREAD	M10x125 F	G1/4"-M	G1/4"-F
Ø 75 mm	VSAG75NBR	VSAG75NBR	VSAG75NBRIM14V	VSAG75NBRIF14V
	VSAG75SI	VSAG75SI	VSAG75SIIM14V	VSAG75SIIF14V
	VSAG75STN	VSAG75STN	VSAG75STNIM14V	VSAG75STNIF14V

		V	
	THREAD	G1/2"-F *	G1/2"-F **
Ø 110 - 150 mm	VSAG110NBR	VSAG110NBRIFS12V	VSAG110NBRIF12V
	VSAG110SI	VSAG110SIIFS12V	VSAG110SIIF12V
	VSAG110STN	VSAG110STNIFS12V	VSAG110STNIF12V
	VSAG150NBR	VSAG150NBRIFS12V	VSAG150NBRIF12V
	VSAG150SI	VSAG150SIIFS12V	VSAG150SIIF12V

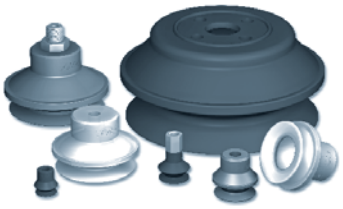
*Configured using fitting n° IFS12120
** Configured using fitting n° IF12120

Additional mounting configurations are available (see page 2/36).
For standard configurations (suction cup+fitting), the C and V versions are delivered unassembled.

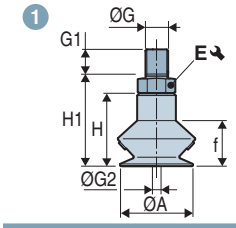
VSAG

Suction Cups with 1.5 Bellows Ø 5 to 50 mm

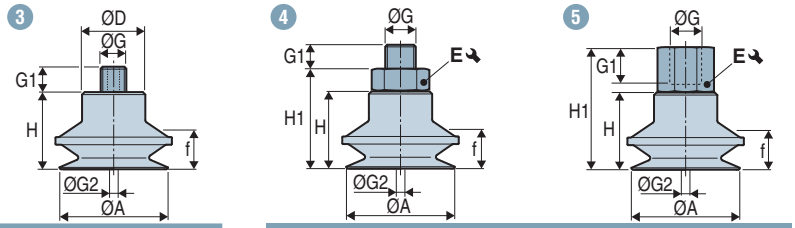
Dimensions - "Suction Cup + Fitting"



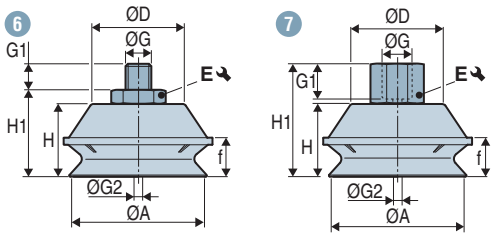
VSAG 10 - 15



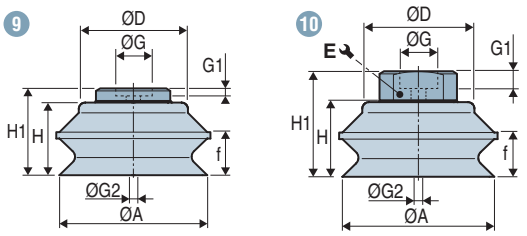
VSAG 20B - 50



VSAG 75



VSAG 110 - 150



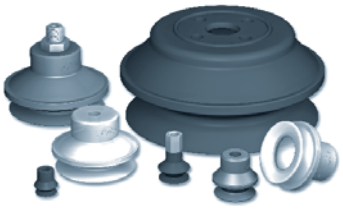
		Diagrams	ØA	ØD	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
Ø 10 - 15 mm	VSAG10---IMM5C	1	10.7	-	5	13.3	16.8	M5-M	4.5	2.2	7	1.3
	VSAG10---IFM5C	2	10.7	-	5	13.3	22.3	M5-F	6	2.2	14	1.8
	VSAG10---IM18C	1	10.7	-	5	13.3	18.3	G1/8"-M	8	2.2	14	4.5
	VSAG10---IF18C	2	10.7	-	5	13.3	28.3	G1/8"-F	9	2.2	14	5.7
	VSAG15---IMM5C	1	15	-	10	16	19.5	M5-M	4.5	2.2	7	1.6
	VSAG15---IFM5C	2	15	-	10	16	25	M5-F	6	2.2	14	2.1
	VSAG15---IM18C	1	15	-	10	16	21	G1/8"-M	8	2.2	14	4.8
	VSAG15---IF18C	2	15	-	10	16	31	G1/8"-F	9	2.2	14	6
Ø 20B - 40 mm	VSAG20B---IM18C	4	20	-	12	22	27	G1/8"-M	8	4	14	7.1
	VSAG20B---IF18C	5	20	-	12	22	37	G1/8"-F	9	4	14	8.5
	VSAG20B---IMM6V	3	20	15	12	22	-	M6-M	6	3.5	-	5.7
	VSAG20B---IM18V	4	20	-	12	22	26.5	G1/8"-M	6	3.5	13	12.3
	VSAG20B---IF18V	5	20	-	12	22	35	G1/8"-F	7.5	3.5	13	15.6
	VSAG20B---IM14V	4	20	-	12	22	27	G1/4"-M	8	3.5	17	21.6
	VSAG20B---IF14V	5	20	-	12	22	38	G1/4"-F	11	3.5	17	26.2
	VSAG30---IM18C	4	30	-	17	30.5	35.5	G1/8"-M	8	4	14	13.2
	VSAG30---IF18C	5	30	-	17	30.5	45.5	G1/8"-F	9	4	14	14.6
	VSAG30---IMM6V	3	30	20	17	30.5	-	M6-M	6	3.5	-	11.8
	VSAG30---IM18V	4	30	-	17	30.5	35	G1/8"-M	6	3.5	13	18.4
	VSAG30---IF18V	5	30	-	17	30.5	43.5	G1/8"-F	7.5	3.5	13	21.7
	VSAG30---IM14V	4	30	-	17	30.5	35.5	G1/4"-M	8	3.5	17	27.7
	VSAG30---IF14V	5	30	-	17	30.5	46.5	G1/4"-F	11	3.5	17	32.3
	VSAG40---IM18C	4	40	-	15.5	30.5	35.5	G1/8"-M	8	4	14	18.8
	VSAG40---IF18C	5	40	-	15.5	30.5	45.5	G1/8"-F	9	4	14	20.2
	VSAG40---IMM6V	3	40	25	15.5	30.5	-	M6-M	6	3.5	-	17.4
	VSAG40---IM18V	4	40	-	15.5	30.5	35	G1/8"-M	6	3.5	13	24
	VSAG40---IF18V	5	40	-	15.5	30.5	43.5	G1/8"-F	7.5	3.5	13	27.3
	VSAG40---IM14V	4	40	-	15.5	30.5	35.5	G1/4"-M	8	3.5	17	33.3
	VSAG40---IF14V	5	40	-	15.5	30.5	46.5	G1/4"-F	11	3.5	17	37.9
Ø 50 mm	VSAG50---IM18C	4	50	-	20	36.5	41.5	G1/8"-M	8	4	14	27.4
	VSAG50---IF18C	5	50	-	20	36.5	51.5	G1/8"-F	9	4	14	28.8
	VSAG50---IMM6V	3	50	-	20	36.5	-	M6-M	6	3.5	-	30
	VSAG50---IM18V	4	50	-	20	36.5	41	G1/8"-M	6	3.5	13	36.6
	VSAG50---IF18V	5	50	-	20	36.5	49.5	G1/8"-F	7.5	3.5	13	40
	VSAG50---IM14V	4	50	-	20	36.5	41.5	G1/4"-M	8	3.5	17	45.9
	VSAG50---IM14F	5	50	-	20	36.5	52.5	G1/4"-F	11	3.5	17	50.4
Ø 75 - 150 mm	VSAG75---	8	75	50.5	22	43.2	-	M10x125-F	-	-	-	87.6
	VSAG75---IM14V	6	75	50.5	22	43.2	48.2	G1/4"-M	10	5	17	94.6
	VSAG75---IF14V	7	75	50.5	22	43.2	60.2	G1/4"-F	10	5	17	95.9
	VSAG110---IF12V	10	110	85	32.5	55	85	G1/2"-F	24	19	48	488.8
	VSAG110---IFS12V	9	110	85	32.5	55	68	G1/2"-F	13	-	-	407.5
	VSAG150---IF12V	10	150	120	39.5	75.5	105.5	G1/2"-F	24	19	48	911.4
	VSAG150---IFS12V	9	150	120	39.5	75.5	88.5	G1/2"-F	13	-	-	830.1

Note: All dimensions are in mm. (1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

VSAG

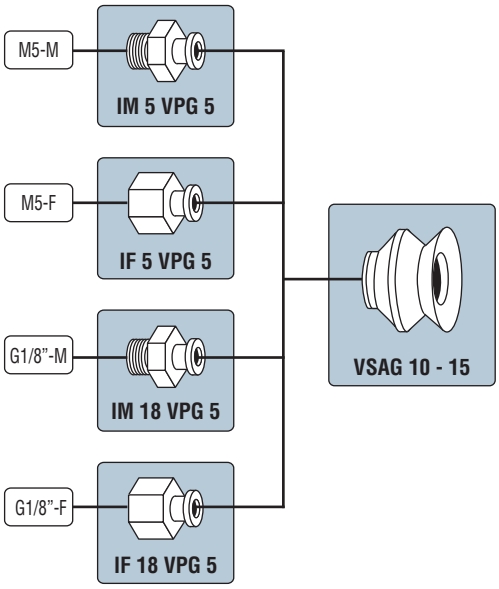
Suction Cups with 1.5 Bellows Ø 5 to 50 mm

Assembly Diagrams



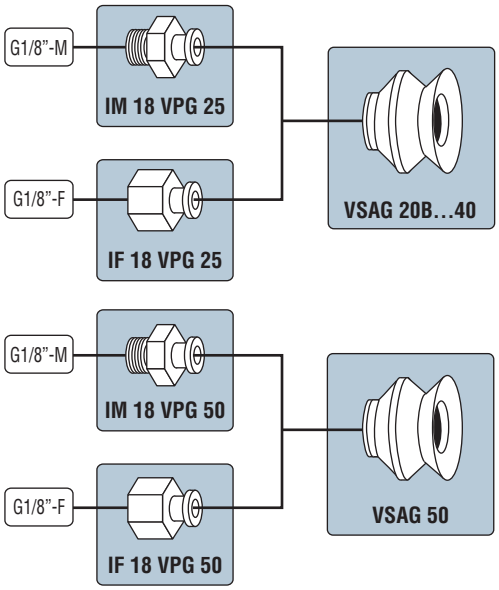
VSAG 10 - 15

Barbed fittings C



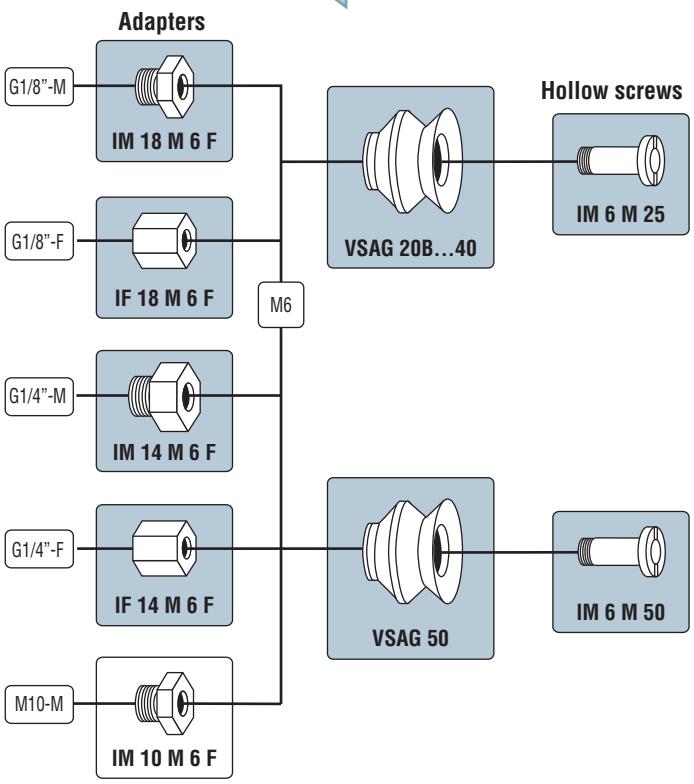
VSAG 20B - 50

Barbed fittings C



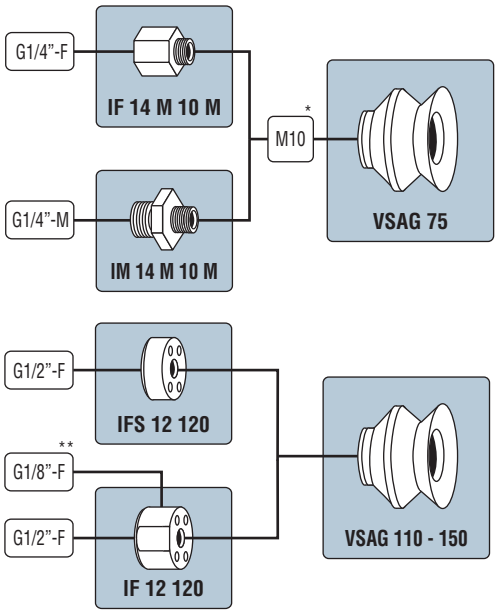
VSAG 20B - 50

Removable fittings V



VSAG 75 - 150

Removable fittings V



* 125 thread
** Female auxiliary radial output

Configurations (suction cup + fitting) refer to page 2/34

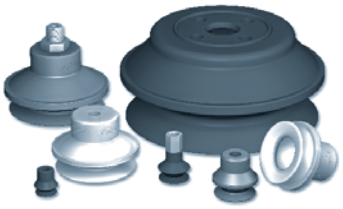
Non-standard configurations must be ordered in seperate part numbers.

Fittings and suction cups dimensions: see pages 2/37 and 2/38.

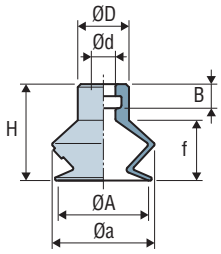
VSAG

Suction Cups with 1.5 Bellows Ø 5 to 50 mm

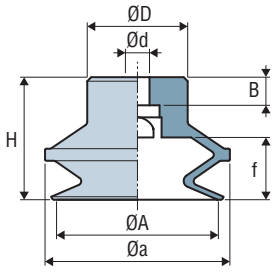
Dimensions - Suction Cups



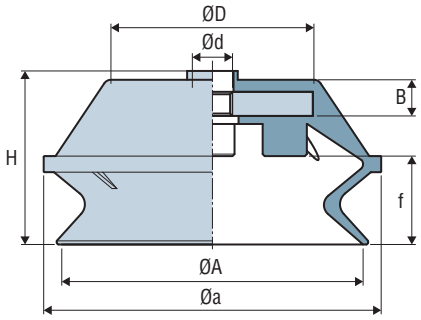
VSAG 10 - 15



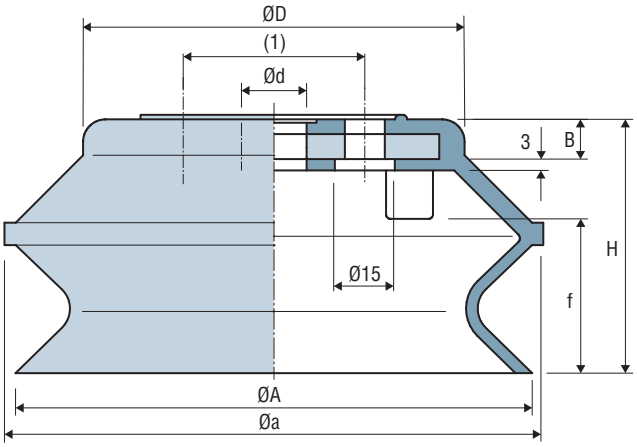
VSAG 20 - 50



VSAG 75



VSAG 110 - 150



(1) 4 holes Ø 9 on Ø 40

(Ø)	ØA	H	Øa	Ød	ØD	f (1)	B	(g)
VSAG 10	10.7	13.3	12.5	4	8.5	5	4	0.6
VSAG 15	15	16	17	4	8.5	10	4	0.9
VSAG 20 B	20	22	24	6	15	12	7	3
VSAG 30	30	30.5	36	6	20	17	7	9.1
VSAG 40	40	30.5	46	6	25	15.5	7	14.7
VSAG 50	50	36.5	59.5	7.8	28.5	20	7	22.5
VSAG 75	75	43.2	84	M10 x 125 - F	50.5	22	9	87.6
VSAG 110	110	55	121.5	14	85	32.5	9	264
VSAG 150	150	75.5	166	13	120	39.5	11	686.6

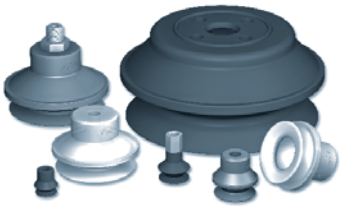
The values represent the average characteristics of our products.
Note: All dimensions are in mm.

(1) f = Deflection of the suction cup.

VSAG

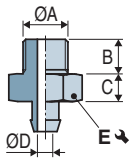
Suction Cups with 1.5 Bellows Ø 5 to 50 mm

Dimensions - Fittings

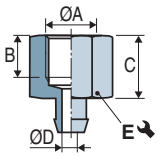


Barbed fittings

Male - IM

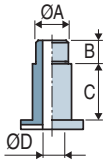


Female - IF



	ØA	B	C	ØD	E	Material	(g)
IM 5 VPG5	M5-M	4.5	3.5	2.2	7	Aluminum	0.7
IM 18 VPG5	G1/8"-M	8	5	2.2	14	Aluminum	3.9
IM 18 VPG25	G1/8"-M	8	5	4	14	Aluminum	4.1
IM 18 VPG50	G1/8"-M	8	5	4	14	Aluminum	4.9
IF 5 VPG5	M5-F	6	9	2.2	14	Aluminum	1.2
IF 18 VPG5	G1/8"-F	9	15	2.2	14	Aluminum	5.1
IF 18 VPG25	G1/8"-F	9	15	4	14	Aluminum	5.5
IF 18 VPG50	G1/8"-F	9	15	4	14	Aluminum	6.3

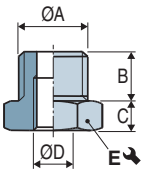
Hollow Screws



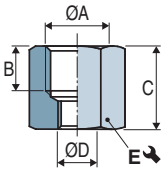
	ØA	B	C	ØD	Material	(g)
IM 6 M25	M6-M	6	6	3.5	Nickel-plated brass	2.7
IM 6 M50	M6-M	6	6	3.5	Nickel-plated brass	7.5

Adapters for Hollow Screws

Male - IM



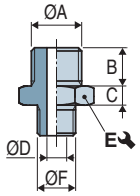
Female - IF



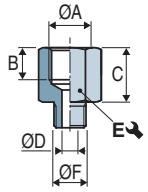
	ØA	B	C	ØD	E	Material	(g)
IM 10 M6F	M10-M	7	3.5	M6	13	Nickel-plated brass	5.9
IM 14 M6F	G1/4"-M	8	5	M6-F	17	Nickel-plated brass	15.9
IM 18 M6F	G1/8"-M	6	4.5	M6-F	13	Nickel-plated brass	6.6
IF 14 M6F	G1/4"-F	11	16	M6-F	17	Nickel-plated brass	20.5
IF 18 M6F	G1/8"-F	7.5	13	M6-F	13	Nickel-plated brass	9.9

Removable Fittings

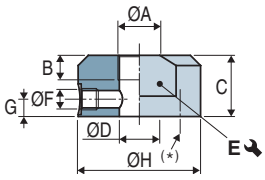
Male - IM



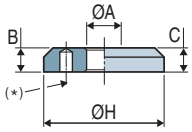
Female - IF



Female - IF 12120



Female - IFS 12120



(1) 4 holes Ø 9 on Ø 40

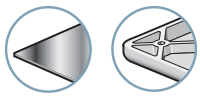
	ØA	B	C	ØD	E	ØF	G	H	Material	(g)
IM 14 M10M	G1/4"-M	10	5	5	17	M10x125-M	-	-	Aluminum	7
IF 14 M10M	G1/4"-F	10	17	5	17	M10x125-M	-	-	Aluminum	8.3
IF 12120	G1/2"-F	24	30	19	48	G1/8"-F	8.7	60	Aluminum	224.8
IFS 12120	G1/2"-F	13	13	-	-	-	-	65	Aluminum	143.5

The values represent the average characteristics of our products.
Note: All dimensions are in mm.

VSAJ
Suction Cups with 1.5 Bellows Ø 15 to 30 mm

The VSAJ series 1.5 bellows suction cups are recommended to grip slightly convex or concave products. They are also able to compensate for height variations in products being gripped.

Industry-specific applications



Types of use

Materials

NBR Nitrile
SI Translucent silicone

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	(lbf) (1)	Rmin (mm)	NBR	SI
VSAJ 15	15	0.5	0.81	0.41	10	**VSAJ15NBR**	**VSAJ15SI**
VSAJ 20	20	1.2	1.54	0.76	13	**VSAJ20NBR**	**VSAJ20SI**
VSAJ 30	30	3	3.00	1.49	26	**VSAJ30NBR**	**VSAJ30SI**

(1) Actual force of the suction cup in use with 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.

Choice of Fittings

(Ø)	M5-M	M6-M	M10-M	G1/8"-F	G1/8"-M	G1/4"-F	G1/4"-M
15…20	■	-	-	■	■	-	-
30	-	■	□	■	■	■	■

■ Standard available configurations (suction cup + fitting) refer to page 2/40

□ Additional mounting configurations see page 2/41

Fitting: M = male F = female

Types of Assembly

COVAL suction cups can be assembled in a wide variety of configurations:

C **Version C**
Barbed fitting

V **Version V**
Removable fitting
(adapter and hollow screw)

Please specify the part n°. e.g. VSAJ20NBRIM18C
Refer to page 2/40

Accessories
To optimize use of your suction cups, Coval offers a comprehensive range of accessories (spring systems, extensions, feeder systems, etc.) see chapters **4** and **12**.

VSAJ

Suction cups with 1.5 bellows Ø 15 to 30 mm

Reference and Dimensions - "Suction Cup + Fitting"

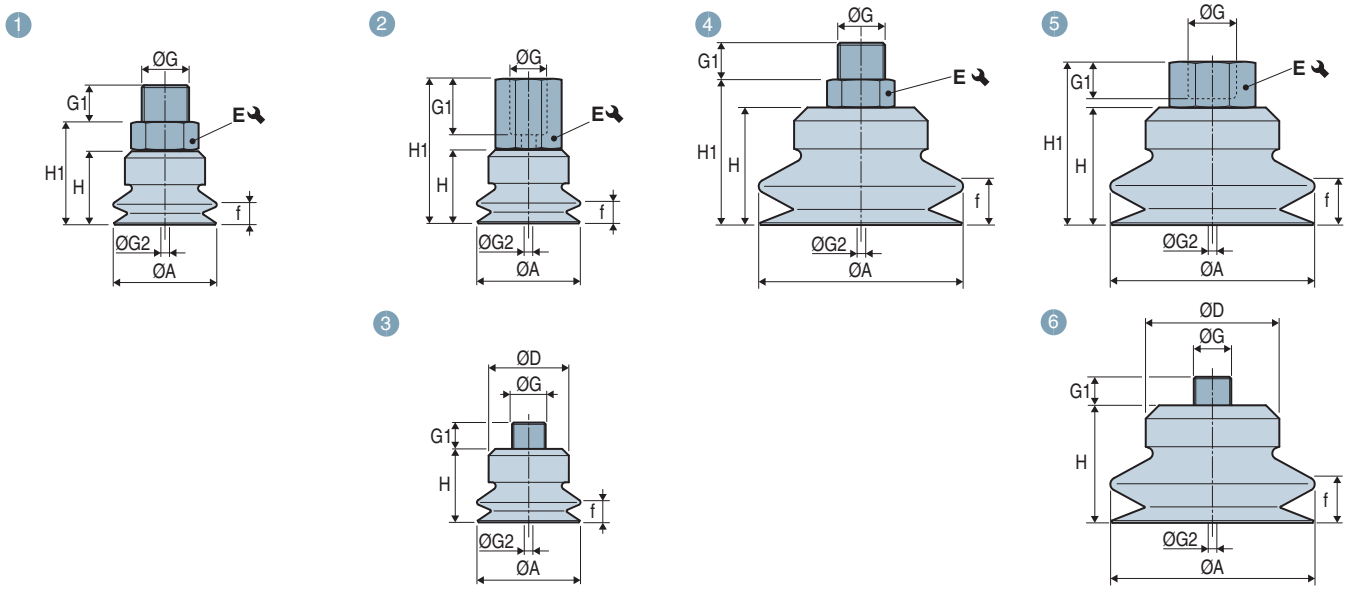
References - "Suction Cup + Fitting"

		C		V		
Ø 15 - 20 mm	THREAD	G1/8"-M	G1/8"-F	M5-M	G1/8"-M	G1/8"-F
	VSAJ15NBR	VSAJ15NBRIM18C	VSAJ15NBRIF18C	VSAJ15NBRIMM5V	VSAJ15NBRIM18V	VSAJ15NBRIF18V
	VSAJ15SI	VSAJ15SIIM18C	VSAJ15SIIF18C	VSAJ15SIIMM5V	VSAJ15SIIM18V	VSAJ15SIIF18V
	VSAJ20NBR	VSAJ20NBRIM18C	VSAJ20NBRIF18C	VSAJ20NBRIMM5V	VSAJ20NBRIM18V	VSAJ20NBRIF18V
	VSAJ20SI	VSAJ20SIIM18C	VSAJ20SIIF18C	VSAJ20SIIMM5V	VSAJ20SIIM18V	VSAJ20SIIF18V

		C		V				
Ø 30 mm	THREAD	G1/8"-M	G1/8"-F	M5-M	G1/8"-M	G1/8"-F	G1/4"-M	G1/4"-F
	VSAJ30NBR	VSAJ30NBRIM18C	VSAJ30NBRIF18C	VSAJ30NBRIMM6V	VSAJ30NBRIM18V	VSAJ30NBRIF18V	VSAJ30NBRIM14V	VSAJ30NBRIF14V
	VSAJ30SI	VSAJ30SIIM18C	VSAJ30SIIF18C	VSAJ30SIIMM6V	VSAJ30SIIM18V	VSAJ30SIIF18V	VSAJ30SIIM14V	VSAJ30SIIF14V

VSAJ 15 -20

VSAJ 30



		Diagrams	ØA	ØD	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
Ø 15 - 20 mm	VSAJ15---IM18C	1	15	-	3.3	11	16	G1/8"-M	8	2.2	14	4.8
	VSAJ15---IF18C	2	15	-	3.3	11	26	G1/8"-F	9	2.5	14	6
	VSAJ15---IMM5V	3	15	12	3.3	11	-	M5-M	5	2.5	-	3
	VSAJ15---IM18V	1	15	-	3.3	11	15.5	G1/8"-M	6	2.5	13	9.4
	VSAJ15---IF18V	2	15	-	3.3	11	24	G1/8"-F	7.5	2.5	13	12.6
	VSAJ20---IM18C	1	20	-	5.5	13	18	G1/8"-M	8	3	14	5.7
	VSAJ20---IF18C	2	20	-	5.5	13	28	G1/8"-F	9	3	14	7
	VSAJ20---IMM5V	3	20	15	5.5	13	-	M5-M	5	2.5	-	3.8
	VSAJ20---IM18V	1	20	-	5.5	13	17.5	G1/8"-M	6	2.5	13	10.1
	VSAJ20---IF18V	2	20	-	5.5	13	26	G1/8"-F	7.5	2.5	13	14.6
Ø 30 mm	VSAJ30---IM18C	4	30	-	7	17	42	G1/8"-M	8	4	14	9
	VSAJ30---IF18C	5	30	-	7	17	32	G1/8"-F	9	4	14	8.4
	VSAJ30---IMM6V	6	30	20	7	17	-	M6-M	6	3.5	-	7.6
	VSAJ30---IM18V	4	30	-	7	17	21.5	G1/8"-M	6	3.5	13	14.2
	VSAJ30---IF18V	5	30	-	7	17	30	G1/8"-F	7.5	3.5	13	17.5
	VSAJ30---IM14V	4	30	-	7	17	21.5	G1/4"-M	8	3.5	17	20.8
	VSAJ30---IF14V	5	30	-	7	17	33	G1/4"-F	11	3.5	17	28.1

Note: All dimensions are in mm.
(1) f = Deflection of the suction cup.
(2) Ø G2 = Ø internal orifice of the fitting.

Additional mounting configurations are available (see page 2/41). For standard configurations (suction cup+fitting), the C and V versions are delivered unassembled.

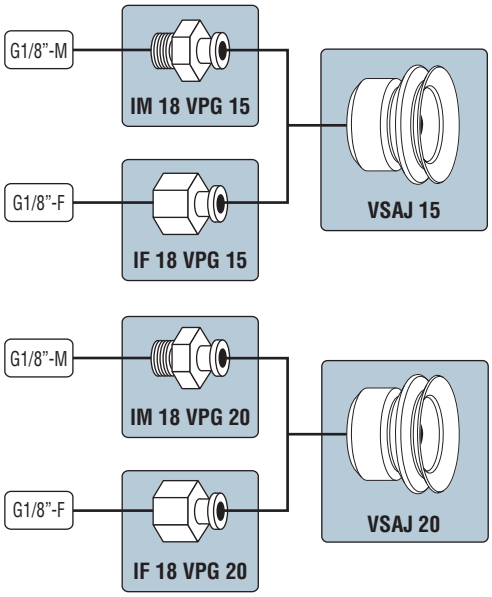
VSAJ

Suction Cups with 1.5 Bellows Ø 15 to 30 mm

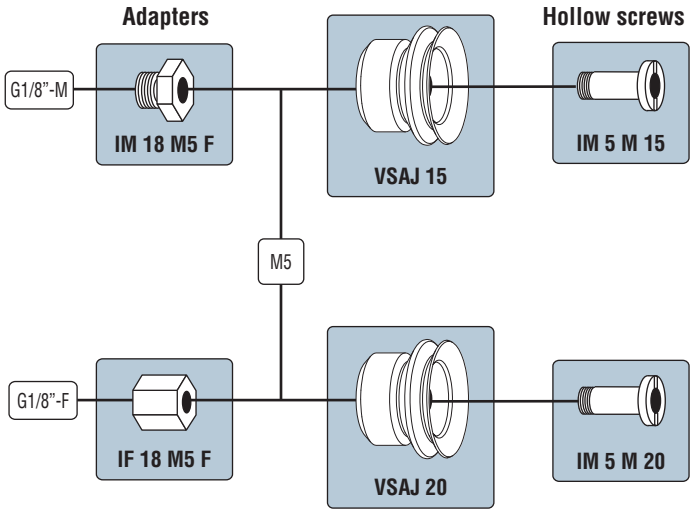
Assembly Diagrams

VSAJ 15 - 20

Barbed fittings C

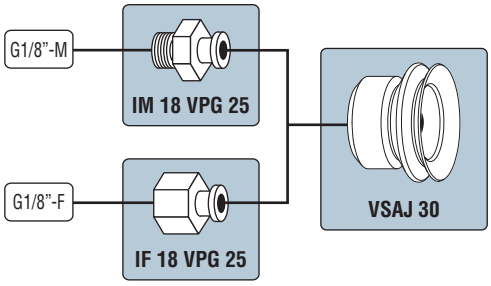


Removable fittings V

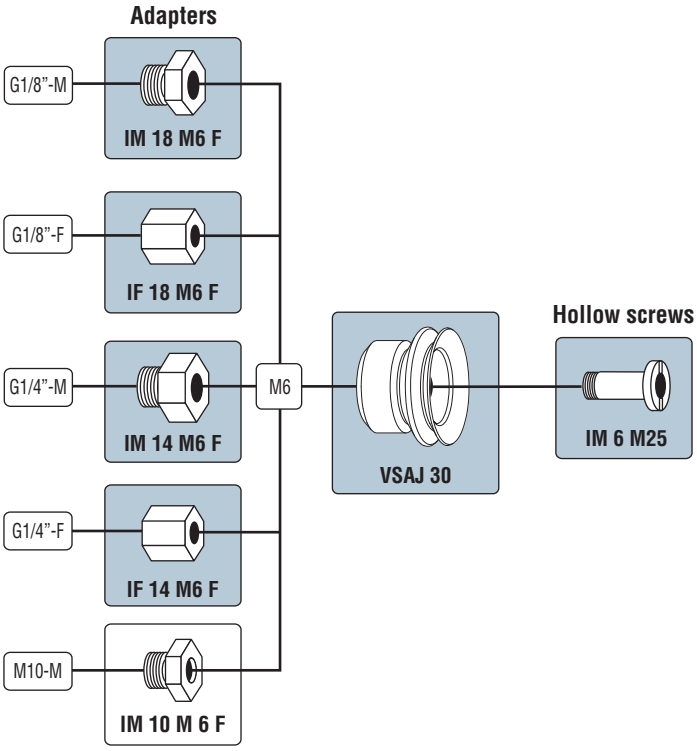


VSAJ 30

Barbed fittings C



Removable fittings V



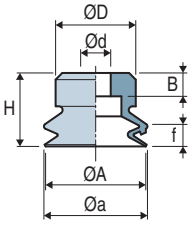
VSAJ

Suction Cups with 1.5 Bellows Ø 15 to 30 mm

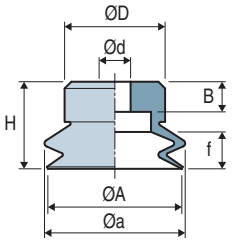
Dimensions

Suction Cups

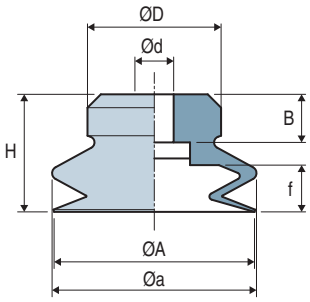
VSAJ 15



VSAJ 20



VSAJ 30

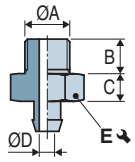


	Ø A	H	Ø a	Ø d	Ø D	f (1)	B	(g)
VSAJ 15	15	11	15.5	4.5	12	3.3	3.5	9
VSAJ 20	20	13	21	4.7	15	5.5	4.5	8.4
VSAJ 30	30	17	30.6	5.8	20	7	7.2	7.6

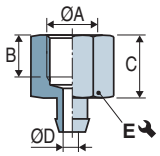
(1) f = Deflection of the suction cup.

Barbed Fittings

Male - IM

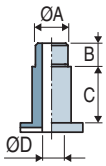


Female - IF



	ØA	B	C	ØD	E	Material	(g)
IM 18 VPG15	G1/8"-M	8	5	2.2	14	Aluminum	4
IM 18 VPG20	G1/8"-M	8	5	3	14	Aluminum	4.1
IM 18 VPG25	G1/8"-M	8	5	4	14	Aluminum	4.1
IF 18 VPG15	G1/8"-F	9	15	2.5	14	Aluminum	5.2
IF 18 VPG20	G1/8"-F	9	15	3	14	Aluminum	5.4
IF 18 VPG25	G1/8"-F	9	15	4	14	Aluminum	5.5

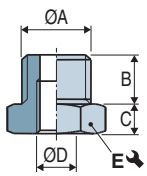
Hollow Screws



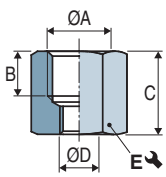
	ØA	B	C	ØD	Material	(g)
IM 5 M15	M5-M	5	2	2.5	Nickel-plated brass	1.3
IM 5 M20	M5-M	5	4	2.5	Nickel-plated brass	2.2
IM 6 M25	M6-M	6	6	3.5	Nickel-plated brass	2.7

Adapters for Hollow Screws

Male - IM



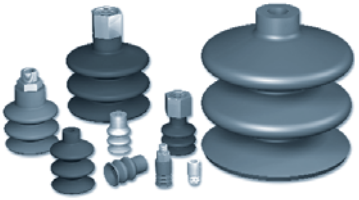
Female - IF



	ØA	B	C	ØD	E	Material	(g)
IM 10 M6F	M10-M	7	3.5	M6-F	13	Nickel-plated brass	5.9
IM 14 M6F	G1/4"-M	8	5	M6-F	17	Nickel-plated brass	15.9
IM 18 M5F	G1/8"-M	6	4.5	M5-F	13	Nickel-plated brass	7.3
IM 18 M6F	G1/8"-M	6	4.5	M6-F	13	Nickel-plated brass	6.6
IF 14 M6F	G1/4"-F	11	16	M6-F	17	Nickel-plated brass	20.5
IF 18 M5F	G1/8"-F	7.5	13	M5-F	13	Nickel-plated brass	10.5
IF 18 M6F	G1/8"-F	7.5	13	M6-F	13	Nickel-plated brass	9.9

The values represent the average characteristics of our products.
Note: All dimensions are in mm.

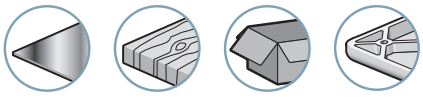
VS
Suction Cups with 2.5 Bellows Ø 5 to 88 mm



VS series suction cups with bellows are recommended for gripping products on different planes (wide deflection) where they can replace spring systems, and for gripping spherical or cylindrical objects gripped at an angle (ball-joint effect).

- Large deflection (stroke)
- Flexibility

Industry-specific applications



Types of use

Materials

NBR Nitrile
NR Natural rubber

SIT5 Translucent silicone
STN Siton® 60 ShoreA
STN5 Siton® 50 ShoreA (on request)

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	Rmin (mm)	NBR	SIT5	NR	STN (2)
VS 5	5	0.04	0.11	8	**VS5NBR**	**VS5SIT5**	-	**VS5STN**
VS 6	6	0.04	0.11	8	**VS6NBR**	**VS6SIT5**	-	-
VS 7	7	0.0425	0.21	8	**VS7NBR**	**VS7SIT5**	-	**VS7STN**
VS 9	9	0.15	0.24	10	**VS9NBR**	**VS9SIT5**	**VS9NR**	**VS9STN**
VS 12	12	0.54	0.63	13	**VS12NBR**	**VS12SIT5**	**VS12NR**	**VS12STN**
VS 14	14	0.975	0.67	15	**VS14NBR**	**VS14SIT5**	**VS14NR**	**VS14STN**
VS 18	17.5	1.35	0.99	20	**VS18NBR**	**VS18SIT5**	**VS18NR**	**VS18STN**
VS 20	20	2	1.04	30	**VS20NBR**	**VS20SIT5**	**VS20NR**	**VS20STN**
VS 25	25	5.4	1.46	30	**VS25NBR**	**VS25SIT5**	**VS25NR**	**VS25STN**
VS 26	25	6.1	2.44	30	**VS26NBR**	**VS26SIT5**	**VS26NR**	**VS26STN**
VS 32	32	10	2.73	35	**VS32NBR**	**VS32SIT5**	**VS32NR**	**VS32STN**
VS 42	42	19.5	4.71	75	**VS42NBR**	**VS42SIT5**	**VS42NR**	**VS42STN**
VS 52	52	36	6.49	75	**VS52NBR**	**VS52SIT5**	**VS52NR**	**VS52STN**
VS 62	62	72.5	9.25	75	**VS62NBR**	**VS62SIT5**	**VS62NR**	**VS62STN**
VS 88	88	165	29.87	100	**VS88NBR**	**VS88SIT5**	**VS88NR**	-

(1) Actual force of the suction cup in use with 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.
(2) On request, some models are available in STN5 (Siton® 50 ShoreA)

Choice of Fittings

(Ø)	Group	M3-M	M5-M	M6-M	M8-M	M10-M	G1/8"-F	G1/8"-M	10/32-M	G1/4"-F	G1/4"-M	G3/8"-M	G1/2"-M
5 - 6	**1**	■	-	-	-	-	-	-	-	-	-	-	-
7 - 25	**1**	-	■	■	-	-	■	■	□	-	-	-	-
26 - 62	**2**	-	□	□	□	□	■	■	-	■	■	-	-
88	**3**	-	-	-	-	□	-	■	-	■	■	□	□

■ Standard available configurations (suction cup + fitting) refer to page 2/44
□ Additional mounting configurations see page 2/47

Fitting: M = male F = female

Types of Assembly

COVAL suction cups can be assembled in a wide variety of configurations.

C **Version C**
Barbed fitting

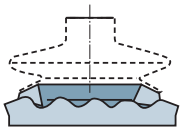
S **Version S**
Factory-crimped fitting

V **Version V**
Removable fitting:
(adapter and hollow screw)

E **Version E**
Pressed fitting

Textured Surfaces

For handling objects with a granular or textured gripping surface, use VS suction cups with the VSBM foam strip option (see page 2/59).



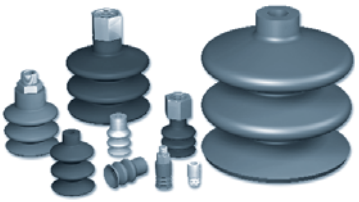
Please specify the part n°. e.g. VS32SIT5IF14
Refer to page 2/44

Accessories
To optimize the use of your suction cups, Coval offers a comprehensive range of accessories (nozzle fittings, spring extensions, and feeder systems, etc.), see chapters **4** and **12**.

VS

Suction Cups with 2.5 Bellows Ø 5 to 88 mm

References - "Suction Cup + Fitting"



Group 1 — C

	THREAD	M3M	M5M	M6M	G1/8"-M	G1/8"-F
Ø 5 -25 mm	**VS5NBR**	VS5NBRIMM3C	-	-	-	-
	VS5SIT5	VS5SIT5IMM3C	-	-	-	-
	VS5STN	VS5STNIMM3C	-	-	-	-
	VS6NBR	VS6NBRIMM3C	-	-	-	-
	VS6SIT5	VS6SIT5IMM3C	-	-	-	-
	VS7NBR	-	VS7NBRIMM5C	VS7NBRIMM6C	VS7NBRIM18C	VS7NBRIF18C
	VS7SIT5	-	VS7SIT5IMM5C	VS7SIT5IMM6C	VS7SIT5IM18C	VS7SIT5IF18C
	VS7STN	-	VS7STNIMM5C	VS7STNIMM6C	VS7STNIM18C	VS7STNIF18C
	VS9NBR	-	VS9NBRIMM5C	VS9NBRIMM6C	VS9NBRIM18C	VS9NBRIF18C
	VS9SIT5	-	VS9SIT5IMM5C	VS9SIT5IMM6C	VS9SIT5IM18C	VS9SIT5IF18C
	VS9NR	-	VS9NRIMM5C	VS9NRIMM6C	VS9NRIM18C	VS9NRIF18C
	VS9STN	-	VS9STNIMM5C	VS9STNIMM6C	VS9STNIM18C	VS9STNIF18C
	VS12NBR	-	VS12NBRIMM5C	VS12NBRIMM6C	VS12NBRIM18C	VS12NBRIF18C
	VS12SIT5	-	VS12SIT5IMM5C	VS12SIT5IMM6C	VS12SIT5IM18C	VS12SIT5IF18C
	VS12NR	-	VS12NRIMM5C	VS12NRIMM6C	VS12NRIM18C	VS12NRIF18C
	VS12STN	-	VS12STNIMM5C	VS12STNIMM6C	VS12STNIM18C	VS12STNIF18C
	VS14NBR	-	VS14NBRIMM5C	VS14NBRIMM6C	VS14NBRIM18C	VS14NBRIF18C
	VS14SIT5	-	VS14SIT5IMM5C	VS14SIT5IMM6C	VS14SIT5IM18C	VS14SIT5IF18C
	VS14NR	-	VS14NRIMM5C	VS14NRIMM6C	VS14NRIM18C	VS14NRIF18C
	VS14STN	-	VS14STNIMM5C	VS14STNIMM6C	VS14STNIM18C	VS14STNIF18C
	VS18NBR	-	VS18NBRIMM5C	VS18NBRIMM6C	VS18NBRIM18C	VS18NBRIF18C
	VS18SIT5	-	VS18SIT5IMM5C	VS18SIT5IMM6C	VS18SIT5IM18C	VS18SIT5IF18C
	VS18NR	-	VS18NRIMM5C	VS18NRIMM6C	VS18NRIM18C	VS18NRIF18C
	VS18STN	-	VS18STNIMM5C	VS18STNIMM6C	VS18STNIM18C	VS18STNIF18C
	VS20NBR	-	VS20NBRIMM5C	VS20NBRIMM6C	VS20NBRIM18C	VS20NBRIF18C
	VS20SIT5	-	VS20SIT5IMM5C	VS20SIT5IMM6C	VS20SIT5IM18C	VS20SIT5IF18C
	VS20NR	-	VS20NRIMM5C	VS20NRIMM6C	VS20NRIM18C	VS20NRIF18C
	VS20STN	-	VS20STNIMM5C	VS20STNIMM6C	VS20STNIM18C	VS20STNIF18C
	VS25NBR	-	VS25NBRIMM5C	VS25NBRIMM6C	VS25NBRIM18C	VS25NBRIF18C
	VS25SIT5	-	VS25SIT5IMM5C	VS25SIT5IMM6C	VS25SIT5IM18C	VS25SIT5IF18C
	VS25NR	-	VS25NRIMM5C	VS25NRIMM6C	VS25NRIM18C	VS25NRIF18C
	VS25STN	-	VS25STNIMM5C	VS25STNIMM6C	VS25STNIM18C	VS25STNIF18C

Group 2 — C / E / V

	THREAD	G1/4"-M	G1/4"-F	G1/4"-M	G1/4"-F	G1/8"-M	G1/8"-F	G1/4"-M	G1/4"-F
Ø 26 - 62 mm	**VS26NBR**	VS26NBRIM14C	VS26NBRIF14C	VS26NBRIM14	VS26NBRIF14	VS26NBRIM18V	VS26NBRIF18V	VS26NBRIM14V	VS26NBRIF14V
	VS26SIT5	VS26SIT5IM14C	VS26SIT5IF14C	VS26SIT5IM14	VS26SIT5IF14	VS26SIT5IM18V	VS26SIT5IF18V	VS26SIT5IM14V	VS26SIT5IF14V
	VS26NR	VS26NRIM14C	VS26NRIF14C	VS26NRIM14	VS26NRIF14	VS26NRIM18V	VS26NRIF18V	VS26NRIM14V	VS26NRIF14V
	VS26STN	VS26STNIM14C	VS26STNIF14C	VS26STNIM14	VS26STNIF14	VS26STNIM18V	VS26STNIF18V	VS26STNIM14V	VS26STNIF14V
	VS32NBR	VS32NBRIM14C	VS32NBRIF14C	VS32NBRIM14	VS32NBRIF14	VS32NBRIM18V	VS32NBRIF18V	VS32NBRIM14V	VS32NBRIF14V
	VS32SIT5	VS32SIT5IM14C	VS32SIT5IF14C	VS32SIT5IM14	VS32SIT5IF14	VS32SIT5IM18V	VS32SIT5IF18V	VS32SIT5IM14V	VS32SIT5IF14V
	VS32NR	VS32NRIM14C	VS32NRIF14C	VS32NRIM14	VS32NRIF14	VS32NRIM18V	VS32NRIF18V	VS32NRIM14V	VS32NRIF14V
	VS32STN	VS32STNIM14C	VS32STNIF14C	VS32STNIM14	VS32STNIF14	VS32STNIM18V	VS32STNIF18V	VS32STNIM14V	VS32STNIF14V
	VS42NBR	VS42NBRIM14C	VS42NBRIF14C	VS42NBRIM14	VS42NBRIF14	VS42NBRIM18V	VS42NBRIF18V	VS42NBRIM14V	VS42NBRIF14V
	VS42SIT5	VS42SIT5IM14C	VS42SIT5IF14C	VS42SIT5IM14	VS42SIT5IF14	VS42SIT5IM18V	VS42SIT5IF18V	VS42SIT5IM14V	VS42SIT5IF14V
	VS42NR	VS42NRIM14C	VS42NRIF14C	VS42NRIM14	VS42NRIF14	VS42NRIM18V	VS42NRIF18V	VS42NRIM14V	VS42NRIF14V
	VS42STN	VS42STNIM14C	VS42STNIF14C	VS42STNIM14	VS42STNIF14	VS42STNIM18V	VS42STNIF18V	VS42STNIM14V	VS42STNIF14V
	VS52NBR	VS52NBRIM14C	VS52NBRIF14C	VS52NBRIM14	VS52NBRIF14	VS52NBRIM18V	VS52NBRIF18V	VS52NBRIM14V	VS52NBRIF14V
	VS52SIT5	VS52SIT5IM14C	VS52SIT5IF14C	VS52SIT5IM14	VS52SIT5IF14	VS52SIT5IM18V	VS52SIT5IF18V	VS52SIT5IM14V	VS52SIT5IF14V
	VS52NR	VS52NRIM14C	VS52NRIF14C	VS52NRIM14	VS52NRIF14	VS52NRIM18V	VS52NRIF18V	VS52NRIM14V	VS52NRIF14V
	VS52STN	VS52STNIM14C	VS52STNIF14C	VS52STNIM14	VS52STNIF14	VS52STNIM18V	VS52STNIF18V	VS52STNIM14V	VS52STNIF14V
	VS62NBR	VS62NBRIM14C	VS62NBRIF14C	VS62NBRIM14	VS62NBRIF14	VS62NBRIM18V	VS62NBRIF18V	VS62NBRIM14V	VS62NBRIF14V
	VS62SIT5	VS62SIT5IM14C	VS62SIT5IF14C	VS62SIT5IM14	VS62SIT5IF14	VS62SIT5IM18V	VS62SIT5IF18V	VS62SIT5IM14V	VS62SIT5IF14V
	VS62NR	VS62NRIM14C	VS62NRIF14C	VS62NRIM14	VS62NRIF14	VS62NRIM18V	VS62NRIF18V	VS62NRIM14V	VS62NRIF14V
	VS62STN	VS62STNIM14C	VS62STNIF14C	VS62STNIM14	VS62STNIF14	VS62STNIM18V	VS62STNIF18V	VS62STNIM14V	VS62STNIF14V

Group 3 — V / S

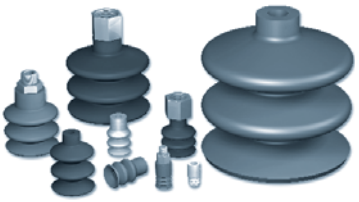
	THREAD	G1/8"-M	G1/4"-M	G1/4"-F	G1/4"-M	G1/4"-F
Ø 88 mm	**VS88NBR**	VS88NBRIM18V	VS88NBRIM14V	VS88NBRIF14V	VS88NBRIM14	VS88NBRIF14
	VS88SIT5	VS88SIT5IM18V	VS88SIT5IM14V	VS88SIT5IF14V	VS88SIT5IM14	VS88SIT5IF14
	VS88NR	VS88NRIM18V	VS88NRIM14V	VS88NRIF14V	VS88NRIM14	VS88NRIF14

Additional mounting configurations are available (see page 2/47).
For standard configurations (suction cup+fitting), the C and V versions are delivered unassembled.

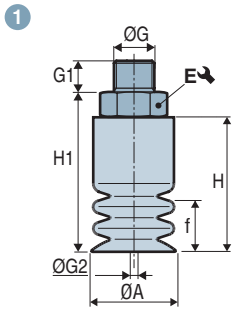
VS

Suction Cups with 2.5 Bellows Ø 5 to 88 mm

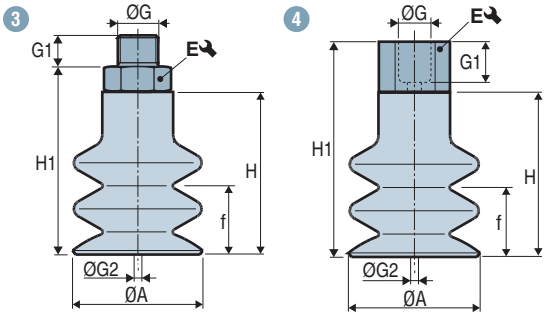
Dimensions - "Suction Cup + Fitting"



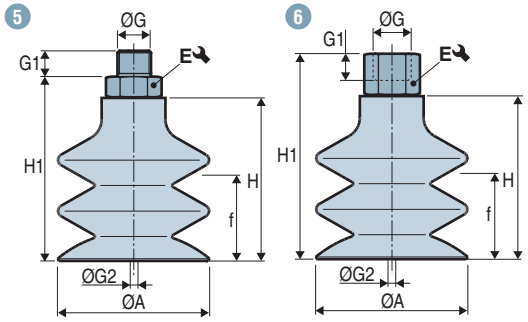
VS 5 - 9 | Group 1



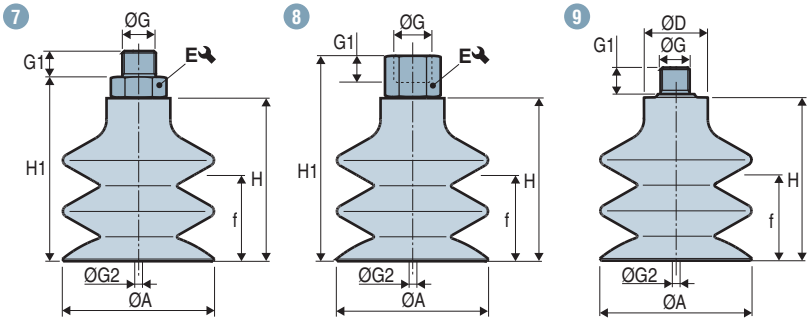
VS 12 - 25 | Group 1



VS 26 - 62 | Group 2



VS 88 | Group 3



Group 1	Diagram	ØA	ØD	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
VS5---IMM3C	1	5	-	3	13.5	15.5	M3-M	3	1.4	5	0.7
VS6---IMM3C	1	6	-	3	13.2	15.2	M3-M	3	1.4	5	0.7
VS7---IMM5C	1	7	-	3	13.5	18.5	M5-M	4.5	2.5	7	3.5
VS7---IMM6C	1	7	-	3	13.5	18.5	M6-M	5	3.5	7	3.1
VS7---IM18C	1	7	-	3	13.5	19.5	G1/8"-M	7.5	3.5	14	4.5
VS7---IF18C	2	7	-	3	13.5	25.5	G1/8"-F	8	3.5	14	4.4
VS9---IMM5C	1	9	-	3	15	20	M5-M	4.5	2.5	7	3.7
VS9---IMM6C	1	9	-	3	15	20	M6-M	5	3.5	7	3.3
VS9---IM18C	1	9	-	3	15	21	G1/8"-M	7.5	3.5	14	4.8
VS9---IF18C	2	9	-	3	15	27	G1/8"-F	8	3.5	14	4.6
VS12---IMM5C	3	12	-	7	21	26	M5-M	4.5	2.5	7	3.2
VS12---IMM6C	3	12	-	7	21	26	M6-M	5	3.5	7	3.8
VS12---IM18C	3	12	-	7	21	27	G1/8"-M	7.5	3.5	14	5.2
VS12---IF18C	4	12	-	7	21	33	G1/8"-F	8	3.5	14	5.1
VS14---IMM5C	3	14	-	10	23	28	M5-M	4.5	2.5	7	4.6
VS14---IMM6C	3	14	-	10	23	28	M6-M	5	3.5	7	4.2
VS14---IM18C	3	14	-	10	23	29	G1/8"-M	7.5	3.5	14	5.6
VS14---IF18C	4	14	-	10	23	35	G1/8"-F	8	3.5	14	5.5
VS18---IMM5C	3	17.5	-	10	23	28	M5-M	4.5	2.5	7	5.1
VS18---IMM6C	3	17.5	-	10	23	28	M6-M	5	3.5	7	4.7
VS18---IM18C	3	17.5	-	10	23	29	G1/8"-M	7.5	3.5	14	6.1
VS18---IF18C	4	17.5	-	10	23	35	G1/8"-F	8	3.5	14	6
VS20---IMM5C	3	20	-	10	23	28	M5-M	4.5	2.5	7	5.5
VS20---IMM6C	3	20	-	10	23	28	M6-M	5	3.5	7	5.1
VS20---IM18C	3	20	-	10	23	29	G1/8"-M	7.5	3.5	14	6.5
VS20---IF18C	4	20	-	10	23	35	G1/8"-F	8	3.5	14	6.4
VS25---IMM5C	3	25	-	20	34	39	M5-M	4.5	2.5	7	7.4
VS25---IMM6C	3	25	-	20	34	39	M6-M	5	3.5	7	7
VS25---IM18C	3	25	-	20	34	40	G1/8"-M	7.5	3.5	14	8.4
VS25---IF18C	4	25	-	20	34	46	G1/8"-F	8	3.5	14	8.3

Ø 5 - 25 mm

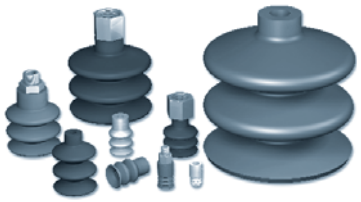
Note: All dimensions are in mm.

(1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

VS

Suction Cups with 2.5 Bellows Ø 5 to 88 mm

Dimensions - "Suction Cup + Fitting"



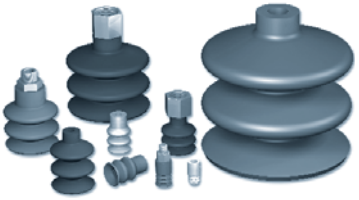
Group 2		Diagram	ØA	ØD	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
Ø 26 - 62 mm	VS26---IM18V	5	25	-	11	31	35.5	G1/8"-M	6	3.5	13	20.2
	VS26---IF18V	6	25	-	11	31	44	G1/8"-F	7.5	3.5	13	23.5
	VS26---IM14	5	25	-	11	31	35	G1/4"-M	11	4.4	17	14.1
	VS26---IM14C	5	25	-	11	31	39	G1/4"-M	10	7	17	15
	VS26---IM14V	5	25	-	11	31	36	G1/4"-M	8	3.5	17	29.5
	VS26---IF14	6	25	-	11	31	46	G1/4"-F	10	4.4	17	14.7
	VS26---IF14C	6	25	-	11	31	46	G1/4"-F	12	6.9	17	14.3
	VS26---IF14V	6	25	-	11	31	47	G1/4"-F	11	3.5	17	34.1
	VS32---IM18V	5	32	-	14.5	37.5	42	G1/8"-M	6	3.5	13	22.9
	VS32---IF18V	6	32	-	14.5	37.5	50.5	G1/8"-F	7.5	3.5	13	26.2
	VS32---IM14	5	32	-	14.5	37.5	41.5	G1/4"-M	11	4.4	17	16.8
	VS32---IM14C	5	32	-	14.5	37.5	45.5	G1/4"-M	10	7	17	17.7
	VS32---IM14V	5	32	-	14.5	37.5	42.5	G1/4"-M	8	3.5	17	32.2
	VS32---IF14	6	32	-	14.5	37.5	52.5	G1/4"-F	10	4.4	17	17.4
	VS32---IF14C	6	32	-	14.5	37.5	52.5	G1/4"-F	12	6.9	17	17
	VS32---IF14V	6	32	-	14.5	37.5	53.5	G1/4"-F	11	3.5	17	36.8
	VS42---IM18V	5	42	-	22	46	50.5	G1/8"-M	6	3.5	13	32.1
	VS42---IF18V	6	42	-	22	46	59	G1/8"-F	7.5	3.5	13	35.4
	VS42---IM14	5	42	-	22	46	50	G1/4"-M	11	4.4	17	26
	VS42---IM14C	5	42	-	22	46	54	G1/4"-M	10	7	17	26.2
	VS42---IM14V	5	42	-	22	46	51	G1/4"-M	8	3.5	17	41.4
	VS42---IF14	6	42	-	22	46	61	G1/4"-F	10	4.4	17	26.6
	VS42---IF14C	6	42	-	22	46	61	G1/4"-F	12	6.9	17	26.2
	VS42---IF14V	6	42	-	22	46	62	G1/4"-F	11	3.5	17	46
	VS52---IM18V	5	52	-	27	49	53.5	G1/8"-M	6	3.5	13	38.1
	VS52---IF18V	6	52	-	27	49	62	G1/8"-F	7.5	3.5	13	41.4
	VS52---IM14	5	52	-	27	49	53	G1/4"-M	11	4.4	17	32
	VS52---IM14C	5	52	-	27	49	57	G1/4"-M	10	7	17	32.9
	VS52---IM14V	5	52	-	27	49	54	G1/4"-M	8	3.5	17	47.4
	VS52---IF14	6	52	-	27	49	64	G1/4"-F	10	4.4	17	32.6
	VS52---IF14C	6	52	-	27	49	64	G1/4"-F	12	6.9	17	32.2
	VS52---IF14V	6	52	-	27	49	65	G1/4"-F	11	3.5	17	52
	VS62---IM18V	5	62	-	31	55	59.5	G1/8"-M	6	3.5	13	51
	VS62---IF18V	6	62	-	31	55	68	G1/8"-F	7.5	3.5	13	54.3
	VS62---IM14	5	62	-	31	55	59	G1/4"-M	11	4.4	17	44.9
	VS62---IM14C	5	62	-	31	55	63	G1/4"-M	10	7	17	45.8
	VS62---IM14V	5	62	-	31	55	60	G1/4"-M	8	3.5	17	60.3
	VS62---IF14	6	62	-	31	55	70	G1/4"-F	10	4.4	17	45.5
	VS62---IF14C	6	62	-	31	55	70	G1/4"-F	12	6.9	17	45.1
	VS62---IF14V	6	62	-	31	55	71	G1/4"-F	11	3.5	17	65
Group 3												
Ø 88 mm	VS88---IM18V	9	88	25	48.5	87.5	-	G1/8"-M	8	6	-	142.8
	VS88---IM14	7	88	-	48.5	87.5	93.5	G1/4"-M	11	8	21	153.4
	VS88---IM14V	7	88	-	48.5	87.5	92.5	G1/4"-M	8	6	17	163
	VS88---IF14	8	88	-	48.5	87.5	102.5	G1/4"-F	10	8	21	130.8
	VS88---IF14V	8	88	-	48.5	87.5	106.5	G1/4"-F	9	6	17	134.7

Note: All dimensions are in mm. (1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

VS

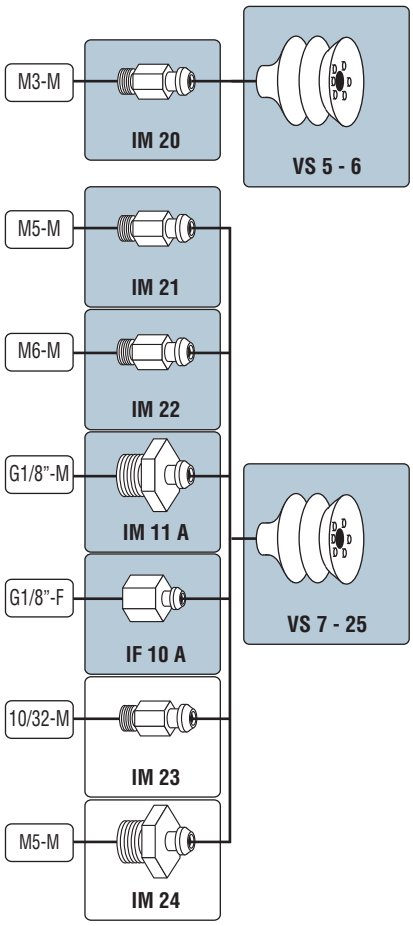
Suction Cups with 2.5 Bellows Ø 5 to 88 mm

Assembly Diagrams



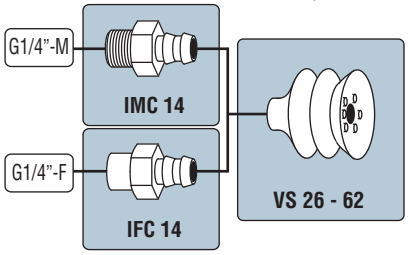
VS 5 - 25 | Group 1

Barbed fittings C

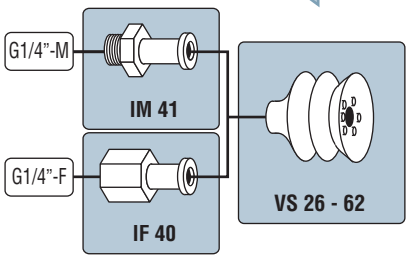


VS 26 - 62 | Group 2

Barbed fittings C

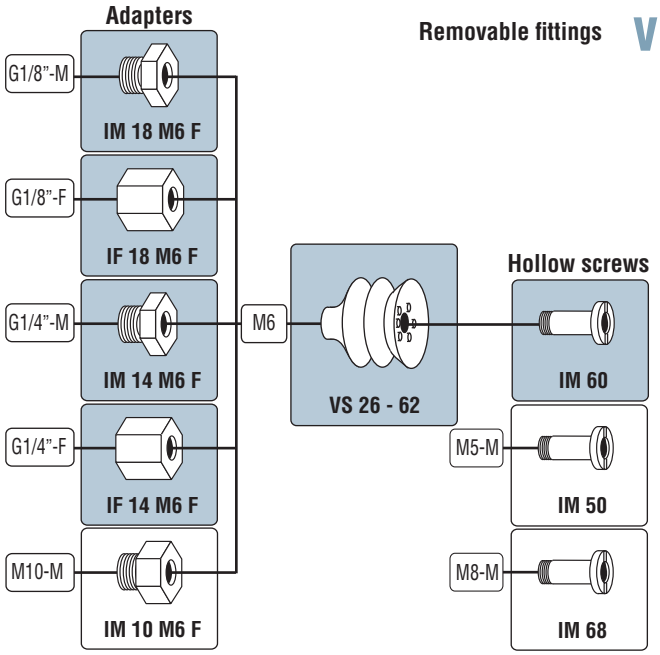


Pressed fittings E



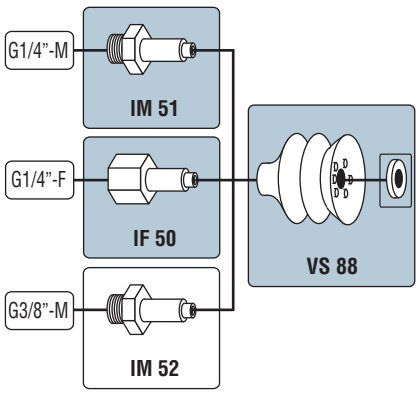
Adapters

Removable fittings V



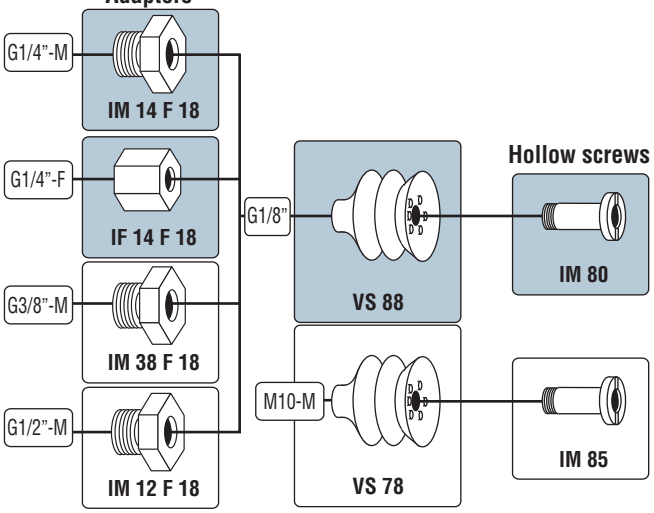
VS 88 | Group 3

Factory-crimped fittings S



Removable fittings V

Adapters



Configurations (suction cup + fitting) refer to page 2/44

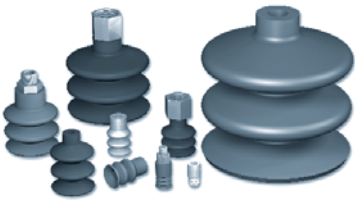
Non-standard configurations must be ordered in seperate part numbers.

Fittings and suction cups dimension: see page 2/48.

VS

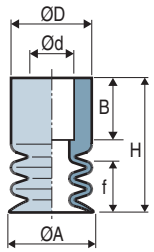
Suction Cups with 2.5 Bellows Ø 5 to 88 mm

Dimensions

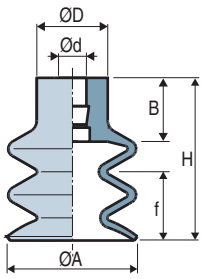


Suction Cups

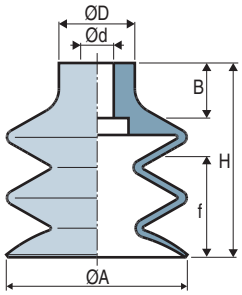
VS 5 - 25



VS 26 - 62



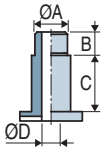
VS 88



(1) f = Deflection of the suction cup.

	ØA	H	Ød	ØD	f (1)	B	(g)
VS 5	5	13.5	4	7	3	8	0.3
VS 6	6	13.2	4	7	3	7	0.31
VS 7	7	13.5	4.7	9	3	6	0.42
VS 9	9	15	4.4	9	3	7	0.64
VS 12	12	21	4	10	7	9	1.1
VS 14	14	23	4	10	10	9	1.5
VS 18	17.5	23	4	10	10	9	2
VS 20	20	23	4	10	10	9	2.4
VS 25	25	34	4	10	20	9	4.3
VS 26	25	31	8	16	11	13	6.3
VS 32	32	37.5	8	18	14.5	13	9
VS 42	42	46	8	18	22	13	18.2
VS 52	52	49	8	18	27	13	24.2
VS 62	62	55	8	21	31	13	37.1
VS 88	88	87.5	12	25	48.5	20	119

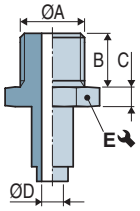
Hollow Screws



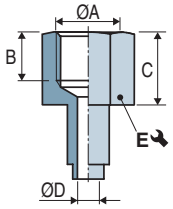
	ØA	B	C	ØD	Material	(g)
IM 50	M5-M	5	11	2.8	Nickel-plated brass	7.4
IM 60 (2) (3)	M6-M	7	11	3.5	Nickel-plated brass	7.3
IM 68	M8-M	8	11	5.2	Nickel-plated brass	6.5
IM 80	G1/8"-M	8	18	6	Nickel-plated brass	23.8
IM 85	M10x150-M	8	18	6	Nickel-plated brass	23.5

Factory-Crimped Fittings

Male - IM



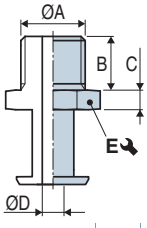
Female- IF



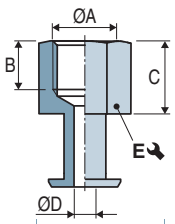
	ØA	B	C	ØD	E	Material	(g)
IM 51	G1/4"-M	11	6	8	21	Aluminum	11.8
IF 50	G1/4"-F	10	15	8	21	Aluminum	15.7
IM 52	G3/8"-M	11	6	8	21	Aluminum	14

Pressed Fittings

Male - IM



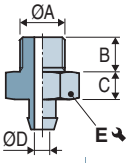
Female - IF



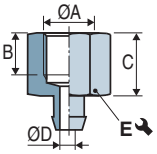
	ØA	B	C	ØD	E	Material	(g)
IM 41	G1/4"-M	11	4	4.4	17	Aluminum	7.8
IF 40	G1/4"-F	10	15	4.4	17	Aluminum	8.4

Barbed Fittings

Male - IM



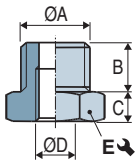
Female - IF



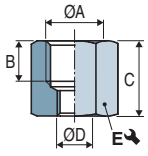
	ØA	B	C	ØD	E	Material	(g)
IM 11 A	G1/8"-M	7.5	6	3.5	14	Aluminum	4.1
IMC 14	G1/4"-M	10	8	7	17	Aluminum	8.7
IM 21 (2)	M5-M	4.5	5	2.5	7	Nickel-plated brass	3.1
IM 22 (2)	M6-M	5	5	3.5	7	Nickel-plated brass	2.7
IM 23	10/32-M	4.5	5	2.5	7	Brass	3
IM 24	M5-M	4.5	2.5	2.5	10	Nickel-plated brass	3.2
IF 10 A	G1/8"-F	8	12	3.5	14	Aluminum	4
IFC 14	G1/4"-F	12	15	6.9	17	Aluminum	8

Adapters for Hollow Screws

Male - IM



Female- IF



	ØA	B	C	ØD	E	Material	(g)
IM 10 M6F	M10-M	7	3.5	M6-F	13	Brass	5.9
IM 12 F18	G1/2"-M	14	6	G1/8"-F	22	Nickel-plated brass	46.8
IM 14 M6F	G1/4"-M	8	5	M6-F	17	Nickel-plated brass	15.9
IM 14 F18	G1/4"-M	8	5	G1/8"-F	17	Nickel-plated brass	10.6
IM 18 M6F	G1/8"-M	6	4.5	M6-F	13	Nickel-plated brass	6.6
IM 38 F18	G3/8"-M	9	5	G1/8"-F	19	Nickel-plated brass	18.8
IF 14 M6F	G1/4"-F	11	16	M6-F	17	Nickel-plated brass	20.5
IF 18 M6F	G1/8"-F	7.5	13	M6-F	13	Nickel-plated brass	9.9
IF 14 F18	G1/4"-F	9	19	G1/8"-F	17	Nickel-plated brass	20.2

The values represent the average characteristics of our products.

(2) Flow restrictor version available: orifice calibrated to reduce leaks when used with a multi-cup gripper (see page 4/9)

(3) Available in stainless steel

Note: All dimensions are in mm.

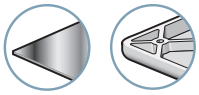
VSG
Suction Cups with 2.5 Bellows Ø 5 and 7mm

The VSG series 2.5 bellows suction cups benefit from very flexible lips allowing the gripping of small concave or convex products. They are ideal for the gripping of sensitive products which require a soft lip.

Materials

NBR Nitrile
SI Silicone
STN Siton®

Industry-specific applications



Types of use

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	R_{min} (mm)	NBR	SI	STN
VSG 5	5	0.03	0.08	3.5	**VSG5NBR**	**VSG5SI**	**VSG5STN**
VSG 7	7	0.04	0.23	4	**VSG7NBR**	**VSG7SI**	**VSG7STN**

(1) Actual force of the suction cup in use with 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.

Choice of Fittings

(Ø)	M5-M	M5-F	G1/8"-M	G1/8"-F
5 - 7	■	■	■	■

■ Standard available configurations (suction cup + fitting)
See part n° table below

Fitting: M = male
F = female

Type of Assembly

C **Version C**
Barbed fitting

References - "Suction Cup + Fitting"

	THREAD	M5-M	M5-F	G1/8"-M	G1/8"-F
Ø 5 -7 mm	**VSG5NBR**	VSG5NBRIMM5C	VSG5NBRIFM5C	VSG5NBRIM18C	VSG5NBRIF18C
	VSG5SI	VSG5SIIMM5C	VSG5SIIFM5C	VSG5SIIM18C	VSG5SIIF18C
	VSG5STN	VSG5STNIMM5C	VSG5STNIFM5C	VSG5STNIM18C	VSG5STNIF18C
	VSG7NBR	VSG7NBRIMM5C	VSG7NBRIFM5C	VSG7NBRIM18C	VSG7NBRIF18C
	VSG7SI	VSG7SIIMM5C	VSG7SIIFM5C	VSG7SIIM18C	VSG7SIIF18C
	VSG7STN	VSG7STNIMM5C	VSG7STNIFM5C	VSG7STNIM18C	VSG7STNIF18C

Please specify the part n°. e.g. VSG5NBR
See part n° table above

Accessories
To optimize use of your suction cups, Coval offers a comprehensive range of accessories (sensors, spring systems, extensions, feeder systems, etc.) see chapters **4** and **12**.

VSG

Suction Cups with 2.5 Bellows Ø 5 and 7mm

Dimensions

Suction Cups + Fittings

VSG 5 VSG 7

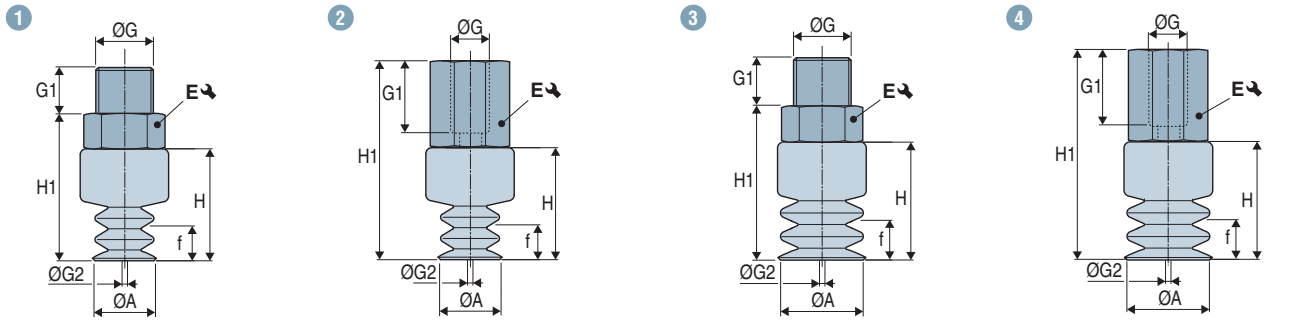
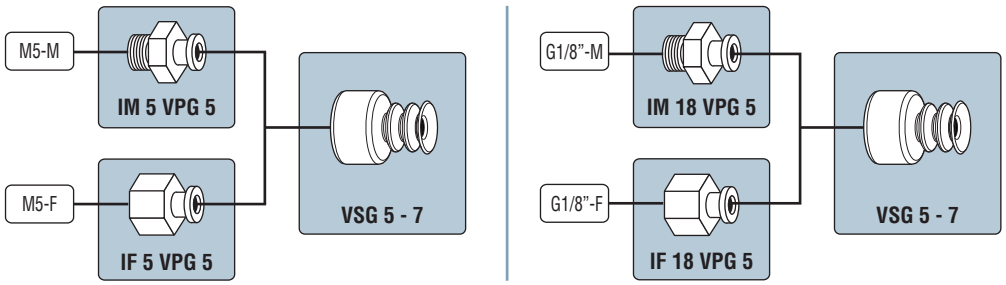


	Diagram	ØA	f (1)	H	H1	ØG	G1	ØG2 (2)	E	(g)
VSG5-IMM5C	1	5	3	9.5	13	M5-M	4.5	2.2	7	2.6
VSG5-IFM5C	2	5	3	9.5	18.5	M5-F	6	2.2	14	3.1
VSG5-IM18C	1	5	3	9.5	14.5	G1/8"-M	8	2.2	14	5.8
VSG5-IF18C	2	5	3	9.5	24.5	G1/8"-F	9	2.2	14	7
VSG7-IMM5C	3	7	3	10	13.5	M5-M	4.5	2.2	7	0.9
VSG7-IFM5C	4	7	3	10	19	M5-F	6	2.2	14	1.4
VSG7-IM18C	3	7	3	10	15	G1/8"-M	8	2.2	14	4.1
VSG7-IF18C	4	7	3	10	25	G1/8"-F	9	2.2	14	5.3

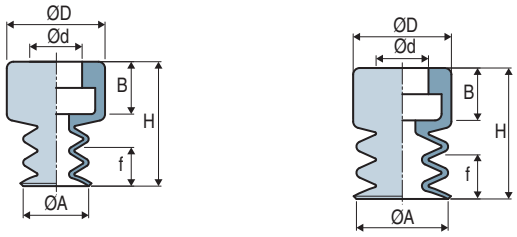
(1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

Assembly Diagrams



Suction Cups

VSG 5 VSG 7



	ØA	H	Ød	ØD	f (1)	B	(g)
VSG 5	5	9.5	4	7.5	3	4	1.9
VSG 7	7	10	4	7.5	3	4	0.24

(1) f = Deflection of the suction cup

Barbed Fittings

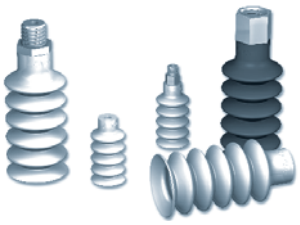
Male - IM Female - IF

	ØA	B	C	ØD	E	Material	(g)
IM 5 VPG 5	M5-M	4.5	3.5	2.2	7	Aluminum	0.7
IF 5 VPG 5	M5-F	6	9	2.2	14	Aluminum	1.2
IM 18 VPG 5	G1/8"-M	8	5	2.2	14	Aluminum	3.9
IF 18 VPG 5	G1/8"-F	9	15	2.2	14	Aluminum	5.1

The values represent the average characteristics of our products.

Note: All dimensions are in mm.

VSD
Long Stroke Suction Cups



Long stroke suction cups (3.5 and 4.5 bellows) are specially recommended for handling spherical or cylindrical objects or which require compensation for varying heights.

Industry-specific applications

Types of use

Materials

NBR Nitrile
SIT3 30 Shore A translucent
SIT5 60 Shore A translucent silicone

Suction Cup Properties

	Ø (mm)	(cm³)	(lbf) (1)	Rmin (mm)	NBR	SIT3	SIT5
VSD 18	17.5	2.5	0.89	20	-	-	**VSD18SIT5**
VSD 32	32	21.7	2.35	35	**VSD32NBR**	**VSD32SIT3**	-

(1) Actual force of the suction cup in use with 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.

Choice of Fittings

(Ø)	Group	M5-M	M6-M	M8-M	M10-M	G1/8"-F	G1/8"-M	10/32-M	G1/4"-F	G1/4"-M
VSD 18	**1**	■	■	-	-	■	■	□	-	-
VSD 32	**2**	□	□	□	□	■	■	-	■	■

■ Standard available configurations (suction cup + fitting) See part n° below
□ Additional mounting configurations see page 2/53
Fitting: M = male F = female

Types of Assembly

COVAL suction cups can be assembled in a wide variety of configurations.

C **Version C:** Factory-crimped fitting

E **Version E:** Pressed fitting

V **Version V:** Removable fitting: (adapter and hollow screw)

References - "Suction Cup + Fitting"

Group 1

Ø 18	THREAD	C M5-M	C M6-M	C G1/8"-M	C G1/8"-F
	VSD18SIT5	VSD18SIT5IMM5C	VSD18SIT5IMM6C	VSD18SIT5IM18C	VSD18SIT5IF18C

Group 2

Ø 32	THREAD	C G1/4"-M	C G1/4"-F	E G1/4"-M	E G1/4"-F	V G1/8"-M	V G1/8"-F	V G1/4"-M	V G1/4"-F
	VSD32NBR	VSD32NBRIM14C	VSD32NBRIF14C	VSD32NBRIM14	VSD32NBRIF14	VSD32NBRIM18V	VSD32NBRIF18V	VSD32NBRIM14V	VSD32NBRIF14V
	VSD32SIT3	VSD32SIT3IM14C	VSD32SIT3IF14C	VSD32SIT3IM14	VSD32SIT3IF14	VSD32SIT3IM18V	VSD32SIT3IF18V	VSD32SIT3IM14V	VSD32SIT3IF14V

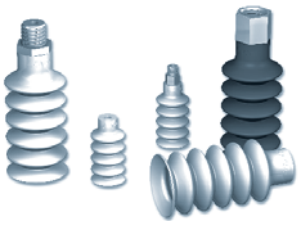
Please specify the part n°. e.g. VSD18SIT5IMM5C
See part n° table above

Accessories
To optimize use of your suction cups, Coval offers a comprehensive range of accessories (sensors, spring systems, extensions, feeder systems, etc.) see chapters **4** and **12**.

VSD

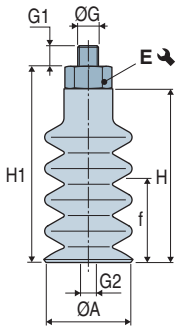
Long Stroke Suction Cups

Dimensions - "Suction Cup + Fitting"



VSD 18	Group 1	VSD 32	Group 2

1



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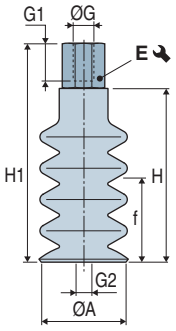
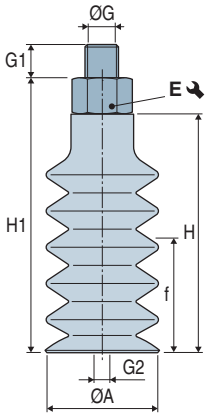
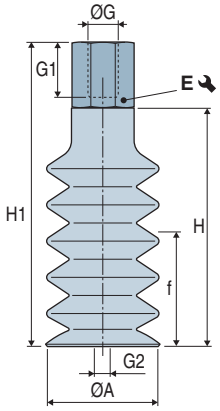


3



4



Group 1		Diagram	ØA	f (1)	H	H1	ØG	G1	ØG2(2)	E	(g)
Ø 18 mm	VSD18-IMM5C	1	17.5	18	36	41	M5-M	4.5	2.5	7	6.2
	VSD18-IMM6C	1	17.5	18	36	41	M6-M	5	3.5	7	5.8
	VSD18-IM18C	1	17.5	18	36	42	G1/8"-M	7.5	3.5	14	7.2
	VSD18-IF18C	2	17.5	18	36	48	G1/8"-F	8	3.5	14	7.1

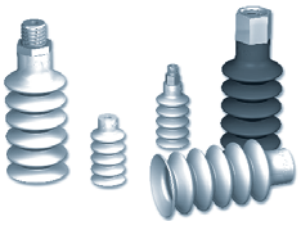
Group 2		Diagram	ØA	f (1)	H	H1	G	G1	ØG2(2)	E	(g)
Ø 32 mm	VSD32-IM18V	3	32	34	65	69,5	G1/8"-M	6	3.5	13	29.2
	VSD32-IF18V	4	32	34	65	78	G1/8"-F	7.5	3.5	13	32.5
	VSD32-IM14	3	32	34	65	69	G1/4"-M	11	4.4	17	22.9
	VSD32-IM14C	3	32	34	65	73	G1/4"-M	10	7	17	23.8
	VSD32-IM14V	3	32	34	65	70	G1/4"-M	8	3.5	17	38.5
	VSD32-IF14	4	32	34	65	80	G1/4"-F	10	4.4	17	23.7
	VSD32-IF14C	4	32	34	65	80	G1/4"-F	12	6.9	17	23.1
	VSD32-IF14V	4	32	34	65	81	G1/4"-F	11	3.5	17	43.5

(1) f = Deflection of the suction cup. (2) Ø G2 = Ø internal orifice of the fitting.

Note: All dimensions are in mm.

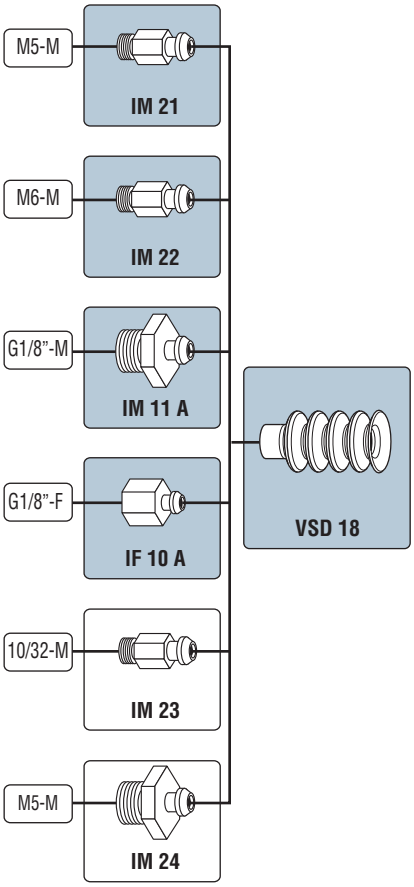
Assembly diagrams
See page 2/53.

VSD
Long Stroke Suction Cups
Assembly Diagrams



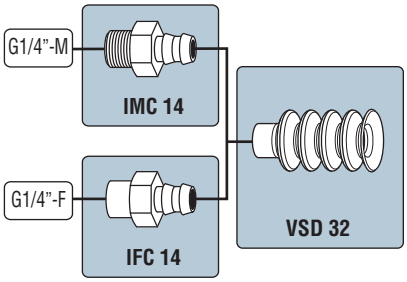
VSD 18 | Group 1

Barbed fittings C

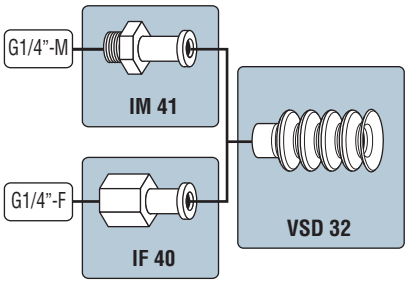


VSD 32 | Group 2

Barbed fittings C

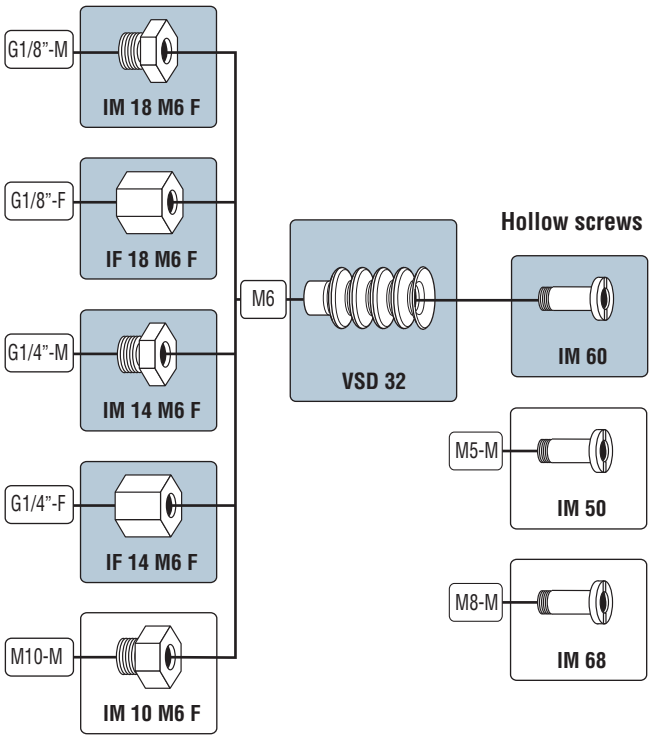


Pressed fittings E



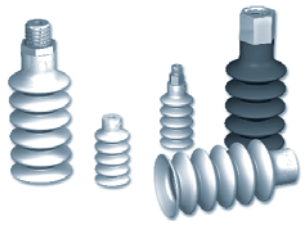
Removable fittings V

Adapters



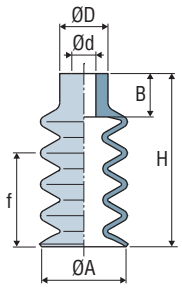
Hollow screws

VSD
Long Stroke Suction Cups
Dimensions

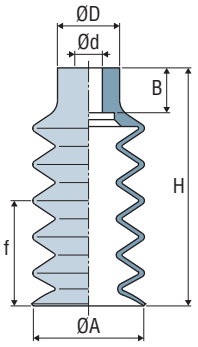


Suction Cups

VSD 18



VSD 32

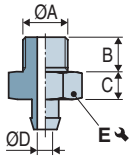


	ØA	f (1)	H	Ød	ØD	B	(g)
VSD 18	17.5	18	36	4	10	9	3.1
VSD 32	32	34	65	8	18	13	15.1

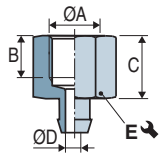
(1) f = Deflection of the suction cup.

Barbed Fittings

Male - IM

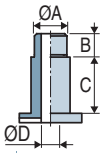


Female - IF



	ØA	B	C	ØD	E	Material	(g)
IM 11 A	G1/8"-M	7.5	6	3.5	14	Aluminum	4.1
IMC 14	G1/4"-M	10	8	7	17	Aluminum	8.7
IM 21 (2)	M5-M	4.5	5	2.5	7	Nickel-plated brass	3.1
IM 22 (2)	M6-M	5	5	3.5	7	Nickel-plated brass	2.7
IM 23	10/32-M	4.5	5	2.5	7	Brass	3.0
IM 24	M5-M	4.5	2.5	2.5	10	Nickel-plated brass	3.2
IF 10 A	G1/8"-F	8	12	3.5	14	Aluminum	4.0
IFC 14	G1/4"-F	12	15	6.9	17	Aluminum	8.0

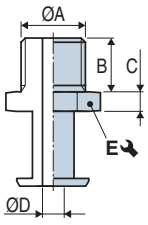
Hollow Screws



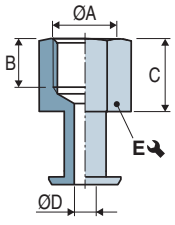
	ØA	B	C	ØD	Material	(g)
IM 50	M5-M	5	11	2.8	Brass	7.4
IM 60 (2) (3)	M6-M	7	11	3.5	Nickel-plated brass	7.5
IM 68	M8-M	8	11	5.2	Nickel-plated brass	6.4

Pressed Fittings

Male - IM



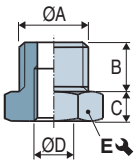
Female - IF



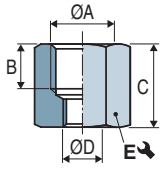
	ØA	B	C	ØD	E	Material	(g)
IM 41	G1/4"-M	11	4	4.4	17	Aluminum	7.8
IF 40	G1/4"-F	10	15	4.4	17	Aluminum	8.6

Adapters for Hollow Screws

Male - IM



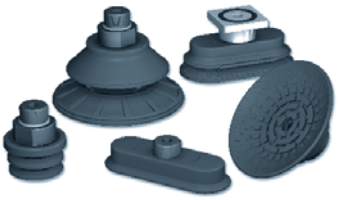
Female - IF



	ØA	B	C	ØD	E	Material	(g)
IM 10 M6F	M10-M	7	3.5	M6-F	13	Brass	5.9
IM 14 M6F	G1/4"-M	8	5	M6-F	17	Nickel-plated brass	15.9
IM 18 M6F	G1/8"-M	6	4.5	M6-F	13	Nickel-plated brass	6.6
IF 14 M6F	G1/4"-F	11	16	M6-F	17	Nickel-plated brass	20.5
IF 18 M6F	G1/8"-F	7.5	13	M6-F	13	Nickel-plated brass	9.9

The values represent the average characteristics of our products.
Note: All dimensions are in mm.
(2) Flow restrictor version available: orifice calibrated to reduce leaks when used with a multi-cup gripper (see page 4/9).
(3) Available in stainless steel.

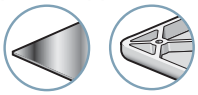
High-performance Suction Cups



The **C series** high-performance suction cup range has been designed to meet the requirements of the automotive sector. The improved characteristics of the **C series** range optimizes production tools in all branches of activity.

- A full range of shapes and diameters to meet every requirement.
- Non-slip cleats ensure optimum positioning of oily metal sheets.
- Textured suction cups for gripping thin sheets without deforming them.
- Ideal for automated applications.
- Specifically for use in the fields of stamping and welding.

Industry-specific applications



Types of use

Characteristics

- Extreme resistance to slipping.
- Gripping of thin metal sheets without deforming them, thanks to the central cleats.
- Elastomer and glass-fibre reinforced plastic design to avoid any risk of damaging costly equipment and to facilitate recycling.
- Double tightening: 2 wrenches of 22 mm and 1 hex key of 6 mm or 8 mm.
- Air-tight fittings using:
  - O-rings on 3/8G male cylindrical suction cups 32 square suction cups,- sealing on all oblong 3/8 male suction cups.
- Traceability.

Materials

The **C series** vacuum cups are made of a nitrile elastomer and the fittings (M38G/ F38G) are polyamide reinforced with fiberglass.
These materials guarantee the vacuum cups' long life, strong oil resistance and heat tolerance of up to 212°F.
This approach helps to avoid any risk of damaging costly equipment and facilitates recycling of vacuum cups.

Suction cups:	**NBR**	- Nitrile 55 Shore A (high resistance to oils), grey color.
Fitting:	**PA**	- Polyamide PA 6.6 ensuring reduced weight (3/8G / F38G Male or Female fitting).
	AL	- Aluminum (F38GA / C32 fitting).
O-ring:	**NBR**	- Nitrile blue

Other fittings available on request.

Range

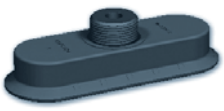
The **C Series** high performance vacuum cups are available in a full range of shapes, dimensions and connections in order to meet all your needs in the most appropriate way.

Models

CFC flat suction cup

CBC suction cup with 1.5 bellows

COFC flat oblong suction cup



COBC oblong suction cup with 1.5 bellows

Fittings

M38G male fitting G3/8"

F38G female fitting G3/8"

F38GA aluminum female fitting G3/8"

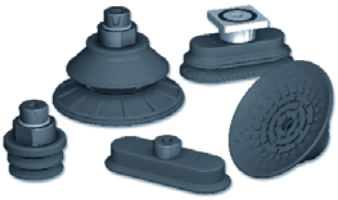
C32 square coupling 32 mm

Please specify the part n°. e.g. CBC85M38G
Refer to page 2/56

Accessories
To optimize use of your suction cups, Coval offers a comprehensive range of accessories (3/8G extensions, feeders and special couplings for 100% air-tight vacuum networks,) see chapters **4** and **12**.

High-performance Suction Cups

References - Suction Cups



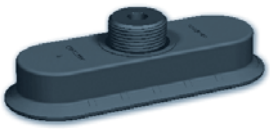
CFC Flat Suction Cup

	Fittings			
	M38G	F38G	F38GA	C32
CFC35	CFC35M38G	CFC35F38G	CFC35F38GA	CFC35C32
CFC50	CFC50M38G	CFC50F38G	CFC50F38GA	CFC50C32
CFC75	CFC75M38G	CFC75F38G	CFC75F38GA	CFC75C32
CFC100	CFC100M38G	CFC100F38G	CFC100F38GA	CFC100C32
CFC125	CFC125M38G	CFC125F38G	CFC125F38GA	CFC125C32

CBC Suction Cup with 1.5 Bellows

	Fittings			
	M38G	F38G	F38GA	C32
CBC22	CBC22M38G	CBC22F38G	CBC22F38GA	CBC22C32
CBC30 (1)	CBC30M38G	CBC30F38G	CBC30F38GA	CBC30C32
CBC45	CBC45M38G	CBC45F38G	CBC45F38GA	CBC45C32
CBC60	CBC60M38G	CBC60F38G	CBC60F38GA	CBC60C32
CBC85	CBC85M38G	CBC85F38G	CBC85F38GA	CBC85C32
CBC115	CBC115M38G	CBC115F38G	CBC115F38GA	CBC115C32

COFC Flat Oblong Suction Cup



	Fittings			
	M38G	F38G	F38GA	C32
COFC2565	COFC2565M38G	COFC2565F38G	COFC2565F38GA	COFC2565C32
COFC3080	COFC3080M38G	COFC3080F38G	COFC3080F38GA	COFC3080C32
COFC4080	COFC4080M38G	COFC4080F38G	COFC4080F38GA	COFC4080C32
COFC50100	COFC50100M38G	COFC50100F38G	COFC50100F38GA	COFC50100C32

COBC Oblong Suction Cup with 1.5 Bellows

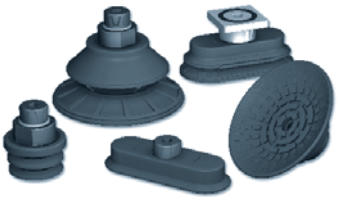
	Fittings			
	M38G	F38G	F38GA	C32
COBC3065	COBC3065M38G	COBC3065F38G	COBC3065F38GA	COBC3065C32
COBC4080	COBC4080M38G	COBC4080F38G	COBC4080F38GA	COBC4080C32
COBC55110	COBC55110M38G	COBC55110F38G	COBC55110F38GA	COBC55110C32
COBC70140	COBC70140M38G	COBC70140F38G	COBC70140F38GA	COBC70140C32

(1) CBC 30 M38G SP624

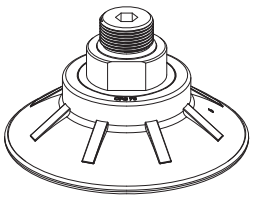
In order to meet the specific needs of end-of-arm tooling users in Stamping, COVAL has designed a Ø 30 mm suction cup, with an extra-large Ø 9.5 mm air-flow, thus removing pressure drops in the vacuum network of the gripper's power supply.

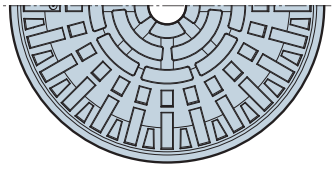
High-performance Suction Cups

Suction Cup Properties



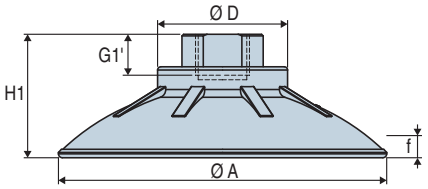
CFC Flat Suction Cup



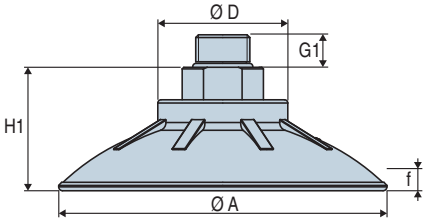


	ØA at rest	ØA gripping	(cm³)	(lbf) (1)	(lbf) (1)	Rmin	Rmin	Ø bore	tightening
CFC 35	37	38.5	2.46	11.24	11.24	58	50	6.3	w 22 + hk 6
CFC 50	51	54	8.37	22.48	22.48	66	52	6.3	w 22 + hk 6
CFC 75	76	80	25.03	44.96	38.22	100	58	6.3	w 22 + hk 6
CFC 100	101	105.7	57.61	78.68	60.70	120	90	6.3	w 22 + hk 6
CFC 125	127	132	119.7	123.64	107.90	160	115	6.3	w 22 + hk 8

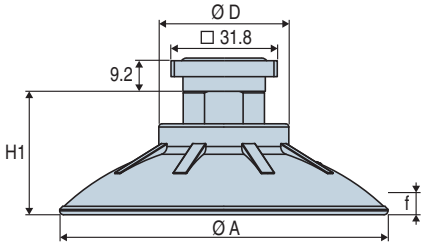
	H1	f (3)	G1	G1'	ØD	(g)			
						F38G	F38GA	M38G	C32
CFC 35	25	3	10	12.6	37	14	25.7	18	36.2
CFC 50	30	5.5	10	12.6	38	25	34.9	29	47.2
CFC 75	33	8	10	12.6	41	40	48.9	45	62.2
CFC 100	38	10	10	12.6	41	67	75.3	72	89.2
CFC 125	44	14	10	12.6	55	119	146	124	141.2



F38G/F38GA Female fitting G3/8"

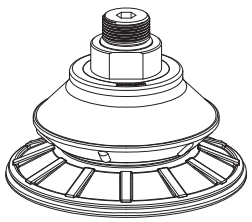


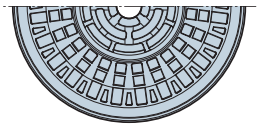
M38G Male fitting G3/8"



C32 Square coupling 32

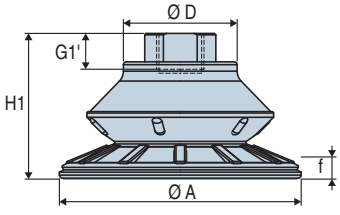
CBC Suction Cup with 1.5 Bellows



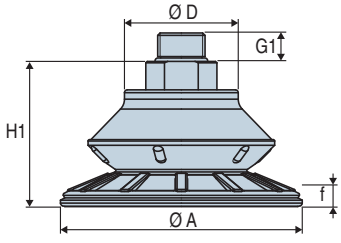


	ØA at rest	ØA gripping	(cm³)	(lbf) (1)	(lbf) (1)	Rmin	Rmin	Ø bore	tightening
CBC 22	21.5	22	1.6	3.82	3.82	25	30	6.3	w 22 + hk 6
CBC 30 (2)	32	34	5	8.99	8.99	30	32	6.3	w 22 + hk 6
CBC 45	47	48.7	11.47	15.74	20.23	36	45	6.3	w 22 + hk 6
CBC 60	62	64.5	25.31	31.47	29.22	44	62	6.3	w 22 + hk 6
CBC 85	85	88	66.54	51.70	53.95	65	115	6.3	w 22 + hk 6
CBC 115	115	119	141.47	94.42	87.67	84	140	6.3	w 22 + hk 8

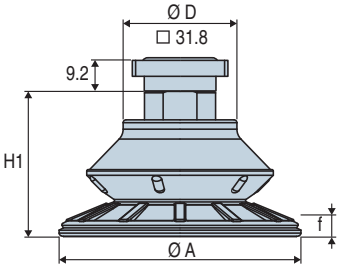
	H1	f (3)	G1	G1'	ØD	(g)			
						F38G	F38GA	M38G	C32
CBC 22	32	6	10	12.6	37	10	23	14	32.2
CBC 30 (2)	31	8	10	12.6	37	14	26.3	19	36.2
CBC 45	36	11	10	12.6	37	22	31.5	26	44.2
CBC 60	41	14	10	12.6	39	32	42	37	54.2
CBC 85	51	22	10	12.6	41	64	71.2	69	86.2
CBC 115	53	24	10	12.6	55	103	131.1	107	125.2



F38G/F38GA Female fitting G3/8"



M38G Male fitting G3/8"

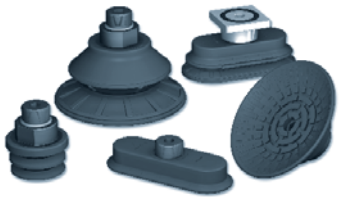


C32 Square coupling 32

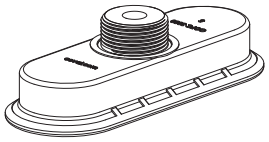
(1) Force measured at 65% on dry, smooth, flat sheet metal, without safety factor.
(2) A specific model of the CBC 30 is available with M 3/8G fitting and 9.5mm diameter bore: **CBC30 M38G SP624**. (3) f: deflection of the suction cup. Note: All dimensions are in mm.

High-performance Suction Cups

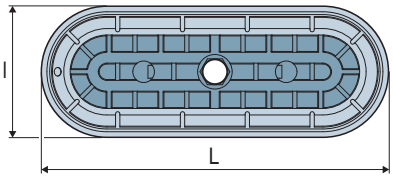
Suction Cup Properties



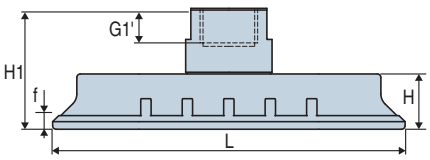
COFC Flat Oblong Suction Cup



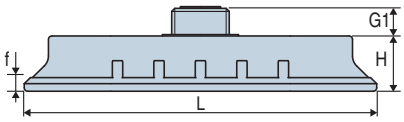
	I x L	I x L	(cm³)	(lbf) (1)	(lbf) (1)	Rmin	Rmin	Ø bore	tightening
COFC 2565	25x65	26.8x67	3.78	15.74	15.74	25	25	6	hk 6
COFC 3080	30x80	31.5x82	6.08	24.73	20.23	40	32	6	hk 6
COFC 4080	40x80	42x82	11.03	31.47	26.98	60	40	6	hk 6
COFC 50100	50x100	52.5x102.5	22.25	51.70	53.95	70	50	6	hk 6



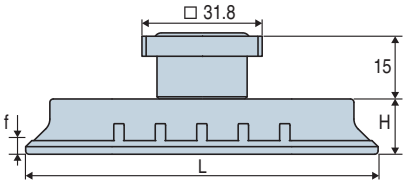
	H1	H	G1	G1'	f (2)	(g)			
						F38G	F38GA	M38G	C32
COFC 2565	31.5	12.5	8	10	3	24	35	17	35
COFC 3080	32	13	8	10	3	29	45	22	40
COFC 4080	34	15	8	10	4.5	30	45.5	23	41
COFC 50100	35	16	8	10	6	43	72.7	36	54



F38G/F38GA Female fitting G3/8"

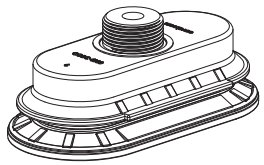


M38G Male fitting G3/8"

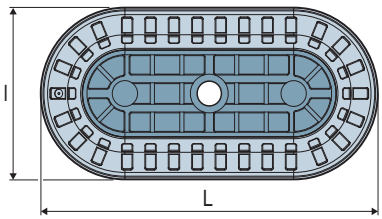


C32 Square coupling 32

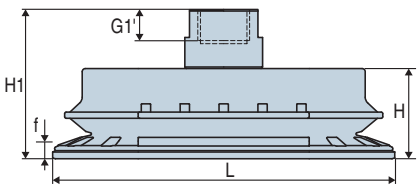
COBC Oblong Suction Cup with 1.5 Bellows



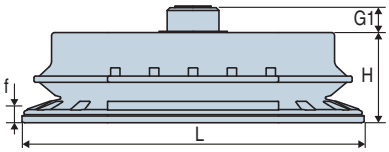
	I x L at rest	I x L gripping	(cm³)	(lbf) (1)	(lbf) (1)	Rmin	Rmin	Ø bore	tightening
COBC 3065	31x65	32.3x67	9.98	13.49	13.49	25	30	6	hk 6
COBC 4080	40x80	41.5x82	19.44	24.73	26.98	38	37	6	hk 6
COBC 55110	55x110	57x112.5	49.25	38.22	42.71	58	57	6	hk 6
COBC 70140	70x140	72x143	93.57	67.44	67.44	72	68	6	hk 6



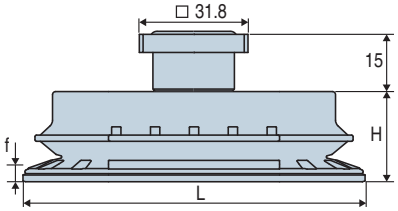
	H1	H	G1	G1'	f (2)	(g)			
						F38G	F38GA	M38G	C32
COBC 3065	39	20	8	10	7	31	45.5	25	43
COBC 4080	41	22	8	10	9	37	53.1	31	49
COBC 55110	48	29	8	10	13	68	95.1	62	80
COBC 70140	49	30	8	10	16	103	121.4	97	115



F38G/F38GA Female fitting G3/8"



M38G Male fitting G3/8"



C32 Square coupling 32

The values represent the average characteristics of our products.

(1) Force measured at 65% on dry, smooth, flat sheet metal without safety factor. (2) f = deflection of the suction cup.

Note: All dimensions are in mm.

VSA-VS BM

Suction Cups with Foam Ring Seals

The VSA and VS series suction cups equipped with VSBM foam rings are suitable for gripping products with rough surfaces. For example...

- sawn wood, sheet metal, flat surfaces with holes.
- Any rough surfaces for which the suction cups' lips do not seal properly.

Industry-specific applications

Types of use

Materials

NBR Nitrile **SIT5** Translucent silicone **Si** Silicone

Specifications

Some suction cup models are available with a foam ring:

- **VSA series:** Standard 1.5 bellows suction cups, Ø 20 to 78 mm in nitrile (NBR) or in transparent silicone (SIT5).
- **VS series:** Standard 2.5 bellows suction cups, Ø 20 to 78 mm in nitrile (NBR) or in transparent silicone (SIT5).
- Foam ring in nitrile for nitrile suction cups (good resistance to oil).
- Foam ring in silicone (SI) for transparent suction cups (SIT5) and silicone glue. (Resistant up to 320°F and leaves no marks on gripped products. Do not use for gripping of products before painting or lacquering.)
- Assembling: foam rings are factory-bonded onto suction cup lips.

Suction Cup Properties

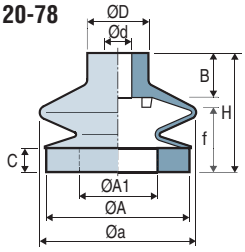
	Ø (mm)	(cm³) NBR	(cm³) SIT5 / SI	(lbf)(1)	NBR	SIT5 / SI
VSA 20	20	-	1.3	1.26	-	**VSA20SIT5BM**
VSA 25	25	-	3.4	1.37	-	**VSA25SIT5BM**
VSA 26	26	-	4.2	2.43	-	**VSA26SIT5BM**
VSA 33	33	6.7	5.3	3.12	**VSA33NBRBM**	**VSA33SIT5BM**
VSA 43	43	12.3	10.8	4.54	**VSA43NBRBM**	**VSA43SIT5BM**
VSA 53	53	34.8	30.5	9.58	**VSA53NBRBM**	**VSA53SIT5BM**
VSA 63	63	52.9	45.9	13.31	**VSA63NBRBM**	**VSA63SIT5BM**
VSA 78	78	102.4	87.5	24.68	**VSA78NBRBM**	**VSA78SIT5BM**

	Ø (mm)	(cm³) NBR	(cm³) SIT5 / SI	(lbf)(1)	NBR	SIT5 / SI
VS 20	20	-	2.2	1.03	-	**VS20SIT5BM**
VS 25	25	-	5.7	1.46	-	**VS25SIT5BM**
VS 26	26	-	6.4	2.43	-	**VS26SIT5BM**
VS 32	32	11.9	10.6	2.72	**VS32NBRBM**	**VS32SIT5BM**
VS 42	42	22.6	21.1	4.70	**VS42NBRBM**	**VS42SIT5BM**
VS 52	52	44.6	40.3	6.50	**VS52NBRBM**	**VS52SIT5BM**
VS 62	62	86.4	79.4	9.26	**VS62NBRBM**	**VS62SIT5BM**
VS 88	88	201.3	181.1	29.88	**VS88NBRBM**	**VS88SIT5BM**

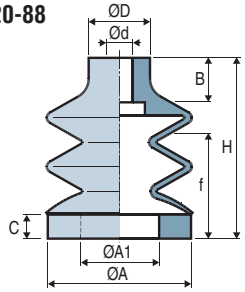
(1) Actual force of the suction cup in use with a 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.

Dimensions

VSA-BM 20-78



VS-BM 20-88



	ØA	Øa	Ød	ØD	B	NBR ØA1	NBR C	NBR H	NBR f (2)	NBR (g)	SIT5 / SI ØA1	SIT5 / SI C	SIT5 / SI H	SIT5 / SI f (2)	SIT5 / SI (g)
VSA 20 ... BM	20	20	4	10	9	-	-	-	-	-	10	2	18	6.0	1.9
VSA 25 ... BM	25	25	4	10	9	-	-	-	-	-	13	2	25	13.0	3.3
VSA 26 ... BM	25	30	8	16	13	-	-	-	-	-	13	2	27	7.0	5
VSA 33 ... BM	32	36.2	8	18	13	22	5	32.5	13.5	7.3	19	2	29.5	12.0	7.5
VSA 43 ... BM	42	46	8	18	13	28	5	33	15.0	12.5	20	5	33	15.0	14
VSA 53 ... BM	53	59	8	18	13	33	10	44	20.0	23.6	33	5	39	17.5	23.7
VSA 63 ... BM	62	67	8	18	13	42	10	44	20.0	27.8	42	5	39	17.5	28.4
VSA 78 ... BM	78	83	12	25	20	58	10	56.8	19.0	62.1	54	5	51.8	16.5	63.6
VS 20 ... BM	20	-	4	10	9	-	-	-	-	-	10	2	25	11.0	2.6
VS 25 ... BM	25	-	4	10	9	-	-	-	-	-	13	2	36	21.0	4.6
VS 26 ... BM	25	-	8	16	13	-	-	-	-	-	13	2	33	12.0	6.6
VS 32 ... BM	32	-	8	18	13	22	5	42.5	17.0	9.3	19	2	39.5	15.5	9.5
VS 42 ... BM	42	-	8	18	13	28	5	51	24.5	18.9	20	5	51	24.5	20.4
VS 52 ... BM	53	-	8	18	13	33	10	59	32.0	26.9	33	5	54	29.5	27
VS 62 ... BM	62	-	8	21	13	42	10	65	36.0	37.1	42	5	60	33.5	40.5
VS 88 ... BM	88	-	12	25	20	68	10	97.5	53.5	123.6	64	5	92.5	51.0	125.4

(2) f = Deflection of the suction cup.

Note: All dimensions are in mm.

The values represent the average characteristics of our products.

Please specify the part n°. e.g. VS42NBRBM
See part n° table above

Selection of fittings: please refer to fittings which are available in the suction cup series. **VSA** series: page 2/25, **VS** series: page 2/43.

VSBM
Foam Rings

The foam ring is designed for gripping products with an uneven or ridged surface, e.g.

- Sawn wood, sheet metal, flat surfaces with bumps or hollows.
- All granular surfaces to which suction cups cannot adhere correctly and therefore cannot be airtight.

Industry-specific applications

Types of use

Materials

NBR Nitrile **SIT5** Translucent silicone **Si** Silicone

Operating Characteristics of the Materials

- Nitrile (NBR - Black)
  5 or 10mm thick, depending on the diameters of the suction cups.
  Good resistance to oil.
  The nitrile foam strip can only be bonded to nitrile suction cups.
- Silicone (SI - White)
  2 or 5 mm thick, depending on the diameters of the suction cups.
  Heat-resistant up to 320°F, does not leave marks on products handled.
  Do not use the silicone foam strip for gripping products before painting or lacquering.
  The silicone foam strip can only be bonded onto silicone suction cups (bonding is guaranteed if it is carried out in the factory).
- Mounting
  The foam rings are mounted by bonding. In all cases, this should be performed in our factory as we have the adhesives adapted to the materials. It is essential that bonding of silicone be carried out in the COVAL factory.

Foam Ring Characteristics

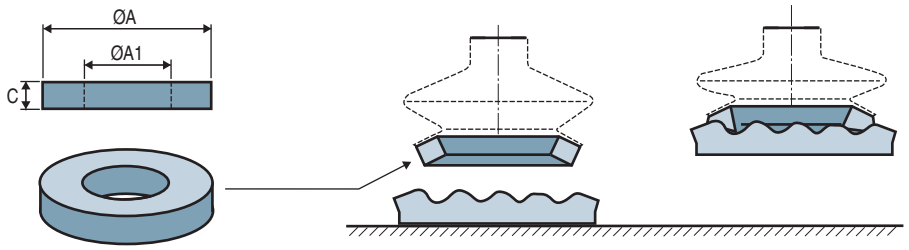
NBR

Part Nr.	ØA	ØA1	C	f (1)	(g)
VSBM32	32	22	5	2.5	0.3
VSBM42	42	28	5	2.5	0.7
VSBM53	53	33	10	5.0	2.7
VSBM62	62	42	10	5.0	2.8
VSBM78	78	58	10	5.0	3.7
VSBM88	88	68	10	5.0	4.6

SI

Part Nr.	ØA	ØA1	C	f (1)	(g)
VSBM20SI	20	10	2	1.0	0.2
VSBM25SI	25	13	2	1.0	0.4
VSBM32SI	32	19	2	1.0	0.5
VSBM42SI	42	20	5	2.5	2.2
VSBM53SI	53	33	5	2.5	2.8
VSBM62SI	62	42	5	2.5	3.4
VSBM78SI	88	64	5	2.5	5.2
VSBM88SI	88	64	5	2.5	6.4

Note: Suction cups with bellows are preferable when foam rings are required, as the slope of the lips is better suited to this type of grip. Please consult us for other models based on quantities.



Please specify the part n°. e.g. VSBM32SI
See part n° table above

The values represent the average characteristics of our products.
(1) f = Deflection of the suction cup. Note: All dimensions are in mm.

Special Purpose Suction Cups

Chapter 3

3

Special Purpose Suction Cups

Thanks to its technological strength and collaboration with its customers in different industries, COVAL supplies a varied range of special purpose suction cups. E.g. handling eggs, CDs, bottles, paper, cakes, sheet metal at high speed, etc.

MVS

Soft and Flexible Suction Cups for High Speed Applications

- Suction cups with 1.5 and 2.5 bellows
- 9 models
- Silicone: FDA and CE standard
- Used to grip delicate objects. Very flexible lip (opening bags, gripping tins and flexible aluminum or plastic bottles, etc.).
- High throughput rate
- Used to grip of flexible products

P 3/3

VSD VSE VSP

Suction Cups For Bakery Applications

- Suction cups with 2.5 to 5.5 bellows
- 11 models
- Silicone: FDA and CE standard
- Range specially developed for gripping delicate objects such as cakes (buns, biscuits, etc.)
- Specific shapes and shore A hardness depending on the applications
- Resistance to temperature: - 40 °F to + 428 °F

P 3/5

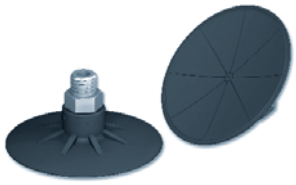
VSO

Suction Cups for Egg-Handling

- Suction cups with 2.5 and 3.5 bellows
- 3 models
- Silicone: FDA and CE standard 1935/2004
- Range specially designed to meet constraints involved when handling eggs.
- Very flexible lip
- Different shapes of suction cup

P 3/7

VPSC

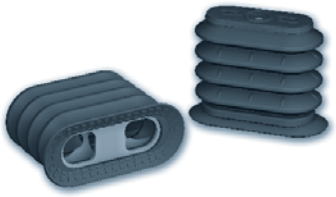


Ultra-flat, Non-Marking Suction Cups

- Ultra flat suction cups
- Ø 80 mm
- 2 materials
- Suction cup specially designed not to deform the gripped product.
- Vacuum distributed across the entire surface of the suction cup for optimal gripping force.
- Extra-thin sealing lip designed to contour to the shape of the product being handled

P 3/8

VSBO VSBO+

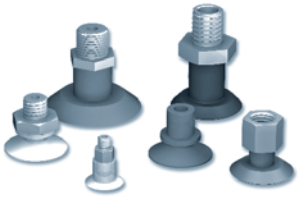


Suction Cups for Bottle Handling

- Suction cups with 4.5 bellows
- 3 models
- High tensile force
- Highly flexible and long stroke
- Used to grip 750 ml bottles and Magnums.
- Bottles gripped from the side, vertical and horizontal handling
- Suction cup with stainless steel reinforcement in the bellows
- Available with integrated sensing valve

P 3/9

VPA



Suction Cups for Paper Applications

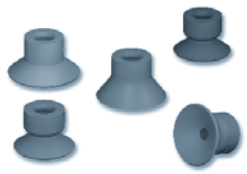
- Flat suction cups
- 9 models
- Very flexible lip
- Materials: natural rubber and silicone (food compatibility)
- Range of suction cups with very flexible lip used to handle very flexible materials
- Very resistant to abrasion (for paper, cardboard)
- Very flexible gripping lip which molds to the shape of the object to be handled

P 3/13

Special Purpose Suction Cups

Chapter 3

VPR



Suction Cups for Mailing Applications

- Flat suction cups
- 4 models
- Material: natural rubber
- The VPR range of suction cups is designed to meet the requirements of mailing applications.
- Envelope stuffing, film-wrapping, mailing (picking)
- Very resistant to abrasion

P 3/15

VPAG

Rounded Suction Cups

- Curved suction cups
- 2 models
- Material: natural rubber
- Thanks to very flexible lips and a curved shape, the VPAG range is adapted to gripping flexible materials such as labels or sheets of paper - or textured objects
- Very resistant to abrasion

P 3/16

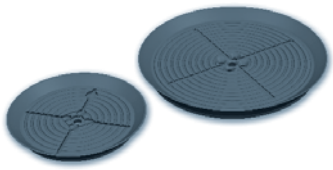
VPYR

Radial Ball-joint Suction Cups

- Flat suction cups with axial ball-joint system
- 4 models (Ø50 to 100mm)
- Materials: nitrile and silicone
- The range of ball-joint suction cups is recommended for gripping curved or rotating products which requires a lot of force and mechanical resistance

P 3/17

SPL

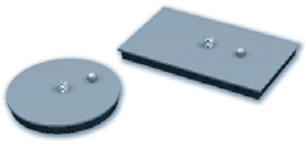


Heavy Load Suction Cups

- "Heavy load" flat suction cups
- 5 models (Ø240 to 600mm)
- Materials: nitrile and silicone
- SPL suction cups are used to handle heavy loads such as sheet metal or glass panels. They have internal cleats allowing them to handle thin metal sheets without distorting them and for vertical handling (non-slip)

P 3/18

Steel



Steel Suction Cups

- Flat suction cups with a bonded foam seal
- 9 cylindrical models (Ø 150 to 580 mm)
- 9 oblong models (175 x 115 to 705 x 385mm)
- For horizontal handling of heavy loads (thick sheet metal) or objects with an uneven surface such as concrete slabs, wood,etc.
- Wide choice of dimensions

P 3/19

MVS

Soft and Flexible Suction Cups for High Speed Applications

COVAL has designed a range of high performance cups in order to meet demanding industry requirements for gripping soft or flexible products at high speeds.

- Soft, thin sealing lip and optional cleats provide a perfect grip during high work rates for all types of flexible shapes and materials.
- Food-grade silicone meets FDA and CE standards.
- Available in 1.5 and 2.5 bellows.
- Available in Ø 20-40 mm.

Industry-specific applications

Types of use

Applications

This flexibility allows for high speed gripping of all types of materials and foods: FlowPack, DoyPack, thermoformed food trays, raw materials (sausage, fresh fish, cookies, chocolates)...Speeds of 120 or more grip and release cycles per minute.

Materials

SIB 35 Shore A white silicone
SIT5 50 Shore A Translucent silicone

Suction Cup Characteristics

	Ø (mm)	(cm³)	(lbf) (1)	SIB	SIT5	Fittings		
				Reference	Reference	G1/8"-M	G1/4"-M	G1/4"-F
MVS202.5	20	4	0.70	**MVS202.5SIB**	**MVS202.5SIT5**	IM18SP1251	-	-
MVS202.5...C	20	4	0.74	**MVS202.5SIBC**	**MVS202.5SIT5C**	IM18SP1251	-	-
MVS301.5	30	7	1.75	**MVS301.5SIB**	**MVS301.5SIT5**	-	IM51SP143	IF50SP143
MVS301.5...C	30	7	2.27	**MVS301.5SIBC**	**MVS301.5SIT5C**	-	IM51SP143	IF50SP143
MVS302.5	30	11.2	1.71	**MVS302.5SIB**	**MVS302.5SIT5**	-	IM51SP143	IF50SP143
MVS302.5...G	30	11.2	1.71	**MVS302.5SIBG**	**MVS302.5SIT5G**	-	IM51SP143	IF50SP143
MVS302.5...C	30	11.2	1.91	**MVS302.5SIBC**	**MVS302.5SIT5C**	-	IM51SP143	IF50SP143
MVS401.5...C	40	7.3	2.85	**MVS401.5SIBC**	**MVS401.5SIT5C**	-	IM51SP143	IF50SP143
MVS402.5...C	40	13	1.84	**MVS402.5SIBC**	**MVS402.5SIT5C**	-	IM51SP143	IF50SP143

(1) Actual holding force of the suction cup at a vacuum of 65% on flat and smooth surface and safety factor of 2 included.

MVS302.5

MVS302.5C

MVS302.5G

For applications requiring suction cups with a smaller diameter, we recommend the VSA series in the SIB version, see pages 2/25.

Specify the part number e.g.: MVS302.5SIBC
Please refer to the characteristics table above

Note: Nozzle fitting IM5MVS see page 4/9.

Accessories

To optimize the use of your suction cups, Coval offers a comprehensive range of accessories (nozzle fittings, spring extensions, and feeder systems, etc.), see chapters **4** and **12**.

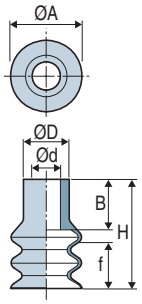
MVS

Soft and Flexible Suction Cups for High Speed Applications

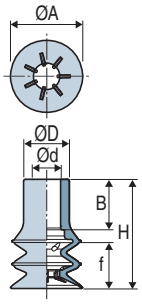
Dimensions

Suction Cups

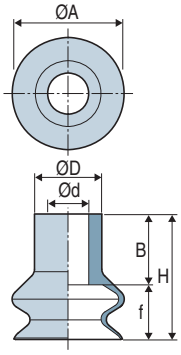
MVS202.5



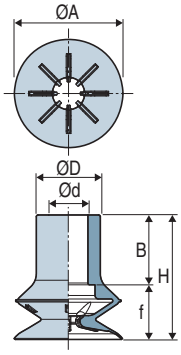
MVS202.5...C



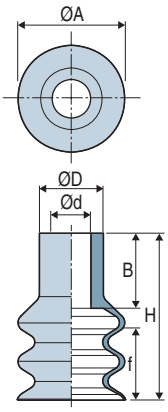
MVS301.5



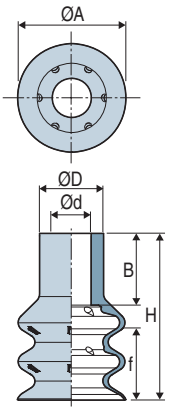
MVS301.5...C



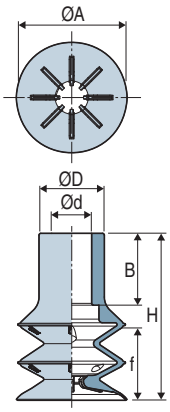
MVS302.5



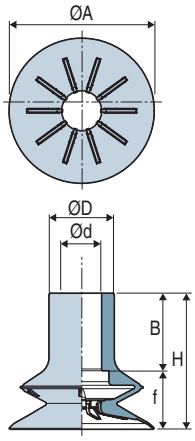
MVS302.5...G



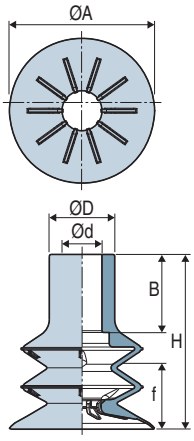
MVS302.5...C



MVS401.5...C



MVS402.5...C

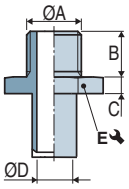


	Ø A	H	Ø d	Ø D	f (2)	B	(g)
MVS202.5	20	31	8	13	10	13	2.3
MVS202.5...C	20	31	8	13	10	13	3
MVS301.5	30	35	11	18	10	19.5	5.9
MVS301.5...C	30	35	11	18	9	19.5	6.5
MVS302.5	30	46	11	18	17.5	19.5	7.4
MVS302.5...G	30	46	11	18	17.5	19.5	6.8
MVS302.5...C	30	46	11	18	15.5	19.5	8.2
MVS401.5...C	40	37.5	11	18	7	21.5	8.7
MVS402.5...C	40	48	11	18	15.5	21.5	10.5

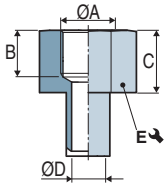
(2) f = Deflection of the suction cup.

Barbed Fittings

Male fittings



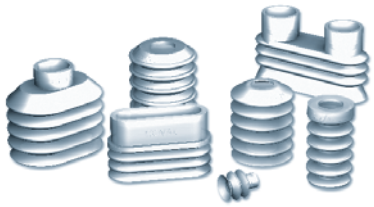
Female fittings



	ØA	B	C	ØD	E	Materials	(g)
IM 18 SP1251	G1/8"-M	8	5	4.8	14	POM-C	2.5
IM 51 SP143	G1/4"-M	11	6	8	21	Aluminum	10.5
IF 50 SP143	G1/4"-F	10	15	8	21	Aluminum	14.4

The values represent the average characteristics of our products.
Note: All dimensions are in mm

VSD, VSE, VSP
Suction Cups for Bakery Applications



Suction cups specially developed for gripping delicate objects such as cakes (buns, biscuits, etc.). Specific shape and shore hardness options are available depending on the application. Food-grade silicone allows the suction cups to be used at temperatures between -40 °F to 428 °F.

Industry-specific applications

Types of use

Materials

Si Silicone
Si3 30 Shore A silicone
Si5 50 Shore A silicone
SIT3 30 Shore A translucent silicone
SIT5 50 Shore A translucent silicone
SIT6 60 Shore A translucent silicone
SIT7 70 Shore A translucent silicone

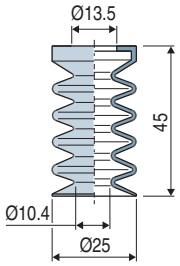
Suction Cup Characteristics

	dim. (mm)	f [1]	maximum vacuum (%)	shore hardness	(g)	Fittings M5-M	G1/4"-M	G1/8"-F	G1/8"-M
VSD 25 SI	Ø 25	24	90	30	6.5	-	-	-	-
VSD 38 SI5	Ø 38	21	20	50	6.3	-	-	-	-
VSE 35 SI3	Ø 35	26	20	30	8.8	-	-	-	-
VSE 35 SI	Ø 35	26	30	50	8.8	-	-	-	-
VSE 39 SI	Ø 39	28	30	50	11.5	-	-		-
VSP 14 SI3	Ø 14	9	70	30 [2]	0.9	IM21SP139	-	IF10ASP139	IM11ASP139
VSP 14 SIT6	Ø 14	9	90	60	0.9	IM21SP139	-	IF10ASP139	IM11ASP139
VSP 2258 SIT5	22 x 58	8	20	50	12.5	-	-	-	-
VSP 2747 SIT3	27 x 47	26	15	30	9.8	-	IM14VSP3856	-	-
VSP 3856 SIT5	38 x 56	28	15	50	11.8	-	IM14VSP3856	-	-
VSP 7623 SIT5	23 x 76	14	15	50	13.5	-	-	-	-

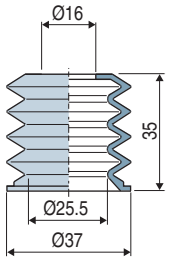
(1) f = Deflection of the suction cup. (2) Non-toxic red silicone

Suction Cup Dimensions

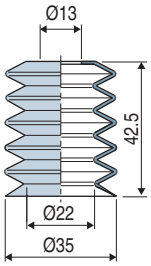
VSD 25



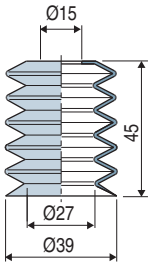
VSD 38



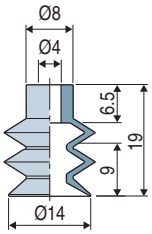
VSE 35



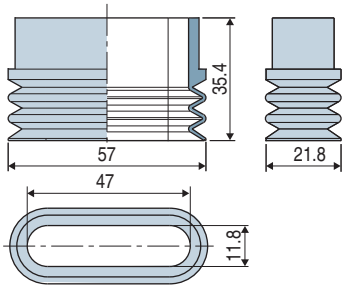
VSE 39



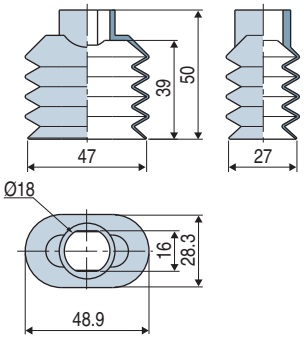
VSP 14



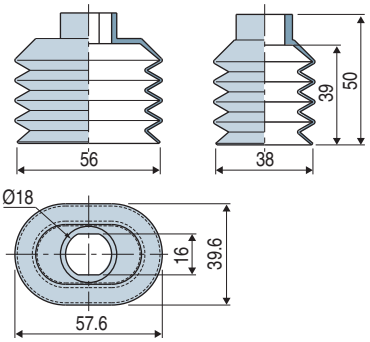
VSP 2258



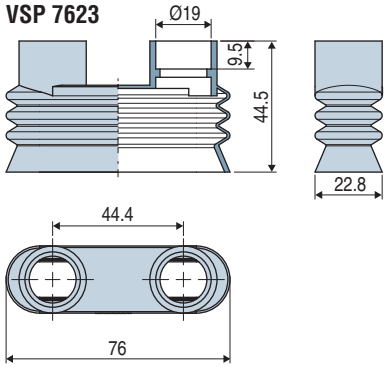
VSP 2747



VSP 3856



VSP 7623

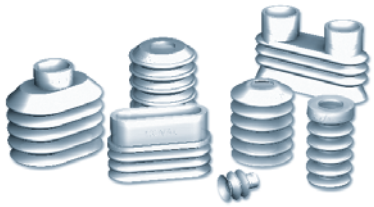


The values represent the average characteristics of our products.
Note: All dimensions are in mm

Specify the part number e.g.: VSP14SIT6
Please refer to the characteristics table above

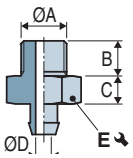
Accessories

To optimize the use of your suction cups, Coval offers a comprehensive range of accessories (nozzle fittings, spring extensions, and feeder systems, etc.), see chapters **4** and **12**.

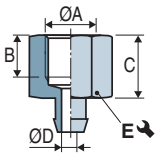


Barbed Fittings

Male - IM



Female - IF



	ØA	B	C	ØD	E	Material	(g)
IM 11 ASP 139	G1/8"-M	7.5	6	3.5	14	Aluminum	4.3
IM 14 VSP 3856	G1/4"-M	14.6	3	9	Ø 24	Aluminum	12
IM 21 SP 139	M5-M	4.5	5	2.5	7	Nickel-plated brass	2.8
IF 10 ASP 139	G1/8"-F	8	12	3.5	14	Aluminum	4.3

VSO
Suction Cups for Egg-handling

The VSO range of suction cups has been specially designed to meet the constraints involved when handling eggs.

- Very flexible lip
- Different shapes of suction cup
- Food-grade silicone meets FDA and CE standards.

Materials

SI 35 Shore A red silicone
SIT3 35 Shore A translucent silicone
SIT6 60 Shore A translucent silicone

Industry-specific applications

Types of use

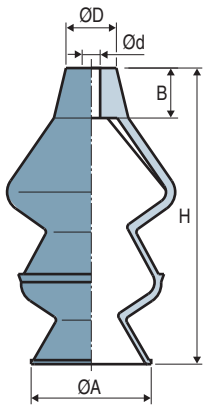
Suction Cup Characteristics

	Ø (mm)	(cm³)	(lbf) (1)	SI	SIT3	SIT6
VSO 30	30	40	0.24	**VSO30SI**	-	-
VSO 33	33	13	0.24	-	-	**VSO33SIT6**
VSO 36	36	34	0.24	-	**VSO36SIT3**	-

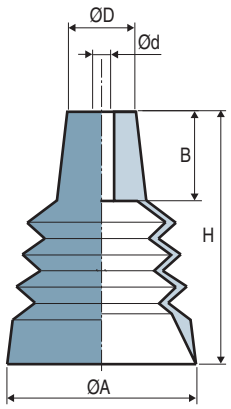
(1) at 30% vacuum with a safety factor of 2 included.

Suction Cup Dimensions

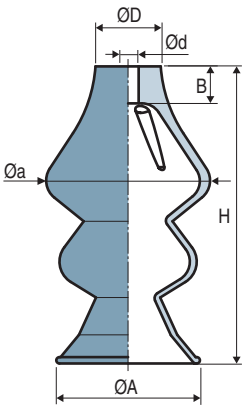
VSO 30 SI



VSO 33 SIT6



VSO 36 SIT3

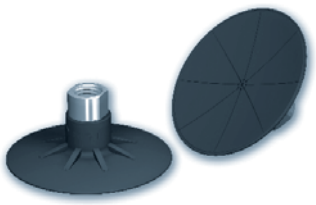


	Ø A	H	Ø a	Ø d	Ø D	B	(g)
VSO 30	30	74	-	4.5	12.6	12.5	17
VSO 33	33	46	-	4.5	12.5	14	7.3
VSO 36	36	75	41	5.3	16.4	9.2	16.36

Specify the part number e.g.: VSO 30 SI
Please refer to the characteristics table above

The values represent the average characteristics of our products.
Note: All dimensions are in mm

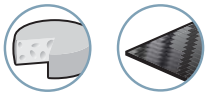
VPSC
Ultra-Flat, Non-Marking Suction Cups



Developed through partnerships with the composite material industry, the VPSC suction cup is dedicated to the handling of raw composite. Its ultra-flat profle and innovative system of vacuum distribution across the surface of the cup provide optimized gripping with no mark and no deformation. The extra thin sealing lip contours to the product shape without restriction.

The specific characteristics of this suction cup enable its use in other fields such as cheese handling or other fragile, easily deformed products.

Industry-specific applications



Types of use

The VPSC cup is available in two materials to meet all the applications:
- Polyurethane (PU), high resistance to hydrocarbons and high durability.
- Silicone (SIBL5), food compliance. FDA and CE standards.

The VPSC suction cups are equipped with a G1/4" female pressed aluminum fitting.

Materials

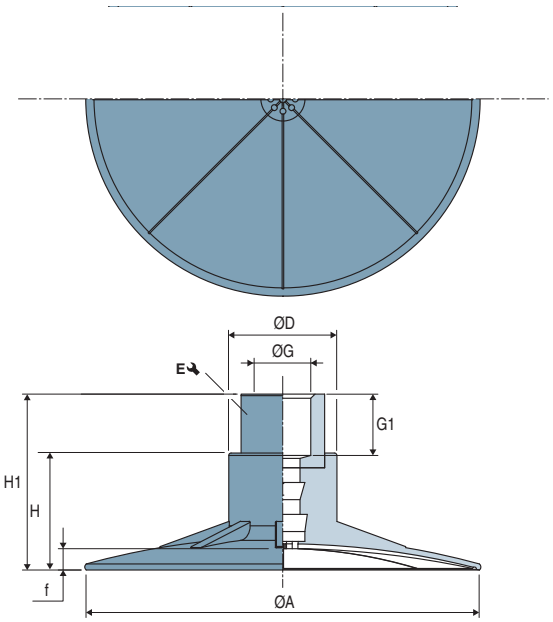
PU Polyurethane 60 Shore A
SIBL5 Blue Silicone 50 Shore A

Suction Cup Characteristics

	Ø (mm)	(cm³)	(lbf) (1)	(lbf) (1)	PU	SIBL5
VPSC	80	11.2	6.52	3.37	**VPSC80PUIF14**	**VPSC80SIBL5IF14**

(1) Force measured at 65% vacuum, for handling without deformation, without safety factor.

Suction Cup Dimensions



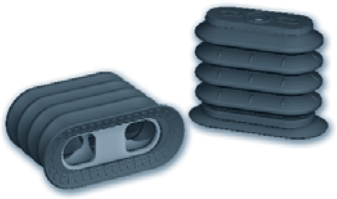
	Ø A	Ø D	f (2)	H	H1	Ø G	E	(g)
VPSC	80	22	4	35.8	23.8	G1/4"-F	17	26

(2) f = Deflection of the suction cup.

Specify the part number e.g.: VPSC80PUIF14
Please refer to the characteristics table above

The values represent the average characteristics of our products.
Note: All dimensions are in mm

VSBO, VSBO+
Bottle Suction Cups



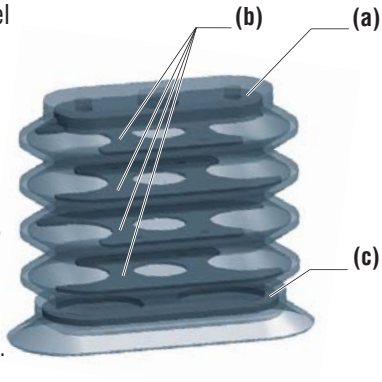
Designed for gripping 750 ml bottles, the VSBO suction cups range has grown with the development of the VSBO+, a specially created suction cup for gripping bottles at high frequency.

For the gripping of Magnum bottles, we have designed the Magnum suction cup VSBO 50105 with a lip shape and surface suited for the weight and the diameter of the bottle.

- The VSBO and VSBO+ are made for handling bottles from the side during vertical or horizontal gripping.
- The VSBO+ is equipped with anti-slip cleats to ensure the gripping of 750 ml bottles at high frequency and in humid environments.
- F2 mounting options: the VSBO Series includes 2 M6 threads allowing the suction cups to be mounted internally with 2 M5 screws or externally with 2 M6 screws.
- To increase lifting force while maintaining a large stroke and flexibility, the VSBO and VSBO+suction cups are equipped with stainless steel upper inserts (**a**), and 4 stainless steel reinforcements (**b**) inside the bellows and with a lower reinforcement (**c**) available either in stainless steel or polypoprylene.

Industry-specific applications

Types of use



Materials

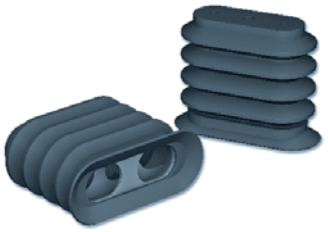
Suction cups
NBR Nitrile
NR Natural rubber

Reinforcements
Version D5 ■ Upper stainless steel insert (**a**), the 4 internal stainless steel reinforcements (**b**) and the lower reinforcement in stainless steel (**c**).
Version D5P ■ Upper stainless steel insert (**a**), the 4 internal stainless steel reinforcements (**b**) and the lower reinforcement in polypropylene (c).

Suction Cup Characteristics VSBO

	(cm³)	(lbf)(1)	(lbf)(1)	f(2) (mm)	(g)	NBR		NR	
						D5	D5P	D5	D5P
VSBO 4095	112.5	35.52	18.66	34	128	VSBO4095NBRD5	VSBO4095NBRD5P	VSBO4095NRD5	VSBO4095NRD5P

(1) Force measured at 65% on dry and smooth bottle without safety factor. (2) f = Deflection of the suction cup.



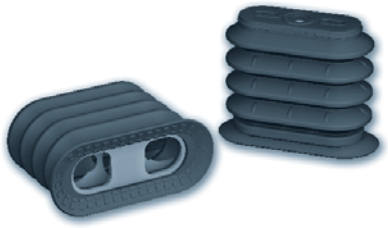
Mounting holes:
The VSBO suction cup center to center distance is 45 mm.

Suction cup replacement without insert and reinforcements
NBR (Nitrile): Part No **VSBO4095NBR**
NR (Natural rubber): Part No **VSBO4095NR**

Suction Cup Characteristics VSBO+

	(cm³)	(lbf)(1)	(lbf)(1)	f (2) (mm)	(g)	NBR		NR	
						D5	D5P	D5	D5P
VSBO 4095C	112.5	35.52	18.66	35.5	128	VSBO4095CNBRD5	VSBO4095CNBRD5P	VSBO4095CNRD5	VSBO4095CNRD5P

(1) Force measured at 65% on dry and smooth bottle without safety factor. (2) f = Deflection of the suction cup.



Mounting holes:
The VSBO+ suction cup has 2 center to center distances: 30 or 45 mm.
It includes an integrated seal to simplify the mounting.

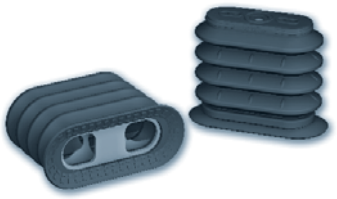
Suction cup replacement without insert and reinforcements:
NBR (Nitrile): Part No **VSBO4095CNBR**
NR (Natural rubber): Part No **VSBO4095CNR**

The values represent the average characteristics of our products.

Specify the part number e.g.: VSBO4095CNBRD5
Please refer to the characteristics table above

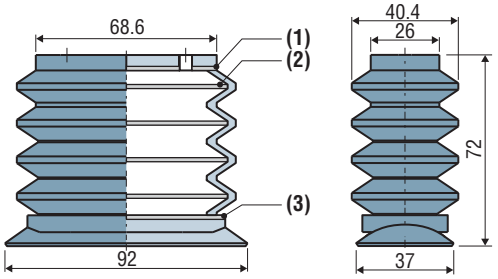
Options:
■ Sensing valve (see page 3/11)
■ Magnum bottle suction cup VSBO50105 (see page 3/10)

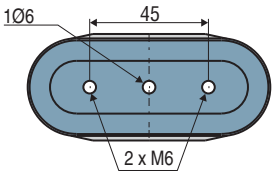
VSBO, VSBO+
Bottle Suction Cups



Suction Cup Dimensions

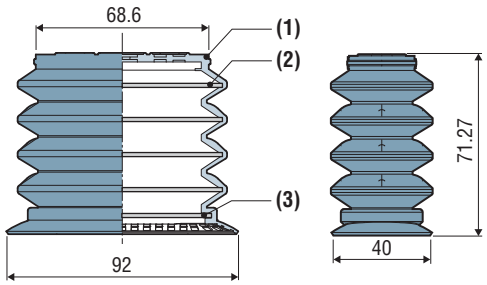
VSBO (VSBO4095)

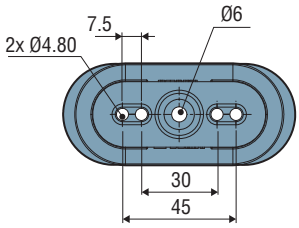




1 - Upper stainless steel fitting
2 - 4 stainless steel reinforcements
3 - Lower stainless steel or polypropylene reinforcement

VSBO+ (VSBO4095C)





Suction Cups for Gripping Magnum Bottles

For the gripping of Magnum bottles, we have designed the Magnum suction cup **VSBO 50105 D5** with a lip shape and surface suited for the weight and the diameter of the bottle.

The **VSBO50105D5** includes:

- Suction cup with 4 bellows in nitrile, VSBO4095NBR
- One stainless steel upper insert
- A lower stainless steel reinforcement
- A 50 x 105 mm nitrile lip
- 4 stainless steel internal reinforcement

Materials

Suction cups	**Insert and reinforcements**	
NBR Nitrile	**Upper insert**	stainless steel
	4 internals reinforcements	stainless steel

Suction Cup Characteristics

	(cm³)	(lbf)(1)	(lbf)(1)	f (2) (mm)	(g)	NBR
VSBO50105	142.5	55.08	18.66	2.5 + 34	202	**VSBO50105D5**

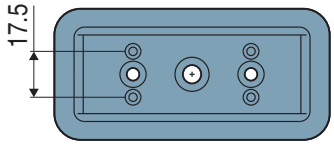
(1) Force measured at 65% on dry and smooth bottle without safety factor.
(2) f = Deflection of the suction cup.

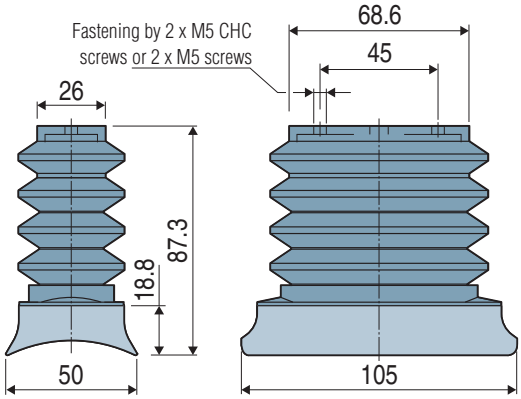
Note: The **VSBO4095** cups may be converted to a Magnum cup **VSBO50105D5** using the kit, **VPO50105M**. This includes the lip (50 x 105 mm) in nitrile (NBR) with reinforcement for mounting below the cup.

Spare parts:
- 4 bellows suction cup in nitrile (NBR) without insert and reinforcement, part number: VSBO4095NBR or VSBO4095CNBR
- Sealing lip with dimensions 50 x 105 mm in nitrile (NBR), part number: VPBO50105NBR

Specify the part number e.g.: VSBO50105D5
Please refer to the characteristics table above

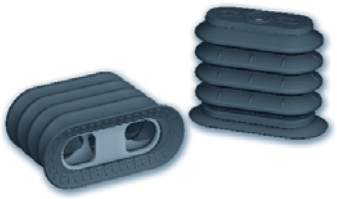
Dimensions





VSBO, VSBO+

Suction Cups for Bottle Handling with Sensing Valve (V3 version)

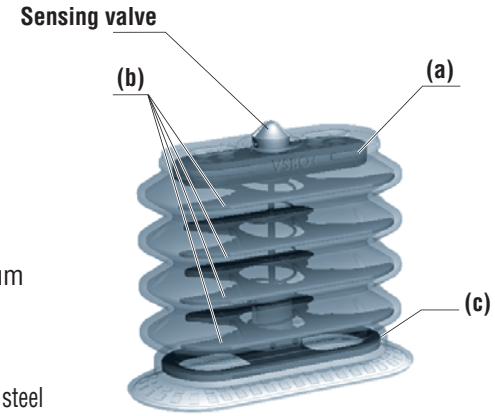


Designed for gripping 750 ml bottles, the VSBO and VSBO+ suction cups are available with a new sensing valve (V3 version) ensuring an airtight vacuum network if a bottle is missing. This new technology gives a greater sensitivity in opening the valve and placing the suction cup under vacuum once contact is made with bottle.

The VSBO suction cups with sensing valve are include one upper stainless steel insert (**a**), 4 stainless steel reinforcements (**b**) in the bellows and a trigger plate in POM (**c**) to increase the traction force while offering a large stroke and flexibility for box filling and emptying applications.

Types of use

Industry-specific applications



Materials

Suction cup	Insert and reinforcements		Sensing valve	
NBR Nitrile	**Upper insert**	Stainless steel	**Pin**	Nylon
	4 internals reinforcements	Stainless steel	**Cone**	Aluminum
			O-ring	Nitrile
			Trigger plate	POM
			Reinforcements	Stainless steel
			Spring	Stainless steel

Advantages of the V3 Sensing Valve

The sensing valve opens when pressure is exerted on the suction cup by a lower reinforcement called the "trigger plate".

- No loss of stroke for the suction cup when placed under vacuum
- Valve adjustment from under the suction cup
- Immediate vacuum action from the first pressure
- Elimination of auto-suction cup phenomenon on release
- No vacuum loss in the event a bottle is absent

Vacuum switch connection

The VSBO and VSBO+ suction cups with sensing valve V3 (45mm center to center distance) has a Ø 5 mm enabling a vacuum switch connection or a blow-off.

Mounting options:

The VSBO suction cups (VSBO4095..) have 3 mounting center distances (30, 40 and 45 mm) to select while ordering.

The VSBO+ suction cups (VSBO4095C..) have 2 mounting center distances. They include an integrated seal to simplify the mounting.

Characteristics

	(cm³)	(lbf)(1)	(lbf)(1)	f (2) (mm)	(g)
VSBO	112.5	35.52	18.66	34	118
VSBO+	112.5	35.52	18.66	35.5	118

(1) Force measured at 65% on dry and smooth bottle without safety factor.
(2) f = Deflection of the suction cup.

Suction Cup References

	Part numbers and center to center distance for cups in NBR			Part numbers and center to center distance for cups in NR		
	30 mm	40 mm	45 mm	30 mm	40 mm	45 mm
VSBO	VSBO4095CH330	VSBO4095CH340	VSBO4095CH345	VSBO4095NRCH330	VSBO4095NRCH340	VSBO4095NRCH345
VSBO+	VSBO4095CNBRCH3	-	VSBO4095CNBRCH3	VSBO4095CNRCH3	-	VSBO4095CNRCH3

The values represent the average characteristics of our products.

Specify the part number e.g.: VSBO4095CNBRCH3
Please refer part number table above

Replacement cup without valve, fitting and reinforcements

- **VSBO** series

NBR (nitrile): Part No VSBO4095NBR

NR (Natural rubber): Part No VSBO4095NR

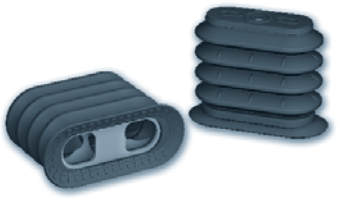
- **Serie VSBO+**

NBR (nitrile): Part No VSBO4095CNBR

NR (Natural rubber): Part No VSBO4095CNR

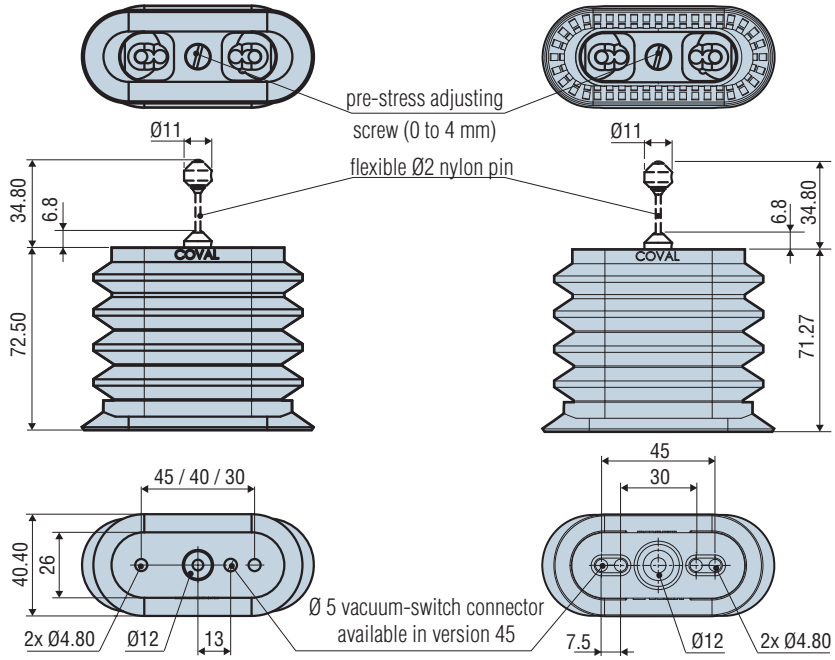
VSBO, VSBO+

Suction Cups for Bottle Handling with Sensing Valve (V3 version)

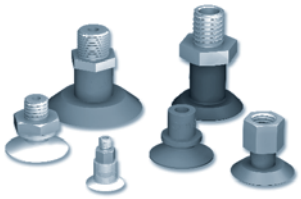


Dimensions

VSBO (VSBO4095) **VSBO+ (VSBO4095C)**

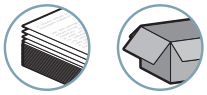


VPA
Suction Cups for Paper Applications



The VPA series is a range of suction cups with a very flexible lip used to handle highly flexible materials. These suction cups are specially designed for gripping in applications such as label placement, plastic films and printing. They are mainly produced in natural rubber(NR) to provide resistance to abrasion caused by paper and cardboard or in silicone(SIT5) for food compatibility.

Industry-specific applications



Types of use

Materials

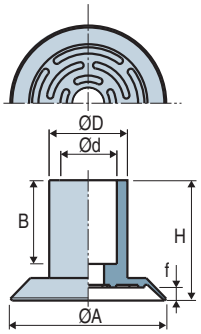
NBR	Nitrile	**NR**	Natural rubber
SIT5	Translucent silicone	**STN**	Siton®

Suction Cup Characteristics

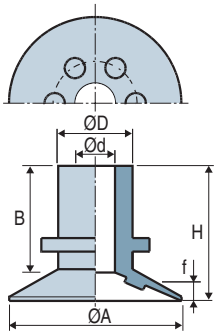
	Ø (mm)	(lbf) (1)	NBR	SIT5	NR	STN
VPA 15	15	0.65	-	**VPA15SIT5**	**VPA15NR**	-
VPA 20	20	0.97	-	**VPA20SIT5**	**VPA20NR**	-
VPA 25	25	1.46	-	**VPA25SIT5**	**VPA25NR**	**VPA25STN**
VPA 26	26	1.46	-	-	**VPA26NR**	**VPA26STN**
VPA 30	30	2.11	**VPA30NBR**	**VPA30SIT5**	**VPA30NR**	**VPA30STN**
VPA 35 A	35	2.76	-	-	**VPA35ANR**	-
VPA 40	40	4.71	-	**VPA40SIT5**	**VPA40NR**	-
VPA 25000	25.5	1.62	-	**VPA25000SIT5**	**VPA25000NR**	-
VPA 25001	25.5	1.62	-	**VPA25001SIT5**	**VPA25001NR**	-

(1) Actual force of the suction cup with 65% vacuum and a safety factor of 2 included.

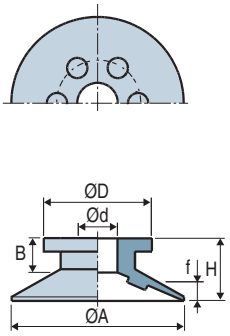
VPA 15…40



VPA 25000



VPA 25001



Suction Cup Dimensions

	ØA	H	Ød	ØD	f (2)	B
VPA 15	15	9.8	5	9	0.8	7
VPA 20	20	10.3	5	10	1.3	7
VPA 25	25	10.8	5	10	1.8	7
VPA 26	26	21.5	6	14	1.9	13.5
VPA 30	30	23	11	15	2.5	16
VPA 35 A	35	23	11	15	2.5	16
VPA 40	40	20	8	16	2	15
VPA 25000	25.5	20	5.8	11	3	15.8
VPA 25001	25.5	9.5	5.8	16	3	5.1

(2) f = Deflection of the suction cup.

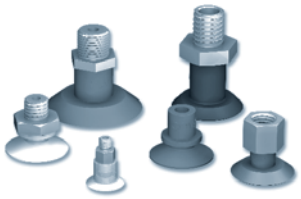
The values represent the average characteristics of our products.
Note: All dimensions are in mm

Specify the part number e.g.: VPA20NR
Please refer to the characteristics table above

Accessories

To optimize the use of your suction cups, Coval offers a comprehensive range of accessories (nozzle fittings, spring extensions, and feeder systems, etc.), see chapters **4** and **12**.

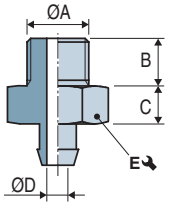
VPA
Suction Cups for Paper Applications



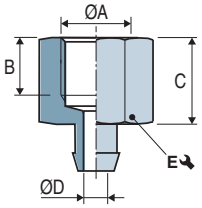
Choice of Fittings

	Male fittings				Female fittings	
	G1/8"-M	G1/4"-M	M5-M	M6-M	G1/8"-F	G1/4"-F
VPA 15	IM11A	-	IM21	IM22	IF10A	-
VPA 20	IM11A	-	IM21	IM22	IF10A	-
VPA 25	IM11A	-	IM21	IM22	IF10A	-
VPA 26	-	-	-	-	-	-
VPA 30	-	IM51SP143	IM5VPA30	-	-	IF50SP143
VPA 35 A	-	IM51SP143	IM5VPA30	-	-	IF50SP143
VPA 40	-	IM41SP477	-		-	IF40SP477
VPA 25000	-	-	-	-	-	-
VPA 25001	IM11ASP082	-	-	-	IF10ASP082	-

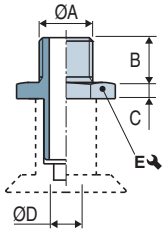
Male fittings
VPA 15…25



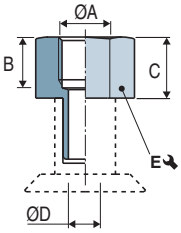
Female fittings
VPA 15…25



Male fittings
VPA 30…40



Female fittings
VPA 30…40

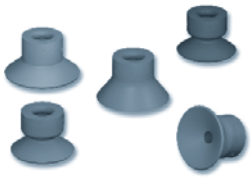


Barbed Fittings

Model	ØA	B	C	ØD	E	Materials	(g)
IM 11 A	G1/8"-M	7.5	6	3.5	14	Aluminum	4.1
IM 11 A SP082	G1/8"-M	7.5	6	3.5	14	Aluminum	4.1
IM 21 (1)	M5-M	4.5	5	2.5	7	Nickel-plated brass	3.1
IM 22 (1)	M6-M	5	5	3.5	7	Nickel-plated brass	2.7
IM 51 SP143	G1/4"-M	11	6	8	21	Aluminum	10.5
IM 5 VPA30	M5-M	5	3	2.5	13	Aluminum	5.7
IF 10 A	G1/8"-F	8	12	3.5	14	Aluminum	4
IF 10 A SP082	G1/8"-F	8	12	3.5	14	Aluminum	4
IF 50 SP143	G1/4"-F	10	15	8	21	Aluminum	14.4
IF 40 SP477	G1/4"-F	10	15	4.4	17	Aluminum	8

(1) Flow control nozzle available: orifice calibrated to reduce the leakage in case of use of a multi-cup gripper (refer to page 4/9)

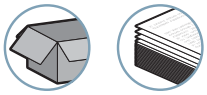
VPR
Suction Cups for Mailing Applications



The COVAL range of mailing application suction cups is designed to meet the requirements of the mailing industry. The improved characteristics mean you can optimize production equipment in your branch, such as:

- Envelope stuffing
- Film wrapping
- Envelope insertion
- Mailing (picking).

Industry-specific applications



Types of use

Material
NR Natural rubber

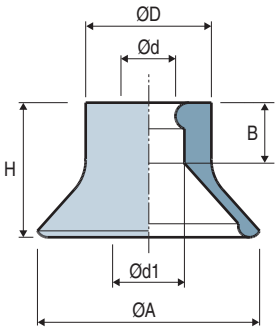
Advantages

- Longer life expectancy
- Optimized for high throughput rates
- Excellent resistance to abrasion and slipping
- 100% compatible with machines currently on the market

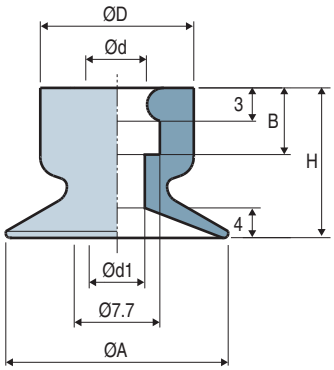
Suction Cup Characteristics

	ØA	H	Ød	Ød1	ØD	B	Color	NR
VPR 001	24.4	15	5.9	7.8	13.8	8	green	**VPR001NR**
VPR 002	25.7	14.5	5.9	7.8	14	9	brown	**VPR002NR**
VPR 003	20	14.2	5.7	4	13.8	6	red	**VPR003NR**
VPR 004	20	14.2	5.7	5	14.8	6	black	**VPR004NR**

VPR 001 - 002



VPR 003 - 004



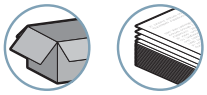
The values represent the average characteristics of our products.
Note: All dimensions are in mm

Specify the part number e.g.: VPR003NR
Please refer to the characteristics table above

VPAG
Rounded Suction Cups

Thanks to very flexible lips, the VPAG range is suitable for gripping flexible materials such as labels or sheets of paper as well as textured objects. Their shape allows them to be used for unstacking.

Industry-specific applications



Types of use

Materials

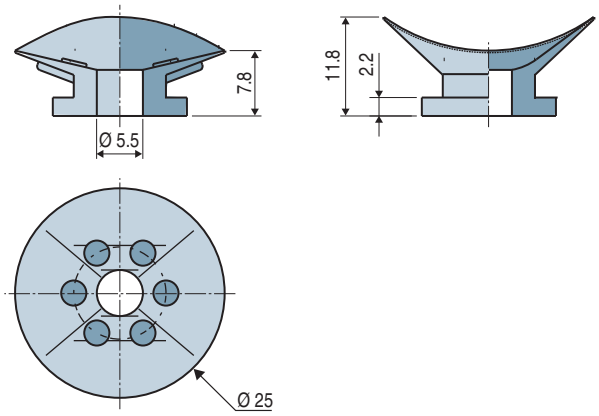
NR Natural rubber

Suction Cup Characteristics

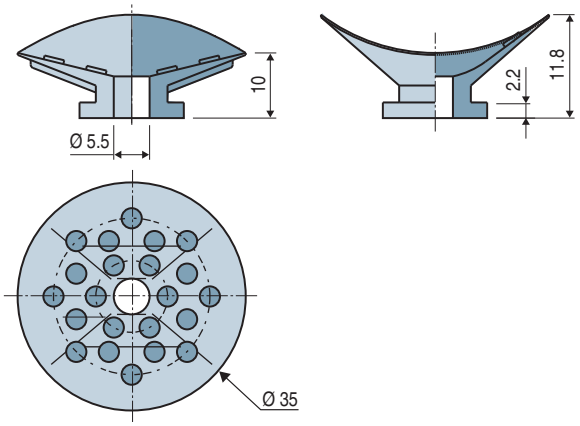
	NR	Fittings	
		G1/8"-M	G1/8"-F
VPAG 25	VPAG25NR	IM11ASP082	IF10ASP082
VPAG 3536	VPAG3536NR	-	-

Suction Cup Dimensions

VPAG 25

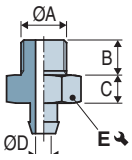


VPAG 3536

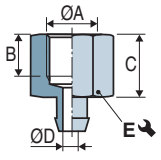


Barbed Fittings

Male - IM



Female - IF



	ØA	B	C	ØD	E	Materials	(g)
IM 11 A SP082	G1/8"-M	7.5	6	3.5	14	Aluminum	4.1
IF 10 A SP082	G1/8"-F	8	12	3.5	14	Aluminum	4.0

The values represent the average characteristics of our products.
Note: All dimensions are in mm

Specify the part number e.g.: VPAG3536NR
Please refer to the characteristics table above.

Accessories

To optimize the use of your suction cups, Coval offers a comprehensive range of accessories (nozzle fittings, spring extensions, and feeder systems, etc.), see chapters **4** and **12**.

VPYR
Radial Ball-joint Suction Cups

VPYR series ball-joints are recommended for gripping rounded or rotating products. They are also recommended for gripping requiring high mechanical resistance and force.

Industry-specific applications

Types of use

Materials

Suction cups
NBR Nitrile
Si Silicone

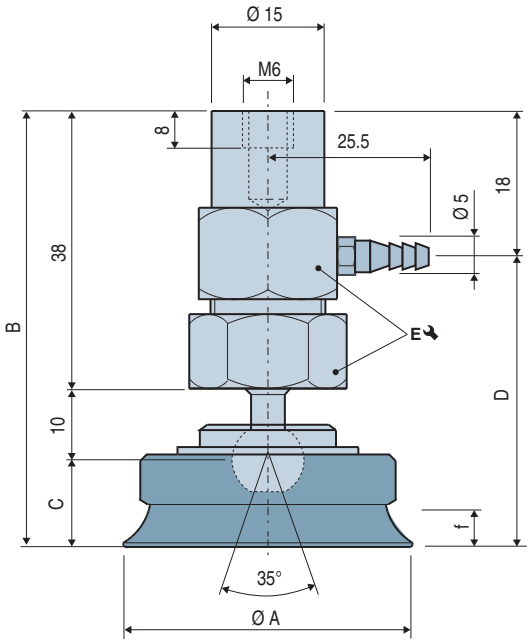
Ball-joint
Nickel-plated brass and zinc-plated steel

Suction Cup Characteristics

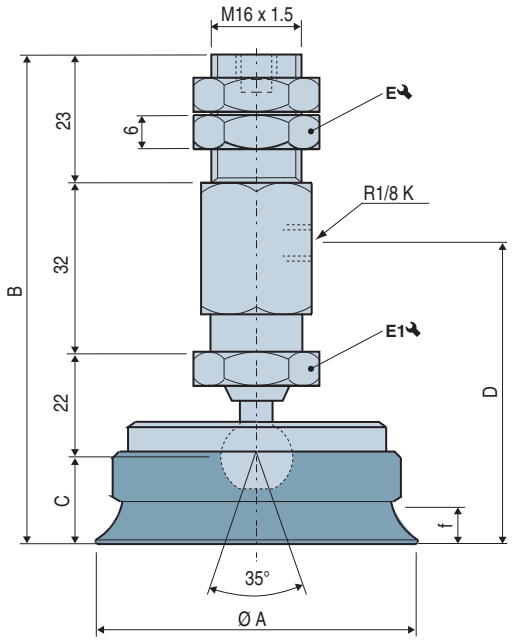
	(lbf) (1)	Rmin	Ø A	B	C	D	E	E1	f (2)	NBR	Si	(g)
VPYR 50	14.61	41	50	60	12	42	19	-	4	**VPYR50NBR**	**VPYR50SI**	117
VPYR 60	21.06	70	60	93	16	58	21	19	5	**VPYR60NBR**	**VPYR60SI**	352
VPYR 80	37.34	100	80	95	18	60	21	19	6	**VPYR80NBR**	**VPYR80SI**	444
VPYR 100	58.45	150	100	95	18	60	21	19	6	**VPYR100NBR**	**VPYR100SI**	568

(1) Actual force of the suction cup with 65% vacuum and a safety factor of 2 included.
(2) f = Deflection of the suction cup.

VPYR 50



VPYR 60...100



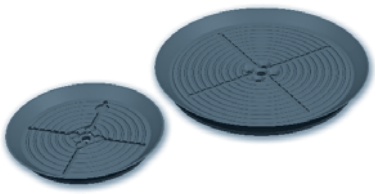
Replacement suction cup
If the suction cup becomes worn, the VPR suction cup can be ordered alone, specifying the diameter (Ø A) and material of the suction cup.
Example VPR 50 NBR.

The values represent the average characteristics of our products.
Note: All dimensions are in mm

Specify the part number e.g.: VPYR50NBR
Please refer to the characteristics table above.

Accessories
Possibility of telescopic spring-mounting on request.

SPL
Heavy Load Suction Cups



SPL suction cups are used to handle heavy loads such as sheet metal or glass panels. They have internal cleats allowing them to handle thin sheet metal without distorting them and for vertical handling (non-slip).

SPL suction cups are delivered without holes for fittings or you can choose from our range of standard models or specific models on request.

Industry-specific applications

Types of use

Materials

NBR Nitrile
Si Silicone

Suction Cup Characteristics

	(cm³)	(lbf) (1)	(lbf) (1)	Ø A	H	Ø D	f (2)	NBR	Si	Fittings (3)	(kg)
SPL 240	510	292	146	240	28	200	14	**SPL240NBR**	**SPL240SI**	Steel	2.2
SPL 340	720	617	308	340	32	300	15	**SPL340NBR**	**SPL340SI**	Steel	5.5
SPL 400	850	812	406	400	46	300	25	**SPL400NBR**	**SPL400SI**	Steel	7.6
SPL 500	1050	1299	649	500	46	400	25	**SPL500NBR**	-	Steel	12
SPL 600	1300	1786	893	600	46	500	25	**SPL600NBR**	-	Steel	18

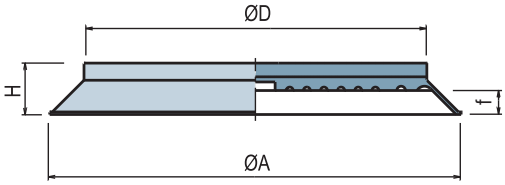
(1) Actual force of the suction cup in use with 65% vacuum and including a safety factor of 2 for horizontal handling and a factor of 4 for vertical handling.
(2) f = Deflection of the suction cup.
(3) Thickness of the steel fitting: 8 mm

Standard internal threads

The threads given below are for mounting on the COVAL spring systems (not supplied with the suction cup).

RSC1: specify **G38 RS1** in the order number

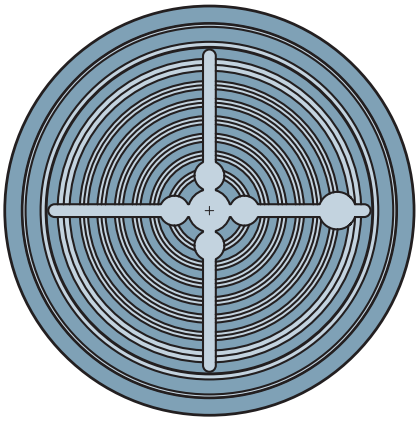
RSC2: specify **G38 RS2** in the order number

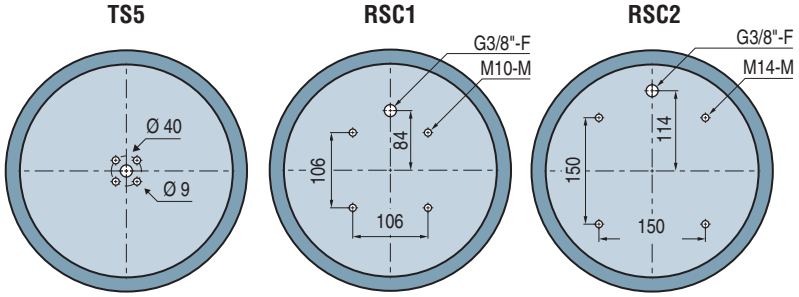


Internal Thread

	TS5 + IFA 12120	RSC1 (1)	RSC2 (1)
SPL 240	■	■	-
SPL 340	■	■	■
SPL 400	-	-	■

(1) A G3/8" internal thread is available for connection to the vacuum system.





The values represent the average characteristics of our products.
Note: All dimensions are in mm

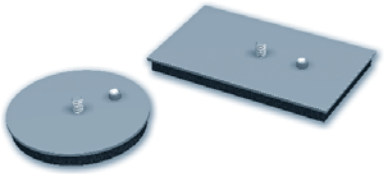
For all orders, please specify the part number from characteristics table and any required threadings
E.g.: SPL240NBRG38RS1

Accessories

Suction cups from the SPL series can be mounted on RSC series spring systems. SPL 240 suction cups can be mounted on the IFA 12 120 fitting and the TS560 spring system.
See page 4/5.

Steel Suction Cups with Bonded Seal

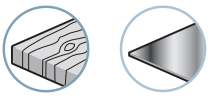
With Bonded Seal



For horizontal handling of heavy loads (very thick sheet metal) or objects with an uneven surface such as concrete slabs or wood,etc.

Advantage: wide selection of shapes and sizes.

Industry-specific applications



Types of use

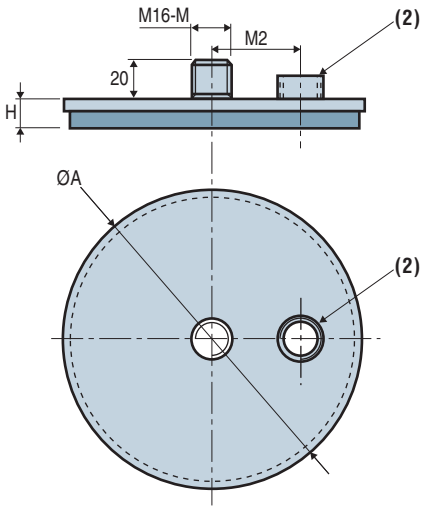
Materials

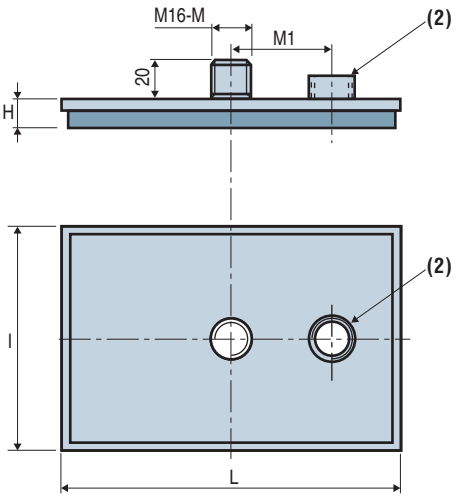
Body	Painted steel
Foam seal	Nitrile

Suction Cup Characteristics

Round suction cups				Rectangular suction cups							
	Ø A	H	(lbf) (1)		L	I	H	M1/M2	Rac. (2)	(lbf) (1)	Type of seal
5020	150	25	70	**6020**	175	115	25	40	G1/4"-F	75	BM 2020 SPTR
5028	170	25	97	**6028**	215	115	25	45	G1/4"-F	96	BM 2020 SPTR
5035	190	25	128	**6035**	225	125	25	50	G1/4"-F	115	BM 2020 SPTR
5050	210	25	166	**6050**	250	150	25	60	G1/4"-F	169	BM 2020 SPTR
5085	260	25	278	**6085**	305	180	25	70	G1/4"-F	271	BM 2020 SPTR
5150	350	35	482	**6150**	410	250	35	80	G3/8"-F	485	BM 3030 SPTR
5240	420	35	744	**6240**	480	310	35	100	G3/8"-F	768	BM 3030 SPTR
5330	500	35	1111	**6330**	575	330	35	120	G3/8"-F	1016	BM 3030 SPTR
5500	580	35	1550	**6500**	705	385	35	140	G3/8"-F	1531	BM 3030 SPTR

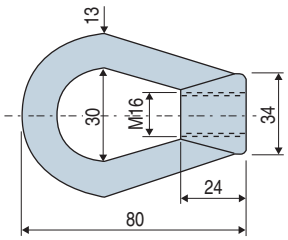
(1) Force measured at 65% vacuum including a factor of 2.



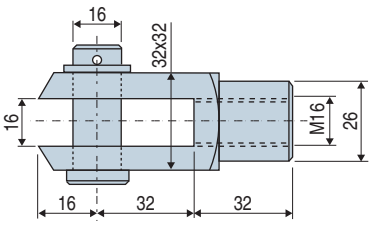


Fittings

■ **5000 An** ring fitting



■ **5000 Ch** cap fitting



The values represent the average characteristics of our products.
Note: All dimensions are in mm

For all orders, please specify:
Round suction cup: Model + Fitting model.
E.g.: 5050 5000 An

Option
Spring system mounting, see page 4/5.

Suction Cup Accessories

Chapter 4

Suction Cup Accessories

Chapter 4

TS11

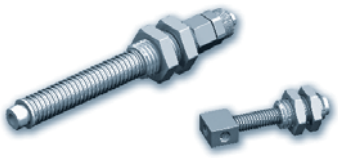
Level Compensators

- Stroke available from 7 to 40 mm
- Protected internal spring

- The TS 11 series spring systems are recommended for horizontal handling of objects located on different levels. The spring function also ensures the gripping points are applied on the same plane when gripping using multiple suction cups.

P 4/3

TS
YS



Level Compensators TS1 – TS2 – TS3 – YS1

- 6 models
- 5 to 70 mm stroke available

- The TS and YS series spring systems are recommended for horizontal handling of objects located on different levels. The spring function also ensures the gripping points are applied on the same plane when gripping using multiple suction cups.

P 4/4

TS

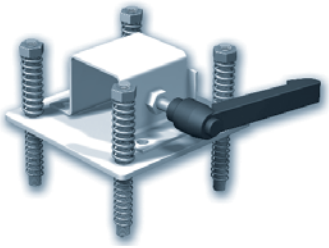
Level Compensators TS4 - TS5

- 3 models available
- Stroke 40 mm and 60 mm
- Available connections to suction cups: G3/8"-M and G1/2"-M

- TS Series spring systems are recomended for horizontal handling of parts at different levels. The spring function also ensures the gripping points are applied on the same plane when gripping using multiple suction cups.

P 4/5

RSC



Multi-Compensator Systems

- 2 models
- 30 mm stroke + 10° ball-joint effect
- Possibility of mounting on square tube with fitting system

- The system of 4 compensated springs is particularly recommended for horizontal handling requiring large diameter suction cups. The springs compensate for different levels between the suction cups (ball-joint effect).

P 4/5

TSOP
TSOG

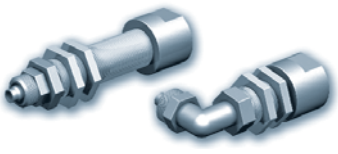
Anti-Rotation Level Compensators

- 8 models
- Anti-rotation
- 7 to 50 mm stroke available
- Protected spring

- The TSOP and TSOG series anti-rotation spring systems are used for horizontal handling of objects at different levels. The anti-rotation function ensures that objects are always gripped in the same position.

P 4/6

L



Mounting Extensions

- 3 ranges (G1/4"-M, G1/8"-M and G3/8"-F)
- 3 possible strokes

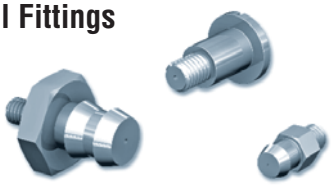
- The L series extensions are used for gripping on various levels using the same installation plate. These extensions are adjustable to different heights.

P 4/7

Suction Cup Accessories

Chapter 4

Flow Control Fittings



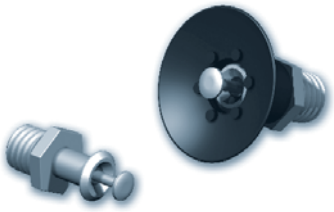
Groups 1 and 2

- 13 models
- (Hollow screw or hollow shaft fitting)

- These fittings are designed for installations requiring a large number of suction cups connected to the same vacuum source, particularly for situations where parts may be missing in the layer to be handled. Using flow-controlled fittings reduces the loss of flow and therefore optimizes the size of the vacuum generator.

P 4/9

PMG2



Mechanical Feelers

- Mechanical feelers
- 5 models
- For VP series Ø30 to 60 mm suction cups

- The PMG2 series mechanical feelers are mounted on VP series diameter 30 to 60 mm flat suction cups in all types of material. The feeler is activated by the object to be handled, causing it to open and free the route for the vacuum.

P 4/10

IMU

Axial Ball-Joints

- Ball-joint fitting
- 4 models

- IMU series ball-joints are recommended for gripping rounded products.
- When installed on a flat suction cup, they provide greater force than a bellows suction cup.

P 4/11

CSP

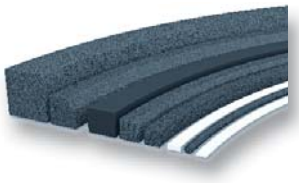
Piloted Safety Valves

- Vacuum check-valve
- Directly mounted on the suction cup
- Release by blow-off

- The CSP series safety valve is a useful safety device in the event of loss of vacuum or emergency shut-off as it maintains the vacuum in the suction cup. Release is obtained by connecting the ancillary coupling to the pressure supply.

P 4/12

BM



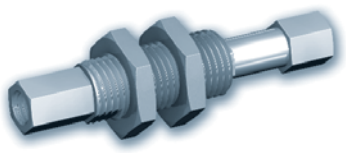
Foam Seals

- Foam strip (airtight cells)
- 10 models
- 3 types of material (Nitrile, Silicone and Natural rubber)

- The foam strip is designed for gripping products with an uneven or ridged surface: sawn wood, metal sheets, flat surfaces with bumps or hollows.
- All granular surfaces to which suction cups cannot adhere correctly and therefore cannot be airtight.

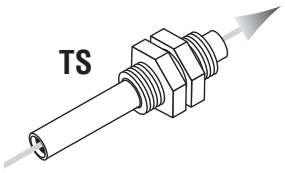
P 4/13

TS 11
Level Compensators



The TS 11 series compensated spring systems are recommended for horizontal handling of objects at different levels. The spring function also ensures that the gripping points are applied on the same plane when gripping with multiple suction cups.

■ Protected spring.



Materials

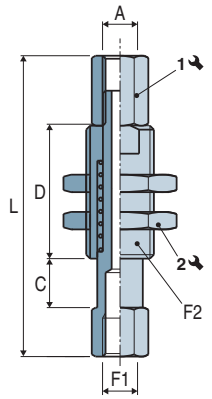
Spring Stainless steel
Tubing Zinc-plated steel
Slider Brass

Characteristics

References	A	F1	F2	C	D	L	1	2	Fres (lbf/in)	Frep (lbf)	(g)
TS11 7	M5-F	M5-F	G1/8"-M	7	19	43	7	14	3.88	0.29	20
TS11 10	M5-F	M5-F	G1/8"-M	10	22	49	7	14	2.57	0.40	22
TS11 20	M5-F	M5-F	G1/8"-M	20	39	76	7	14	1.37	0.38	33
TS11 40	M5-F	M5-F	G1/8"-M	40	64	121	7	14	0.74	0.36	50

Note: All dimensions are in mm **C** = Stroke **Fres** = Spring force **Frep** = Force at rest

TS11

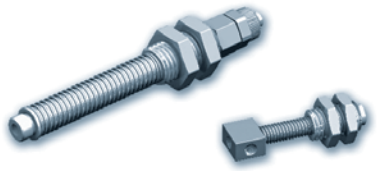


Please specify the part n° e.g.: TS1140
See part n° table above.

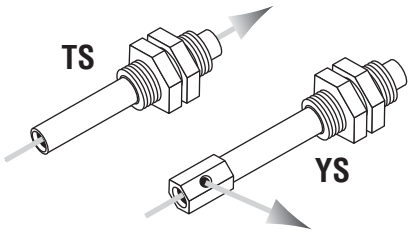
Suction cup mounting

The TS 11 series spring system can be fitted on all suction cups in group 1 (VP, VSA, VS Ø 5 to 25 mm) for IM21 and on suction cups in series VPG 5 to 20.

TS, YS
Level Compensators



TS and YS series compensated spring systems are recommended for horizontal handling of parts at different levels. The spring function also ensures that the gripping points are applied on the same plane when gripping with multiple suction cups.



Materials

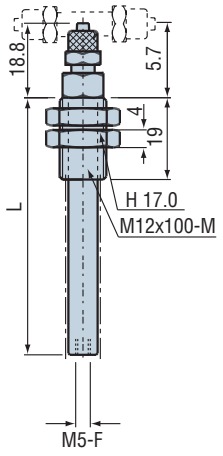
Spring Stainless steel
Tubing Zinc-plated steel
Slider Brass

Characteristics

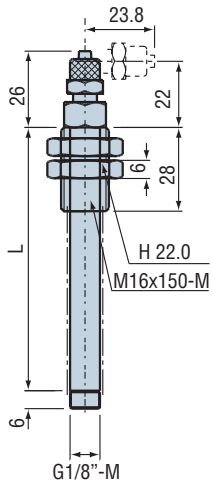
Models	TS1				TS2				TS3				TS1.20 LG	YS1			
Stroke	05	10	20	30	10	30	50	70	10	30	50	70	20	5	10	20	30
L	29	39	59	79	48	88	128	168	48	88	128	168	59	29	39	59	79
Spring force (lbf/in)	2.06	0.86	0.40	0.26	5.14	1.14	0.66	0.46	5.14	1.14	0.66	0.46	0.40	2.06	0.86	0.40	0.26
Force at rest (lbf)	0.22	0.38	0.33	0.45	1.82	0.94	1.01	1.01	1.15	0.94	1.01	1.01	0.33	0.22	0.38	0.33	0.45

Note: All dimensions are in mm

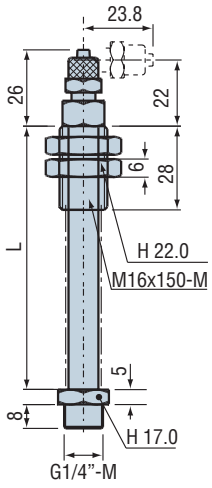
TS1



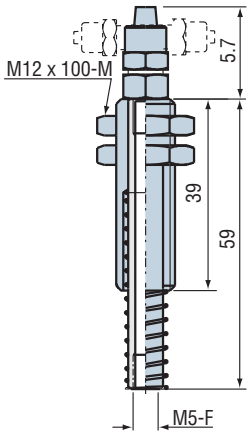
TS2



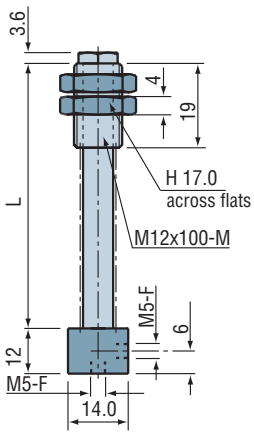
TS3



TS1.20 LG



YS1



Please specify the part n° e.g.:
Model + Spring stroke + Fitting
e.g.: TS350C46

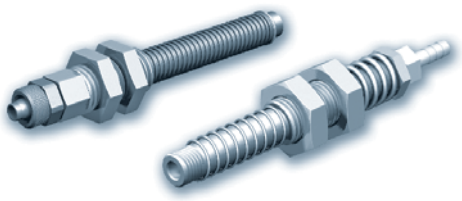
1: Model	2: Spring stroke		3: Fittings (for TS series)	
TS1	**05 - 10 - 20 - 30**	(TS1, YS1)	**D46**	(Straight 4 x 6 - TS1, TS2, TS3)
TS2	**10 - 30 - 50 - 70**	(TS2, TS3)	**D68**	(Straight 6 x 8 - TS2, TS3)
TS3			**C46**	(Elbow 4 x 6 - TS1, TS2, TS3)
YS1			**C68**	(Elbow 6 x 8 - TS2, TS3)
			T46[1]	(T-shape 4 x 6 - TS1)
			N[2]	(Without fitting)

Advantage of the TS120LG

The adjustment height is twice that of the standard TS1 spring system and its spring is protected.

(1) versions T46 and T68 on request for TS2 and TS3.
(2) For TS1 model, vacuum connection M5-F and for models TS2 and TS3 vacuum connection G1/8"-M.

TS
Level Compensators



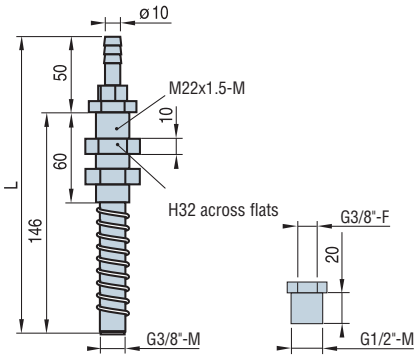
Characteristics

Models	TS4 50	TS5 60
Stroke	45	60
L	196	234
Spring force (lbf/in)	2.68	7.02
Force at rest (lbf)	0.90	0

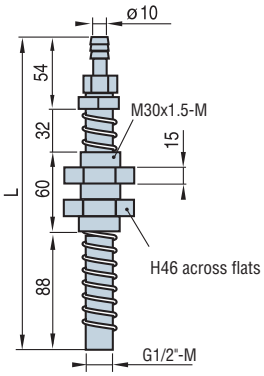
Materials

Spring Stainless steel
Tubing Zinc-plated steel
Slider Brass

Note: All dimensions are in mm



TS4 50 VPI **TS4 50 VPG**

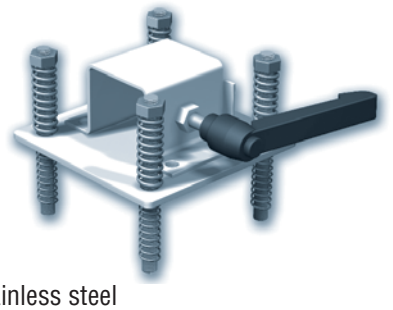


TS5 60

4

TS, RSC

RSC
Multi-Compensator Systems



Use

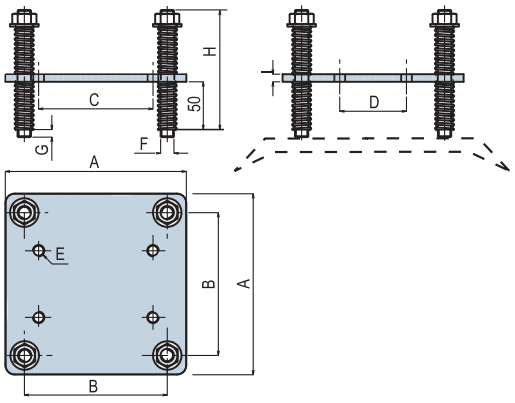
The system of 4 compensated springs is particularly recommended for horizontal handling requiring large diameter suction cups. The upper stainless steel springs act as dampers for all vertical movements. They compensate for different levels between the suction cups. The system of 4 compensated springs mounted in a square gives the assembly a ball-joint effect.

Materials

Spring Stainless steel
Damper Stainless steel
Studs A 60
Colour Yellow RAL 1023

Characteristics

Models	Max. load (lbf)	Stroke under traction	Vertical force (lbf)	Maxi. weigth (kg)	Ball-joint angle	Tube mounted	A	B	C	D	E	F	G	H	I	J	K	L
RSC1	449.60	30	35.97	1	10 °	50	140	106	88	50	M8-F	M10-M	8	120	5	52	52	9
RSC2	899.20	30	76.43	2.7	10 °	80	190	150	120	70	M12-F	M14-M	8	130	8	83	83	13



Note: All dimensions are in mm

RSC option...VAC

Square tube mounting options (Tightening by indexable lever).

- RSC1 VAC on 50 mm square tube.
- RSC2 VAC on 80 mm square tube.

Note:

- RSC1: for SPL 240 suction cups, 5085 steel suction cups, VA 250, VA 280 and VA 320.
- RSC2: for SPL 340 suction cups, 5150 steel suction cups, VA 350, VA 380 and VA 410.

Please specify the part:
Model + Type + Tube mounting option
e.g.: RSC2VAC

1: Model	2: Type		3: Tube-mounting option	
RSC	1	max. 449.60 lbf	VAC	with tube-mounting option
	2	max. 899.20 lbf		

TSOP - TSOG
Anti-Rotation Level Compensators

The TSOP and TSOG series spring systems are anti-rotation spring systems. They are used for horizontal handling of parts at different levels. The anti-rotation function ensures that objects are always gripped in the same position

The TSOP range is designed for applications requiring very precise handling.

- The hexagonal rod prevents the suction cup from rotating.
- Protected spring.

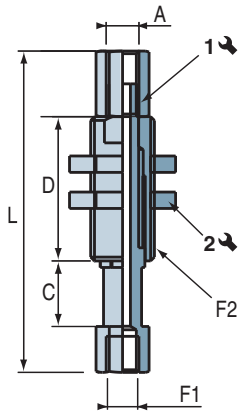
Characteristics - TSOP

References	A	F1	F2	C	D	L	1	2	Fres (lbf/in)	Frep (lbf)	(g)
TSOP 107	M5-F	M5-F	G1/8"-M	7	18	42	7	14	3.88	0.29	20
TSOP 110	M5-F	M5-F	G1/8"-M	10	22	49	7	14	2.57	0.40	22
TSOP 120	M5-F	M5-F	G1/8"-M	20	39	73.5	7	14	1.37	0.38	33
TSOP 140	M5-F	M5-F	G1/8"-M	40	64	118.5	7	14	0.74	0.36	50

Note: All dimensions are in mm **C** = Stroke **Fres** = Spring force **Frep** = Force at rest

Materials

Spring Stainless steel
Tubing Anodized aluminum
Slider Nickel-plated steel



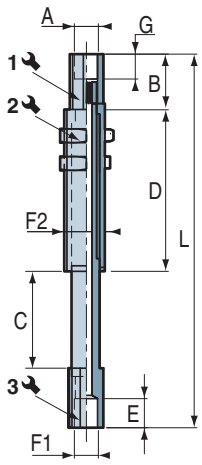
Characteristics - TSOG

References	A	F1	F2	C	B	D	E	G	L	1	2	3	Fres (lbf/in)	Frep (lbf)	(g)
TSOG2 20F	G1/8"-F	G1/8"-F	M16x1-M	20	20	38.5	7	9	100	12	19	12	1.44	0.82	35
TSOG2 35F	G1/8"-F	G1/8"-F	M16x1-M	35	20	58.5	7	9	135	12	19	12	0.78	0.97	45
TSOG3 25F	G1/4"-F	G1/4"-F	M20x1.5-M	25	23	50	10	10	113	16	24	16	1.47	0.99	65
TSOG3 50F	G1/4"-F	G1/4"-F	M20x1.5-M	50	23	82.5	10	10	170.5	16	24	16	0.74	1.00	90
TSOG4 40F	G3/8"-F	G3/8"-F	M25x1.5-M	40	33	71	11	11	159	22	32	22	1.31	1.37	170
TSOG4 80F	G3/8"-F	G3/8"-F	M25x1.5-M	80	33	121	11	11	249	22	32	22	0.68	1.35	235

Note: All dimensions are in mm **C** = Stroke **Fres** = Spring force **Frep** = Force at rest

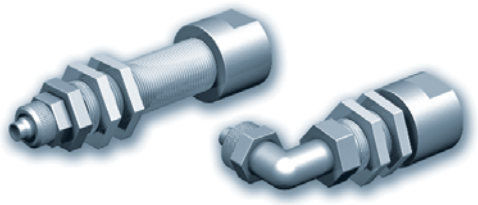
Materials

Spring Stainless steel
Tubing Anodized aluminum
Slider Anodized aluminum



Please specify the part e.g.: TSOG350F
See part n° table above.

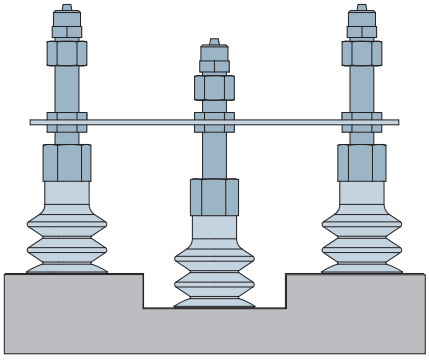
L
Mounting Extensions



The L series extensions are used for gripping on various levels using the same installation plate. These extensions are adjustable to different heights.

This system is especially useful for 2.5 bellows type suction cups, as height adjustment is made easier by the deflection of the suction cup.

Spring systems should be chosen, instead, for flat suction cups with low deflection.



Materials

Threaded rod and nut	Brass
Screwed vacuum fitting	Nickel-plated brass

4

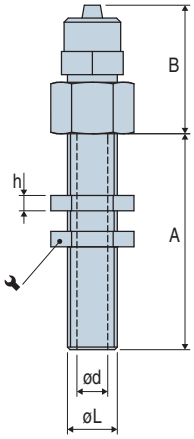
Characteristics

Models	A (1)			B	C	h	🔧	Ød	ØL	D	P
G1/8"-M	22	42	52	25	19	3	14	6	G1/8"-M	-	-
G1/4"-M	19	49	69	29	24	4	19	9	G1/4"-M	-	-
G3/8"-F	19	49	69	20.5	19.5	4	23	-	G3/8"-F	19	22
G3/8"-M	19	49	69	20.5	19.5	4	23	10	G3/8"-M	-	-

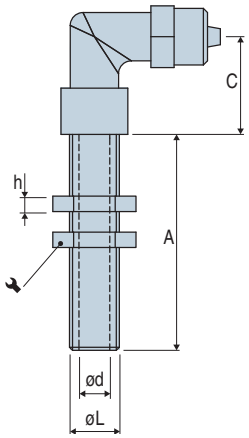
(1) Other lengths available on request for a minimum quantity of 10 pieces.

G1/4"-M - G1/8"-M

Straight

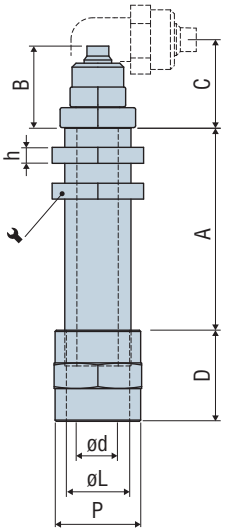


Elbow



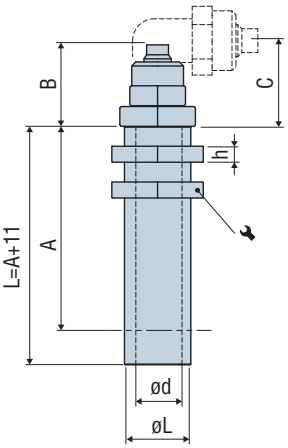
G3/8"-F

Straight or elbow 6x8



G3/8"-M

Straight or elbow 6x8



Note: All dimensions are in mm

Please specify the part:
Model + Thread + Adjustable stroke + Fitting + Suction cup fitting
e.g.: L1449C68F

1: Model	2: Thread		3: Adjustable stroke		4: Fittings		5: Suction cup fitting G3/8" version	
L	**18**	G1/8"	**22 - 42 - 52**	G1/8"	**D46**	Straight 4 x 6	**F**	Female
	14	G1/4"	**19 - 49 - 69**	G1/4"	**D68**	Straight 6 x 8	**M**	Male
	38	G3/8"		G3/8"	**C46**	Elbow 4 x 6		
					C68	Elbow 6 x 8		
					N	Without fitting		

G3/8" extensions are compatible with the High Performance C series range of suction cups (see page 2/55).

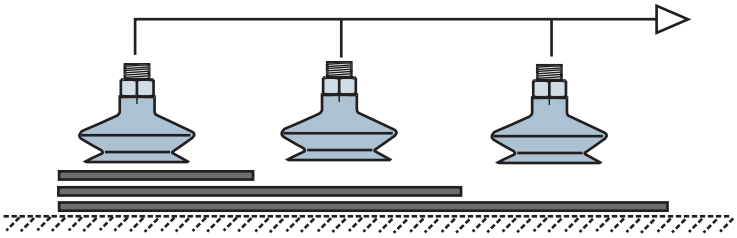
Miscellaneous Gripping

Principle

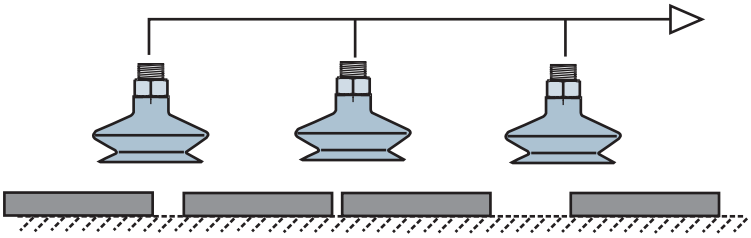
In many cases when using a multi-suction cup installation, some of the cups will not be covered by the product(s) to be handled. This leads to a high risk of reduced grip from the covered suction cups, or may even prevent them gripping at all.

Examples

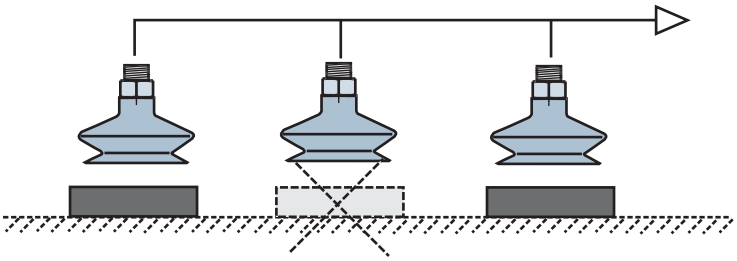
- Gripping of panels, sheet metal,etc. in a wide variety of sizes by a vacuum lifter equipped with suction cups.



- Uncertain position of the object(s).



- Gripping several objects at one time, some of which may be missing.



Solutions

- Independent ejector

Mounting an ejector for each suction cup guarantees the installation will operate perfectly even if one or more suction cups are not covered.

COVAL responds to this problem by offering the CIL, VR, GVR, and GVRL Series ejectors.

For further information, see chapter 6.

- Flow control fittings

Flow control fittings are incorporated as part of the suction cup mounting, thus reducing leakage in that cup with no part present during the vacuum cycle.

This technical solution is particularly suitable for vacuum grippers with a large number of suction cups.

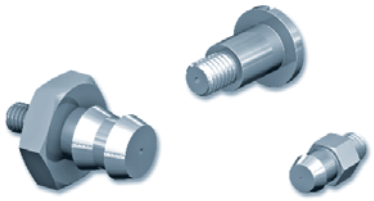
To determine the diameter of the nozzle, COVAL has developed a specific CAD.

- Mechanical feelers

See following pages. COVAL offers four solutions depending on the application, with their advantages and drawbacks.

Flow Control Fittings

Groups 1 and 2

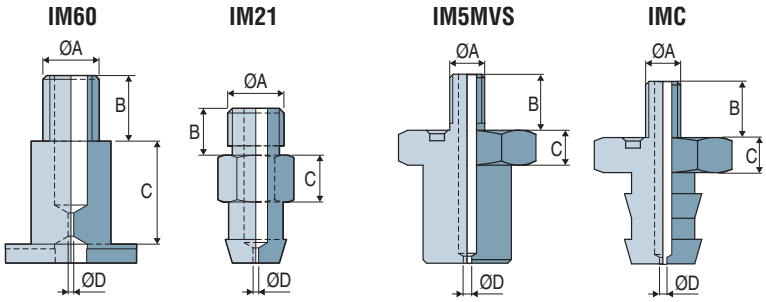


These fittings are designed for installations with a large number of suction cups connected to the same vacuum generator (vacuum gripper technology), particularly in cases where there may be objects missing from the layer of objects to be handled. Using flow-controlled fittings reduces the loss of flow and therefore optimizes the size of the vacuum generator.

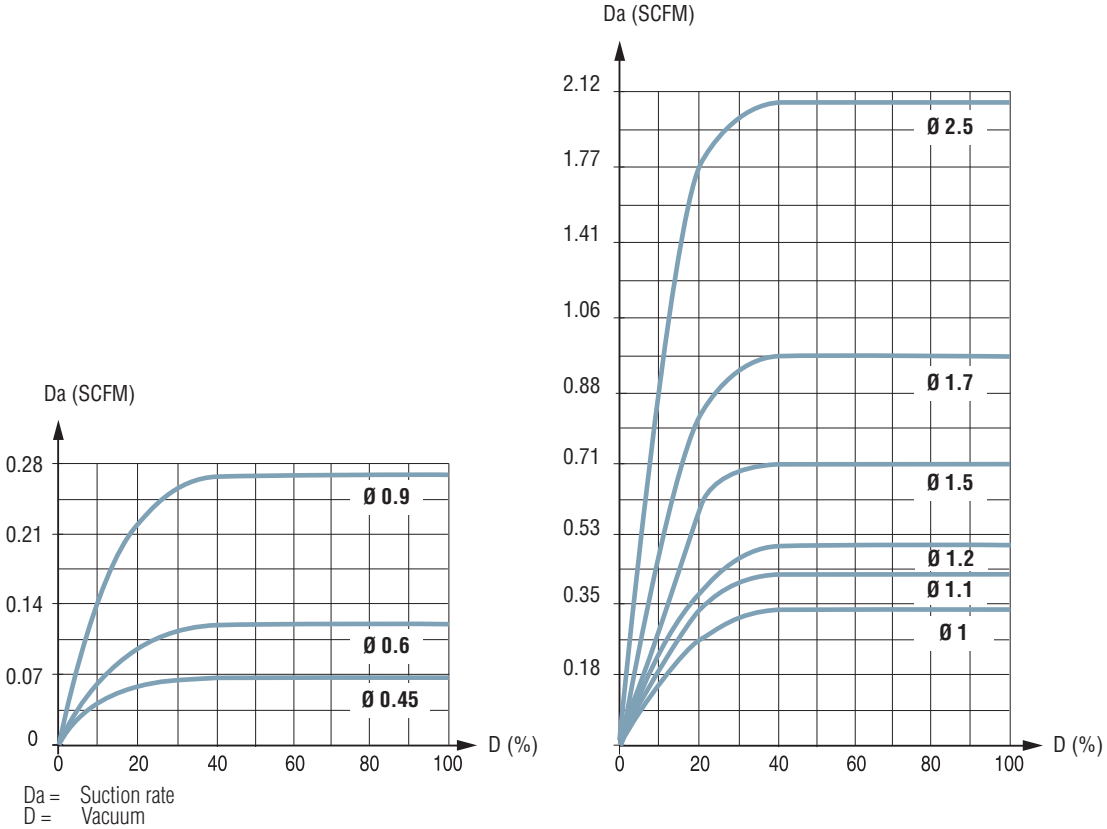
Caution, do not use this type of fitting for applications in a dusty environment.

Characteristics

References	ØA	ØD	B	C
IM5 MVSD1.1	M5-M	1.1	8	5
IM21 SP058	M5-M	0.45	4.5	5
IM21 SP094	M5-M	0.6	4.5	5
IM60 SP335	M6-M	0.6	7	11
IM60 SP387	M6-M	1.2	7	11
IM60 SP461	M6-M	0.9	7	11
IM60 SP483	M6-M	1	7	11
IM60 SP510	M6-M	1.7	7	11
IM60 SP511	M6-M	2.5	7	11
IMCM5 D0.6	M5-M	0.6	8	5
IMCM5 SP691	M5-M	1.1	8	5
IMCM5 SP701	M5-M	1.5	8	5



Maximum suction per nozzle diameter

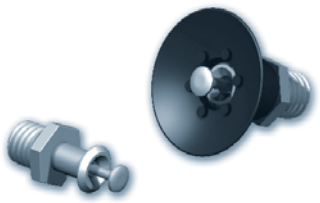


Da = Suction rate
D = Vacuum

Please specify the part e.g.: IM60SP387
See part n° table above.

Note: All dimensions are in mm

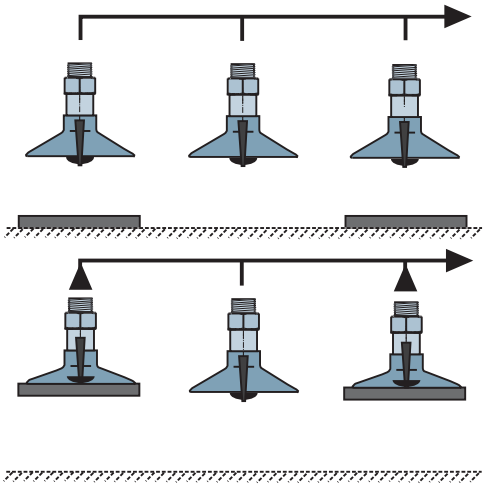
PMG2
Mechanical Feelers



The PMG2 series mechanical feelers are mounted on VP series diameter 30 to 60 mm flat suction cups in all types of material (group 2 suction cups).

The mechanical feeler blocks the path from the vacuum source to the suction cup.

The feeler is actuated by the object, causing it to open and free the path for the vacuum.



Materials

Body Nickel-plated brass
Spring Stainless steel
Feeler Delrin and brass

Advantages

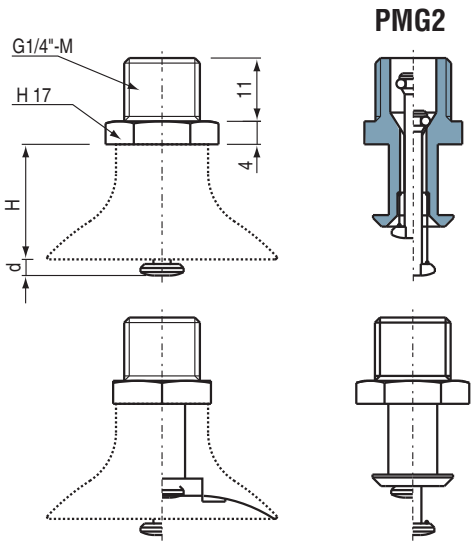
- Simple to install and operate.
- Very efficient air-tightness for non-covered suction cups.
- Little risk of marking delicate objects, as the feeler has a rounded surface.

Mounting

The feelers are mounted by press fitting. It is preferable to allow us to assemble the feeler onto the suction cup.

Characteristics

	VP 30	VP 35	VP 40	VP 50	VP 60
d (mm)	3.9	2.9	2.9	0.9	0.9
H (mm)	19	20	20	22	22



Leakage rate

No leakage if all the suction cups are correctly placed. This represents substantial savings in power with regard to the vacuum source: pneumatic ejector or electric vacuum pumps.

Please specify the part: PMG2

Accessories
Mounting on spring or ball-joint systems (see chapter **4**).

IMU
Axial Ball-Joints

IMU series ball-joints are recommended for gripping rounded or rotating products.

When installed on a flat suction cup, they provide greater force than a bellows suction cup.

The vacuum connection is axial and sealing is ensured by a special seal always in contact with the spherical articulation.

The suction pad installed over the axial ball joint is free to rotate on its axis around 360° and can incline up to 15°

The ball joints are manufactured entirely in copper except the spherical joint made in stainless steel.

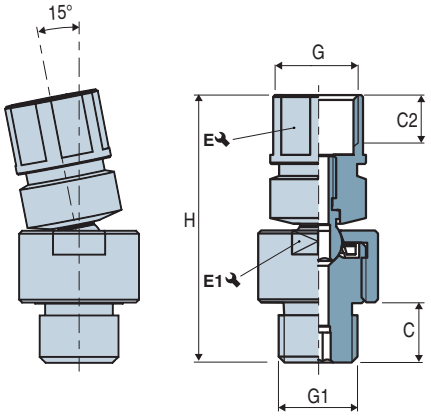
Materials

Ball-joint Zinc-plated steel and brass

Seal Nitrile (NBR)

Characteristics

References	G	G1	C2	C	E	E1	H	(g)
IMU 18	G1/8"-F	G1/8"-M	8	8.5	11	18	43	40
IMU 14	G1/4"-F	G1/4"-M	8	10	15	18	44.6	56
IMU 38	G3/8"-F	G3/8"-M	13	13	26	28	63.3	206
IMU 12	G1/2"-F	G1/2"-M	15	17	26	28	72.3	232



Please specify the part e.g.: IMU14
See part n° table above.

Note: All dimensions are in mm

CSP
Piloted Safety Valves

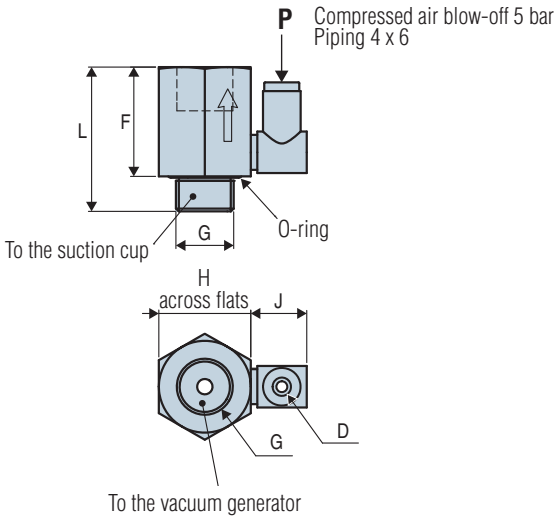
The CSP series safety valve is a useful safety device. In the event of loss of vacuum or emergency stop it maintains the vacuum in the suction cup. Release is obtained by connecting the ancillary coupling to the pressure supply.

Materials

Valve Nitrile (NBR)
Body Anodized aluminum
Filter Stainless steel screen 200 µ

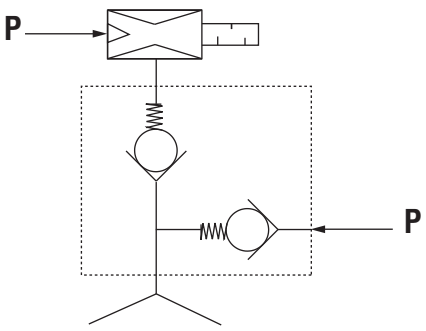
Characteristics

Reference	G	ØD	F	L	J	H
CSP 14	G1/4"-M	4	25	33	12.8	21



Mounting

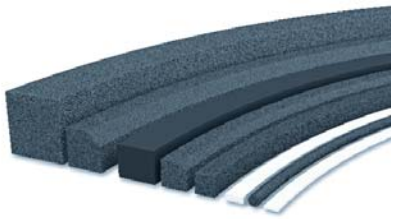
- One safety valve per suction cup.
- Blow-off pressure, minimum 5 bar.



Please specify the part e.g.: CSP14
See part n° table above.

Note: All dimensions are in mm

BM
Foam Strips



Industry-specific applications

Nitrile foam strip: 10m roll

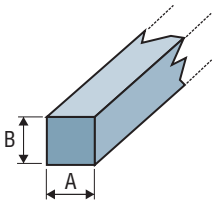
Mounting

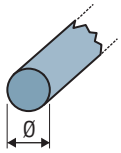
Mounting with contact adhesive or flush-mounted at a depth adapted to the height and potential flush-mounting of the seal subject to the vacuum: 50% to 70% of the new height.

References	A	B	Ø
BM 8	-	-	8
BM 1510	15	10	-
BM 1010	10	10	-
BM 1515	15	15	-
BM 2020	20	20	-
BM 3030	30	30	-
BM 5050	50	50	-

Support

- All supports, particularly steel, aluminum, etc.
- Closed cells.
- Tube of neoprene adhesive (120 ml): Part No. 095.99.006.

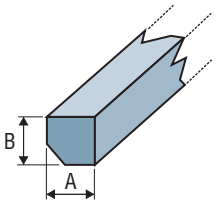




Nitrile beveled foam strip: 10m roll

- The beveling facilitates gripping of products with uneven surfaces.
- Closed cells.
- Contact adhesive reference: BOSTIK 1400 (Neoprene adhesive).

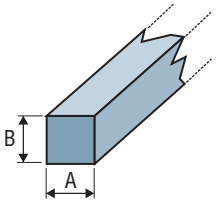
References	A	B
BM 2020 SPTR	20	20
BM 3020 SPTR	20	30
BM 3030 SPTR	30	30



Silicone foam strip

- Heat resistant: 320°F.
- Do not use on parts before painting.
- Closed cells.
- Contact adhesive reference: LOCTITE 5366 (silicone adhesive).

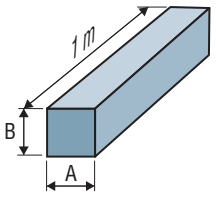
References	A	B
BM 210 SI	10	2
BM 513 SI	13	5
BM SI 3030	30	30



Natural rubber foam strips: Length 1m

- Flush-mounting.
- Use with turbine (strong suction) for gripping products with very uneven surfaces, such as slabs of washed gravel.
- Open cells.
- Contact adhesive reference: BOSTIK 1400 (Neoprene adhesive)

Reference	A	B
BMS 3025	30	25



Please specify the part e.g.: BM1510
See part n° table above.

Note: All dimensions are in mm

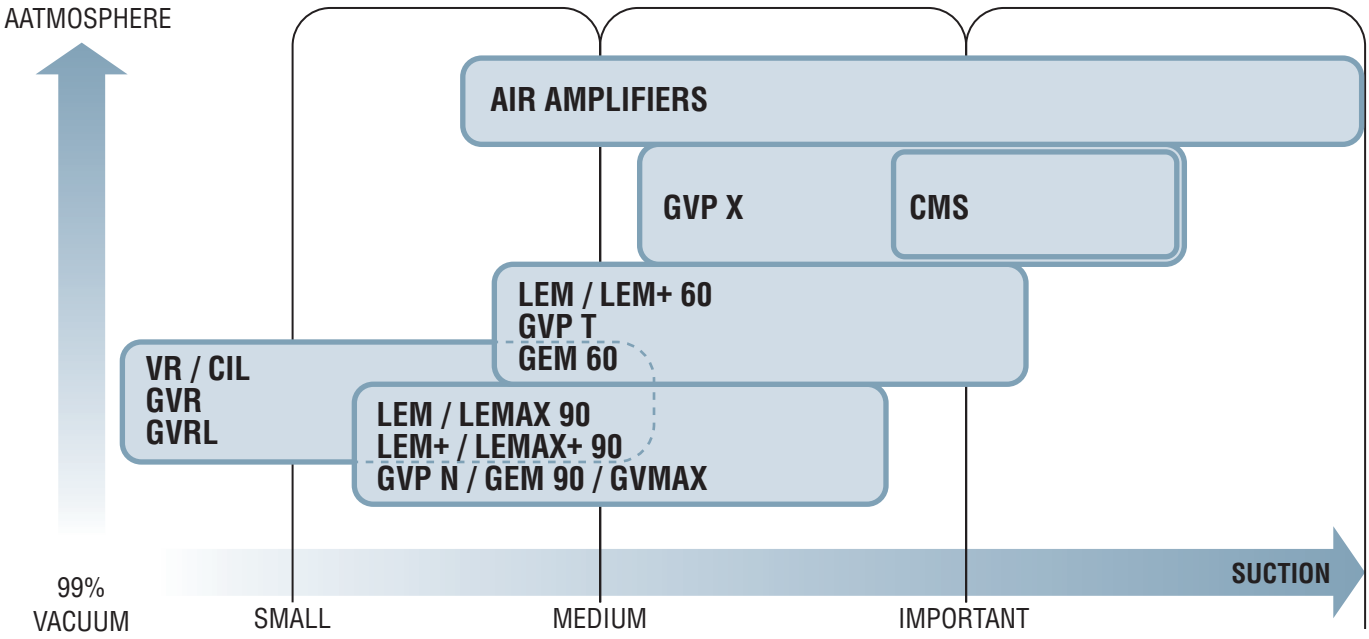
Vacuum Pumps Overview

Chapter 5

Vacuum Pumps Overview

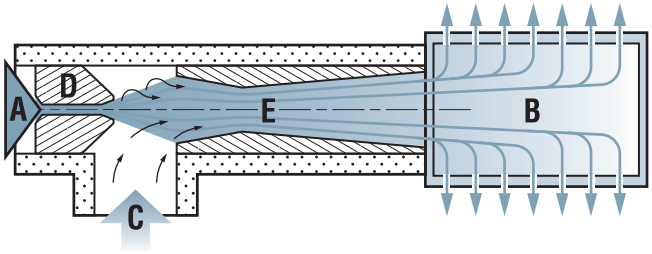
General Points

What is vacuum?



HOW A VENTURI WORKS

The COVAL vacuum pump works on the Venturi principle. The filtered, non-lubricated compressed air in **A** is blown through nozzle **D** and speeds up. It then goes into mixer **E** and finally escapes through silencer **B**. The vacuum is caused by the pressure drop in the chamber around nozzle **D**. The air sucked in **C** follows the same route to end up in silencer **B.**



PRESSURE UNIT CONVERSION

Units	Bar 10 N/cm² = 100 kPa	Atm kp/cm²	Torr mm of Hg
Bar = 10 N/cm² = 100 kPa	1	0.986923	750.0617
Atm = kp/cm²	1.01325	1	760
Torr = mm of Hg	0.0013332	0.001316	1

CONVERSION ACCORDING TO THE PERCENTAGE OF VACUUM

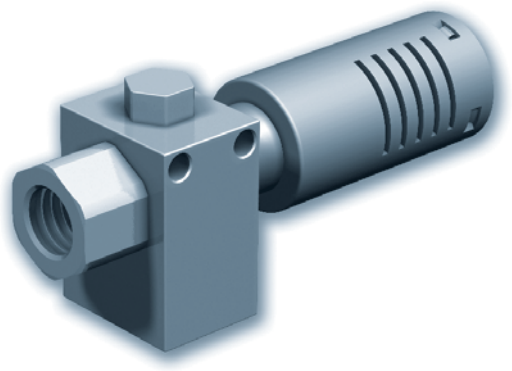
%	Bar (10 N/cm² = 100 kPa)	Atm (kp/cm²)	mm of water column
10%	-0.101	-0.103	1000
20%	-0.203	-0.207	2000
30%	-0.304	-0.310	3000
40%	-0.405	-0.413	4000
50%	-0.507	-0.517	5000
60%	-0.608	-0.620	6000
70%	-0.709	-0.723	7000
80%	-0.811	-0.827	8000
90%	-0.912	-0.930	9000

Vacuum Pumps Overview

Choosing a Vacuum Pump

The role of the vacuum pump is to generate a vacuum relative to a specific capacity. For vacuum handling, this capacity generally consists of:

- the internal volume of the suction cups to be evacuated,
- the volume of the network (piping).



GRIPPING AIRTIGHT AND POROUS OBJECTS

Airtight objects
Only the volume of the cups and vacuum network needs to be considered. The choice of vacuum pump will correspond directly to the evacuation time required by the application. By nature of the product, it is ideal and more efficient to select pumps with a maximum vacuum level of 85% or more.

Porous objects
In this case, it is not possible to fully evacuate the vacuum system. The leakage rate from the suction cup network must be considered as well as the volume. A vacuum pump equipped to handle this application will be one whose flow is significantly greater than that of the leakage in the system, thus allowing vacuum pressure to build. For these products, it is preferable to choose a pump with high flow rates and a reduced maximum vacuum level of 50-60%.

CALCULATING THE LEAKAGE RATE

First, choose a suction cup with a diameter compatible with the object to be gripped.
Second, equip a vacuum pump(with known characteristics) with a pressure gauge and a vacuum gauge. Then supply the pump with optimal pressure(e.g. 5 bar).
Finally, apply the suction cup to the surface to be tested.

Three possible cases may arise:

- The vacuum gauge indicates the maximum vacuum achieved for this type of pump: the object is airtight.
- The vacuum gauge does not measure any vacuum: choose a more efficient vacuum pump as the leakage rate is higher than the maximum vacuum pump flow.
- The vacuum gauge displays a vacuum value, e.g. -300 mb (30% vacuum), refer to the vacuum pump curve. Read the flow corresponding to -300 mb (e.g. 2.65 SCFM).

For example, the leakage rate at -300mb is measured at 2.65 SCFM for the suction cup used.

Using this data, calculate the forces to be applied to handle the object:
At -300mb the theoretical force of the suction cup is:
F(lbf) = S (cm²) x 0.3 / 0.2248* with:
S = surface of the suction cup in cm^2.
(-300 mbar = -0.3 bar, for calculation use 0.3).
(*) coefficient to convert daN (decanewton) to lbf (pound-force)

To grip the object safely, (factor of 2 for horizontal gripping and 4 for vertical gripping), one must account for the varying characteristics of the vacuum pumps.

THINGS TO REMEMBER

"An installation must breathe properly".
The throughput for a machine includes:

- gripping time,
- transfer time,
- release time.

Efficient vacuum handling will ensure a proper release of the object in addition to the grip, as the release is often a difficult point to resolve. Some steps to consider.

- Install vacuum pump as close as possible to the suction cups,
- Choose suction cups with the smallest possible internal volume,
- Identify suitable sizes of piping and fittings to limit pressure losses.

Vacuum Pumps Overview

Comparison of Vacuum Pumps and Air Amplifiers

AIR AMPLIFIER

Optimal usage zone: 0 to 12% vacuum.

Maximum usage range: 0 to 15% vacuum.

■ Applications:

TRANSPORT - DRYING - DEGASSING

Handling very porous, lightweight products: carpet, textiles, foam, etc...

Transporting small objects: granules, grains of coffee, rice, paperclips, etc...

Smoke extraction, degassing.

5

TYPES OF VACUUM PUMPS

■ **Version 60% vacuum**

Optimal usage zone: 30 to 55% vacuum.

Use of vacuum pumps optimized at 60% maximum vacuum implies high suction flow to account for the drop in vacuum pressure.

■ **Version 85 % vacuum**

Optimal usage zone: 55 to 80% vacuum.

The importance of a vacuum pump which can create an 85% vacuum is to generate high vacuum and therefore a high force/surface ratio.

■ Applications:

HANDLING - SUCTION - EMPTYING - DOSING

Handling porous, semi-porous and airtight products.

High-speed pick and place.

Air and/or liquid dosing.

COMMENTS

The optimal use zones recommended as follows are the most adapted to the different types of technology. However they are in no way restrictive or limiting.

The notes are valid for both COVAL product groups: air amplifiers and vacuum pumps and also apply to all products using the same technology.

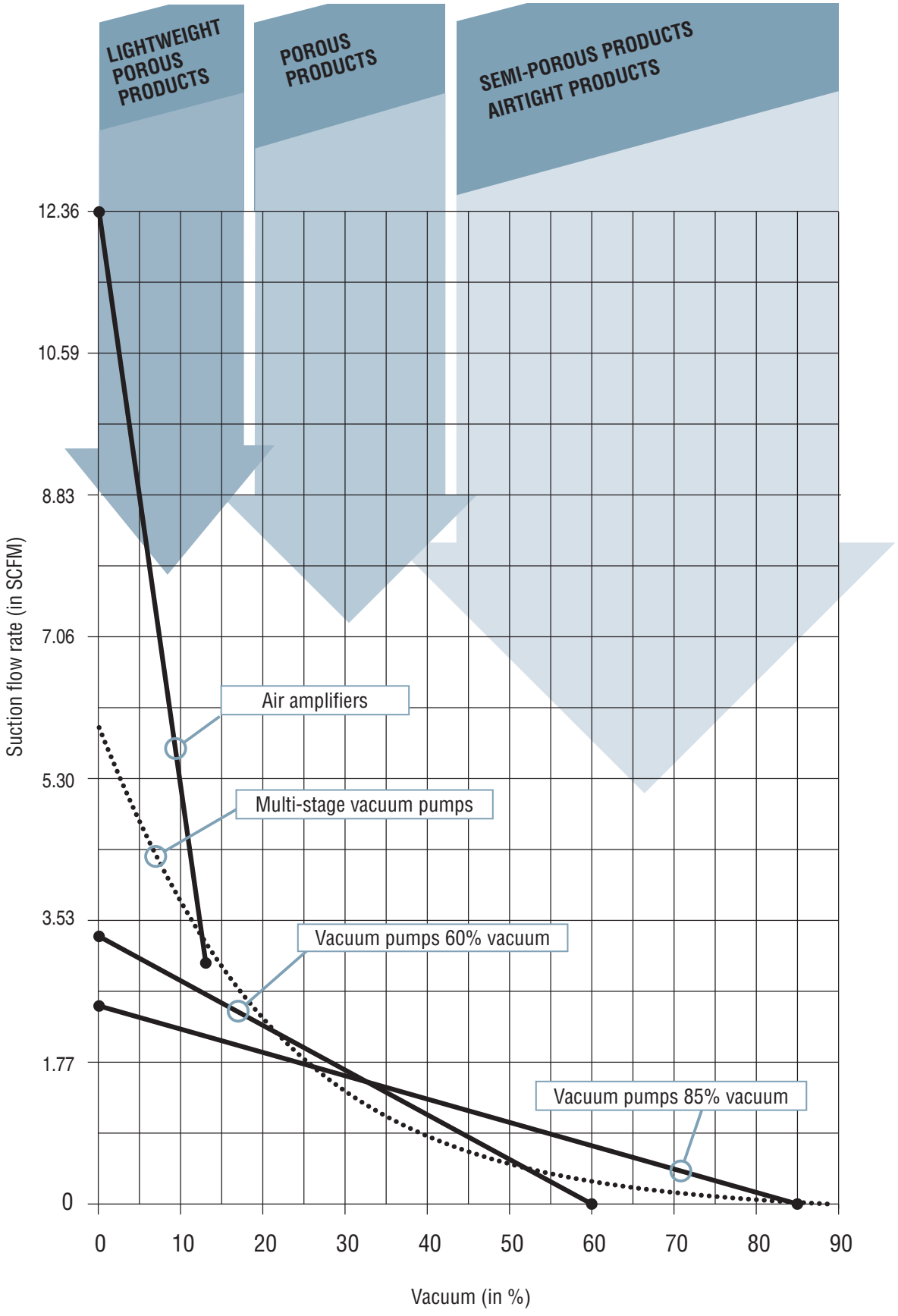
NOTE

The following curves have been established using COVAL equipment: M 10 C air amplifier, LEM60X14 and LEM90X14 vacuum pumps.

The values given are values for identical compressed air consumption and optimal characteristics of each of the vacuum generation procedures.

Vacuum Pumps Overview

Comparison of Vacuum Pumps and Air Amplifiers



Vacuum Pumps Overview

Vacuum Pump Range

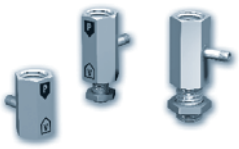
Micro/Mini-Ejectors

CIL

- 2 sizes
- 3 nozzle Ø: 0.5 ; 0.7 ; 0.9 mm
- Suction flow rate: 0.25 to 0.80 SCFM
- Optimum supply pressure: 5 bar
- Weight between 7 and 13g
- Push fitting

- In-line connection
- Easily integrated
- No clogging
- Installation very close to the suction cups
- Very flexible installation
- Adaptable to all industries

VR



- 3 models
- Nozzle Ø: 0.5 ; 0.7 ; 0.9 ; 1 ; 1.2 ; 1.4mm
- Suction flow rate: 0.25 to 2.26 SCFM
- Optimum supply pressure: 5 bar
- Weight between 20 and 45 g
- Silencer option

- Wide range
- Very compact
- Installed directly on the suction cups
- Excellent mechanical resistance
- Reduced gripping time
- Blow-off option
- Extended suction flow rate range
- Silent operation
- Adaptable to all industries

GVR

- 2 models
- Nozzle Ø: 0.9 ; 1 ; 1.2 ; 1.4 mm
- Suction flow rate: 0.74 to 2.26 SCFM
- Optimum supply pressure: 5 bar
- Weight 45 g
- Integrated silencer

- Very compact
- Installed directly on the suction cups
- Excellent mechanical resistance
- No clogging
- Reduced gripping time
- Blow-off option
- Extended suction flow rate range
- Silent operation
- Adaptable to all industries

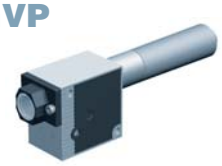
GVRL10

- Nozzle Ø: 1 mm
- Suction flow rate: 1.02 SCFM
- Optimum supply pressure: 3.5 bar
- Weight 28 g
- Silencer option

- Ultra compact and lightweight
- Easily integrated with grippers
- Excellent mechanical resistance
- Dust resistant
- Direct connection onto suction cups
- Ideal for high-speed robotics

Modular Vacuum Pumps

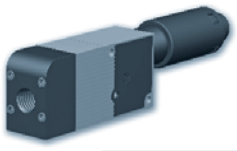
GVP



- Simple vacuum pumps
- Nozzle Ø: 1.2 ; 1.5 ; 2 ; 2.5 ; 3 mm
- Suction flow rate: 1.59 to 15.9 SCFM
- Optimum supply pressure: 4 bar
- Integrated silencer

- Modular design thanks to different options
- Compact
- Optimized performance for handling all types of objects
- Silent operation
- No clogging
- Adaptable to all industries

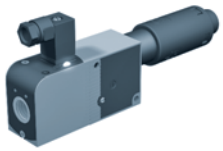
GEMP



- Simple energy-saving vacuum pumps
- Nozzle Ø 1.2 ; 1.5 ; 2 ; 2.5 ; 3 mm
- 2 vacuum levels: 60 % and 85 %
- Suction flow rate between 2.54 to 13.6 SCFM
- Integrated pressure regulator (ASR)
- Integrated silencer

- Very compact and lightweight
- Ideal for all applications requiring an external pressure regulator
- Exceptional energy savings thanks to automatic pressure regulation at 4 bar
- Optimal performances
- Silent operation
- No clogging

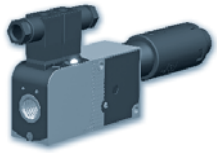
GVPS



- Vacuum pumps with electric vacuum control
- Nozzle Ø: 1.2 ; 1.5 ; 2 ; 2.5 ; 3 mm
- Suction flow rate: 1.59 to 15.9 SCFM
- Optimum supply pressure: 4 bar
- Integrated electric vacuum control
- Integrated silencer

- Modular design thanks to different options
- Compact
- Optimized performance for handling all types of objects
- Silent operation
- No clogging
- Adaptable to all industries

GVPD



- Vacuum pumps with electric vacuum control and blow-off
- Nozzle Ø: 1.2 ; 1.5 ; 2 ; 2.5 ; 3 mm
- Suction flow rate: 1.59 to 15.9 SCFM
- Optimum supply pressure: 4 bar
- Integrated vacuum control and blow-off
- Integrated silencer

- Modular design thanks to the different options
- Compact
- Optimized performance for handling all types of objects
- Silent operation
- No clogging
- Adaptable to all industries
- Adjustable blow-off flow

Vacuum Pumps Overview

Vacuum Pump Range

Intelligent Vacuum Pumps

LEM  twin tech Integration & Intelligence · AIR Saving Regulator	■ Integrated mini-vacuum pump with ASR (Air Saving Regulator) ■ Nozzle Ø: 1; 1.2; 1.4 ■ 2 vacuum levels: 60% and 85% ■ Suction flow rate up to 3.25 SCFM ■ Integrated pressure regulator (ASR) ■ All required functions integrated internally ■ M8 connections ■ Stand-alone or island module	■ For airtight and porous objects ■ Ultra 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
LEM+  twin tech Integration & Intelligence · 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 9.71 SCFM ■ 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
LEMAX  twin tech Integration & Intelligence · AIR Saving Control	■ Integrated mini-vacuum pump with ASC (Air Saving Control) ■ Nozzle Ø: 1; 1.2; 1.4 ■ Vacuum level: 85% ■ Suction flow rate up to 2.47 SCFM ■ Integrated pressure regulator (ASR) ■ Integrated vacuum regulation (ASC) ■ All required functions integrated internally ■ M8 connections ■ Stand-alone or island module	■ For airtight and slightly porous objects ■ Ultra compact and lightweight ■ Control panel for monitoring and adjustment ■ ASC = 75 to 99% energy savings ■ Reduced wiring ■ Reduced installation time ■ Adaptable to all industries
LEMAX+  twin tech Integration & Intelligence · 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 7.06 SCFM ■ Integrated pressure regulator (ASR) ■ Integrated vacuum regulation (ASC) ■ All required functions integrated internally ■ M12 connections	■ For airtight and slightly porous objects ■ Compact and lightweight ■ Control panel for monitoring and adjustment ■ ASC = 75 to 90% energy savings ■ Reduced wiring ■ Reduced installation time ■ Adaptable to all industries
LEMCOM  twin tech Integration & Intelligence · AIR Saving Control EtherNet/IP · CANopen	■ Mini-vacuum pumps with fieldbus communication ■ Nozzle Ø: 1 ; 1.2 ; 1.4 ■ 2 vacuum levels: 60 and 85% ■ Suction flow rate up to 3.25 SCFM ■ Integrated pressure regulator (ASR) ■ Integrated vacuum regulation (ASC) ■ Fieldbus: Ethernet IP™ or CANopen® ■ M8 connections ■ Stand-alone or island module	■ For airtight and slightly porous objects ■ Ultra compact and lightweight ■ Settings and diagnosis by remote monitoring. ■ ASC = 75 to 99% energy savings ■ Reduced wiring ■ Reduced installation time ■ Adaptable to all industries
GEM  twin tech Integration & Intelligence · AIR Saving Regulator	■ Vacuum pumps with ASR (Air Saving Regulator) ■ Nozzle Ø 1.2 ; 1.5 ; 2 ; 2.5 ; 3 mm ■ 2 vacuum levels: 60 % and 85 % ■ Suction flow rate up to 13.6 SCFM ■ All required functions integrated internally ■ Integrated pressure regulator (ASR) ■ Integrated M12 connection (Plug &Play)	■ For airtight or porous objects ■ Energy savings exceeding 50% ■ Noise levels reduced by up to 30 dBa ■ Modular design thanks to different options ■ Reduced wiring ■ Reduced installation time ■ No clogging ■ Adaptable to all industries

5

Vacuum Pumps Overview

Vacuum Pump Range

Intelligent Vacuum Pumps

GVMAX V2-2 / V2-V2R

- Self-regulating vacuum pumps (electric vacuum and blow-off control)
- Separate inlets and outlets
- M12 connections
- Nozzle Ø: 2.5 mm
- Maximum vacuum level 85%
- Suction flow rate up to 7.06 SCFM
- Integrated vacuum check-valve
- Vacuum regulation function

- Compact and light
- Ideal for retaining air-tight objects in the automotive, plastics and sheet metal industries
- Energy saved by automatic vacuum regulation
- Safety guaranteed in case of power failure
- Optimal performances
- Silent operation
- No clogging

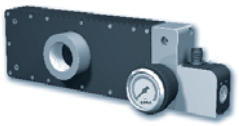
GVMAX

- Self-regulating vacuum pumps (electric or pneumatic vacuum control and blow-off)
- Two versions: electric or pneumatic
- Nozzle Ø: 2.5 mm
- Three levels of vacuum: 50%, 75% and 85%
- Vacuum regulation function
- Integrated vacuum solenoid valves and blow-off
- 2 integrated check valves for pneumatic version and 1 for electric version
- Integrated vacuum switch to adjust the vacuum threshold and hysteresis

- Compact and light
- Ideal for retaining air-tight objects in the automotive, plastics and sheet metal industries
- Energy saved by the vacuum regulation function
- Safety guaranteed in case of power failure
- Optimal performances
- Silent operation
- No clogging

High Flow Vacuum Generator

CMS



- Multi-stage technology
- 2 vacuum flow rates: 31.8 and 63.6 SCFM
- Possibility to include a control valve for control of vacuum and release (M12 connectors)
- Optional vacuum gauge

- For applications requiring a high suction flow rate
- Emptying of large tanks
- Handling porous materia
- Remotely generate vacuum for chambers in MVG and CVG Series

M--C

- Operating principle based on the COANDA effect
- Bore diameter (Ø): 6, 10, 20, 30, 40 mm
- Flow rate: between 7.06 and 177 SCFM depending on the supply pressure (between 1.5 and 6 bar)
- Body material: aluminum

- Recommended for gripping light-weight, porous products: foam, carpet, cakes, leather, etc.
- Transport of powdery materials: powders, granules,etc.
- Transporting small, light-weight objects: paper clips, rice, coffee, etc.
- Smoke evacuation, depressurizing chambers

Vacuum Pumps Overview

Evacuation Time

Evacuation time in seconds per liter

% vacuum	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	85 %
VR05	0.92	1.96	3.18	4.63	6.38	8.79	12.17	18.96	27.39
CIL05	0.92	1.96	3.18	4.63	6.38	8.79	12.17	18.96	27.39
VR07	0.46	0.98	1.58	2.28	3.13	4.27	5.8	8.55	11.01
CIL07	0.46	0.98	1.58	2.28	3.13	4.27	5.8	8.55	11.01
VR09	0.31	0.65	1.05	1.52	2.09	2.85	3.87	5.7	7.34
CIL09	0.31	0.65	1.05	1.52	2.09	2.85	3.87	5.7	7.34
VR10	0.24	0.51	0.82	1.18	1.62	2.21	3.01	4.43	5.71
GVR09S	0.31	0.65	1.05	1.52	2.09	2.85	3.88	5.7	7.34
GVRL10	-	-	-	-	-	2.04	2.8	4.09	-
GVR10	0.24	0.51	0.82	1.18	1.62	2.21	3.01	4.43	5.71
VR12	0.14	0.3	0.49	0.71	0.97	1.33	1.81	2.66	3.42
GVR12	0.14	0.3	0.49	0.71	0.97	1.33	1.81	2.66	3.42
VR14	0.1	0.21	0.34	0.5	0.68	0.93	1.27	1.85	2.44
GVR14	0.1	0.21	0.34	0.5	0.68	0.93	1.27	1.85	2.44
GVP/S/D12N, GVMAX12N	0.14	0.3	0.49	0.71	0.97	1.33	1.81	2.66	3.42
GVP/S/D15, GVMAX15N	0.09	0.20	0.32	0.46	0.63	0.85	1.16	1.71	2.20
GVP/S/D20N, GVMAX20N	0.06	0.12	0.19	0.28	0.38	0.52	0.71	1.04	2.13
GVP/S/D25N, GVMAX25N	0.03	0.07	0.11	0.16	0.22	0.30	0.41	0.60	0.77
GVP/S/D30N, GVMAX30N	0.02	0.05	0.08	0.12	0.17	0.23	0.31	0.45	0.58

% vacuum	10 %	20 %	30 %	40 %	50 %	60 %	70 %
GVP/S/D12T, GVMAX12T	0.1	0.22	0.37	0.55	0.78	1.16	1.92
GVP/S/D15T, GVMAX15T	0.07	0.15	0.24	0.36	0.52	0.77	1.27
GVP/S/D20T, GVMAX20T	0.04	0.09	0.14	0.22	0.31	0.46	0.76
GVP/S/D25T, GVMAX25T	0.03	0.06	0.1	0.14	0.21	0.3	0.5
GVP/S/D30T, GVMAX30T	0.02	0.04	0.07	0.1	0.15	0.22	0.37

% vacuum	10 %	20 %	30 %	35 %	40 %	45 %
GVP/S/D12X, GVMAX12X	0.05	0.11	0.22	0.33	0.62	0.62
GVP/S/D15X, GVMAX15X	0.04	0.09	0.15	0.2	0.27	0.39
GVP/S/D20X, GVMAX20X	0.03	0.06	0.11	0.15	0.19	0.28
GVP/S/D25X, GVMAX25X	0.02	0.04	0.08	0.1	0.14	0.19
GVP/S/D30X, GVMAX30X	0.01	0.03	0.06	0.08	0.11	0.15

% vacuum	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	85 %
GEM60x12	0.09	0.2	0.35	0.55	0.9	-	-	-	-
GEM60x15	0.06	0.14	0.23	0.36	0.59	-	-	-	-
GEM60x20	0.04	0.08	0.13	0.21	0.34	-	-	-	-
GEM60x25	0.03	0.05	0.09	0.14	0.24	-	-	-	-
GEM60x30	0.01	0.04	0.07	0.10	0.17	-	-	-	-
GEM90x12	0.13	0.27	0.44	0.64	0.88	1.19	1.62	2.37	3.12
GEM90x15	0.09	0.18	0.29	0.42	0.58	0.79	1.08	1.59	2.08
GEM90x20	0.05	0.11	0.18	0.25	0.35	0.46	0.65	0.95	1.25
GEM90x25	0.03	0.07	0.11	0.16	0.22	0.3	0.41	0.59	0.78
GEM90x30	0.03	0.06	0.09	0.13	0.18	0.24	0.33	0.48	0.64

Note: evacuation time of GEMP = evacuation time of GEM.

Vacuum Pumps Overview

Evacuation Time and Weight of Vacuum Pumps

Evacuation time in seconds per liter (cont.)

% vacuum	30 %	35 %	40 %	45 %	50 %	55 %
LEM60X10	0.66	0.83	1.04	1.31	1.70	2.35
LEM60X12	0.41	0.52	0.66	0.83	1.07	1.49
LEM60X14	0.27	0.34	0.43	0.54	0.70	0.97
LEM60X20	-	0.16	-	0.27	-	0.42
LEM60X25	-	0.11	-	0.18	-	0.31

% vacuum	55 %	60 %	65 %	70 %	75 %	80 %
LEM90X10, LEMAX90X10	1.76	2.04	2.38	2.80	3.33	4.09
LEM90X12, LEMAX90X12	1.13	1.31	1.53	1.80	2.15	2.64
LEM90X14, LEMAX90X14	0.73	0.85	0.99	1.16	1.38	1.70
LEM90X20, LEMAX90X20	0.38	-	0.55	-	0.80	-
LEM90X25, LEMAX90X25	0.26	-	0.35	-	0.50	-

5

Weight of micro/mini-ejectors in grams

Model	Nozzle size (mm)							
	0.5	0.7	0.9	1.0	1.2	1.4	1.5	2.0
CIL (Size 1)	7	9	-	-	-	-	-	-
CIL (Size 2)	-	-	13	-	-	-	-	-
VR	20.7	20.5	20.2	45.4	45.4	45.4	-	-
GVR	20.7	20.5	20.2	45.4	45.4	45.4	-	-
GVRL	-	-	-	28	-	-	-	-

Weight of vacuum pumps in grams

Model	Nozzle size (mm)				
	1.0	1.5	2.0	2.5	3.0
GVP	100	110	160	180	265
GVPS	176.5	186.5	236.5	256.5	341.5
GVPD	208.5	218.5	268.5	278.5	363.5
LEM	80 to 120 g, depending on the model.				
LEM+	410 to 460 g, depending on the model.				
LEMAX	100 to 130 g, depending on the model.				
LEMAX+	410 to 460 g, depending on the model.				
GVMAXE	-	-	-	510	-
GVMAXP1	maximum weight 440				
GVMAXV2/V2R	-	-	-	550	-
GVMAXV3	-	-	-	-	450
GEM	maximum weight 250				
GEMP	maximum weight 265				

Micro Ejectors

Chapter 6

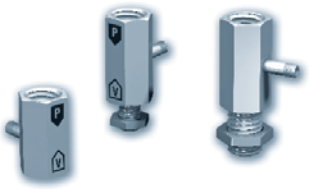
CIL

In-line Ejectors

- 2 sizes
- 3 nozzle Ø: 0.5 ; 0.7 ; 0.9 mm
- Suction flow rate: 0.25 to 0.8 SCFM
- Optimum supply pressure: 5 bar
- Weight between 7 and 13g
- Push fitting
- In-line connection
- Easily integrated
- No clogging
- Installation very close to the suction cups
- Very flexible installation
- Adaptable to all industries

P 6/2

VR



Heavy-duty in-Line Ejectors

- 2 models
- Nozzle Ø: 0.5 ; 0.7 ; 0.9 ; 1 ; 1.2 ; 1.4 mm
- Suction flow rate: 0.25 to 2.26 SCFM
- Optimum supply pressure: 5 bar
- Weight between 20 and 45 g
- Silencer option
- Wide range
- Very compact
- Direct installation on suction cups
- Excellent mechanical resistance
- Reduced gripping time
- Blow-off option
- Extended suction flow rate range
- Silent operation
- Adaptable to all industries

P 6/4

GVR

Heavy-duty in-Line Ejectors

- 2 models
- Nozzle Ø: 0.9 ; 1 ; 1.2 ; 1.4 mm
- Suction flow rate: 0.74 to 2.26 SCFM
- Optimum supply pressure: 5 bar
- Weight: 45 g
- Integrated silencer
- Very compact
- Direct installation on suction cups
- Excellent mechanical resistance
- No clogging
- Reduced gripping time
- Blow-off option
- Extended suction flow rate range
- Silent operation
- Adaptable to all industries

P 6/8

GVRL

Ultra Light in-Line Ejector for High Speeds

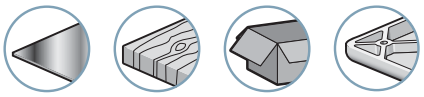
- Nozzle Ø: 1 mm
- Suction flow rate: 1.02 SCFM
- Optimum supply pressure: 3.5 bar
- Weight 28 g
- Silencer option
- Ultra compact and light weight
- Easily integrated onto grippers
- Excellent mechanical resistance
- Dust resistant
- Direct installation on suction cups
- Ideal for high speed robotics

P 6/10

CIL
In-line Ejectors

Due to their lightweight and compact design (only 7 to 13 g depending on the version), the "just plug it in" CIL ejectors can be easily integrated into the compressed air network and very close to the suction cups, even in the most inaccessible parts of the machine.

Industry-specific applications



Use

COVAL advises using CIL in-line ejectors for handling electronic components and other lightweight objects, feed systems, "Pick and Place" applications and separating systems for machining sheet metal or plastics.

Advantages

- Simple, efficient connection
  Push fittings, M12 male or M14 male thread.
- Improved reliability due to no moving mechanical parts.
- Silent operation
  Nozzle-mixer combination resulting from new COVAL fluidics.
- Optimized performance

CILs are available in 3 nozzle diameters (0.5, 0.7 and 0.9 mm), max. vacuum 85%.
Size 1 (M12): 0.5 and 0.7 nozzles
Size 2 (M14): 0.9 nozzle

Characteristics

References	Ø nozzle	Air consumed (SCFM)	Maximum vacuum (%)	Air drawn in (SCFM)	At air pressure (bar)
CIL 190X05R	0.5	0.34	85	0.25	5
CIL 190X07R	0.7	0.65	85	0.48	5
CIL 290X09R	0.9	1.08	85	0.80	5

Note: All dimensions are in mm

Evacuation Time in Seconds per Liter

% vacuum	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	85 %
CIL 190X05R	0.92	1.96	3.18	4.63	6.38	8.79	12.17	18.96	27.39
CIL 190X07R	0.46	0.98	1.58	2.28	3.13	4.27	5.8	8.55	11.01
CIL 290X09R	0.31	0.65	1.05	1.52	2.09	2.85	3.87	5.7	7.34

Specifications

Supply	non-lubricated filtered air, 5 microns (ISO standard 8573-1 class 4)
Optimum operating pressure	5 bar
Weight	7 to 13 g, depending on the model
Materials	PA6.6 15 % FV – 2017A
Operating temperature	32 to 140°F

Flexible Installation

Push fitting

Removable axial mounting directly on the pipe using push fittings.

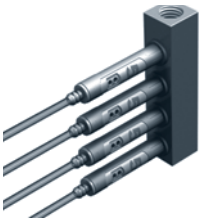
Available in two sizes

- For calibrated pipe 2.7 x 4 mm (size 1)
- For calibrated pipe 4 x 6 mm (size 2)

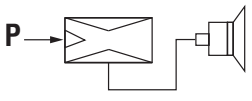
Integrated fitting

M12 (size 1) or M14 (size 2) incorporated male thread allows the CIL in-line module to be fitted easily and securely.

Manifold mounting



M12 (size 1) or M14 (size 2) incorporated male thread allows several CIL in-line vacuum modules to be integrated into a machined block to feed several suction cups simply and economically from a single source of compressed air.



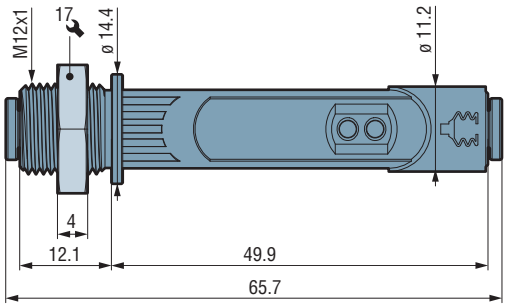
Delivered with a zinc-plated steel fastening nut.

Please specify the part n°. e.g. CIL190X05R
See Characteristics table above

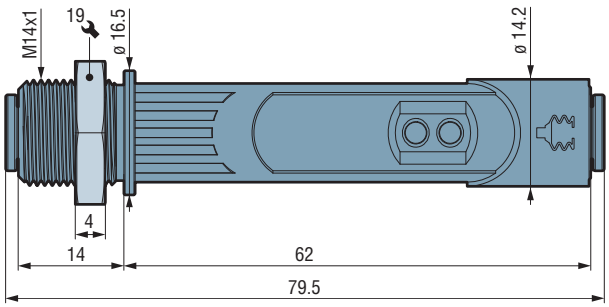
CIL
In-line Ejectors
Dimensions and Data Curves

Dimensions

Size 1



Size 2

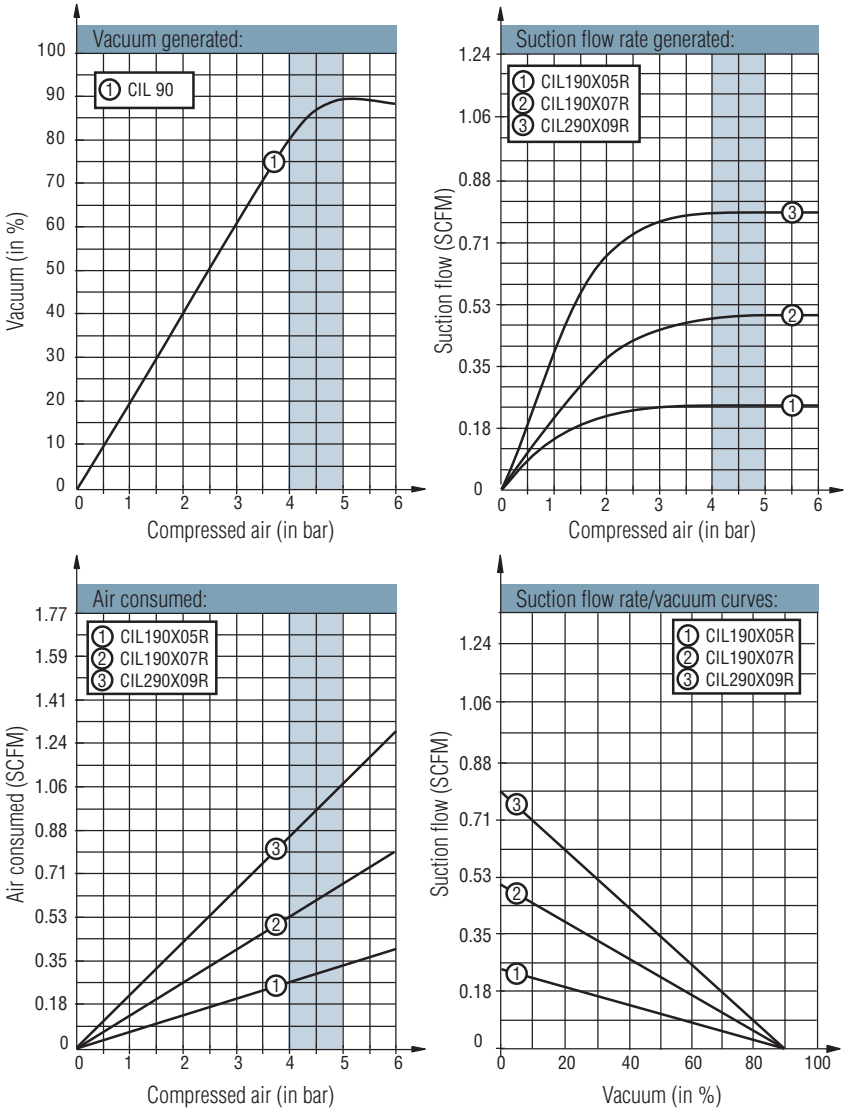


Note: All dimensions are in mm

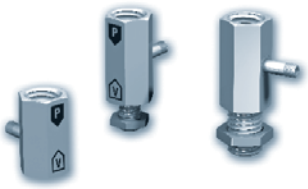
Advantages

- Adaptable to all industries
- In-line connection
- Installation very close to the suction cups
- No clogging
- Very flexible installation
- Silent operation

Data Curves



VR 05, 07, 09
Heavy-duty In-line Ejectors

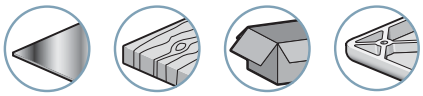


The main advantage of the VR series in-line ejectors is that they can be mounted directly on the suction cup, which simplifies plumbing.

By integrating the ejector on the suction cup, we obtain a localized vacuum and, therefore, the possibility of obtaining multiple independent grips, even in the absence of objects.

It is also possible to supply vacuum to two or more suction cups using a G1/8" or G1/4" T-shaped fitting.

Industry-specific applications



Advantages

- Wide range
- Adaptable to all industries
- Lightweight and compact
- Reduced gripping time
- Direct installation on suction cups
- Excellent mechanical resistance
- Blow-off option
- Extended range of suction flow rates
- No clogging
- Silent operation

Characteristics

Model	Ø Nozzle	Air consumed (SCFM)	Maximum vacuum (%)	Air drawn in (SCFM)	At air pressure (bar)
VR 05	0.5	0.42	87	0.25	5
VR 07	0.7	0.74	90	0.49	5
VR 09	0.9	1.27	90	0.74	5

Note: All dimensions are in mm

Evacuation Time in Seconds per Liter

% vacuum	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	85 %
VR05	0.92	1.96	3.18	4.63	6.38	8.79	12.17	18.96	27.39
VR07	0.46	0.98	1.58	2.28	3.13	4.27	5.8	8.55	11.01
VR09	0.31	0.65	1.05	1.52	2.09	2.85	3.87	5.7	7.34

Specifications

Supply	Non-lubricated filtered air, pressure 2 to 6 bar
Optimum operating pressure	5 bar
Weight	20 g
Material	2017A - Cu Zn
Temperature	32 to 176 °F.

When ordering, please specify: Model + Nozzle diameter + Vacuum outlet e.g.: VR07M6

1: Model	2: Ø Nozzle		3: Vacuum outlet	
VR	**05**	Ø 0.5 mm	**M6**	M6 Female
	07	Ø 0.7 mm	**M18**	G1/8" Male
	09	Ø 0.9 mm	**M14**	G1/4" Male
			F18	G1/8" Female
			F14	G1/4" Female

Additional Information

Mounting on spring systems

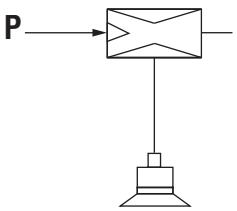
- Spring system, series TS3, available strokes: 10, 30, 50, 70mm, page 4/4.
- TSO series anti-rotation spring system-, page 4/6.
- Ball-joint systems, IMU series, page 4/11.

Customized on request

- Alternate material option: stainless steel or plastic, based on specifications.
- Special characteristics such as suction flow rate or vacuum level.
- On request for the F18 model, M5 ancillary vacuum fitting for connection of a vacuum switch.

New function

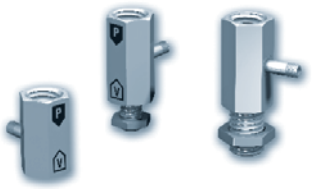
- Silencer option: (ref. **SILGV10M5F**)
- Vacuum or blow-off switch, on request.



VR 05, 07, 09

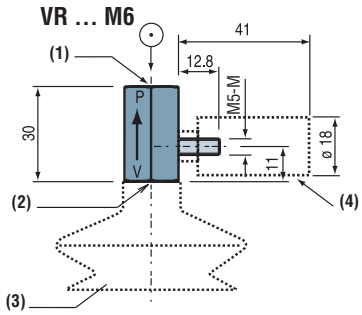
Heavy-duty In-line Ejectors

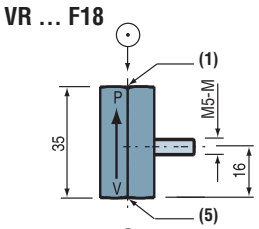
Dimensions and Data Curves

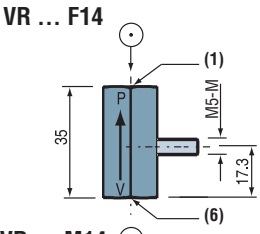


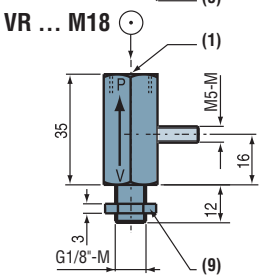
Dimensions

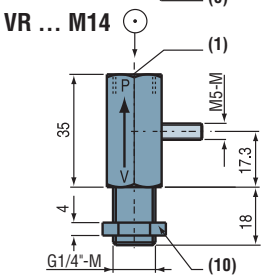
(**1**) G1/4"-F C.A. inlet, depth 10 mm
(**2**) M6-F vacuum outlet, depth 6 mm
(**3**) Example of suction cup
(**4**) Silencer
(**5**) G1/8"-F vacuum outlet, depth 7.5 mm
(**6**) G1/4"-F vacuum outlet, depth 10 mm
(**7**) Compressed air
(**8**) Exhaust
(**9**) Hexagonal nut, 14 across flats
(**10**) Hexagonal nut, 19 across flats





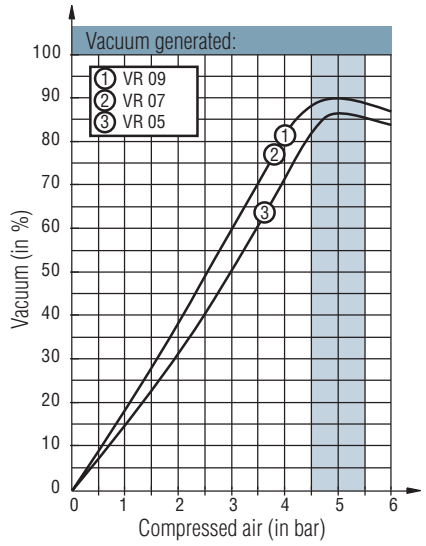


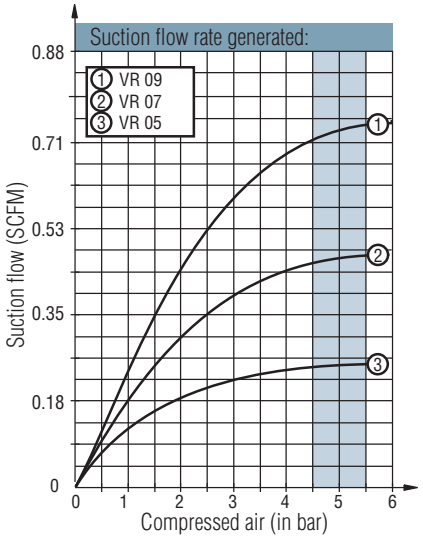


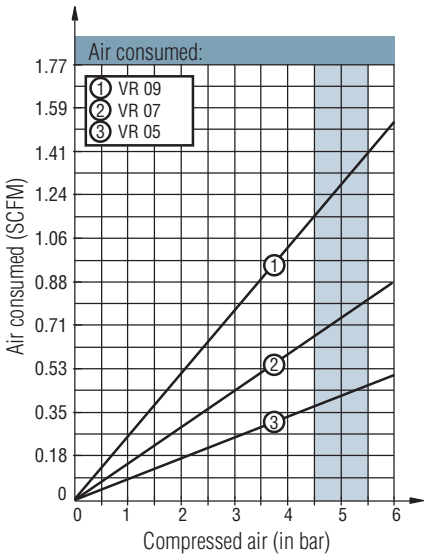


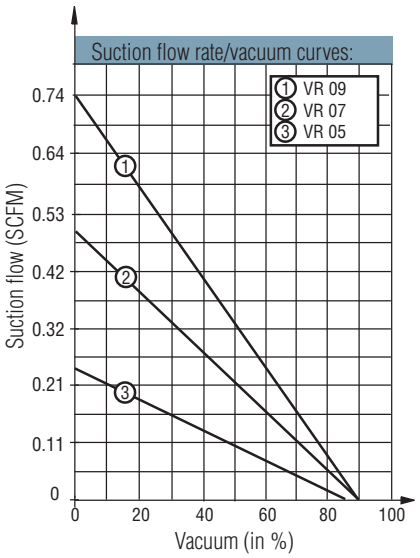
Note: All dimensions are in mm

Data Curves

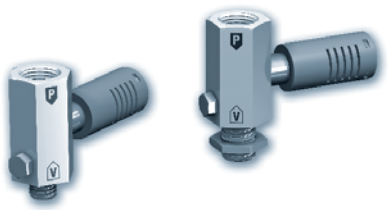








VR 10, 12, 14
Ejector Fittings

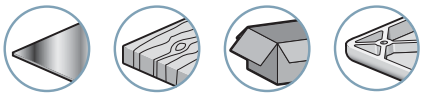


Based on the same principle as the VR 05, 07, 09, the main advantage of the VR 10, 12, 14 series is that they can be mounted directly on larger suction cups due their optimum technical characteristics.

The aluminum design guarantees:

- Excellent mechanical resistance
- Lightweight
- Ideal for miscellaneous gripping.

Industry-specific applications



Advantages

- Wide range
- Adaptable to all industries
- Lightweight and compact
- Reduced gripping time
- Direct installation on suction cups
- Excellent mechanical resistance
- Blow-off option
- Extended range of suction flow rates
- No clogging
- Silent operation

Characteristics

Model	Ø nozzle	Air consumed (SCFM)	Maximum vacuum (%)	Air drawn in (SCFM)	At air pressure (bar)
VR 10	1	1.55	90	0.95	5
VR 12	1.2	2.37	90	1.59	5
VR 14	1.4	3.81	90	2.26	5

Note: All dimensions are in mm

Evacuation Time in Seconds per Liter

% vacuum	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	85 %
VR 10	0.24	0.51	0.82	1.18	1.62	2.21	3.01	4.43	5.71
VR 12	0.14	0.3	0.49	0.71	0.97	1.33	1.81	2.66	3.42
VR 14	0.1	0.21	0.34	0.5	0.68	0.93	1.27	1.85	2.44

Specifications

Supply	Non-lubricated filtered air, pressure 2 to 6 bar
Optimum operating pressure	5 bar
Weight	50 g
Material	2017A - Cu Zn
Temperature	32 to 176 °F.

When ordering, please specify:
Model + Nozzle diameter + Vacuum outlet + Silencer
e.g.: VR12M10S

1: Model	2: Ø Nozzle		3: Vacuum outlet		4: Silencer	
VR	**10**	Ø 1 mm	**M14**	G1/4" Male	**S**	SILGV 10
	12	Ø 1.2 mm	**M10**(1)	M10x125 Male	**K**	SILK 18 C (2)
	14	Ø 1.4 mm				

(1) especially for VPG 60, 80 and 95 suction cups

(2) SILK 18 C through-type silencer dimensions, see page 10/2.

Additional Information

As standard

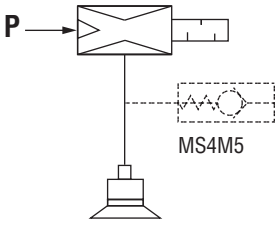
- New functions: vacuum switch or blow-off switch with or without silencer (SILGV 10).

Optional

- MS2M5 or MS4M5 blow-off valves with no-return valve on vacuum (see page 10/3).

Special

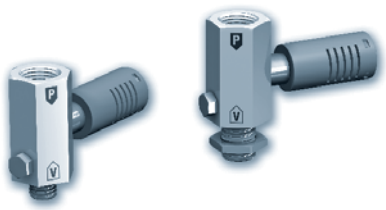
- Coval offers the product best adapted to your needs based on your specifications, and advises you according to your applications (material, shape, special technical characteristics).



VR 10, 12, 14

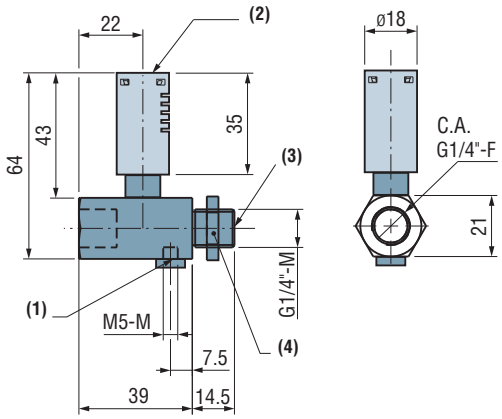
Ejector Fittings

Dimensions and Data Curves

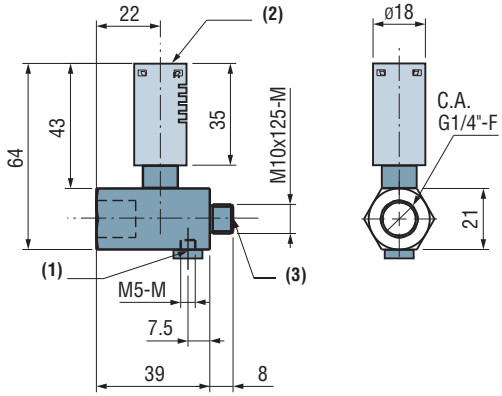


Dimensions

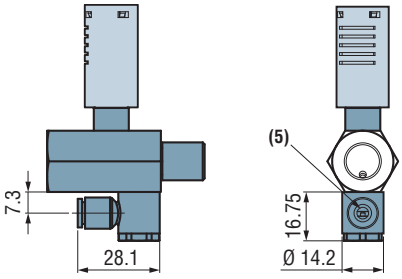
M14 version with mounting nut



M10 version

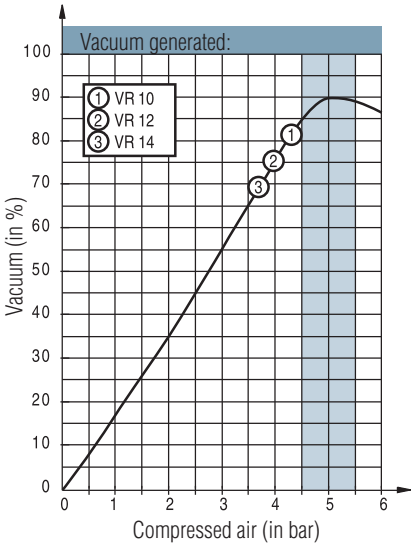


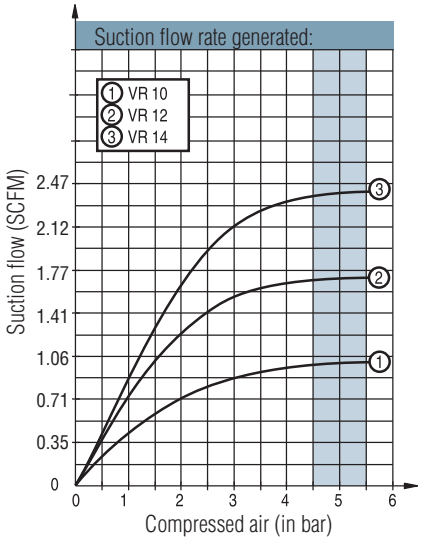
VR + MS4M5 version

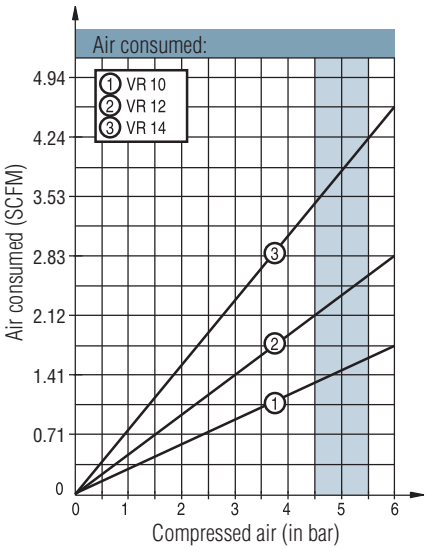


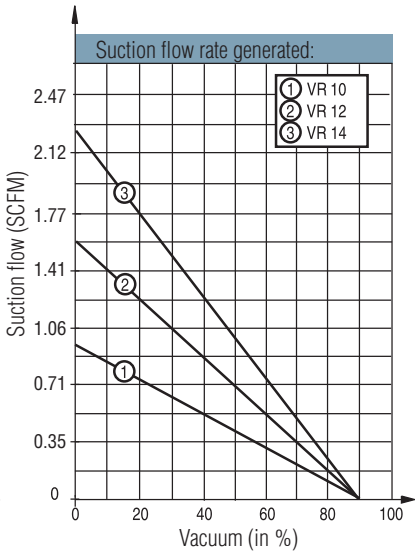
(**1**) Blow-off or vacuum switch
(**2**) Silencer
(**3**) Vacuum
(**4**) Hexagonal nut, 19 across flats
(**5**) Push fitting, external Ø 6

Data Curves







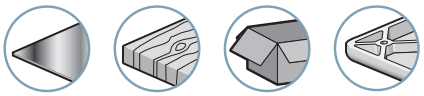


Note: All dimensions are in mm

GVR 09, 10, 12, 14
Micro Ejectors

The GVR range is designed for an industrial environment:
- Compact
- Lightweight
- Optimized technical characteristics
- Pollution-resistant with its through-type silencer (SILK 18C)
- Easily integrated onto vacuum gripper
- Pass-through mounting using M10 screws (GVR09)

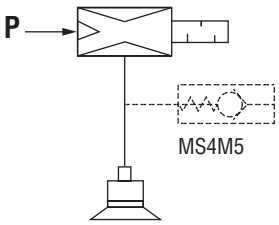
Industry-specific applications



Advantages
- Adaptable to all industries
- Lightweight and compact
- Reduced gripping time
- Direct installation on suction cups
- Excellent mechanical resistance
- Blow-off option
- No clogging
- Silent operation

Additional Information
As standard
- Vacuum switch or blow-off switch with SILGV 10. SILK18C silencer (through-type) on request.

Optional
- MS2M5 or MS4M5 blow-off valves with non-return valve on vacuum (see page 10/3).



Characteristics

Models	Ø nozzle	Air consumed (SCFM)	Maximum vacuum (%)	Air drawn in (SCFM)	At air pressure (bar)
GVR 09	0.9	1.27	85	0.74	5
GVR 10	1	1.55	85	0.95	5
GVR 12	1.2	2.37	85	1.59	5
GVR 14	1.4	3.81	85	2.26	5

Note: All dimensions are in mm

Evacuation Time in Seconds per Liter

% vacuum	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	85 %
GVR 09	0.31	0.65	1.05	1.52	2.09	2.85	3.87	5.7	7.34
GVR 10	0.24	0.51	0.82	1.18	1.62	2.21	3.01	4.43	5.71
GVR 12	0.14	0.3	0.49	0.71	0.97	1.33	1.81	2.66	3.42
GVR 14	0.1	0.21	0.34	0.5	0.68	0.93	1.27	1.85	2.44

Specifications

Supply	Non-lubricated filtered air, pressure 2 to 6 bar
Optimum operating pressure	5 bar
Weight	40 g
Material	2017A - Cu Zn
Temperature	32 to 176 °F.

When ordering, please specify: Model + Nozzle diameter + Silencer e.g.: GVR12K

1: Model	2: Ø nozzle		3: Silencer	
GVR	**09**	Ø 0.9 mm	**-**	Without
	10	Ø 1 mm	**S**	SILGV 10
	12	Ø 1.2 mm	**K**	SILK 18 C (1)
	14	Ø 1.4 mm		

(1) SILK 18 C through-type silencer dimensions, see page 10/2.

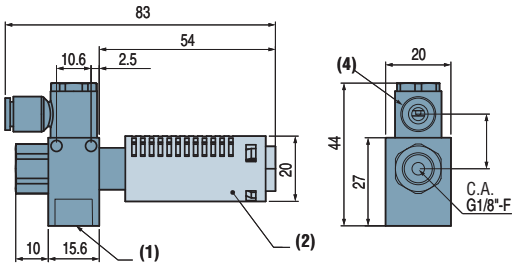
GVR 09, 10, 12, 14

Micro Ejectors

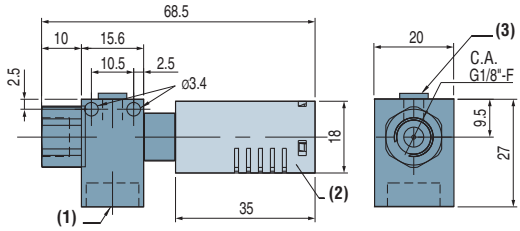
Dimensions and Data Curves

Dimensions

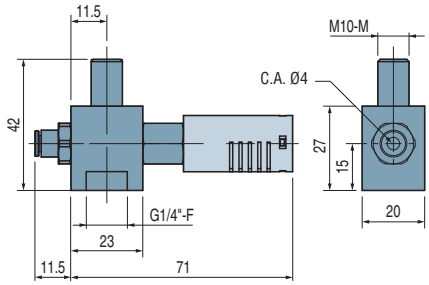
GVR 10, 12, 14 + MS4M5



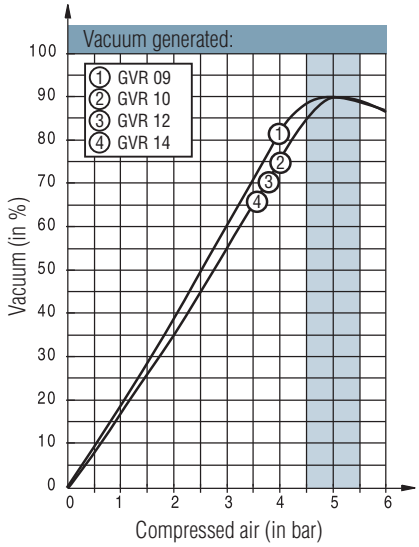
GVR 10, 12, 14

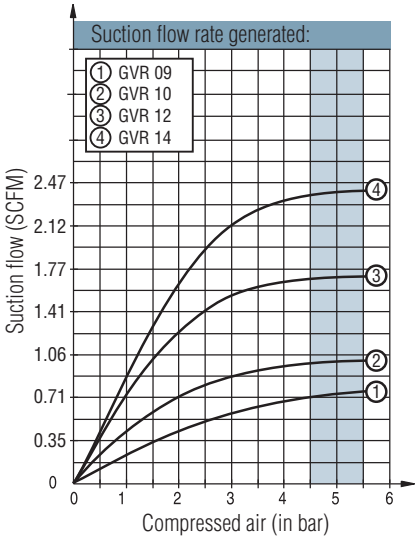


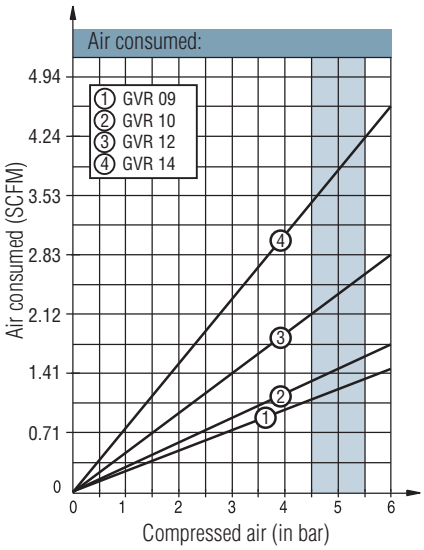
GVR 09

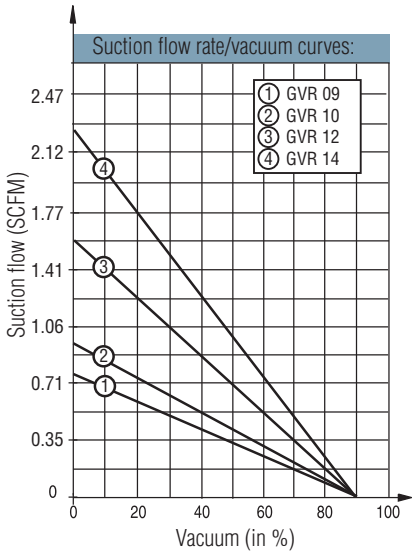


Data Curves









(**1**) Vacuum G1/4"-F
(**2**) Silencer
(**3**) M5-F plug for vacuum switch
(**4**) Push fitting, outside Ø 6

Note: All dimensions are in mm

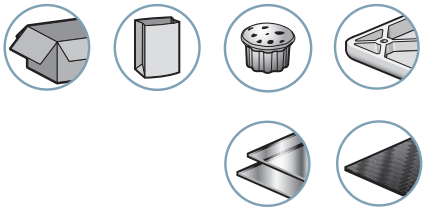
GVRL 10

Ultra Light In-line Ejector for High Speeds

Due to its ultra light and compact nature, the GVRL ejector can be easily integrated onto automated, high-speed grippers. Its tough aluminum design is reliable and allows the GVRL to be mounted directly to the suction cup.

- Compact
- Lightweight
- Easy integration on grippers
- Excellent mechanical resistance
- Dust resistant
- Directly mounted onto suction cups
- Ideal for high-speed robotics (Flex-picker)

Industry-specific applications



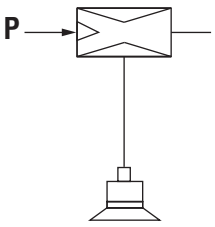
Connections

- Compressed air supply: G1/8"-Female
- Vacuum: G1/4"-Female
- Silencer: G1/4"-Female
- Vacuum switch plug available G1/8"-Female (supplied with stopper)

Characteristics

References	Ø nozzle	Air consumed (SCFM)	Maximum vacuum (%)	Air drawn in (SCFM)	At air pressure (bar)
GVRL 10	1	1.55	85	1.02	3.5

Note: All dimensions are in mm



Evacuation Time in Seconds per Liter

% vacuum	55%	60%	65%	70%	75%	80%
GVRL 10	1.76	2.04	2.38	2.8	3.33	4.09

Specifications

Supply	Non-lubricated filtered air, pressure 2 to 8 bar
Optimum operating pressure	3.5 bar
Noise level	70 dB maxi at 3.5 bar (without silencer)
Weight	28 g
Material	Laiton, Aluminium
Temperature	32 to 140 °F.

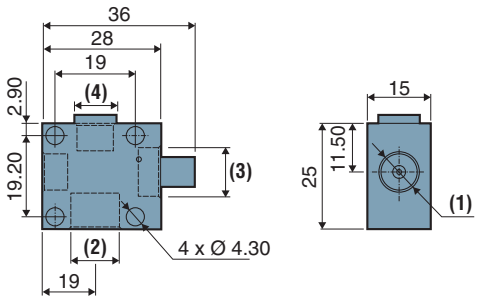
Please specify the part n°. e.g. GVRL10
See part n° table above

GVRL 10

Ultra Light In-line Ejector for High Speeds

Dimensions and Data Curves

Dimensions

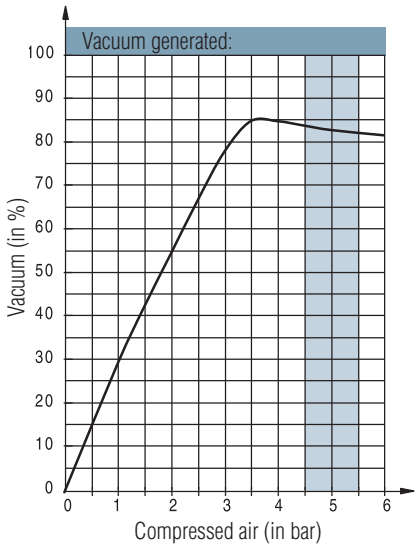


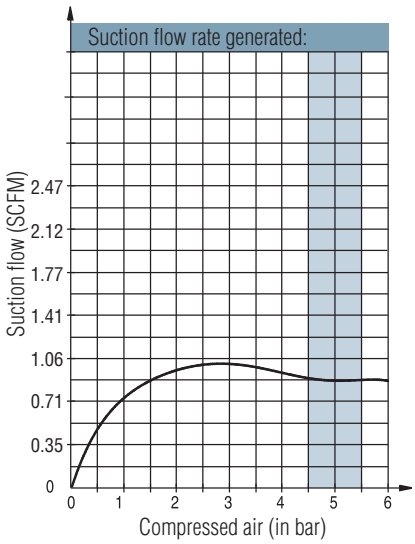
(**1**) C.A. G1/8"-F
(**2**) Vacuum outlet, G1/4"-F
(**3**) Silencer G1/4"-F, depth 4mm
(**4**) Vacuum switch plug G1/8"-F (supplied with stopper)

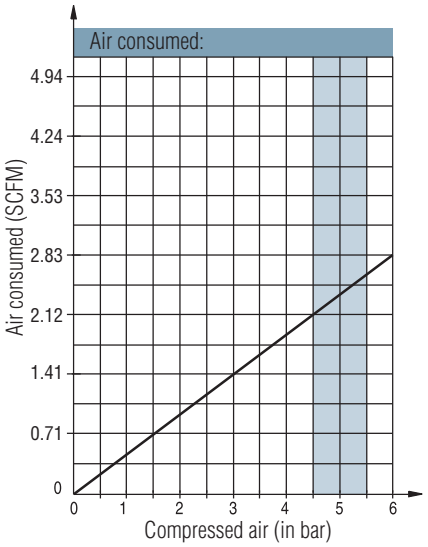
Options:

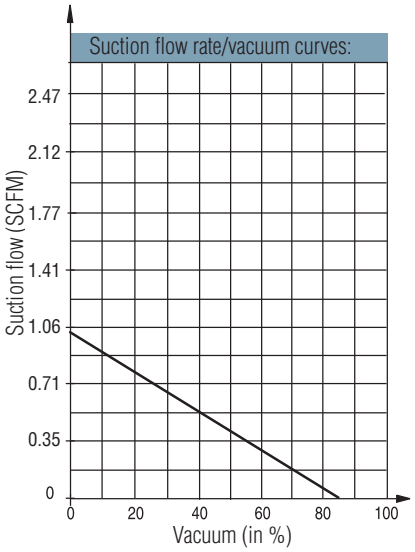
■ Through-type silencer SILK14C

Data Curves









6

GVRL

Note: All dimensions are in mm

Overview of Modular and Intelligent Vacuum Pumps

Chapter 7

Energy Savings

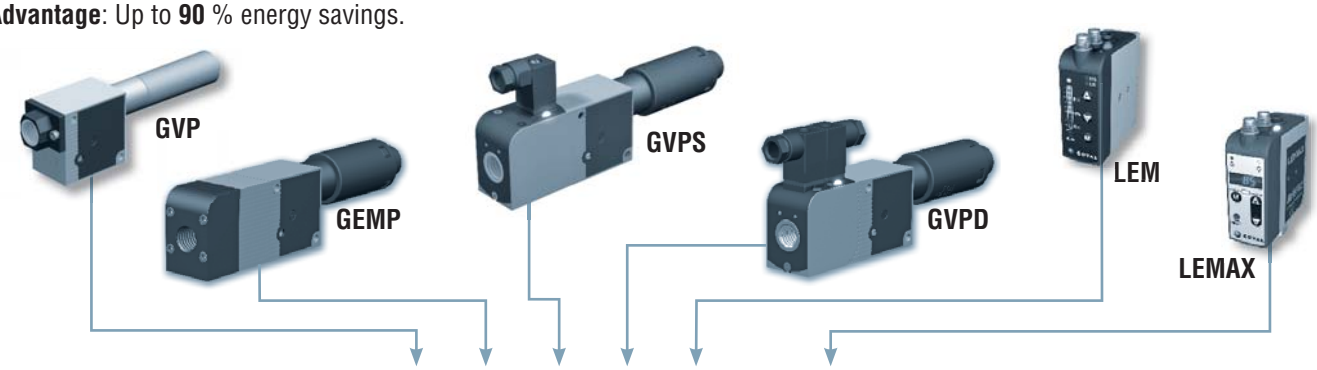
COVAL's intelligent vacuum pumps have 2 integrated technologies allowing substantial energy savings.

ASR (Air Saving Regulator) A "venturi pressure regulator" that guarantees optimized operation at 3.5 bar is included with most intelligent vacuum pumps: LEM, LEM+, LEMAX, LEMAX+, GEM and LEMCOM. Ideal for gripping of porous products or rough surfaces.

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

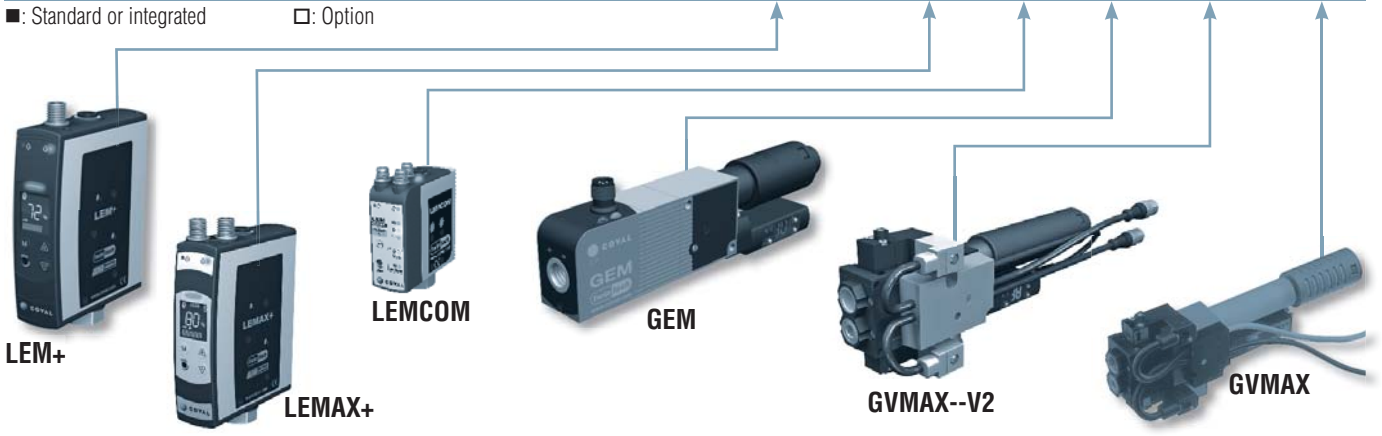
ASC (Air Saving Control) A vacuum regulation system that auto-adjusts to the product being handled and is included on the LEMAX, LEMAX+ and LEMCOM vacuum pumps. Ideal for gripping airtight products.

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



Functions \ Model	MODULAR VACUUM PUMPS Chapter 7				INTELLIGENT VACUUM PUMPS Chapter 8							
	GVP	GEMP	GVPS	GVPD	LEM	LEM+	LEMAX	LEMAX+	LEMCOM	GEM	GVMAX--V2	GVMAX
Compressed air control (Suction)			■	■	■	■	■	■	■	■	■	■
Blow-off control				■	■	■	■	■	■	■	■	■
Integrated pressure regulator (ASR)		■			■	■	■	■	■	■		
Powerful blow-off						■		■				
Electronic vacuum switch with display	□	□	□	□	■	■	■	■		■	■	■
Electronic vacuum switch	□	□	□	□					■	■		
Vacuum switch with electrical contact	□	□	□	□						■		
Vacuum check-valve	□		□	□	□		■	■	■	□	■	■
Electric control			■	■	■	■	■	■	■	■	■	■
Pneumatic control												■
Twin Tech (Integration & Intelligence)					■	■	■	■	■	■		
ASC (Air saving Control)							■	■	■			
Automatic vacuum regulation							■	■	■		■	■
M8 connections					■		■		■			
M12 connections						■		■		■	■	
Island Assembly Available					■		■		■			
Field bus Ethernet / IP™ / CANopen®									■			

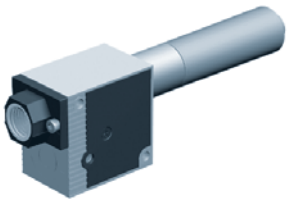
■: Standard or integrated □: Option



Modular Vacuum Pumps

Chapter 7

GVP

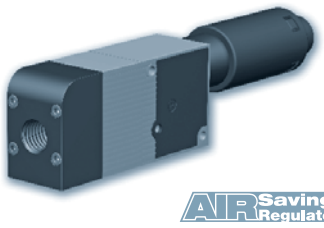


Modular Vacuum Pumps

- Nozzle Ø: 1.2 ; 1.5 ; 2 ; 2.5 ; 3 mm
- Suction flow rate: 1.59 to 15.9 SCFM
- Optimum supply pressure: 4 bar
- Integrated silencer
- Modular design with interchangeable options
- Compact
- Optimized performance for handling all types of objects
- Gripping time two times faster than multi-stage technology
- Silent operation
- No clogging
- Adaptable to all industries

P 7/3

GEMP

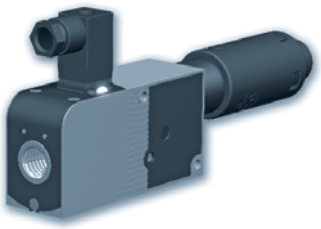


Simple Vacuum Pumps with ASR (Air Saving Regulator)

- Nozzle Ø 1.2 ; 1.5 ; 2 ; 2.5 ; 3 mm
- 2 levels of vacuum: 60% and 85%
- Suction flow rate between 2.54 to 13.6 SCFM
- Integrated supply pressure regulation (ASR)
- Integrated silencer
- Very compact and light-weight
- Ideal for all applications requiring an outside pressure regulator
- Exceptional energy savings thanks to automatic pressure regulation at 4 bar
- Optimized performance for handling all types of objects
- Silent operation
- No clogging

P 7/5

GVPS

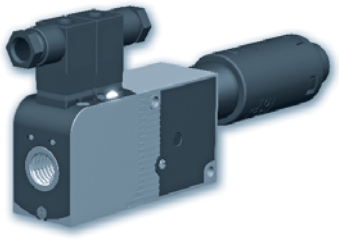


Vacuum Pumps with Electric Vacuum Control

- Nozzle Ø: 1.2 ; 1.5 ; 2 ; 2.5 ; 3 mm
- Suction flow rate: 1.59 to 15.9 SCFM
- Optimum supply pressure: 4 bar
- Integrated electric vacuum control
- Integrated silencer
- Modular design with interchangeable options
- Compact
- Optimized performance for handling all types of objects
- Silent operation
- No clogging
- Adaptable to all industries

P 7/7

GVPD



Vacuum Pumps with Blow-off and Electric Vacuum Control

- Nozzle Ø: 1.2 ; 1.5 ; 2 ; 2.5 ; 3 mm
- Suction flow rate: 1.59 to 15.9 SCFM
- Optimum supply pressure: 4 bar
- Integrated vacuum control and blow-off
- Integrated silencer
- Adjustable blow-off flow
- Modular design with interchangeable options
- Compact
- Optimized performance for handling all types of objects
- Silent operation
- No clogging
- Adaptable to all industries

P 7/9

GVP
Modular Vacuum Pumps

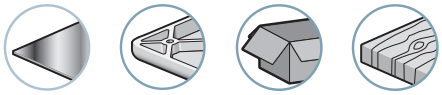
The GVP series vacuum pumps are the simplest in the modular range. They exist in 5 levels of power (suction rate) and 3 different levels of maximum vacuum:

- Version X (50% vacuum for very porous products).
- Version T (75% vacuum for porous products).
- Version N (85% vacuum for air-tight products).

For the same nozzle diameter, the suction flow rate increases proportionally to the decrease in the maximum vacuum level.

In addition to suction pads, they can also be used for dosing liquid, spraying and tank depressurization.

Industry-specific applications



Characteristics

Model	Ø Nozzle (mm)	Air consumed (SCFM)	Max. vacuum (%)			Air drawn in (SCFM)			At air pressure (bar)
			X	T	N	X	T	N	
GVP 12	1.2	2.37	40	75	85	5.30	2.22	1.59	4
GVP 15	1.5	3.53	50	75	85	6.36	3.35	2.47	4
GVP 20	2	6.36	50	75	85	8.83	5.65	4.41	4
GVP 25	2.5	9.53	50	75	85	12.71	8.48	7.06	4
GVP 30	3	14.13	50	75	85	15.90	11.65	9.36	4

As standard, versions N and T are delivered with silencer S and version X with silencer K. Only exception, the GVP 30 is fitted with silencer K.

Advantages

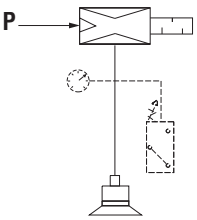
- Adaptable to all industries
- Optimized performance for handling all types of objects
- Modular design with interchangeable options
- Light and compact
- Silent operation
- No clogging thanks to the through type silencer

Evacuation Time in Seconds per Liter

% vacuum	10 %			20 %			30 %			40 %			50 %			60 %			70 %			80 %			85 %		
versions	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N
GVP12	0.05	0.10	0.14	0.11	0.22	0.30	0.22	0.37	0.49	0.62	0.55	0.71	-	0.78	0.97	-	1.16	1.33	-	1.92	1.81	-	-	2.66	-	-	3.42
GVP15	0.04	0.07	0.09	0.09	0.15	0.20	0.15	0.24	0.32	0.27	0.36	0.46	-	0.52	0.63	-	0.77	0.85	-	1.27	1.16	-	-	1.71	-	-	2.20
GVP20	0.03	0.04	0.06	0.06	0.09	0.12	0.11	0.14	0.19	0.19	0.22	0.28	-	0.31	0.38	-	0.46	0.52	-	0.76	0.71	-	-	1.04	-	-	2.13
GVP25	0.02	0.03	0.03	0.04	0.06	0.07	0.08	0.10	0.11	0.14	0.14	0.16	-	0.21	0.22	-	0.30	0.30	-	0.50	0.41	-	-	0.60	-	-	0.77
GVP30	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.11	0.10	0.12	-	0.15	0.17	-	0.22	0.23	-	0.37	0.31	-	-	0.45	-	-	0.58

Specifications

Supply	Non-lubricated filtered air, pressure 2 to 6 bar
Optimum pressure	4 bar
Weight	100 to 265g
Material	POM - 2017A – Cu Zn
Temperature	32 to 176 °F

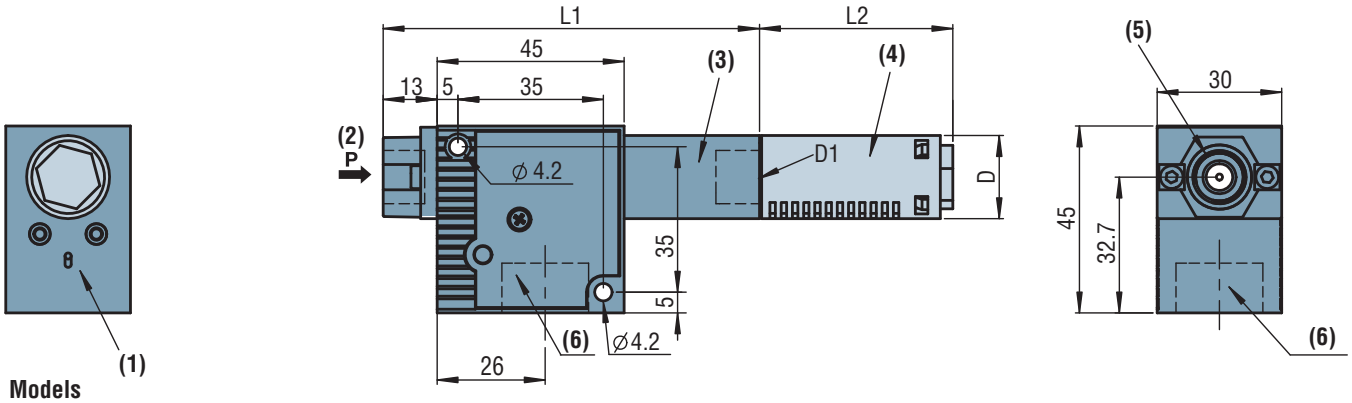


For all orders, please specify:
Model + Nozzle Ø + % vacuum + Silencer + C.A. fitting
e.g.: GVP30NK14

1: Model	2: Nozzle diameter		3: % vacuum		4: Silencer		5: C.A. fitting	
GVP	12	1.2 mm	X	50 % vacuum	-	Without silencer	14	G1/4" Female
	15	1.5 mm	T	75 % vacuum	S (1)	Diffuser		
	20	2 mm	N	85 % vacuum	K	Through-type		
	25	2.5 mm						
	30	3 mm						

(1) no silencer for nozzle Ø 30.

GVP
Modular Vacuum Pumps
Dimensions



Models

	L1		L2			D		D1	
	X	**N/T**	**S(N/T)**	**K(N/T)**	**K(X)**	**X**	**N/T**	**X**	**N/T**
GVP12	76	81	46	68	121	30	20	G1/2 "-F	G1/4 "-F
GVP15	76	91	46	68	121	30	20	G1/2 "-F	G1/4 "-F
GVP20	76	76	62	121	121	30	30	G1/2 "-F	G1/2 "-F
GVP25	76	76	62	121	121	30	30	G1/2 "-F	G1/2 "-F
GVP30	148	148	-	121	121	30	30	G 1/2 "-F	G1/2 "-F

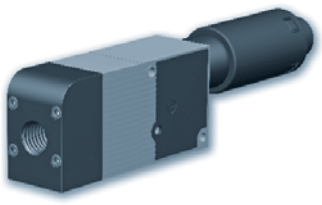
(**1**) Vacuum switch option mounting zone
(**2**) 4 bar compressed air supply
(**3**) Exhaust
(**4**) Silencer model S or K
(**5**) G1/4"-F
(**6**) Vacuum G1/2"-F

Options
- Vacuum switches see page 7/11 and 7/12
- Other options see pages 7/12 and 7/13
- Silencer see page 10/2.

Curves
See page 7/14

Note: all dimensions are in mm

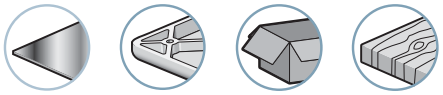
GEMP
Simple Vacuum Pump with ASR



AIR Saving Regulator

The GEMP series vacuum pumps are the simplest in the energy-saving range.
They automatically regulate the supply pressure to an optimal 4 bar thanks to an integrated pressure regulator (ASR). Energy savings are achieved regardless of the pressure in the compressed air network and without penalizing other applications which require more than 4 bar.
GEMP pumps therefore reduce both energy consumption and the noise level.

Industry-specific applications



Characteristics

Models	Ø Nozzle (mm)	Air consumed (SCFM)	Maximum vacuum (%)	Air drawn in (SCFM)	At air pressure (bar)
GEMP60x12	1.2	2.30	60	2.54	4
GEMP60x15	1.5	3.43	60	3.88	4
GEMP60x20	2.0	6.32	60	6.67	4
GEMP60x25	2.5	9.18	60	9.71	4
GEMP60x30	3.0	13.60	60	13.60	4
GEMP90x12	1.2	2.30	85	1.77	4
GEMP90x15	1.5	3.43	85	2.65	4
GEMP90x20	2.0	6.32	85	4.41	4
GEMP90x25	2.5	9.18	85	7.06	4
GEMP90x30	3.0	13.60	85	8.65	4

Advantages

- Modular design with interchangeable options
- Compact and light
- Exceptional energy savings
- Optimized performance for all types of applications
- Silent operation
- No clogging

Evacuation Time in Seconds per Liter

% vacuum	10	20	30	40	50	60	70	80	85
GEMP60x12	0.09	0.2	0.35	0.55	0.9	-	-	-	-
GEMP60x15	0.06	0.14	0.23	0.36	0.59	-	-	-	-
GEMP60x20	0.04	0.08	0.13	0.21	0.34	-	-	-	-
GEMP60x25	0.03	0.05	0.09	0.14	0.24	-	-	-	-
GEMP60x30	0.01	0.04	0.07	0.10	0.17	-	-	-	-
GEMP90x12	0.13	0.27	0.44	0.64	0.88	1.19	1.62	2.37	3.12
GEMP90x15	0.09	0.18	0.29	0.42	0.58	0.79	1.08	1.59	2.08
GEMP90x20	0.05	0.11	0.18	0.25	0.35	0.46	0.65	0.95	1.25
GEMP90x25	0.03	0.07	0.11	0.16	0.22	0.3	0.41	0.59	0.78
GEMP90x30	0.03	0.06	0.09	0.13	0.18	0.24	0.33	0.48	0.64

Specifications

Supply	Non-lubricated filtered air, 2 to 8 bar
Optimum pressure	4 bar
Weight	100 to 265g
Material	POM - 2017A – Cu Zn – PA6 15 % FV
Operating temperature	32 to 176 °F

Vacuum Switch Characteristics

See pages 7/11 and 7/12.

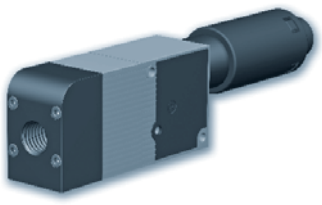
For all orders, please specify:
Model + % vacuum + X + Ø Nozzle + Vacuum switch.
e.g.: GEMP90X12VA

1: Model	2: % vacuum		X	4: Nozzle diameter		5: Vacuum switch	
GEMP	60	max. 60% vacuum. (porous objects)	X	12	1.2 mm	VA	electronic display
				15	1.5 mm	VB	electronic
	90	max. 85% vacuum (air-tight objects)		20	2 mm	VC	with electrical contact
				25	2.5 mm	VO	without vacuum switch
				30	3 mm		

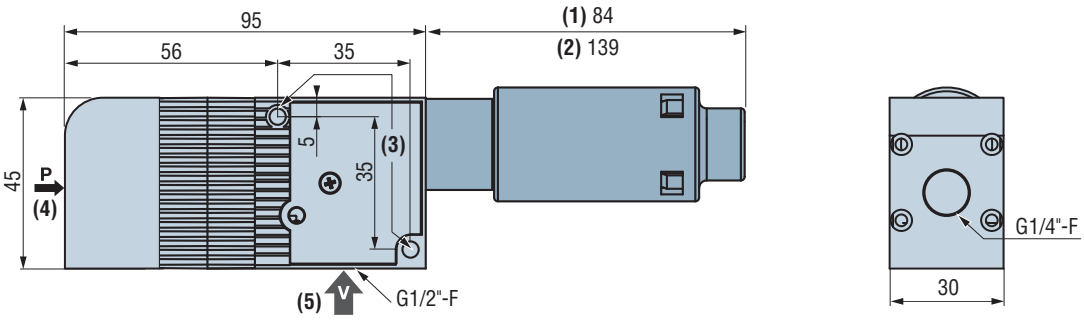
GEMP

Simple Vacuum Pump with ASR

Dimensions and Performance Curves

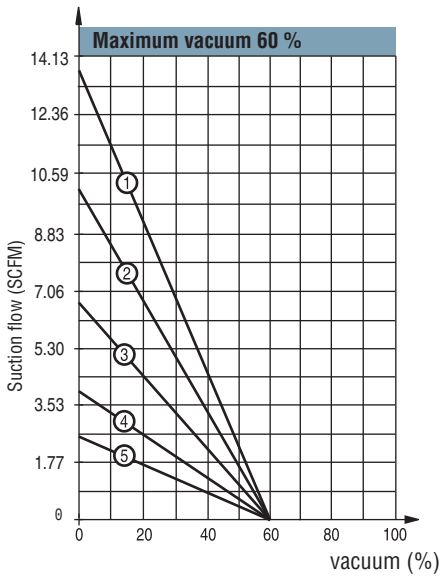


Dimensions

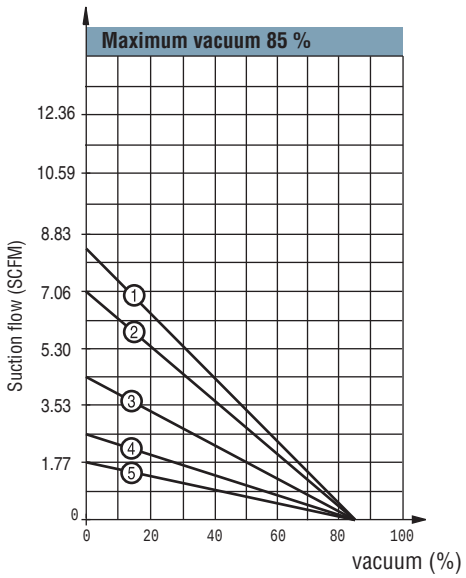


(**1**) silencer for nozzles Ø 1.2 or 1.5 mm (GEMP--X12--, GEMP--X15--)
(**2**) silencer for nozzles Ø 2 - 2.5 or 3 mm (GEMP--X20--, GEMP--X25--, GEMP--X30--)
(**3**) fittings Ø 4.2 mm
(**4**) G1/4"-F pressure fitting: pressure at 4 bar
(**5**) G1/2"-F vacuum fitting

Performance Curves



1 - GEMP60X30
2 - GEMP60X25
3 - GEMP60X20
4 - GEMP60X15
5 - GEMP60X12

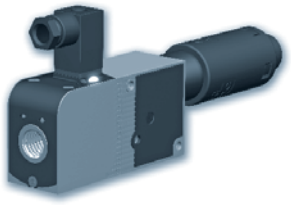


1 - GEMP90X30
2 - GEMP90X25
3 - GEMP90X20
4 - GEMP90X15
5 - GEMP90X12

Option
■ Vacuum switches see pages 7/11 and 7/12.

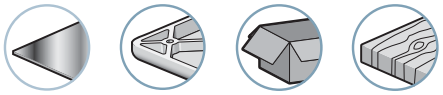
Note: all dimensions are in mm

GVPS
Vacuum Pumps with Electric Vacuum Control



GVPS series vacuum pumps control vacuum generation using an integrated valve. This installation simplifies wiring and reduces vacuum pump response times. The valve is electrically controlled (24 V DC).

Industry-specific applications



Characteristics

Model	Ø Nozzle (mm)	Air consumed (SCFM)	Max. vacuum (%)			Air drawn in (SCFM)			At air pressure (bar)
			X	T	N	X	T	N	
GVPS 12	1.2	2.37	40	75	85	5.30	2.22	1.59	4
GVPS 15	1.5	3.53	50	75	85	6.36	3.35	2.47	4
GVPS 20	2	6.36	50	75	85	8.83	5.65	4.41	4
GVPS 25	2.5	9.53	50	75	85	12.71	8.48	7.06	4
GVPS 30	3	14.13	50	75	85	15.90	11.65	9.36	4

As standard, versions N and T are delivered with silencer S and version X with silencer K. Only exception, the GVPS 30 is fitted with silencer K.

Advantages

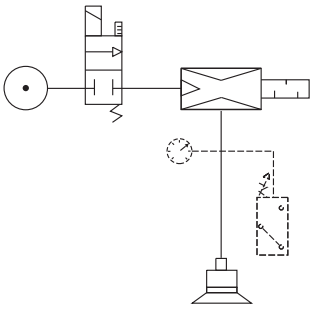
- Integrated electric vacuum control
- Adaptable to all industries
- Optimized performance for handling all types of objects
- Reduced wiring and easy-to-use
- Modular design with interchangeable options
- Light and compact
- No clogging thanks to the through type silencer
- Silent operation

Evacuation Time in Seconds per Liter

% vacuum	10			20			30			40			50			60			70			80			85		
versions	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N
GVPS 12	0.05	0.10	0.14	0.11	0.22	0.30	0.22	0.37	0.49	0.62	0.55	0.71	-	0.78	0.97	-	1.16	1.33	-	1.92	1.81	-	-	2.66	-	-	3.42
GVPS 15	0.04	0.07	0.09	0.09	0.15	0.20	0.15	0.24	0.32	0.27	0.36	0.46	-	0.52	0.63	-	0.77	0.85	-	1.27	1.16	-	-	1.71	-	-	2.20
GVPS 20	0.03	0.04	0.06	0.06	0.09	0.12	0.11	0.14	0.19	0.19	0.22	0.28	-	0.31	0.38	-	0.46	0.52	-	0.76	0.71	-	-	1.04	-	-	2.13
GVPS 25	0.02	0.03	0.03	0.04	0.06	0.07	0.08	0.10	0.11	0.14	0.14	0.16	-	0.21	0.22	-	0.30	0.30	-	0.50	0.41	-	-	0.60	-	-	0.77
GVPS 30	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.11	0.10	0.12	-	0.15	0.17	-	0.22	0.23	-	0.37	0.31	-	-	0.45	-	-	0.58

Specifications

Supply	Non-lubricated filtered air, 2 to 6 bar
Optimum press	4 bar
Voltage	24 V DC
Power	0.7 W
Materials	POM - 2017A – Cu Zn – PA6 15 % FV
Temperature	32 to 140 °F
Number of valve operations	10 million
Operating frequency	Maximum 2 Hz
Function	NC (NO on request)

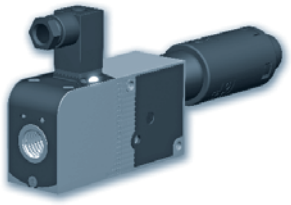


For all orders, please specify:
Model + Nozzle Ø + % Vide + Silencer + Fitting + Control
e.g.: GVPS30NK14E1

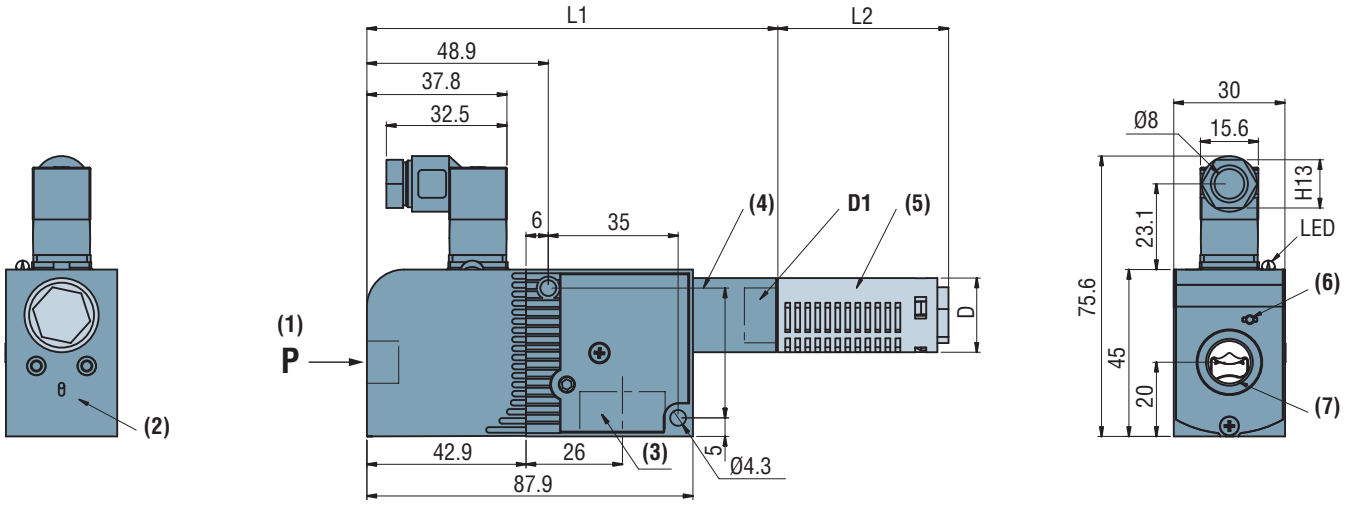
1: Model	2: Nozzle diameter		3: % vacuum		4: Silencer		5: C.A. fitting		6: Controls	
GVPS	12	1.2 mm	X	50 % vacuum	-	Without silencer	14	G1/4" Female	E1	24 VCC NC
	15	1.5 mm	T	75 % vacuum	S (1)	Diffuser			E...	Other voltages (2)
	20	2 mm	N	85 % vacuum	K	Through-type				
	25	2.5 mm								
	30	3 mm								

(1) No silencer (S) for nozzle Ø 30. (2) On request

GVPS
Vacuum Pumps with Electric Vacuum Control



Dimensions



Models	L1		L2			D		D1	
	X	N/T	S(N/T)	K(N/T)	K(X)	X	N/T	X	N/T
GVPS12	106	111	46	68	121	30	20	G1/2"-F	G1/4"-F
GVPS15	106	121	46	68	121	30	20	G1/2"-F	G1/4"-F
GVPS20	106	106	62	121	121	30	30	G1/2"-F	G1/2"-F
GVPS25	106	106	62	121	121	30	30	G1/2"-F	G1/2"-F
GVPS30	178	178	-	121	121	30	30	G1/2"-F	G1/2"-F

(**1**) 4 bar compressed air supply
(**2**) Vacuum switch option mounting zone
(**3**) Vacuum G1/2"-F
(**4**) Exhaust
(**5**) Silencer model S or K
(**6**) Manual controls
(**7**) G1/4"-F

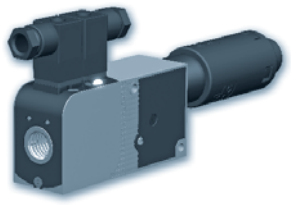
Options
- Vacuum switches see pages 7/11 and 7/12
- Other options see pages 7/12 and 7/13
- Silencer see page 10/2.

Curves
See page 7/14

Note: all dimensions are in mm

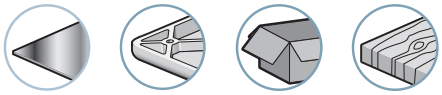
GVPD

Vacuum Pumps with Blow-off and Electric Vacuum Control



GVPD series vacuum pumps control vacuum generation and blow-off (adjustable flow). Controlling the force and duration of blow-off accelerates gripping/release rates, cleans objects before gripping and improves releasing process for large diameter suction pads.

Industry-specific applications



Characteristics

Model	Ø Nozzle (mm)	Air consumed (SCFM)	Max. vacuum (%)			Air drawn in (SCFM)			At air pressure (bar)
			X	T	N	X	T	N	
GVPD 12	1.2	2.37	40	75	85	5.30	2.22	1.59	4
GVPD 15	1.5	3.53	50	75	85	6.36	3.35	2.47	4
GVPD 20	2	6.36	50	75	85	8.83	5.65	4.41	4
GVPD 25	2.5	9.53	50	75	85	12.71	8.48	7.06	4
GVPD 30	3	14.13	50	75	85	15.90	11.65	9.36	4

As standard, versions N and T are delivered with silencer S and version X with silencer K. Only exception, the GVPD 30 is fitted with silencer K.

Advantages

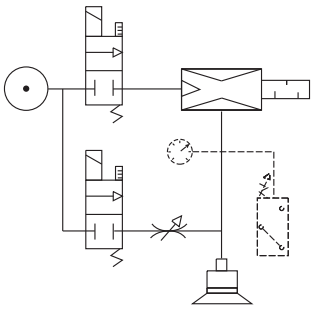
- Integrated electric vacuum and blow-off control
- Adaptable to all industries
- Optimized performance for handling all types of objects
- Reduced wiring and easy-to-use
- Modular design with interchangeable options
- Light and compact
- No clogging thanks to the through type silencer
- Silent operation

Evacuation Time in Seconds per Liter

% vacuum	10			20			30			40			50			60			70			80			85		
versions	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N	X	T	N
GVPD 12	0.05	0.10	0.14	0.11	0.22	0.30	0.22	0.37	0.49	0.62	0.55	0.71	-	0.78	0.97	-	1.16	1.33	-	1.92	1.81	-	-	2.66	-	-	3.42
GVPD 15	0.04	0.07	0.09	0.09	0.15	0.20	0.15	0.24	0.32	0.27	0.36	0.46	-	0.52	0.63	-	0.77	0.85	-	1.27	1.16	-	-	1.71	-	-	2.20
GVPD 20	0.03	0.04	0.06	0.06	0.09	0.12	0.11	0.14	0.19	0.19	0.22	0.28	-	0.31	0.38	-	0.46	0.52	-	0.76	0.71	-	-	1.04	-	-	2.13
GVPD 25	0.02	0.03	0.03	0.04	0.06	0.07	0.08	0.10	0.11	0.14	0.14	0.16	-	0.21	0.22	-	0.30	0.30	-	0.50	0.41	-	-	0.60	-	-	0.77
GVPD 30	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.11	0.10	0.12	-	0.15	0.17	-	0.22	0.23	-	0.37	0.31	-	-	0.45	-	-	0.58

Specifications

Supply	Non-lubricated filtered air, 2 to 6 bar
Optimum press	4 bar
Voltage	24 V DC
Power	0.7 W
Materials	POM - 2017A – Cu Zn – PA6 15 % FV
Temperature	32 to 140 °F
Number of valve operations	10 million
Operating frequency	Maximum 2 Hz
Function	NC (NO on request)



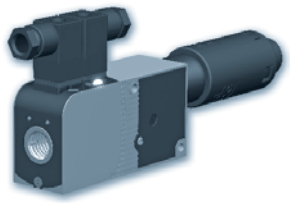
For all orders, please specify:
Model + Nozzle Ø + % Vide + Silencer + Fitting + Control
e.g.: GVPD25NK14E1

1: Model	2: Nozzle diameter		3: % vacuum		4: Silencer		5: C.A. fitting		6: Controls	
GVPD	**12**	1.2 mm	**X**	50 % vacuum	**-**	Without silencer	**14**	G1/4" Female	**E1**	24 VDC N.F.
	15	1.5 mm	**T**	75 % vacuum	**S** (1)	Diffuser			**E...**	Other voltages (2)
	20	2 mm	**N**	85 % vacuum	**K**	Through-type				
	25	2.5 mm								
	30	3 mm								

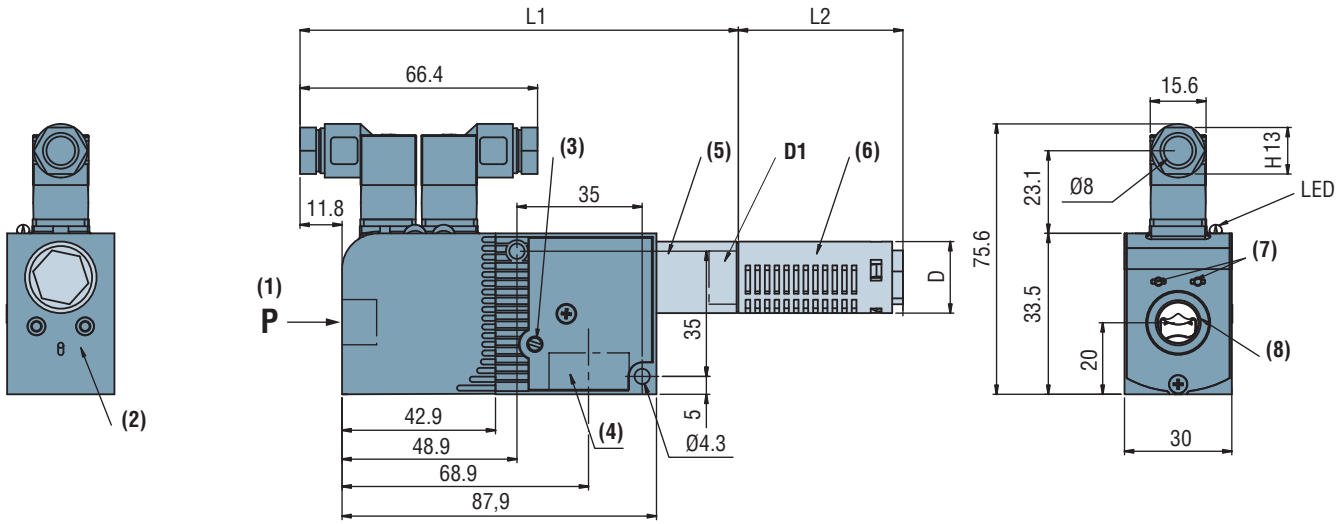
(1) No silencer (S) for nozzle Ø 30. (2) On request

GVPD

Vacuum Pumps with Blow-off and Electric Vacuum Control



Dimensions



Models	L1		L2			D		D1	
	X	N/T	S(N/T)	K(N/T)	K(X)	X	N/T	X	N/T
GVPD12	118	123	46	68	121	30	20	G1/2"-F	G1/4"-F
GVPD15	118	133	46	68	121	30	20	G1/2"-F	G1/4"-F
GVPD20	118	118	62	121	121	30	30	G1/2"-F	G1/2"-F
GVPD25	118	118	62	121	121	30	30	G1/2"-F	G1/2"-F
GVPS30	190	190	-	121	121	30	30	G1/2"-F	G1/2"-F

(**1**) 4 bar compressed air supply
(**2**) Vacuum switch option mounting zone
(**3**) Blow-off adjustment
(**4**) Vacuum G1/2"-F
(**5**) Exhaust
(**6**) Silencer model S or K
(**7**) Manual controls
(**8**) G1/4"-F

Options
- Vacuum switches see pages 7/11 and 7/12
- Other options see pages 7/12 and 7/13
- Silencer see page 10/2.

Curves
See page 7/14

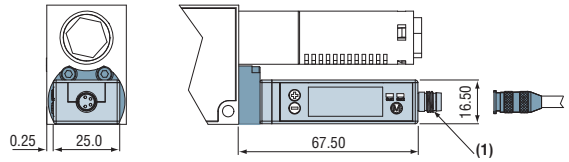
Note: all dimensions are in mm

Customer-mounted
Modular Vacuum Pump Options

Electronic Vacuum Switch with Display

GVO PSA 100 C option

(See exact characteristics page 11/4)



Delivered with M8 cable (2 meters)
(1) M8 connector

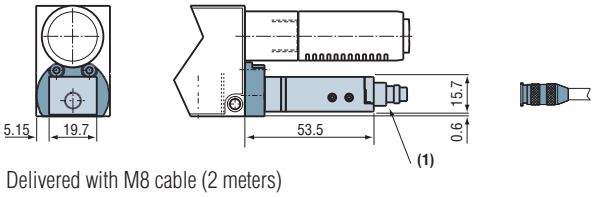
Our top-of-the-range electronic vacuum switch, the PSA 100C has an LED display showing the vacuum value in different units. It also has two separate outputs with independently regulated hysteresis, NO or NC

- PNP as standard
- M8 connector.
- Connection cable, see page 10/9.

Electronic Vacuum Switch

GVO PSP 100 C (M5), PSP 100 L (M5) option

(See characteristics page 11/7)



Delivered with M8 cable (2 meters)
(1) M8 4 pole connector

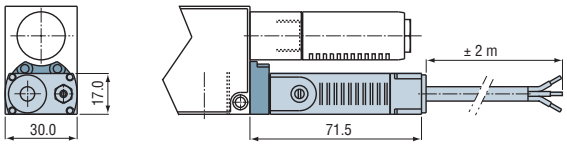
The vacuum data collected is always very reliable even with a large number of suction pads, thanks to the precision of the PSP 100. It has one output with hysteresis adjustment.

- PNP as standard
- M8 connector.
- Connection cable, see page 10/9.

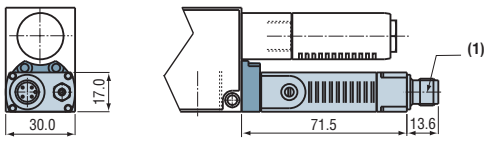
Vacuum Switch with Electrical Signal

GVO PSE 100 E or EC option

(See characteristics page 11/9)



GVO PSE 100 E with cable (length 2 metres)



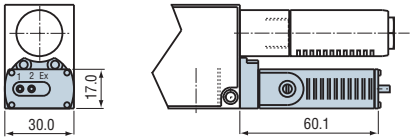
GVO PSE 100 EC with M12 connector (delivered without connection cable)
(1) M12 male connector

The PSE 100 E or EC vacuum switch indicates the level of vacuum in the suction pad circuit. For a small number of suction pads (5 to 10 maximum). This indication is enough to prove an object is gripped. Hysteresis (125mbar) must also be taken into account according to the use of the vacuum switch data.
Check that the vacuum pump supply pressure generates a level of pressure equal to the threshold setting.
For connection cable, see page 10/9.

Customer-mounted
Modular Vacuum Pump Options

Vacuum Switch with Pneumatic Signal

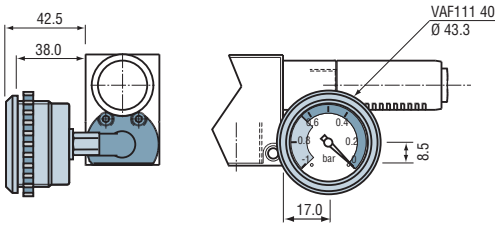
GVO PSE 100 P NO or NC option (see characteristics page 11/10)



For use in fully pneumatic applications or explosive environments. The vacuum switch enables a pressure data message to be given when a vacuum threshold is reached.

Vacuum Gauge

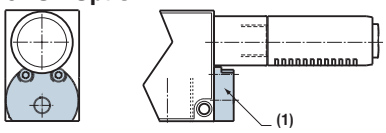
GVO VAF 111 40 option (See characteristics page 11/12)



The vacuum gauge displays the level of vacuum in the suction pad circuit. This option makes it simple to keep the status of the vacuum circuit under constant surveillance.

Plug to Shut off Vacuum Data

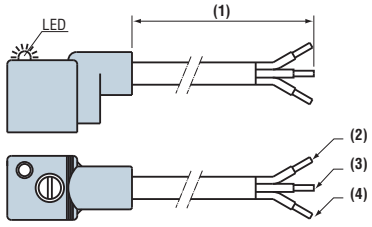
GVOB Option



(1) Plug

This plug option makes it possible to shut off the vacuum signal to avoid affecting operation of the vacuum pump if a GVO option is removed.

GVO CA 24 V option, (110 V or 220 V on request)



(1) L(2 meters) - (2) Brown - (3) Blue - (4) Yellow-Green - (Earth)

With anti-interference on electric valve control: factory-mounted.
Use of an anti-interference is recommended on the valve control when using electrically-controlled pumps. This anti-interference protects the equipment and ensures the valve control is reliable in electrically polluted environments.

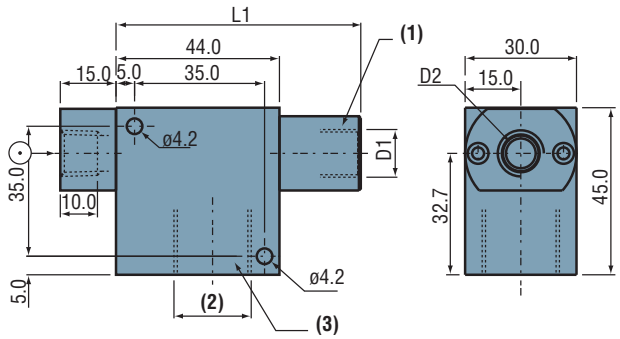
- As standard for 24V DC and CA control
- On request for other models

Factory-mounted
Modular Vacuum Pump Options

GVO AL and GVO AL NPT option (for GVP vacuum pump)

Body and flange G1/4"-F Gas in aluminum (on request).

■ Note: It is no longer possible to mount vacuum gauge options.



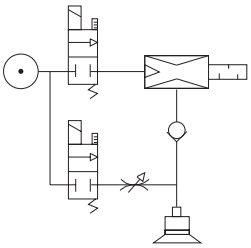
L1 = L1 GVP (plastic) - 1mm
D1 = D1 (GVP N, T and X)
D2 = G1/4"-F
1/4 NPT (on request)

(**1**) Exhaust
(**2**) G1/2"-F
(**3**) Vacuum

Check Valve Option - Ref. 02090101 (for GVPD vacuum pump)

Check valve option.

Requires blow-off downstream from the valve for release.

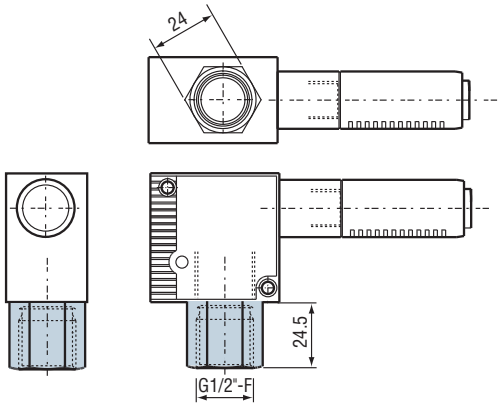


GVO P Option

With G1/2"-F protective extension.

The G1/2"-F extension is recommended for double valve models or with pneumatic vacuum switch to protect components during mounting or installation.

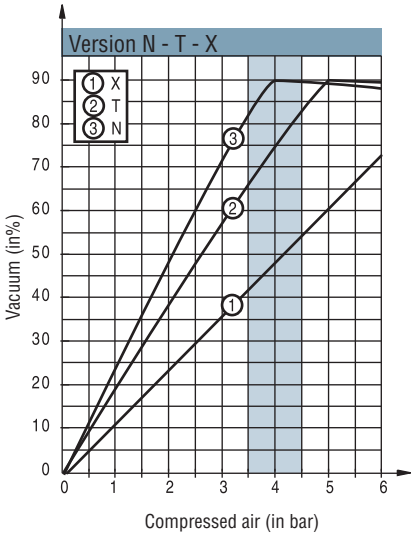
The extension is fitted with a 400 micron stainless steel filtration grid as standard.



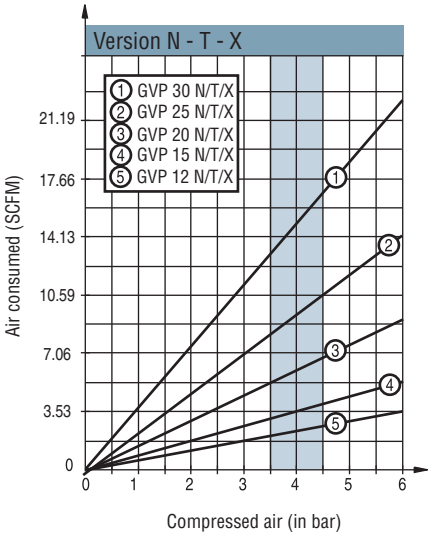
GVP - GVPS - GVPD

Performance Curves for Modular Vacuum Pumps

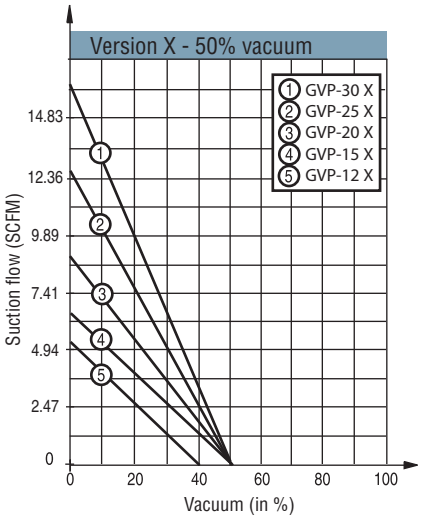
Vacuum Generated - Supply pressure 4 bar

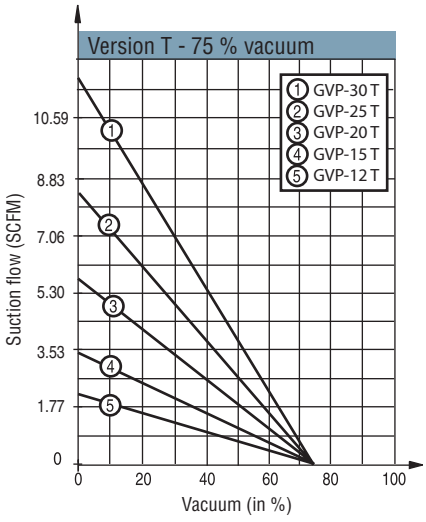


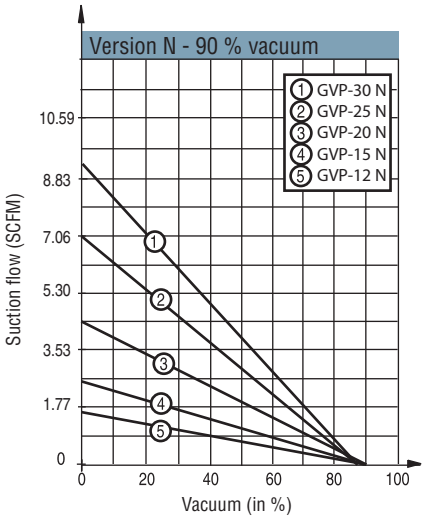
Air Consumed - Supply pressure 4 bar



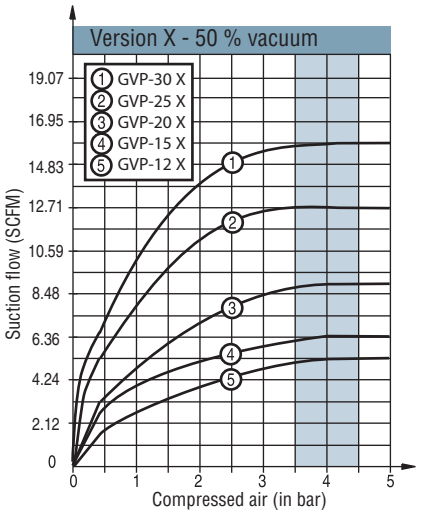
Suction Flow Rate/Vacuum Curves - Supply pressure 4 bar

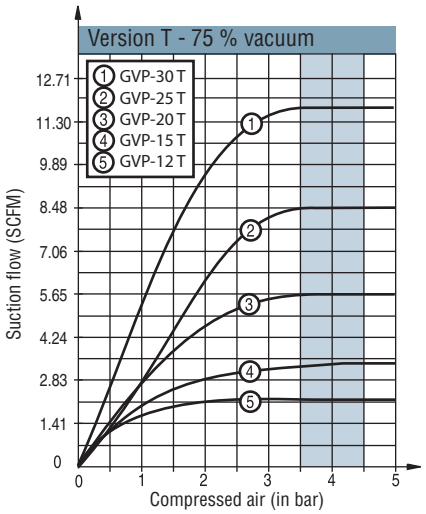


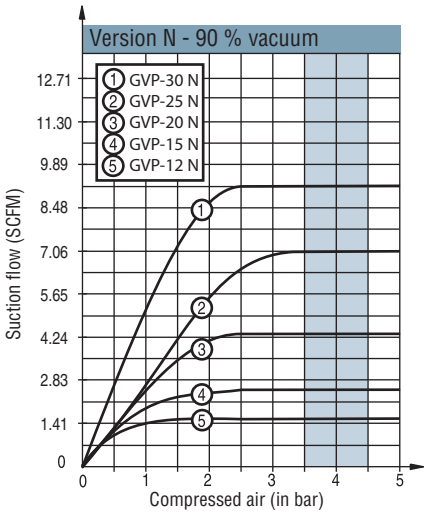




Suction Flow Rate Generated - Supply pressure 4 bar







Intelligent Vacuum Pumps

Chapter 8

Ultra-Compact series

LEM

twin tech Integration & Intelligence — AIR Saving Regulator

Integrated Mini-vacuum Pumps with ASR (Air Saving regulator)

- Nozzle Ø: 1; 1.2; 1.4 mm
- 2 vacuum levels: 60% and 85%
- Suction flow rate up to 3.25 SCFM
- Integrated pressure regulator (ASR)
- All required functions integrated internally
- M8 connections
- Stand-alone or island module
- For airtight and porous objects
- Ultra 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

P 8/3

LEM+

twin tech Integration & Intelligence — 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 9.71 SCFM
- 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

P 8/9

LEMAX

twin tech Integration & Intelligence — AIR Saving Control

Integrated Mini-vacuum Pumps with ASC (Air Saving Control)

- Nozzle Ø: 1; 1.2; 1.4 mm
- Vacuum levels: 85%
- Suction flow rate up to 2.47 SCFM
- Integrated pressure regulator (ASR)
- Integrated mini-vacuum pump (ASC)
- All required functions integrated internally
- M8 connections
- Stand-alone or island module
- For airtight and porous objects
- Ultra compact and lightweight
- Control panel for monitoring and adjustment
- ASC = 75 to 99% energy savings
- Reduced wiring
- Reduced installation time
- Adaptable to all industries

P 8/15

LEMAX+

twin tech Integration & Intelligence — AIR Saving Control

Compact High-flow Vacuum Pumps with ASC (Air Saving Control)

- Nozzle Ø: 2 ; 2.5 mm
- Vacuum levels: 85%
- Suction flow rate up to 7.06 SCFM
- Integrated pressure regulator (ASR)
- Integrated mini-vacuum pump (ASC)
- All required functions integrated internally
- M12 connections
- For airtight and porous objects
- Compact and lightweight
- Control panel for monitoring and adjustment
- ASC = 75 to 90% energy savings
- Reduced wiring
- Reduced installation time
- Adaptable to all industries

P 8/21

LEMCOM

twin tech Integration & Intelligence — AIR Saving Control — EtherNet/IP — CANopen

Mini-vacuum Pump Communicating via Industrial Field Bus

- Nozzle Ø: 1 ; 1.2 ; 1.4 mm
- 2 vacuum levels: 60 and 85%
- Suction flow rate up to 3.25 SCFM
- Integrated pressure regulator (ASR)
- Integrated mini-vacuum pump (ASC)
- Field bus: Ethernet IP™ ou CANopen®
- M8 connections
- Stand-alone or island module
- For airtight and porous objects
- Ultra compact and lightweight
- Settings and diagnosis by remote monitoring.
- ASC = 75 to 99% energy savings
- Reduced wiring
- Reduced installation time
- Adaptable to all industries

P 8/27

Intelligent Vacuum Pumps

Chapter 8

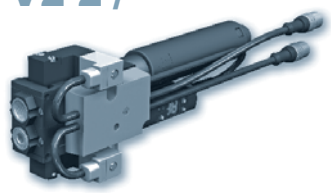
GEM

Vacuum Pump with ASR (Air Saving Regulator)

- Integrated energy-saving vacuum pumps
- Nozzle Ø 1.2 ; 1.5 ; 2 ; 2.5 ; 3 mm
- 2 levels of vacuum: 60% and 85%
- All required functions integrated internally
- Integrated pressure regulator
- Integrated M12 connection (Plug &Play)
- Energy savings exceeding 50 %
- Noise levels reduced by up to 30 dBa
- Modular design with interchangeable options
- Reduced wiring
- Reduced installation time
- No clogging
- Optimized performance for handling all types of objects
- Adaptable to all industries

P 8/37

GVMAX V2-2 / V2-2R



Self-regulating Vacuum Pump

- Electric vacuum and blow-off controls
- Nozzle Ø: 2.5 mm
- Maximum vacuum level 90%
- Vacuum regulation function
- Integrated vacuum solenoid valves and blow-off
- Integrated vacuum check-valve
- Compact and lightweight
- Ideal for retaining airtight objects in the automotive, plastics and sheet metal industries
- Energy savings thanks to the vacuum regulation function
- Safety guaranteed in case of power failure
- Optimized performance for handling all types of objects
- Silent operation
- No clogging

P 8/46

GVMAX

Self-regulating Vacuum Pump (electric or pneumatic control)

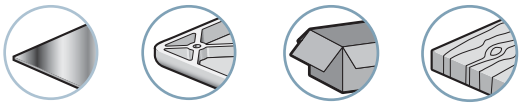
- Nozzle Ø: 2.5 mm
- Three vacuum levels: 50%, 75% and 90%
- Vacuum regulation function
- Integrated vacuum solenoid valves and blow-off
- 2 integrated non-return valves for pneumatic version and 1 for electric version
- Integrated vacuum switch to adjust the vacuum threshold and hysteresis
- Integrated silencer
- Compact and lightweight
- Ideal for retaining airtight objects in the automotive, plastics and sheet metal industries
- Energy saved by the vacuum regulation function
- Safety guaranteed in case of power failure
- Optimized performance for handling all types of objects
- Silent operation
- No clogging

P 8/48

LEM

Integrated Mini-Vacuum Pumps with ASR
(Air Saving Regulator)

Industry-specific applications



For all objects, porous or airtight

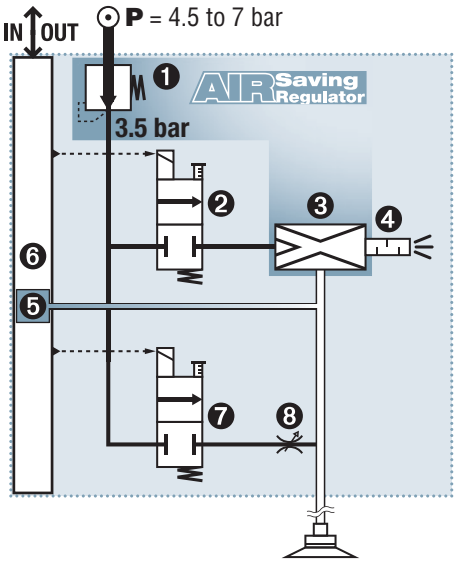
Advantages

- "All-in-one" solution, no more peripherals to be added.
- Simplified installation and use thanks to the Plug & Play system
- Unmatched compactness: Installation close to suction cups ➔ short response times and energy savings.
- No clogging, thanks to the through-type silencer.
- A LEM for every need: a wide range, with many options.
- Smart dialogue ➔ user friendly at all stages: initial settings, operation, maintenance.

Compact Integration

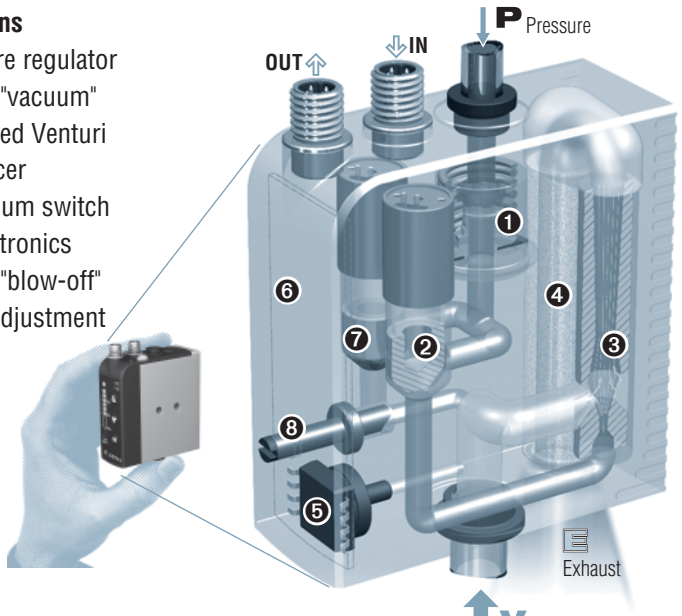
The illustrations below demonstrate the 8 functions integrated in the mini-module, and their respective roles in operation.
The result of this COVAL innovation is:

- **A mini module** (≅ 120 g) that is easy to install close to the suction cups, reducing the volume to be evacuated ➔ increased speed and energy savings.
- **A complete module** (including integrated pressure regulator and clog-free silencer), therefore not requiring any additional function or connection.



Integrated functions

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

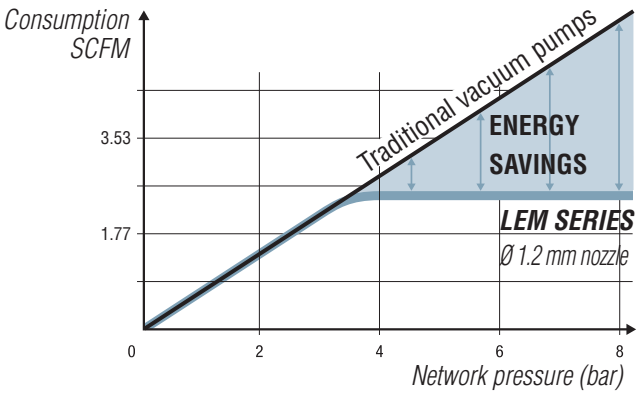
The LEM vacuum pumps, which integrate an **ASR** "venturi regulator" combination, maintain ideals that COVAL values greatly: reducing both compressed air consumption and noise generation.

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

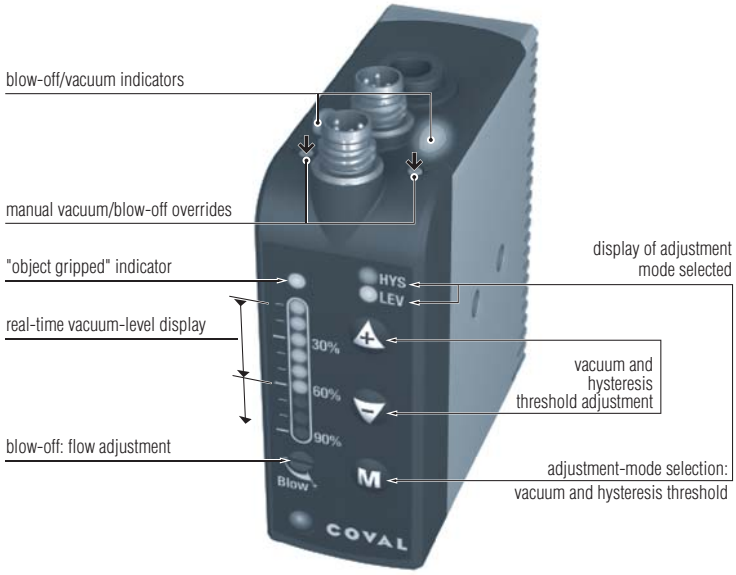
Integrated Mini-Vacuum Pumps with ASR

Smart Dialogue / Stand-alone and Island Modules

Smart Dialogue

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 by viewing each of the phases of the cycle: vacuum, blow-off, and rest.



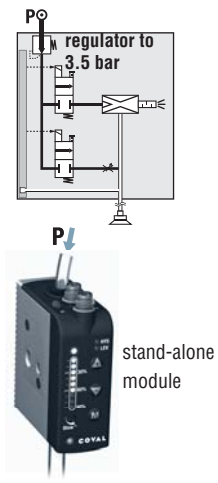
Stand-alone or Island Modules?

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 cupss 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.

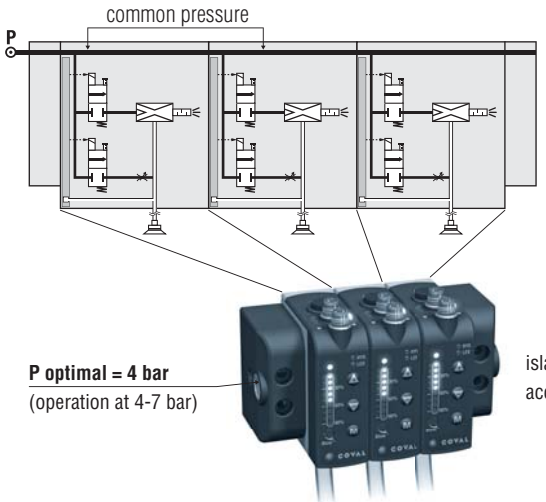
The diagrams below help in the selection:
- Stand-alone modules are complete, with the integrated pressure regulator (ASR, see p 8/3)
- in an island, the integrated regulator is absent: to maintain the advantage of economical and silent operation, it is recommended to reduce the pressure of the island's common pressure unit to 4 bar.

4.5 to 7 bar network pressure



stand-alone module

network pressure 4 bar



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

island of 3 modules supplying suction cups according to different sequences

8

LEM

LEM

Integrated Mini-Vacuum Pumps with ASR

Selection Guide

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.

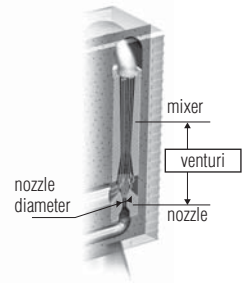
Select Vacuum Level and Nozzle Diameter

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.

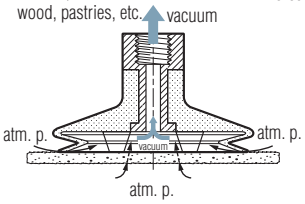
The table below helps to select the nozzle diameter which generates enough vacuumed air flow to respond in the time required by the application,based on a measurement of the material's leakage rate.

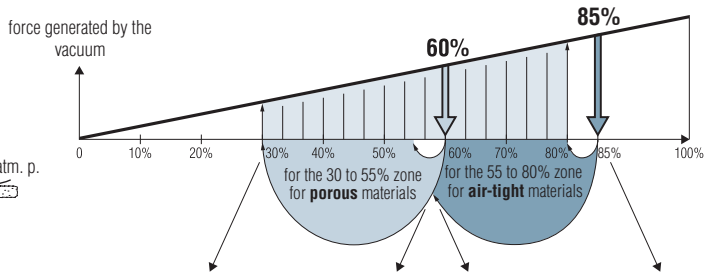
On the contrary, with an airtight material, the vacuum used is 55 % to 80 %, obtained by a 85 % max. vacuum pump.

- 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 (see p. 8/15).
- 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.

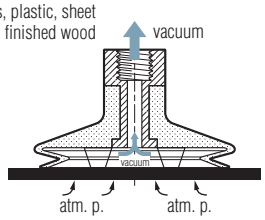


Porous materials:
cardboard, unfinished wood, pastries, etc.





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**

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

Airtight Objects ▸ Maximum Vacuum Level: 85%

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

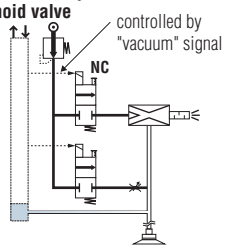
ø nozzle \ vacuum achieved	55%	60%	65%	70%	75%	80%	Air consumed *(SCFM)*	Air drawn in *(SCFM)*
1.0 mm	1.76	2.04	2.38	2.80	3.33	4.09	**1.55**	**1.02**
1.2 mm	1.13	1.31	1.53	1.80	2.15	2.64	**2.30**	**1.59**
1.4 mm	0.73	0.85	0.99	1.16	1.38	1.70	**3.18**	**2.47**

Select Vacuum Controlled by NC or NO Solenoid Valve

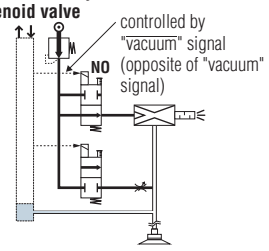
Vacuum controlled by a NC (Normally Closed) solenoid valve remains the simplest standard option to use. In the event of an electricity shutoff, the vacuum is interrupted and the object is released.

Select vacuum controlled by NO (Normally Open) solenoid valve if the application requires holding the object in the event of an electricity shut-off. In this case, make sure to control the NO solenoid valve with the inverse signal of the "vacuum" signal, which is noted as "$\overline{\text{vacuum}}$".

signal controlled by NC solenoid valve



signal controlled by NO solenoid valve



Select with or without Integrated Blow-off

Many applications require integrated blow-off. However, for some applications not requiring blow-off, a simplified version without blow-off is offered.

Select with or without Vacuum Switch

For common applications, the vacuum switch is needed, with the dialogue face for digital display and adjustment ➔ see page 8/4. 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

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

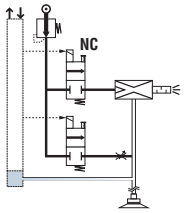
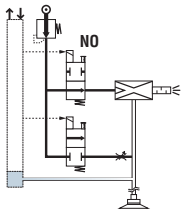
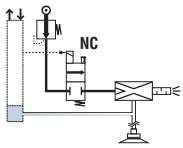
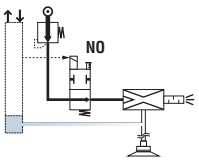
NOZZLE DIAMETER

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	

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.

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**

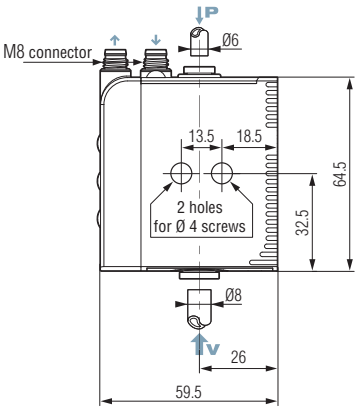
Stand-alone LEM Module, 60% max. vacuum, ø 1.2 mm nozzle, vacuum controlled by NC solenoid valve, blow-off and vacuum switch.

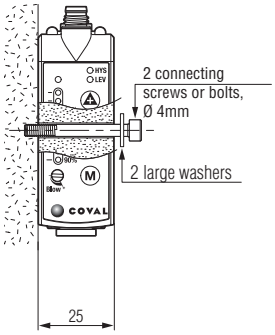
Integrated Mini-Vacuum Pumps with ASR

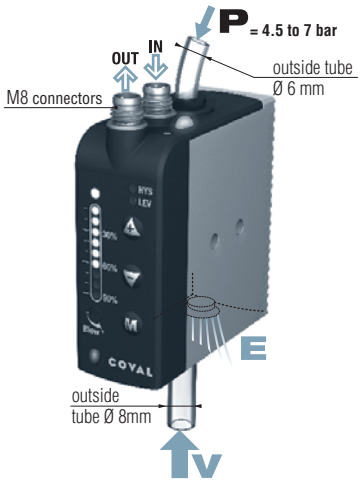
Dimensions / Mounting options

Stand-alone Modules

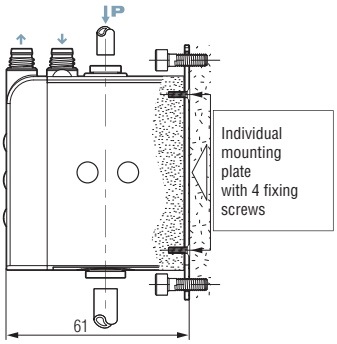
Side mounting

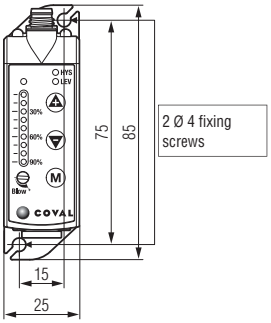






Front mounting

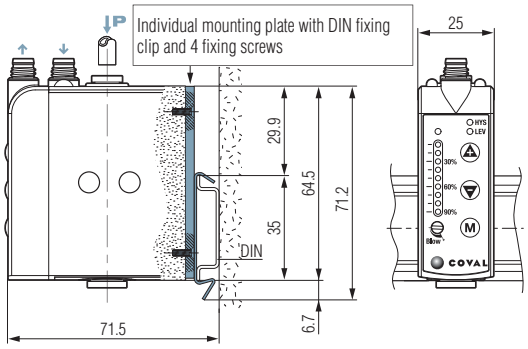




For front mounting, order the necessary kit, in addition to the module:

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

Mounting on DIN rail

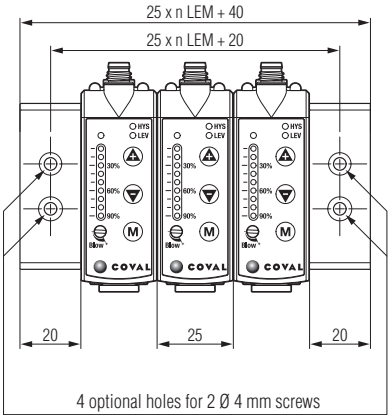


A module can be clipped onto a DIN rail.

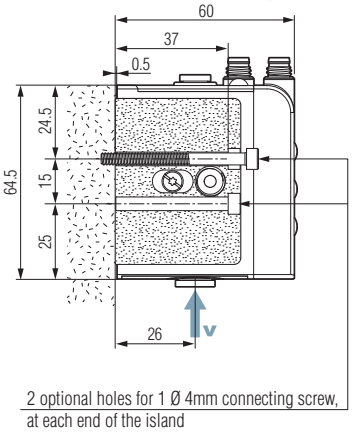
For this purpose, the module must first be equipped with an individual DIN installation plate, ordered separately:

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

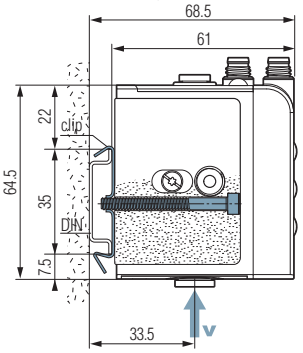
Islands



Front mounting



Mounting on DIN rail



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

LEM

Integrated Mini-Vacuum Pumps with ASR

Characteristics / Assembling an Island

Overall Characteristics

- Supply: non-lubricated air filtered to 5 microns according to standard ISO 8573-1 class 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 (see page 8/4).
- Suction rate: 1.02 to 3.25 SCFM depending on model (see page 8/5).
- Air consumption: 1.55 to 3.18 SCFM depending on model (see page 8/5).
- 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: 10 million cycles.
- Weight: 80 to 120 g, depending on model.
- Operating temperature: 50 to 140 °F.
- Materials: PA 6-6 15 %FV, brass, aluminium, NBR.

Integrated Vacuum-switch Characteristics

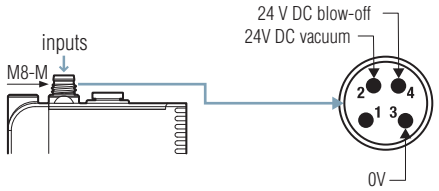
- Measuring range: -1 to 0 bar.
- Precision: ± 1.5% of the range.
- Hysteresis: adjustable from 0% to 100%.
- Output threshold: 1 x T.O.R. in NO.
- Analog output: 1 V DC to 5 V DC on the measuring range.
- Switching power: 125 mA, PNP.
- Threshold status display: 1 green LED.
- Supply voltage 24V DC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

Integrated-silencer Characteristics

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

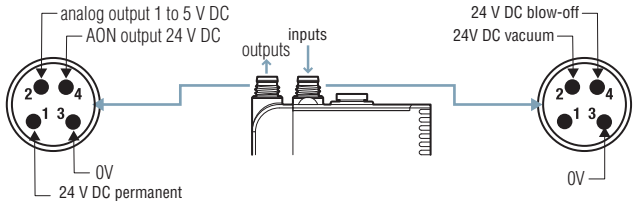
Electrical Connections

MODULES WITHOUT VACUUM-SWITCH FUNCTION



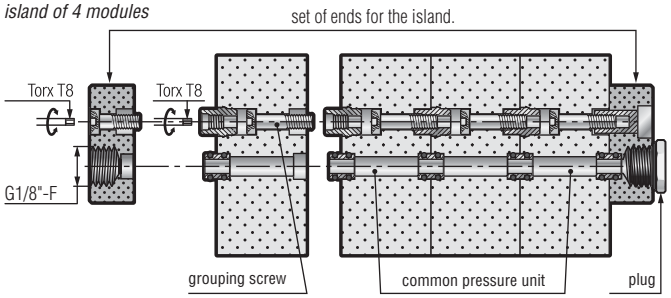
Note: straight and angled M8 connectors shown (p. 10/9).

MODULES WITH VACUUM-SWITCH FUNCTION



Characteristics and Connecting an Island

island of 4 modules

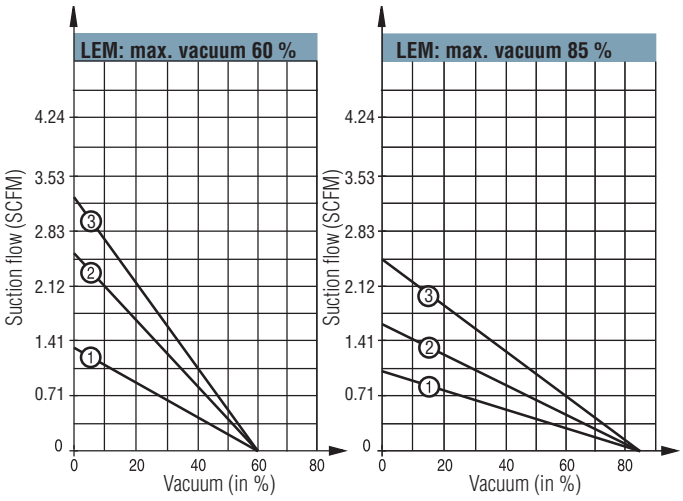


island of 3 modules

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

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.

8

LEM

LEM+

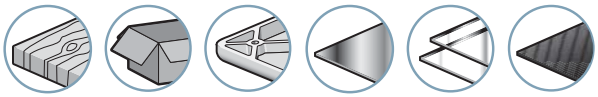
Compact, High Flow Vacuum Pumps

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** (see page 8/21).

Industry-specific applications



Advantages

- Easy implementation: Plug & Play, multiple choices, every type of application.
- Maximum automatic energy savings:
  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 (SCFM):

max. vacuum / nozzle Ø	60%	85%
2.0 mm	6.67	4.41
2.5 mm	9.71	7.06

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** optimised venturi

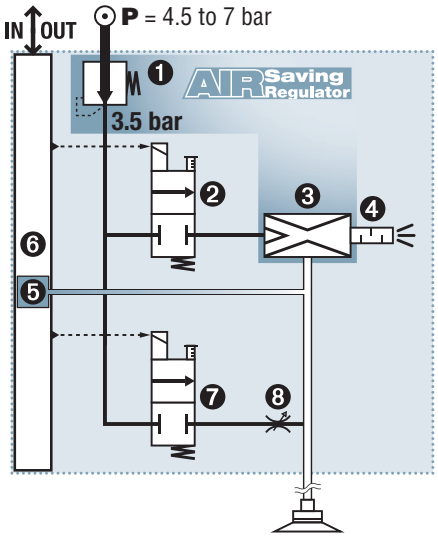
❹ Optimized silencer

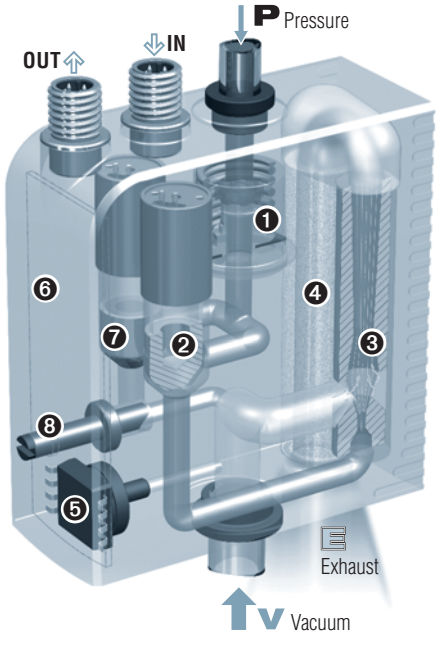
❺ Electronic vacuum sensor

❻ Integrated electronics

❼ "Blow-off" solenoid valve

❽ Blow-off flow rate regulator





Schematic representation

40% energy savings (on average, see p.8/10).

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

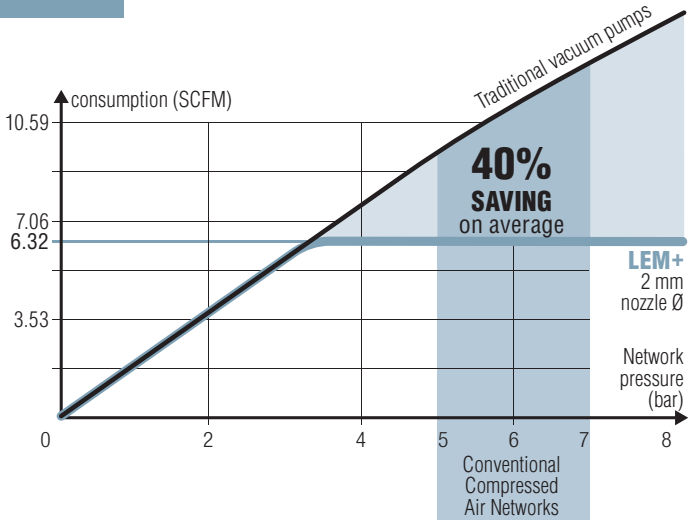
The LEM+ vacuum pumps, which integrate an **ASR** "venturi regulator" combination, maintain ideals that COVAL values greatly: reducing both compressed air consumption and noise generation.

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.

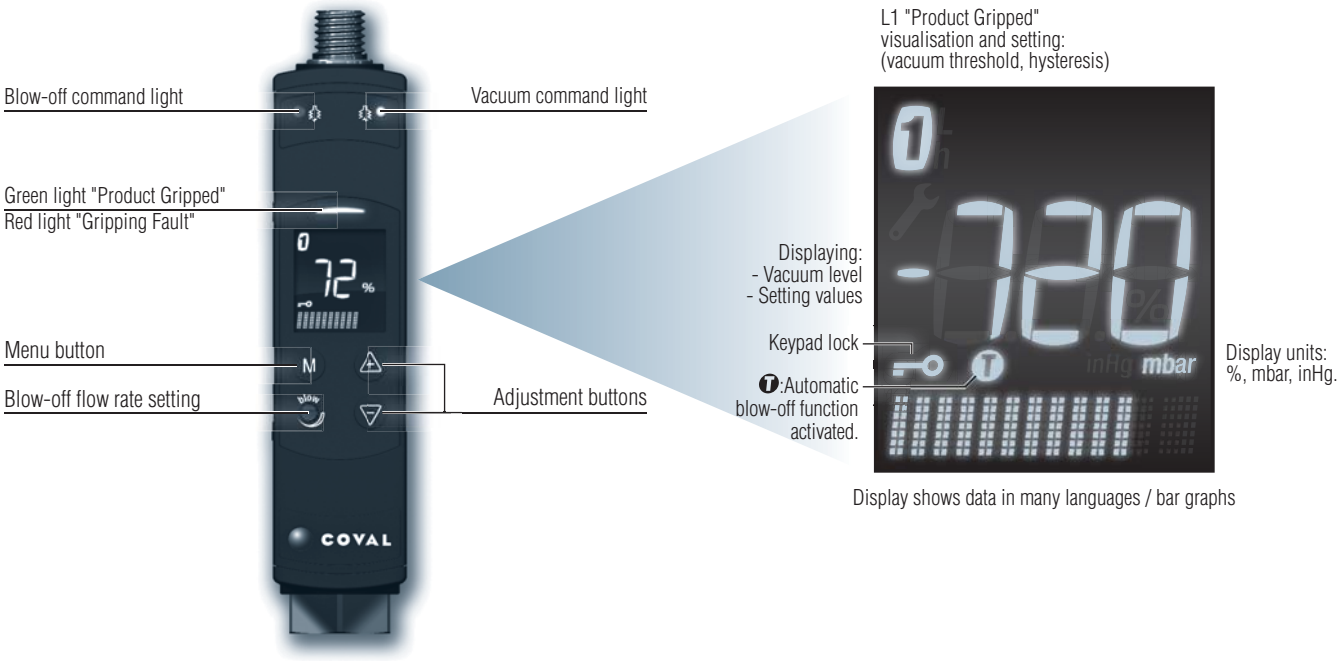
➔ **Simplified & Protected Installation and Operation.**

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.**



8

LEM+

LEM+
Compact, High Flow Vacuum Pumps
Selection Guide

LEM+: Versatile Series for all Applications

The opposite page demonstrates the versatility of this series. In addition to a very wide range of complete 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

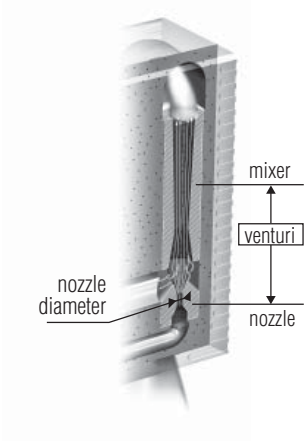
The introductory guide in this catalog shows that for porous objects, a 30-55% vacuum is economical and effective. This is obtained with a 60% maximum vacuum pump.

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.

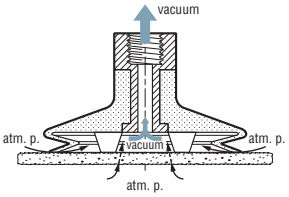
On the contrary, with an air-tight material, the vacuum used is 55% to 80%, obtained by a 85% max. vacuum pump.

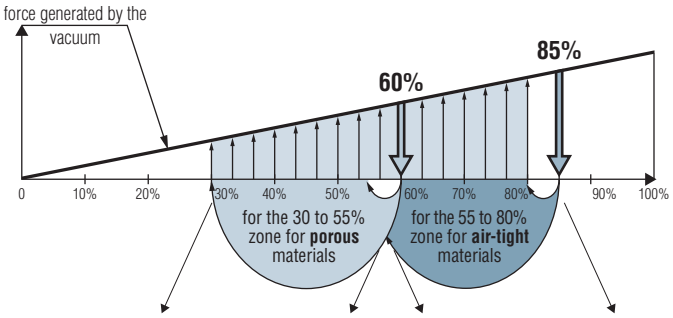
For standard cases, with its integrated blow-off the **LEMAX+** series is preferable, and more economical due to its **ASC** (Air Saving Control) function ➔ see p. 8/21.

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.

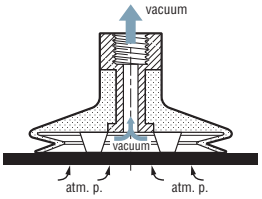


Porous materials:
cardboard, unfinished wood, pastries, etc.





Air-tight materials:
glass, plastic, sheet metal, finished wood



Pourous Objects ▸ Maximum Vacuum Level: 60%

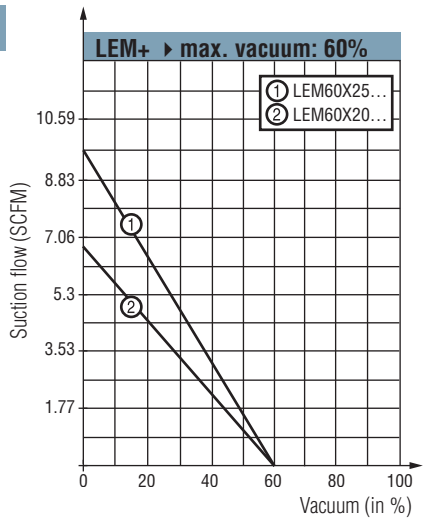
Time to create vacuum (seconds) for a volume of 1 liter				Air consumed (SCFM)	Air drawn in (SCFM)
vacuum achieved / Ø nozzle	35 %	45 %	55 %		
2.0 mm	0.16	0.27	0.42	**6.32**	**6.67**
2.5 mm	0.11	0.18	0.31	**9.18**	**9.71**

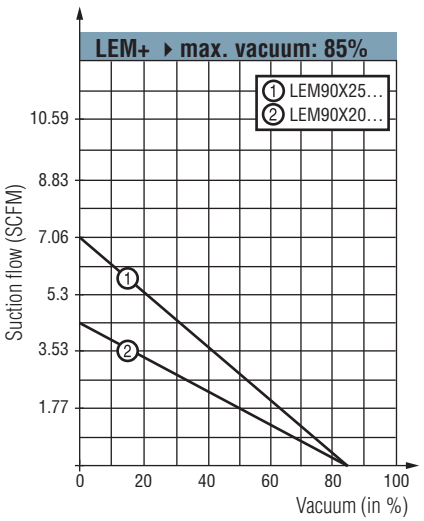
Airtight Objects ▸ Maximum Vacuum Level: 85%

Time to create vacuum (seconds) for a volume of 1 liter				Air consumed (SCFM)	Air drawn in (SCFM)
vacuum achieved / Ø nozzle	55 %	65 %	75 %		
2.0 mm	0.38	0.55	0.80	**6.32** ✱	**4.41**
2.5 mm	0.26	0.35	0.50	**9.18** ✱	**7.06**

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

Suction Flow Rate / Vacuum Curves





LEM+

Compact, High Flow Vacuum Pumps

Configuring a Vacuum Pump

LEM	60	X	25	S		VA	C15		P	G1	F

VACUUM LEVEL

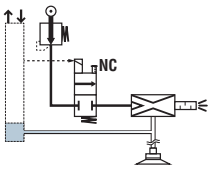
60 % max. vacuum is optimal for porous materials	**60**
85 % max. vacuum is optimal for air-tight products	**90**

NOZZLE DIAMETER

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

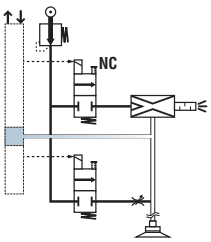
MODULE COMPOSITION

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



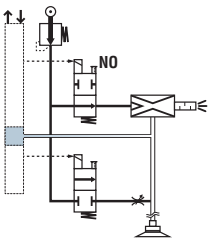
LEM__X__**R**V_C__PG1
- Single command signal.
- **NC** vacuum command valve.

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

CONNECTORS

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

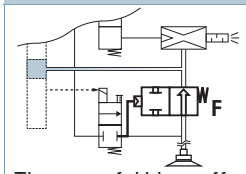
- Electronic vacuum sensor (VA).
- "Gripped product" switching output 24V DC / NO.
- Front face panel and full dialogue.

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.

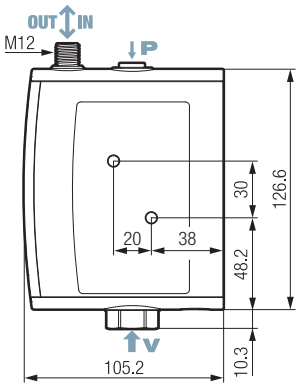
EXAMPLE OF COMPLETE PART NUMBER: LEM60X25SVAC15PG1 **LEM+** vacuum pump, 60% maximum vacuum, 2.5 mm nozzle Ø, controlled by a NC (Normally Closed) solenoid valve with vacuum sensor and dialogue, connection by 1 M12 5-pin connector.

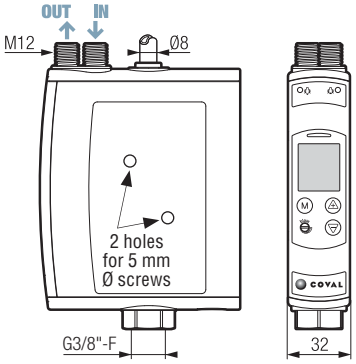
Compact, High Flow Vacuum Pumps

Dimensions, Mounting Options

Side Mounting

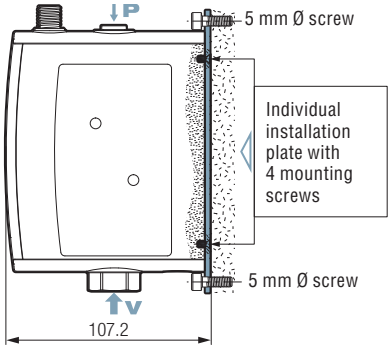
- Version: one M12 connector
- Version: two M12 connectors

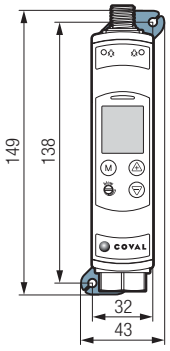




Mounting from side is the simplest to implement: Two Ø 5 mm through screws or bolts with large washers.

Mounting from Front



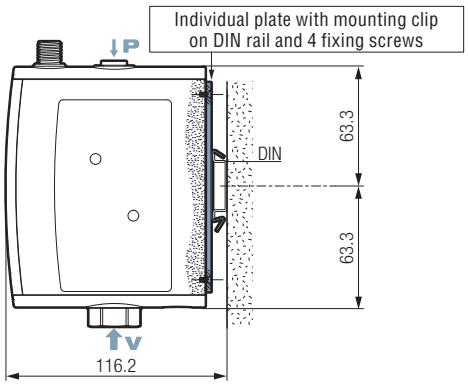


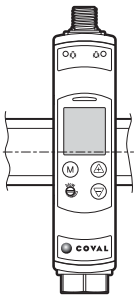
For mounting from front, in addition to the module, you need to order an additional kit:

Mounting from front kit:
1 plate + 4 screws

Part No.: LEMFIX2A

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

Specifications

COMMON SPECIFICATIONS

- Supply: Non-lubricated air 5 microns filtered, according to ISO 8573-1 Class 4 standard.
- 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 4.41 to 9.71 SCFM, depending on model.
- Air consumption: From 6.32 to 9.18 SCFM, 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 50 to 122°F.
- 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.

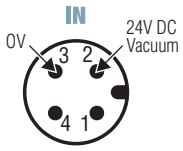
Auxiliary output (C24 model only, 2 x M12 4 pins)

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

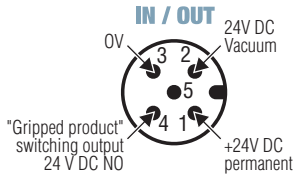
Electrical Connections

1- For Vacuum Pumps of Model R (vacuum control **NC** valve)

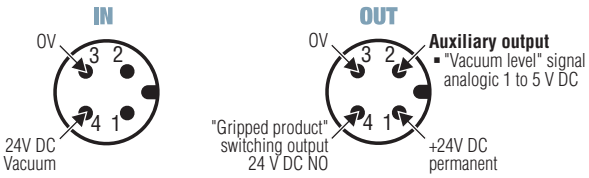
- **C14:** 1 M12 4-pin connector



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

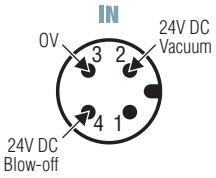


- **C24:** 2 M12-4 pin connector

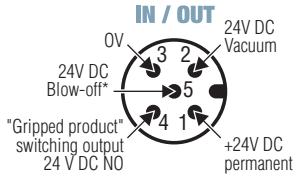


2- For Vacuum Pumps of Model S (vacuum control **NC** valve, blow-off control **NC** valve)

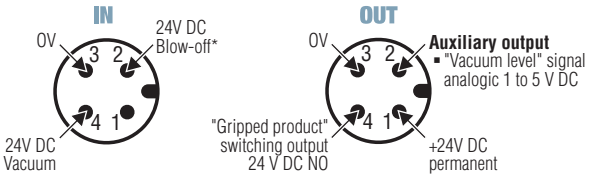
- **C14:** 1 M12 4-pin connector



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



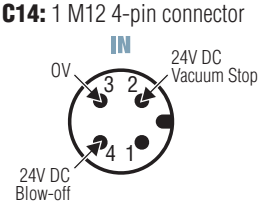
- **C24:** 2 M12-4 pin connector



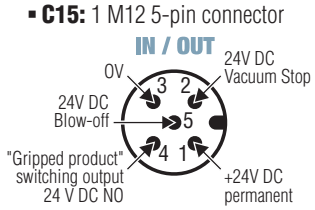
* externally controlled blow-off or automatic blow-off function > economy of an automaton outlet.

3- For Vacuum Pumps of Model V (vacuum control **NO** valve, blow-off control **NC** valve)

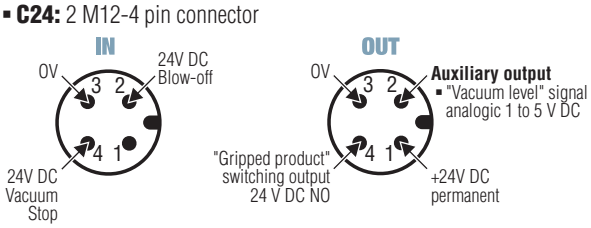
- **C14:** 1 M12 4-pin connector



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



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



M12 Electrical Connectors: see page 10/9.

LEMAX

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

Industry-specific applications

For all objects, airtight or not very porous

Advantages

- Energy savings of 75 to 99% (depending on application) thanks to automatic **ASC** (Air Saving Control) operation.
- "All-in-one" solution, no more peripherals to be added.
- Simplified installation and use thanks to the Plug & Play system.
- 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.

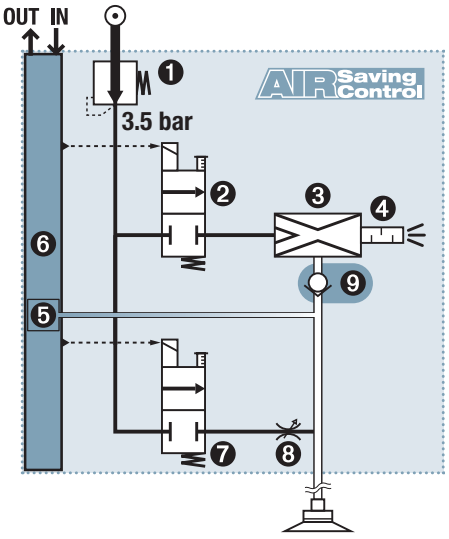
Compact Integration

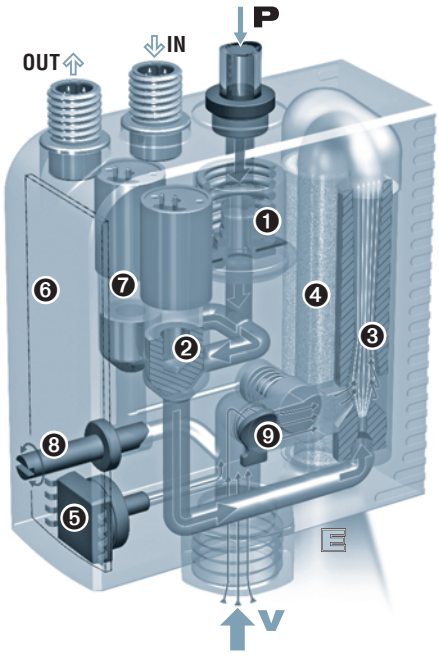
The illustrations below demonstrate the 9 functions integrated in the mini-module, and their respective roles in operation.

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





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

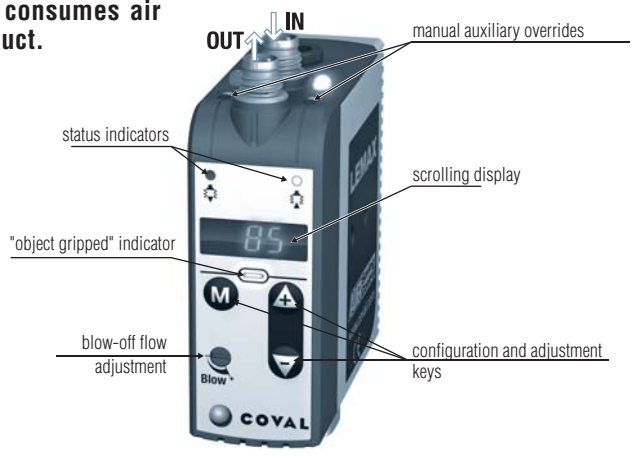
➔ **Once desired vacuum level is reached, the LEMAX no longer consumes air when gripping the product.**

90% energy savings (on average, see p.8/16).

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.

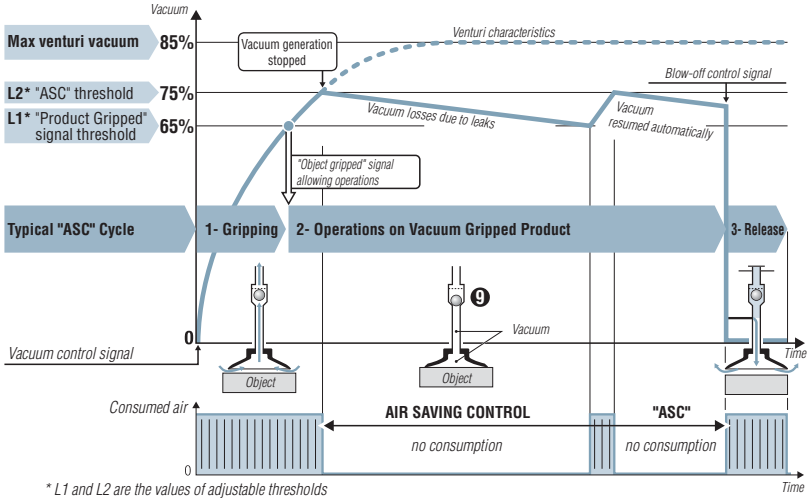


LEMAX

Integrated Mini Vacuum Pump 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	0.014 ft³	0.014 ft³	Energy savings achieved
Transfer	1.20 s	0.063 ft³	0	
Release	0.14 s	0.007 ft³	0.007 ft³	
		0.084 ft³	0.021 ft³	→ 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	0.028 ft³	0.028 ft³	Energy savings achieved
Operations	60 s	3.178 ft³	0	
Release	0.14 s	0.007 ft³	0.007 ft³	
		3.213 ft³	0.035 ft³	→ 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:

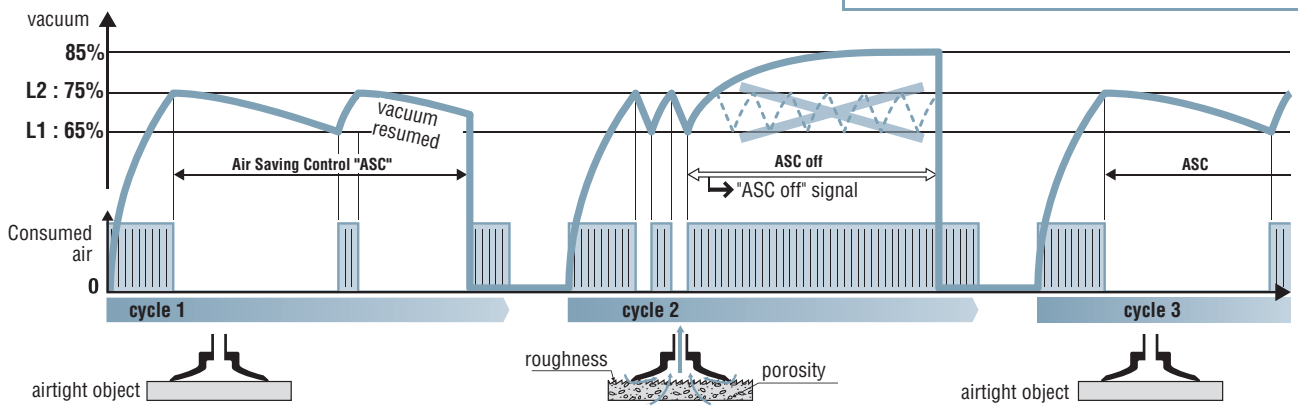
1- No specific adjustment: The initial setting (L1 = 65%, L2 = 75%) is suitable for most applications.

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. See p. 8/3.

LEMAX

Integrated Mini Vacuum Pump with "ASC"

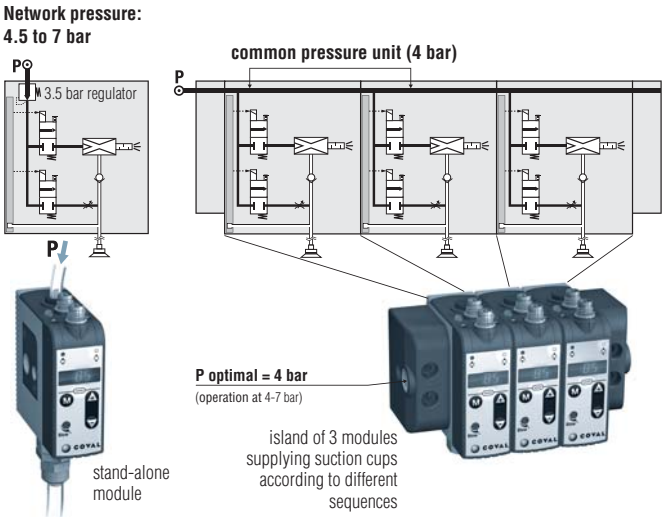
Selection Guide

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 (see "**ASR**" p. 8/3)
- 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.



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.

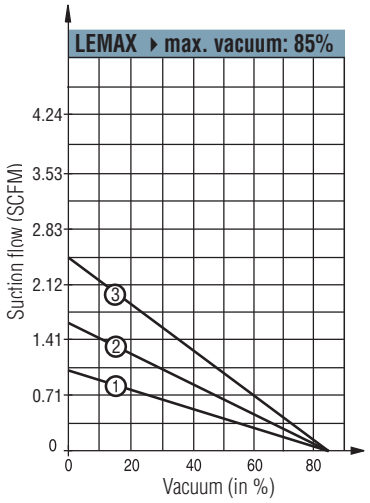
On the other hand, during "**ASC**" operation, a large nozzle quickly reaches the vacuum threshold generating power shut-off.

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 (SCFM)	air consumed (SCFM)	grip time (s) (65% vacuum)	time (s) up to 75% vacuum	air consumed (ft^3)
1.4 mm	**2.47**	**3.18**	**0.99**	**1.38**	**0.077**
1.2 mm	**1.59**	**2.30**	**1.53**	**2.15**	**0.077**
1.0 mm	**1.02**	**1.55**	**2.38**	**3.33**	**0.077**

Suction Flow Rate / Vacuum Curves



1 - LEMAX90X10
2 - LEMAX90X12
3 - LEMAX90X14

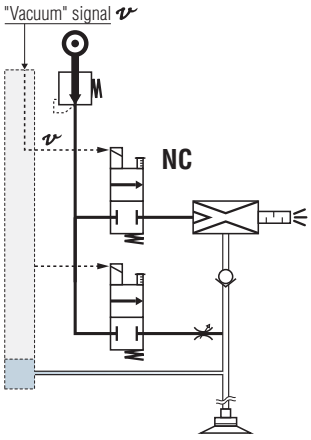
Select Vacuum Controlled by NC or NO Solenoid Valve

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.

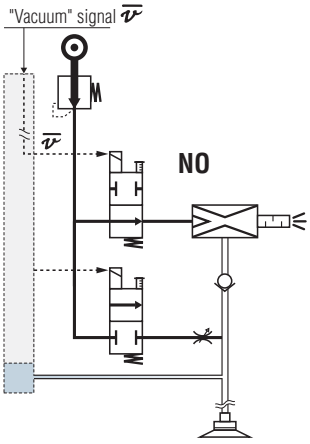
The diagrams opposite show that both versions are controlled by the same "vacuum" signal v:
The opposite $\overline{v}$ required for control of the NO solenoid valve is automatically obtained internally by the control electronics.

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

■ NC solenoid valve



■ NO solenoid valve



LEMAX

Integrated Mini Vacuum Pump with "ASC"

Configuring a Vacuum Pump

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

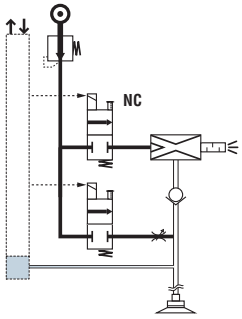
maximum 85% vacuum optimum for airtight objects	**90**

NOZZLE DIAMETER

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

COMPOSITION OF THE MODULE

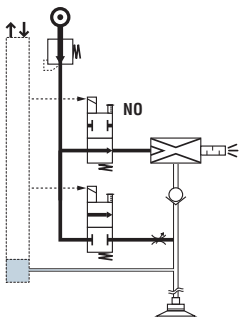
Vacuum pump controlled by a Normally Closed (NC) solenoid valve — **S**



LEMAX90X--**S**--

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

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



LEMAX90X--**V**--

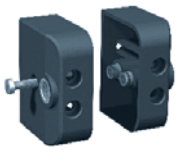
- In the event of an electrical shut-off, the vacuum continues to be generated: gripped object held ➔ positive security.
- Blow-off controlled by a specific signal.

ISLAND ASSEMBLIES

B2		LEMAX90X---**B2** 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. (see p. 8/20)

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**

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.

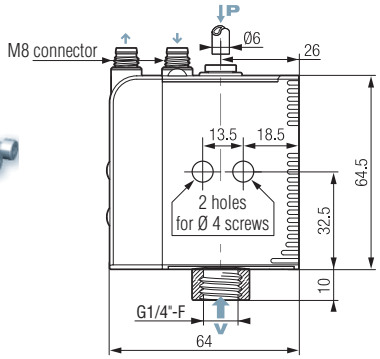
LEMAX

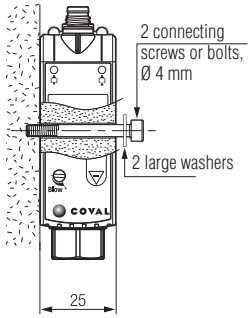
Integrated Mini Vacuum Pump with "ASC"

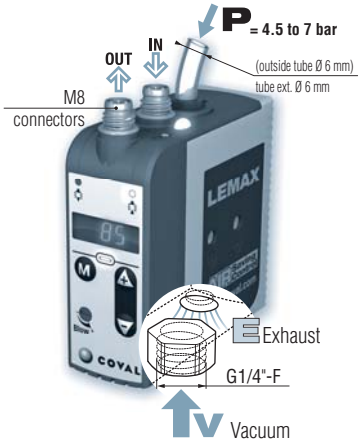
Dimensions, Mounting Options

Stand-alone Modules

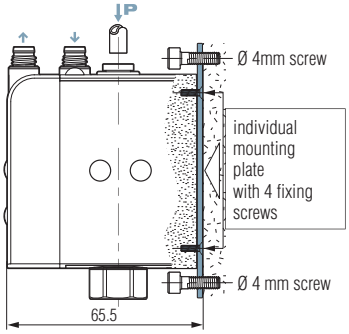
Side mounting

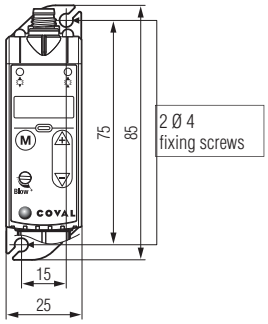






Front mounting

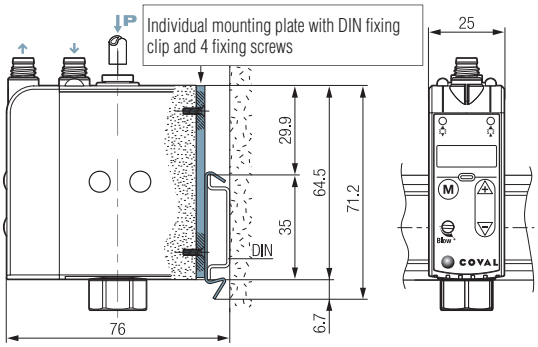




For front mounting, order the necessary kit, in addition to the module:

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

Mounting on DIN rail

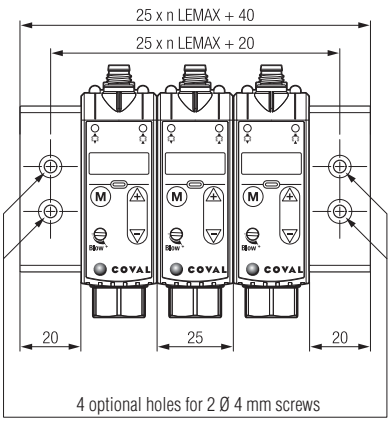


A module can be clipped onto a DIN rail.

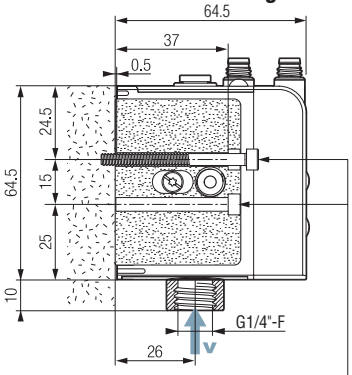
For this purpose, the module must first be equipped with an individual DIN installation plate, ordered separately:

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

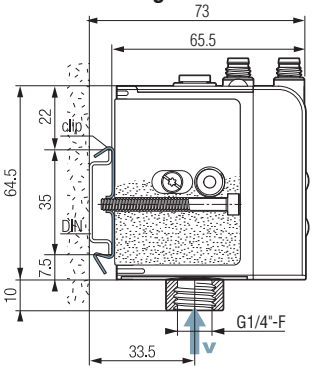
Islands



Front mounting



Mounting on DIN rail



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

LEMAX

Integrated Mini Vacuum Pump with "ASC"

Characteristics / Assembling a Group

Overall Characteristics

- Supply: non-lubricated air filtered to 5 microns according to standard ISO 8573-1 class 4.
- Operating pressure: 4.5 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: 1.02 to 3.25 SCFM.
- Air consumption: 1.55 to 3.18 SCFM 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: 50 to 140 °F.
- Materials: PA 6-6 15%FV, brass, aluminium, NBR.

Electrical controls

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

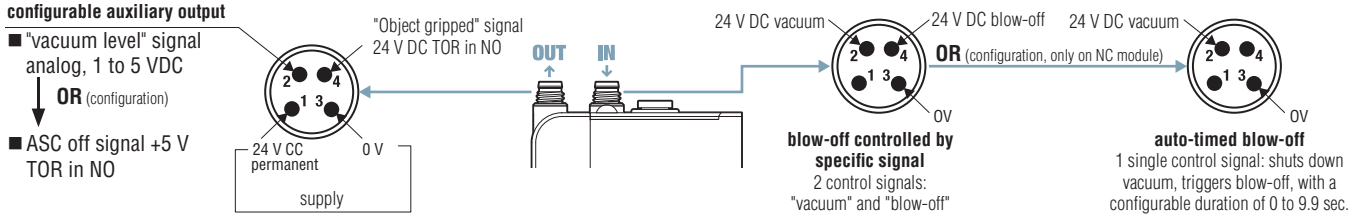
Integrated electronics

- Power supply 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

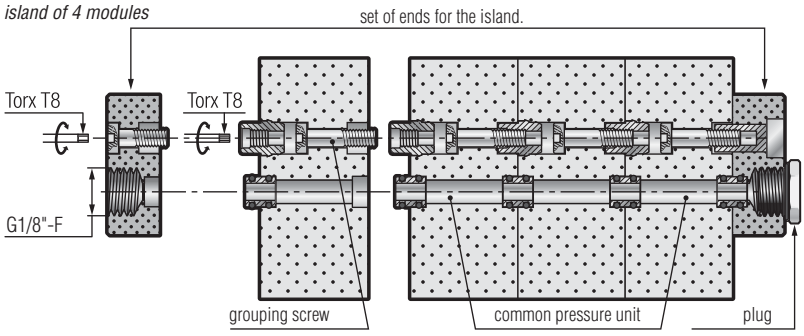
- "Object gripped" output signal
  - 24 VDC, switching output / NO, switching power: 125 mA PNP.
- Configurable auxiliary output, you can choose from:
  - "vacuum level" signal , analog 1 to 5 VDC of the measuring range.
  - "**ASC**" off signal, +5 V switching output / NO.
- Displays
  - Scrolling display: 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.
- Settings
  - By mechanical keys and drop-down menu (see page 8/15).
  - Measurement unit selection (%, mbar, inHg)..
  - Blow-off type selection: controlled or automatic adjustable from 0 to 9.9 sec.
- 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.

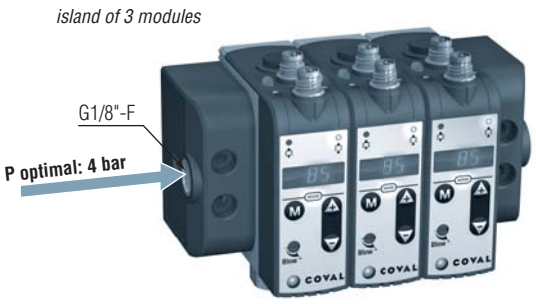
Electrical Connections and Corresponding Configurations



Note: straight and angled M8 connectors shown p. 10/9

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

Note:
In a single island, it is possible to combine LEMAX series modules and LEM series modules (see p. 8/3).

LEMAX+

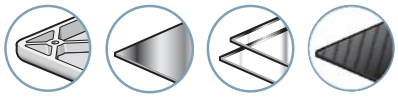
Compact, High Flow Vacuum Pumps

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** (see page 8/9).

Industry-specific applications



Advantages

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

Configurations

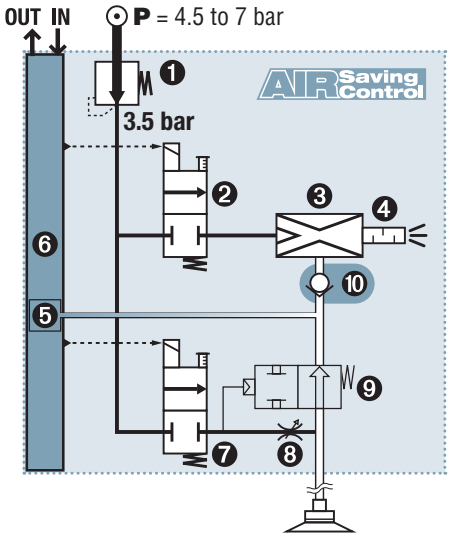
- 85% of maximum vacuum.
- NC or NO, depending on safety.
- ASC advanced electronics.
- High visibility display.
- Integrated vacuum sensor.
- Vacuum non-return valve.
- Combined **ASR** "venturi regulator".
- External blow-off signal or automatic blow-off function.
- Powerful blow-off as option.
- Versions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

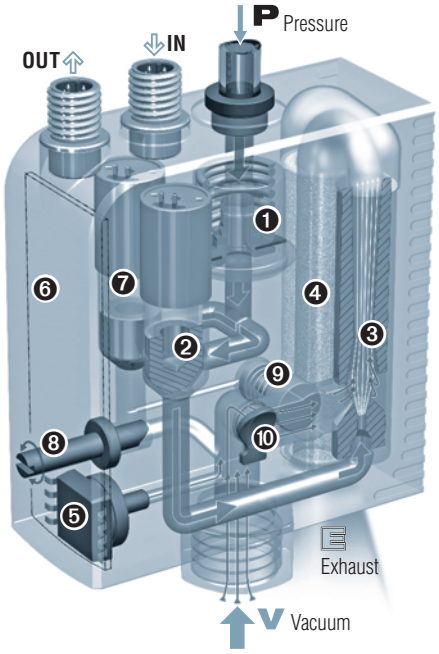
nozzle Ø \ max. vacuum	85%
2.0 mm	4.41
2.5 mm	7.06

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** optimised venturi
❹ Optimized silencer
❺ Electronic vacuum sensor
❻ Integrated electronics
❼ "Blow-off" solenoid valve
❽ Blow-off flow rate regulator
❾ Powerful blow-off valve
❿ Vacuum non-return valve





Schematic representation

90% energy savings
(on average, see p.8/22).

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

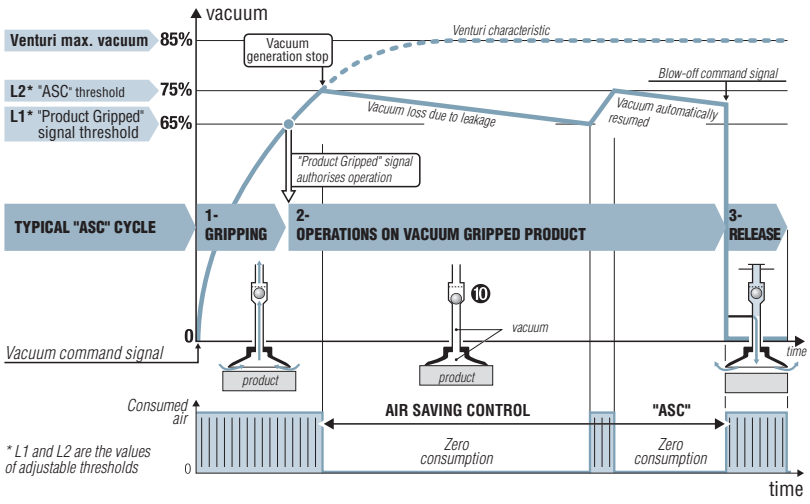
→ Once vacuum is established, the pump does not continue to consume air to hold the product.

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 ❿. 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%).

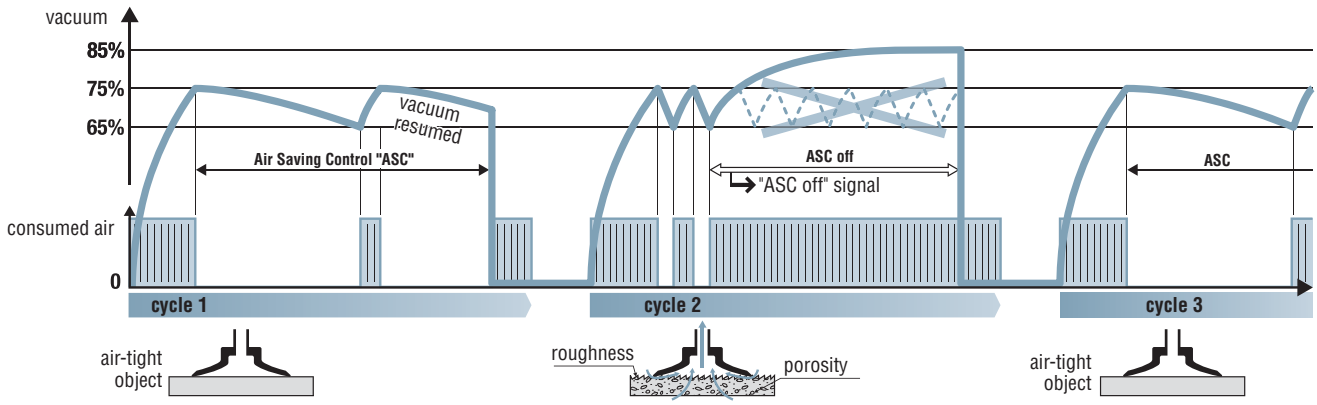
3- Releasing the object

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 ❾, and, via flow regulation 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"	with "ASC"	
Gripping	0.16 s	0.016 ft³	0.016 ft³	achieved
Transfer	1.20 s	0.106 ft³	0	economy
Release	0.14 s	0.010 ft³	0.010 ft³	
		0.132 ft³	0.027 ft³	→ 80 %

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

Phase	Duration	Air consumption		
		without "ASC"	with "ASC"	
Clamping	0.32 s	0.032 ft³	0.032 ft³	achieved
Operations	60 s	6.32 ft³	0	economy
Release	0.14 s	0.010 ft³	0.010 ft³	
		6.36 ft³	0.042 ft³	→ 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. See page 8/3.

LEMAX+

Compact, High Flow Vacuum Pumps

Intelligence & Selection Guide

Intelligence

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

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

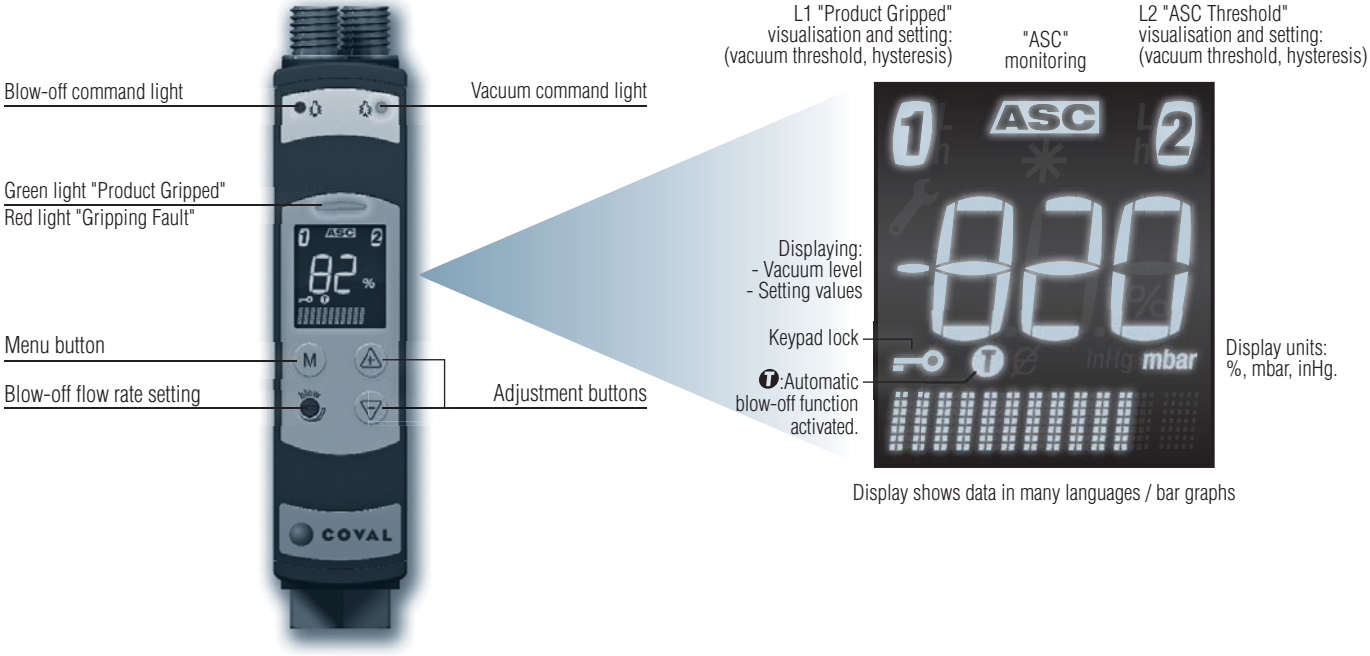
➔ **Simplified & Protected Installation and Operation.**

Due to the high visibility display of the **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.

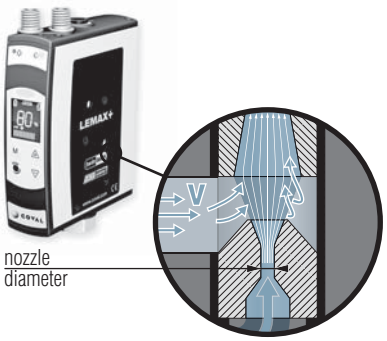
On the other hand, during "**ASC**" operation, a large nozzle quickly reaches the vacuum threshold generating power shut-off.

In conclusion:

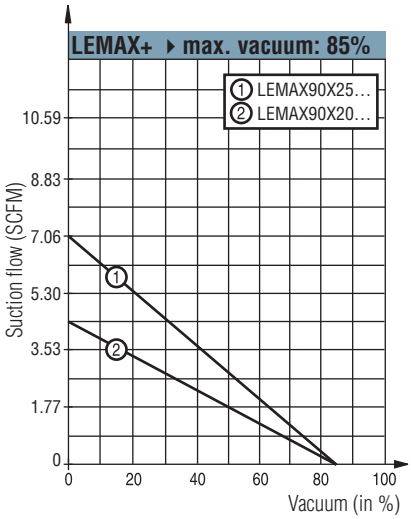
- A large nozzle enables quicker gripping without consuming more during "**ASC**" operation.
- A small nozzle does not consume less when operating with "**ASC**" off.

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 (SCFM)	Consumed Air (SCFM)	Gripping Time (65% Vacuum) (s)	Time Until 75% Vacuum (s)	Consumed Air (ft³)
2.0 mm	4.41	6.32	0.55	0.80	0.077
2.5 mm	7.06	9.18	0.35	0.50	0.077



Suction Flow Rate / Vacuum Curves



LEMAX+

Compact, High Flow Vacuum Pumps

Configuring a Vacuum Pump

LEMAX	90	X	25	S	C24		P*	G1	F		S

VACUUM LEVEL

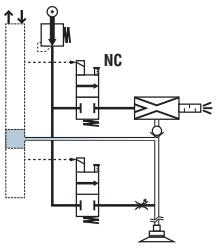
85% max. vacuum is optimal for airtight products	**90**

NOZZLE DIAMETER

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

MODULE COMPOSITION

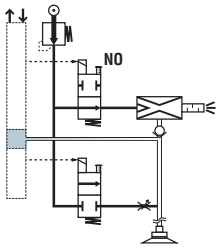
NC Vacuum Pump With Blow-Off — **S**



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.

NO Vacuum Pump With Blow-Off — **V**



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.

CONNECTORS

C15 — **Vacuum Pump with 1 M12 5-pin Connector**
LEMAX90X___**C15**PG1

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

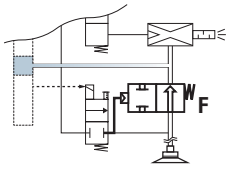
C24 — **Vacuum Pump with 2 M12 4-pin Connectors**
LEMAX90X___**C24**PG1

- 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.

POWERFUL BLOW-OFF

	Without
F	With

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

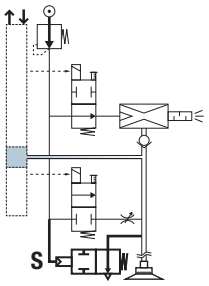


Isolation valve **F** directs the entire blow-off flow to the vacuum pad.

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

AIR SAFETY VALVE

	Without
S	With



Safety in Case of Air Cut

If compressed air is blocked, valve **S** ensures venting of the vacuum pad.
The product is then automatically released, allowing maintenance work to be carried out safely.

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

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.

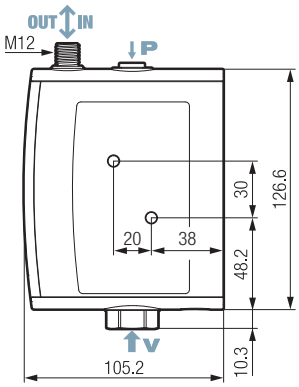
LEMAX+

Compact, High Flow Vacuum Pumps

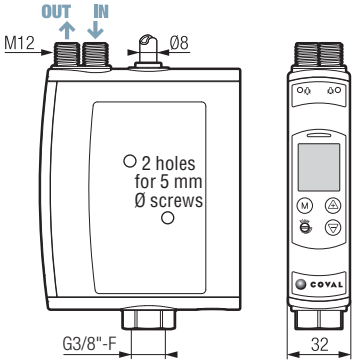
Dimensions, Mounting Options

Side Mounting

- Version: one M12 connector

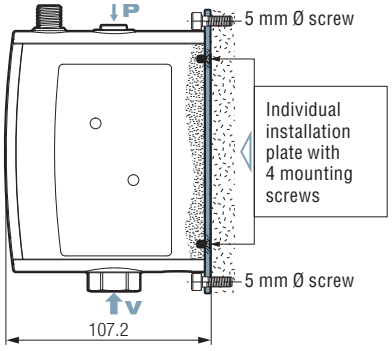


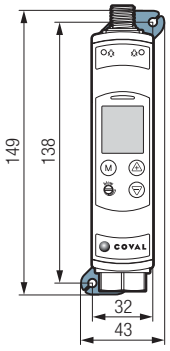
- Version: two M12 connectors



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

Mounting from Front

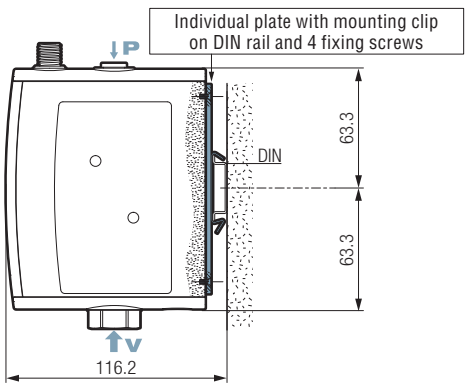


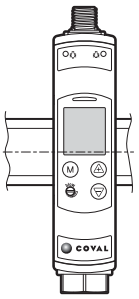


For mounting from front, in addition to the module, you need to order an additional kit:

Mounting from front kit: 1 plate + 4 screws
Part No.: LEMFIX2A

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

Specifications

- Supply: Non-lubricated air 5 microns filtered, according to ISO 8573-1 Class 4 standard.
- 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 4.41 to 7.06 SCFM, depending on model.
- Air consumption: From 6.32 to 9.18 SCFM, 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 50 to 122°F.
- 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.

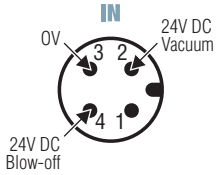
ASC: Regulation & Self-Adaptation

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

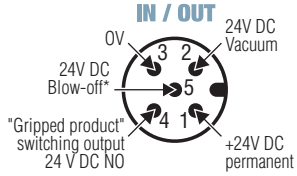
Electrical Connections

1- For Vacuum Pumps of Model S (vacuum control **NC** valve, blow-off control **NC** valve)

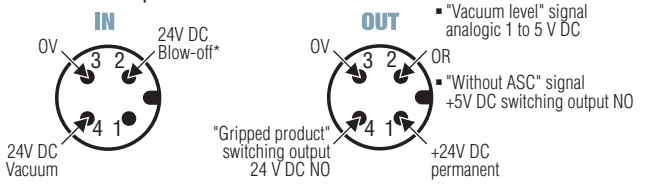
- **C14**: 1 M12 4-pin connector



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



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

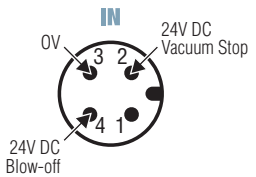


Configurable auxiliary output
- "Vacuum level" signal analogic 1 to 5 V DC
- "Without ASC" signal +5V DC switching output NO

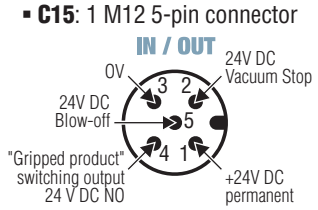
* externally controlled blow-off or automatic blow-off function > economy of an automaton outlet.

2- For Vacuum Pumps of Model V (vacuum control **NO** valve, blow-off control **NC** valve)

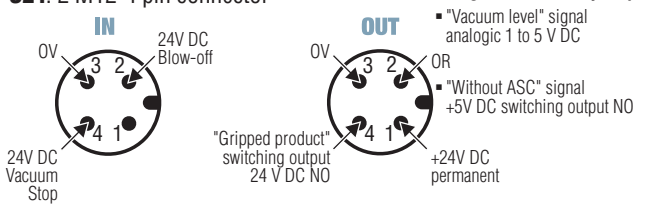
- **C14**: 1 M12 4-pin connector



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



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



Configurable auxiliary output
- "Vacuum level" signal analogic 1 to 5 V DC
- "Without ASC" signal +5V DC switching output NO

M12 Electrical Connectors: see page 10/9.

LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

General Points

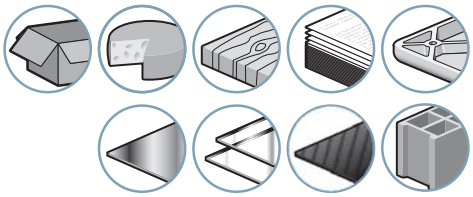
CANopen

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, CANopen and Ethernet / IP. 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

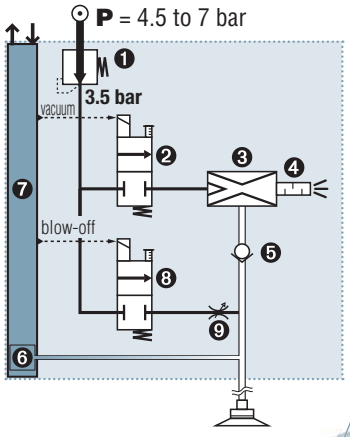


Compact Integration: The COVAL Technique

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

INTEGRATED FUNCTIONS:

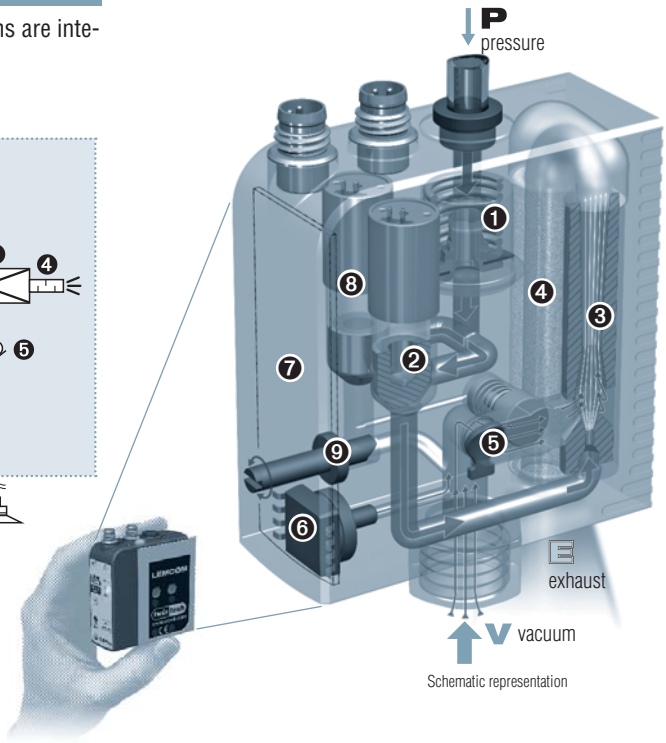
❶ Pressure regulator **3.5 bar**
❷ "Vacuum" solenoid valve
❸ **3.5 bar** optimized venturi
❹ Optimized silencer
❺ Vacuum non-return valve
❻ Vacuum sensor
❼ Integrated electronics: management of "vacuum" functions and communication
❽ "Blow-off" solenoid valve
❾ Blow-off flow regulator



CANopen

EtherNet/IP

ODVA CONFORMANT



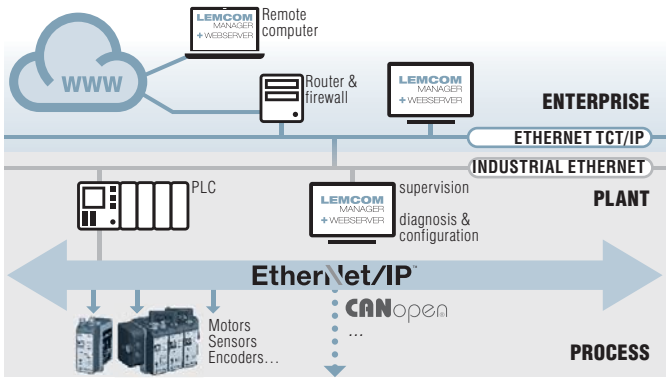
Schematic representation

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 CiA (CANopen), LEMCOM is connected very easily to the PLC (EDS file, RSLogix 5000 Add-On Instructions).

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:
  - **ASR**: 40% savings for porous products.
  - **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 CANopen.
- **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), see page 8/32.

➔ An essential innovation for intelligent vacuum gripping.

LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Vacuum Levels and Energy-saving

CANopen
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 (SCFM):

Nozzle Ø \ max. vacuum	60%
1.0 mm	1.34
1.2 mm	2.54
1.4 mm	3.25

VERSION 90 (Max. 85% vacuum)

To enable a high vacuum level and thus increase the holding force for gripping airtight materials.

Suction flow rate (SCFM):

Nozzle Ø \ max. vacuum	85%
1.0 mm	1.02
1.2 mm	1.59
1.4 mm	2.47

	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.

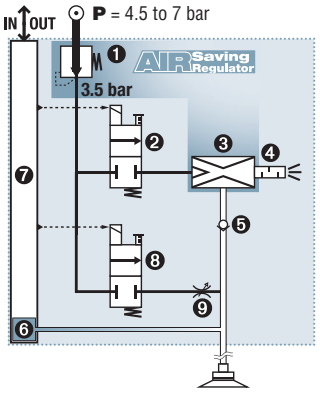
Integrated Energy-saving Technologies

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.**

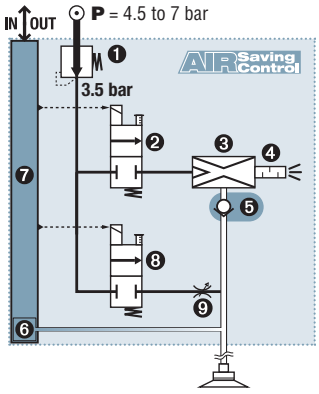


AIR Saving Control

90% energy savings (on average, see p.8/29)

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

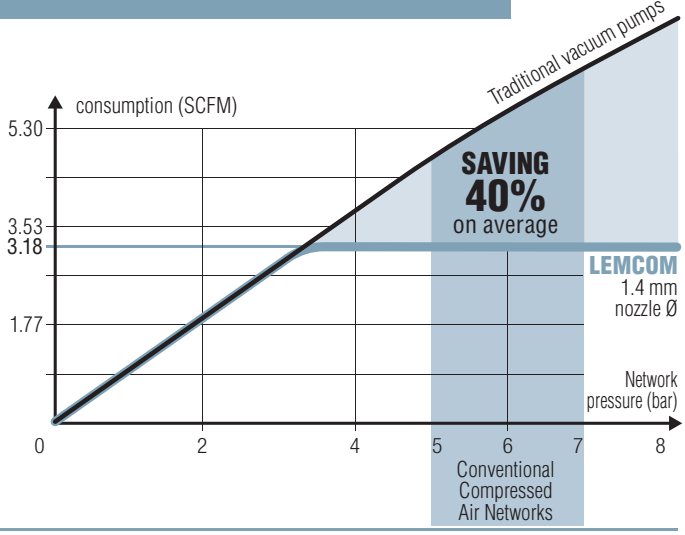
LEMCOM series vacuum pumps, which integrate an **ASR** "venturi regulator" combination, maintain ideals that COVAL values greatly: reducing both compressed air consumption and noise generation.

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.



8

LEMCOM

LEMCOM

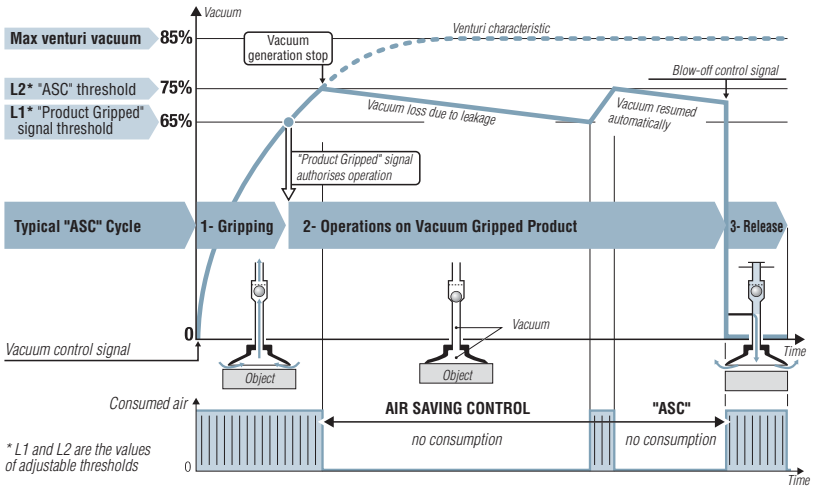
1st Mini Vacuum Pump on Industrial Fieldbus

Energy Savings

CANopen

EtherNet/IP

"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

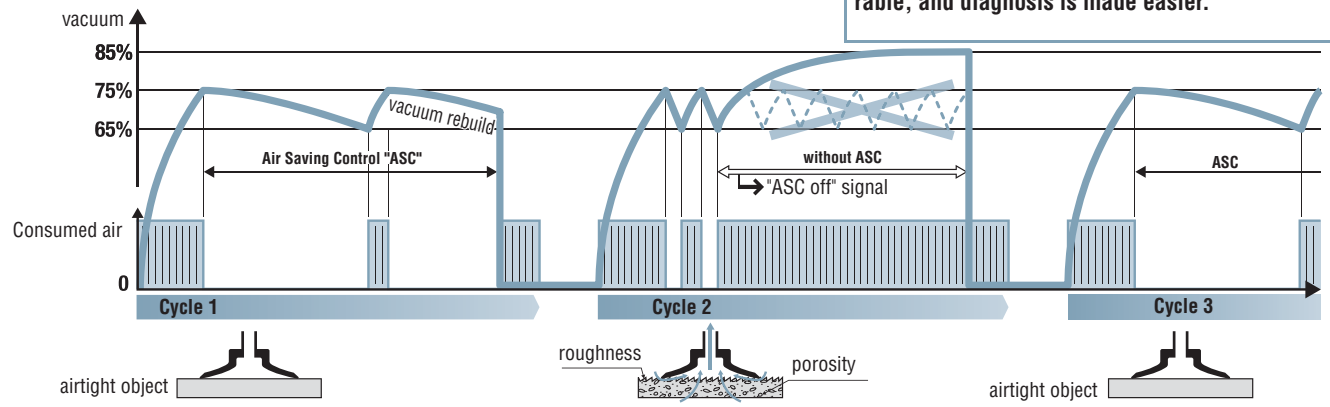
At the end of operations, blow-off is ordered. The "blow-off" solenoid valve ❽ generates a stream of air which closes the isolation valve ❾, blows on the object to release it quickly.

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"	Energy savings achieved
Gripping	0.28 s	0.014 ft³	0.014 ft³	
Transfer	1.20 s	0.063 ft³	0	
Release	0.14 s	0.007 ft³	0.007 ft³	
		0.084 ft³	0.021 ft³	75 %

2- Clamping + Operations *(1.4 mm nozzle Ø, emptying 0.4 l)*

Phase	Duration	Air consumption		
		without "ASC"	with "ASC"	Energy savings achieved
Clamping	0.55 s	0.028 ft³	0.028 ft³	
Opérations	60 s	3.178 ft³	0	
Release	0.14 s	0.007 ft³	0.007 ft³	
		3.213 ft³	0.035 ft³	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. See p. 8/28.

LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

CANopen
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:

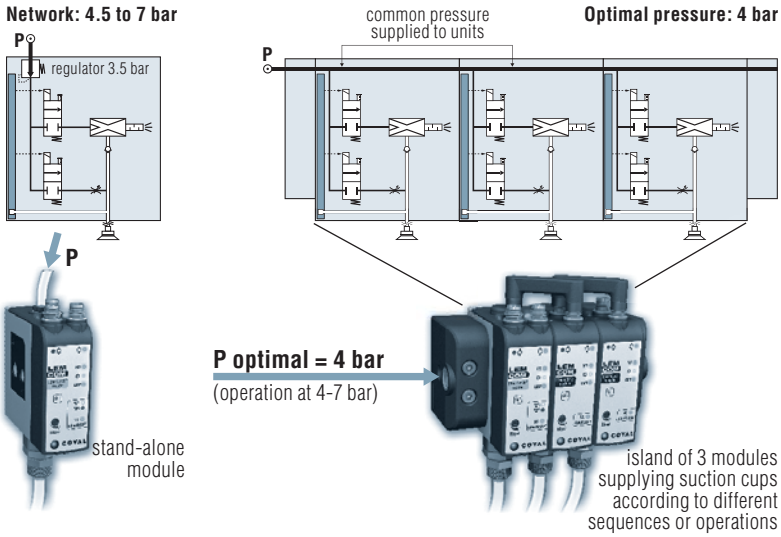
- several autonomous modules, OR
- a group of these modules with an internally shared pressure supply

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.

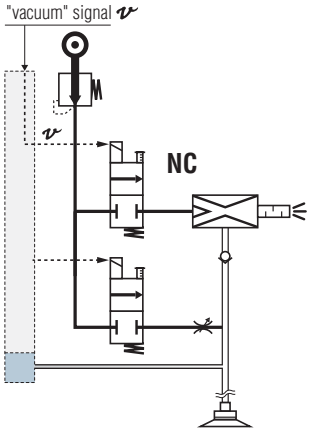


Vacuum Control by NC or NO Solenoid Valve

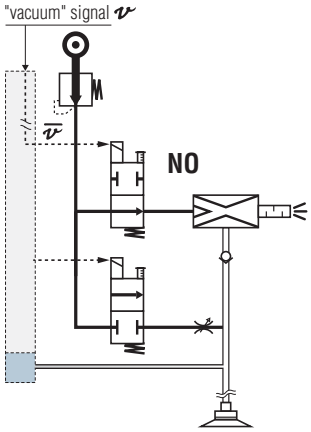
Vacuum control by NC (Normally Closed) solenoid valve is the most common: in the event of an electrical shut-off, vacuum is no longer generated. On the other hand, with a NO (Normally Open) solenoid valve, vacuum continues to be generated in the event of an electrical shut-off, providing positive object-gripped 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

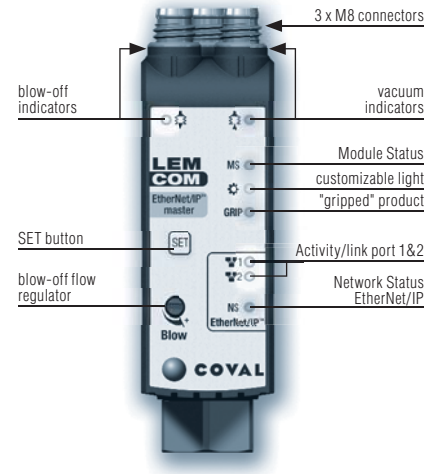


■ NO solenoid valve

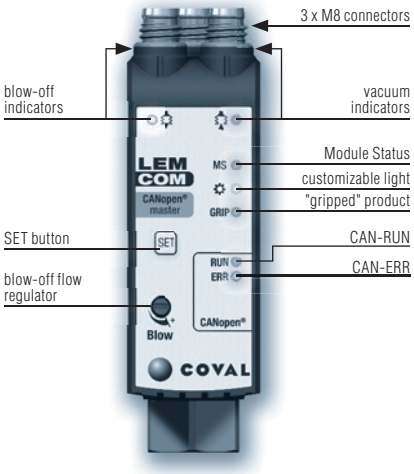


Communications Panel

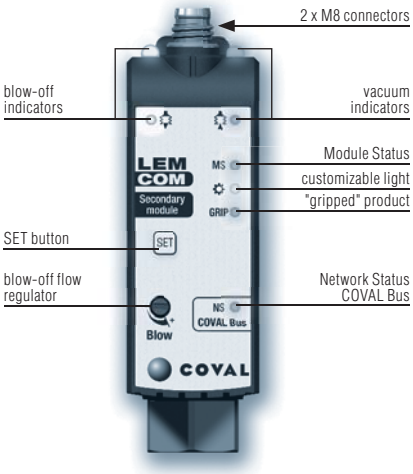
LEMCOM master
EtherNet/IP



LEMCOM master
CANopen



LEMCOM secondary module



8

LEMCOM

LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

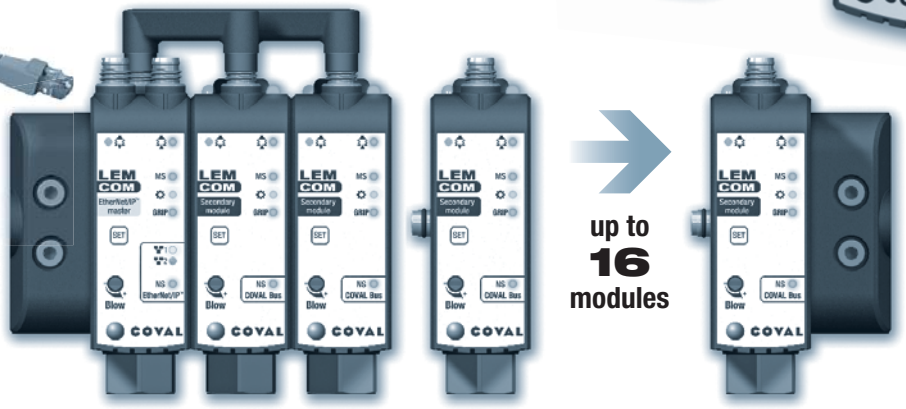
Simplified Communication along the Entire Line

CANopen®
EtherNet/IP™

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™ / CANopen®…
- IP 65 / M8 standard connectors.

EtherNet/IP™
CANopen®



up to **16** modules

A Simple Product to Utilize

LEMCOM master
EtherNet/IP™

- On-board 2-Port Ethernet Switch.
- On-board web server.
- Dedicated configuration software.
- M8/RJ45 standard connectors.
- RSLogix 5000 Add-On Instructions.

LEMCOM master
CANopen®

- Two CAN ports.
- From 20 to 1000 Kbps.
- Dedicated configuration software.
- Configuration by SDO.
- Adjustable PDO-TX transmission threshold.

LEMCOM secondary module

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

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

CANopen

EtherNet/IP

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.

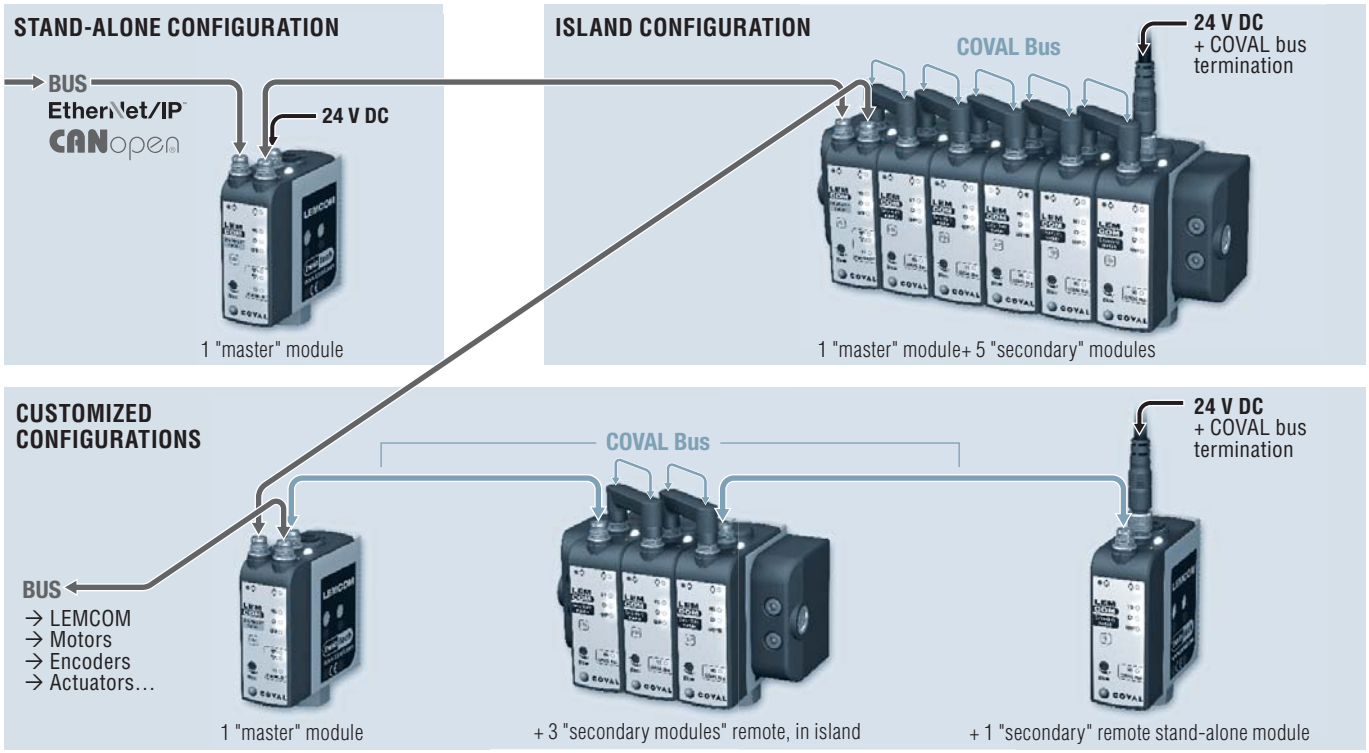
Contact between the "master" module and the "secondary" modules is confirmed by an M8 connecting bridge for island configurations or by a M8/M8 standard cable for configurations based on remote modules.

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.

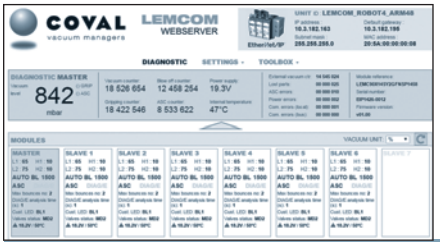


Full Remote Access

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 only) 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

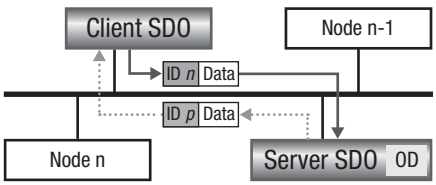
- Implicit (I/O) and explicit messaging (setting).
- Embedded web server.



CANopen

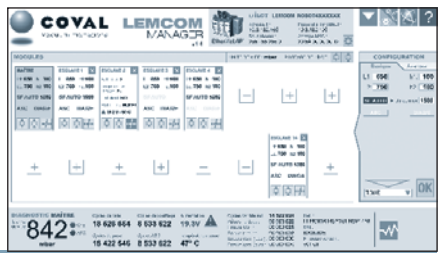
- PDO/SDO.

PDO: Process Data Object (I/O process data).
SDO: Service Data Object (configuration data).



LEMCOM MANAGER

- Dedicated universal application: LEMCOM Manager.



LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Selection Guide

CANopen

EtherNet/IP

LEMCOM: Versatile Series for all Applications

The opposite page demonstrates the versatility of this series. In addition to a wide range of complete, stand-alone, or island vacuum pumps, LEMCOM has options for protocol, vacuum level, and valve components.

Venturi Specifications

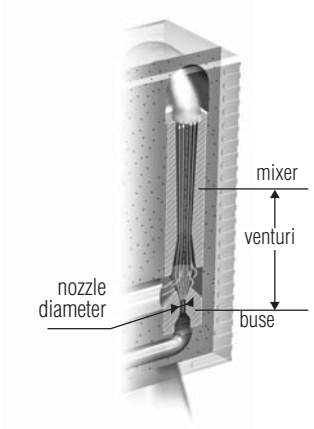
1- Maximum Vacuum Level

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.



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** *(SCFM)*	**Vacuum flow** *(SCFM)*
vacuum reached / Nozzle Ø	**35%**	**45%**	**55%**		
1.0 mm	0.83	1.31	2.35	1.55	1.34
1.2 mm	0.52	0.83	1.49	2.3	2.54
1.4 mm	0.34	0.54	0.97	3.18	3.25

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.

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".

Working without "ASC":

Evacuation time *(in seconds)* **of 1 liter volume**				**Consumed Air** *(SCFM)*	**Vacuum flow** *(SCFM)*
vacuum reached / Nozzle Ø	**55%**	**65%**	**75%**		
1.0 mm	1.76	2.38	3.33	1.55	1.02
1.2 mm	1.13	1.53	2.15	2.3	1.59
1.4 mm	0.73	0.99	1.38	3.18	2.47

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

Ø buse	**gripping time (65% vacuum)** *(s)*	**Time up to 75% vacuum** *(s)*	**Consumed Air** *(ft^3)*
1.0 mm	2.38	3.33	0.077
1.2 mm	1.53	2.15	0.077
1.4 mm	0.99	1.38	0.077

ACCESSORIES

Shielded Ethernet cable - Cat-5 - M8 female / Plug straight RJ45.
- **CDM8RJ45L2**: length 2 m.
- **CDM8RJ45L4**: length 4 m.
- **CDM8RJ45L10**: length 10 m.

Other lengths on request.

Female M8/Female M8 cable to screw, straight, 4 pins, PVC cable, IP65, for "COVAL Bus" link.
- **CDM8FFL05** : length 0.5 m.
- **CDM8FFL1** : length 1 m.
- **CDM8FFL2** : length 2 m.

Other lengths on request.

Female M8 cable (open ended), straight, 4 pins, PVC cable, IP 65.
- **CDM8** : length 2 m.
- **CDM8N** : length 0.5 m.

M8/M8 "COVAL Bus" 120 Ω termination.
- **80002303:** length 0.2 m.

The COVAL Bus is based on a CAN structure and needs the addition of an end of bus termination to guarantee perfect communication between the "secondary" and "master" modules. This is done by using an M8 male/M8 female cable integrating a 120 ohm termination resistor.

It must be integrated on the last "secondary" of the COVAL Bus, between the final M8 connector of the product and the 24 V DC electric supply.

The termination is not needed when a "master" module is used without any "secondary" module connected to it.

LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Configuring a Vacuum Pump

CANopen
EtherNet/IP

LEMC	90	X	14	S		Y2		G		B2

VACUUM LEVEL

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

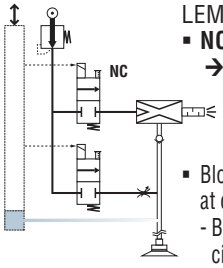
NOZZLE DIAMETER

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

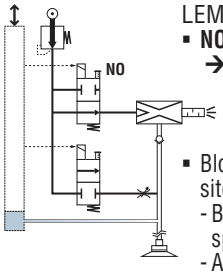


LEMC__X__**S**__G__

- **NC** vacuum control valve:
  → in case of electrical cut-off, vacuum generation stops (see p. 8/30).
- 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 without blow-off



LEMC__X__**V**__G__

- **NO** vacuum control valve:
  → In case of electrical cut-off, vacuum continues to be generated (see p. 8/30).
- 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

W2 CANopen master
LEMC__X___**W2**G__

- Two CAN ports.
- From 20 to 1000 Kbps.
- Dedicated configuration software.
- Configuration by SDO.
- Regulated PDO-TX transmission threshold.

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 Add-On Instructions.

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.

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

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___Z2GB_ "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

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

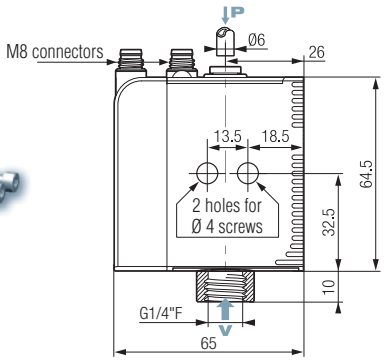
Dimensions, Mounting Options

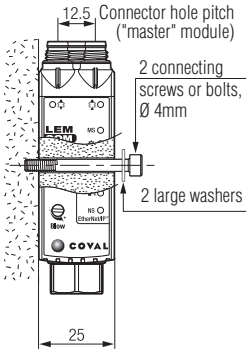
CANopen

EtherNet/IP

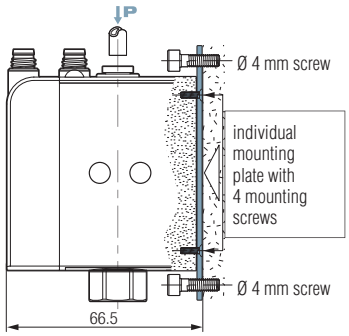
1- Stand-alone Modules

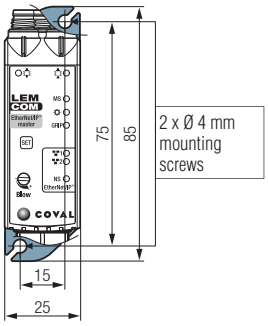
Mounting from side





Mounting from front



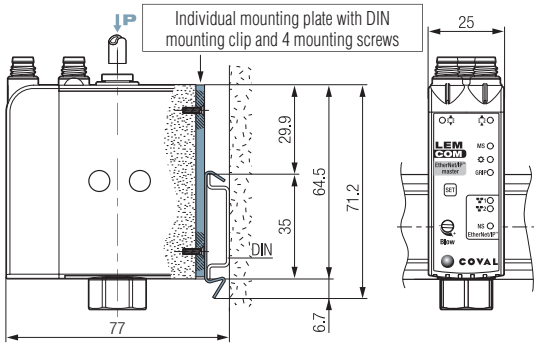


To mount from front, in addition to the module, a mounting kit must be ordered:

Kit for mounting from front:
1 plate + 4 screws

Part No.: LEMFIXA

Mounting on DIN rail

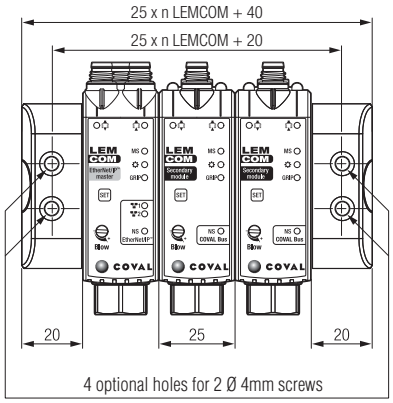


For static mounting (for example, in a cabinet), a module can be clipped onto a DIN rail. For this purpose, the module must first be equipped with an individual plate for mounting onto a DIN rail

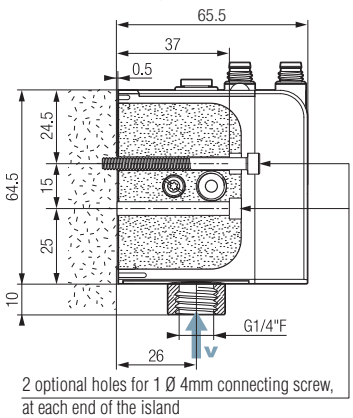
DIN rail mounting kit:
1 plate/clip + 4 screws

Part No.: LEMFIXB

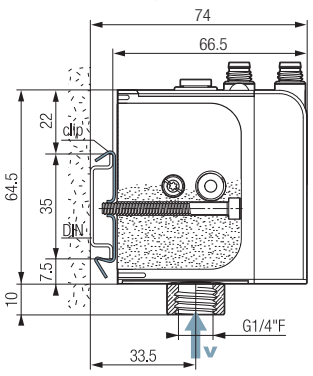
2- Islands



Mounting from front



Mounting on DIN rail



DIN rail mounting kit:
2 clips + 2 screws

Part No.: LEMFIXC

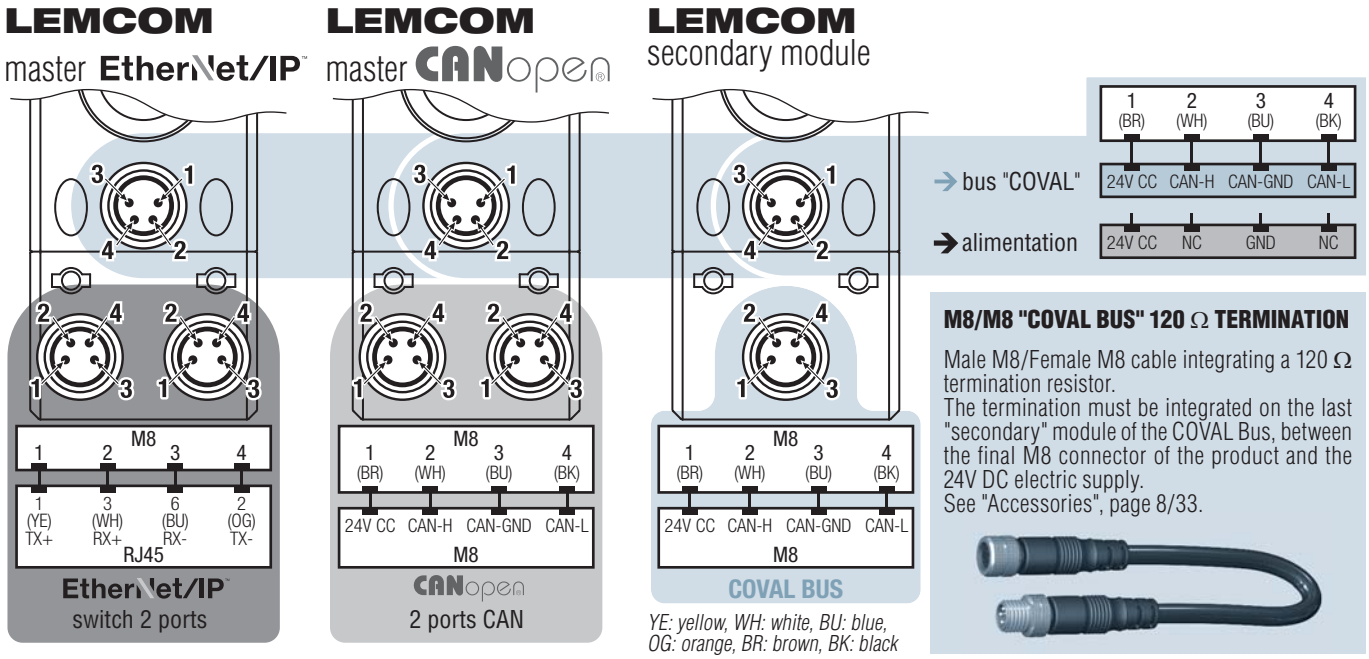
LEMCOM

1st Mini Vacuum Pump on Industrial Fieldbus

Connections , Specifications

CANopen
EtherNet/IP

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.
See "Accessories", page 8/33.

Common Specifications

- Supply: Non-lubricated air 5 microns filtered, according to ISO 8573-1 Class 4 standard.
- 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 1.02 to 3.25 SCFM.
- Air consumption: From 1.55 to 3.18 SCFM, 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 32 to 122°F.
- 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

- 24V 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 and CANopen universal application.
- Embedded web server (EtherNet/IP module only).

Communication

EtherNet/IP:

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

CANopen:

- 2 CAN port.
- 10 to 1000 Kbps.
- EDS 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.

GEM

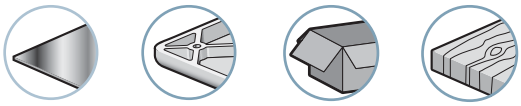
Vacuum Pump with ASR

(Air Saving Regulator)

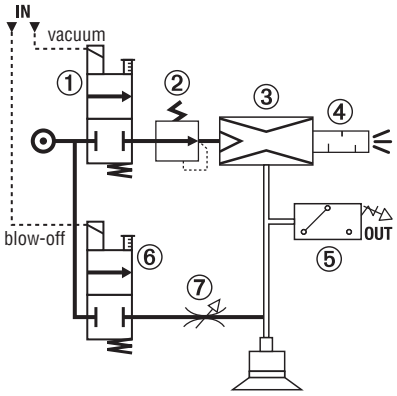
Advantages

- "All-in-one " solution, no more peripherals to be added.
- Simplified installation and use thanks to the Plug & Play system
- Strong suction rate: up to 13.60 SCFM.
- A GEM for every need: a wide range, many options, and only the necessary functions are chosen.
- No clogging, thanks to the through-type silencer.
- Controlled or timed blow-off.
- Smart dialogue ➔ User-friendly at all stages: initial settings, production, maintenance.

Industry-specific applications



For all objects, porous or airtight



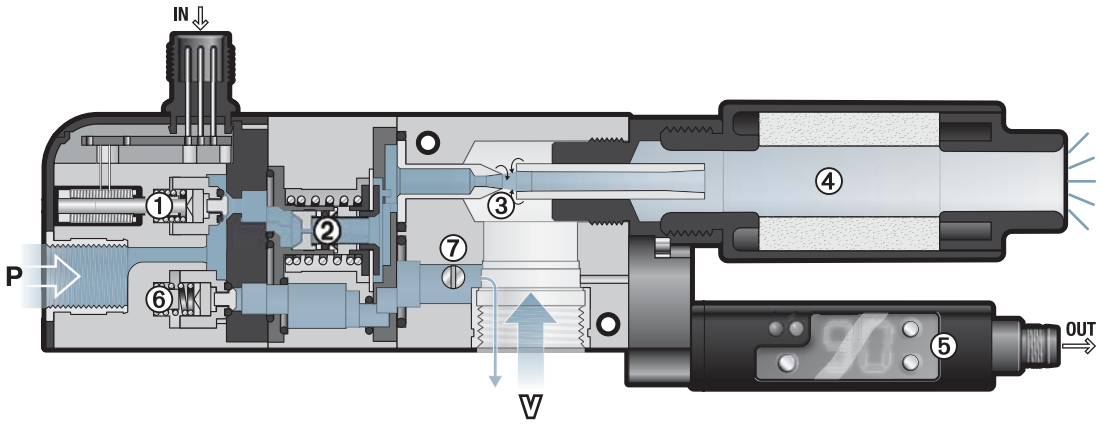
Compact Integration

The illustrations below present the 7 functions integrated in the vacuum pump and their respective roles in operation.
The result of COVAL's innovation is:

- **A compact vacuum pump**, that is easy to install as close as possible to the vacuum cups in order to reduce the volume to purge ➔ speed and energy savings.
- **A complete vacuum pump** (including integrated pressure regulator (ASR) and clog-free silencer), therefore not requiring any additional function or connection.

Integrated functions

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



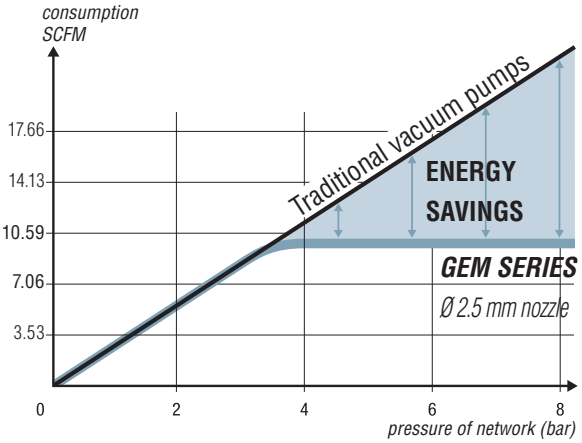
AIR Saving Regulator (ASR): Porous Applications

The GEM 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.

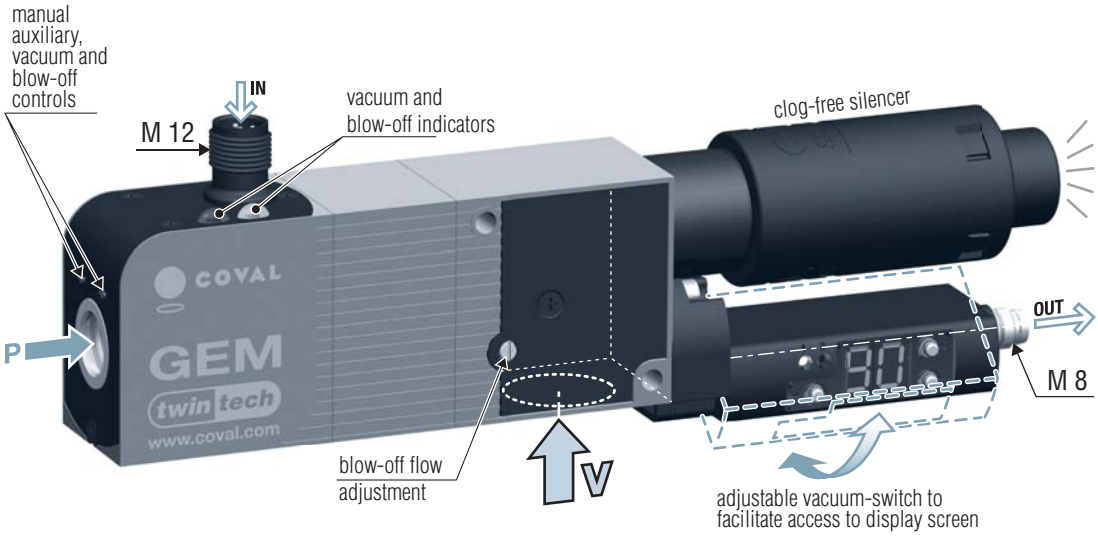
Compared to pressures found in most compressed air networks (5-7 bar), the graph opposite demonstrates an achieved economy of 40% on average.

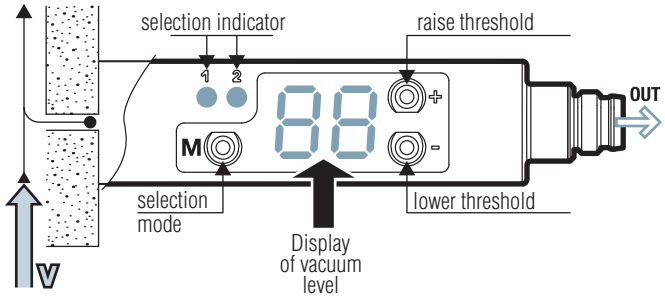


GEM
Vacuum Pump with ASR
Smart Dialogue

Programmable Vacuum Switch with Display

In its version with electronic vacuum switch with display, GEM presents a particularly high-performance smart dialogue.
The vacuum switch (figure opposite) measures the vacuum level measured at the input V connected to the vacuum cups and operates it as follows:
- Real-time display for monitoring production.
- Adjustment of the vacuum level generating the "object gripped" signal allowing operations to continue.





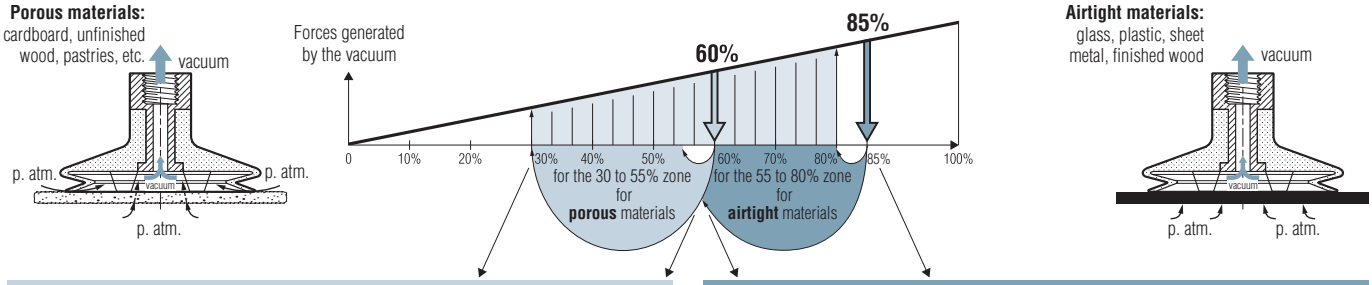
Adjustable Façade for Easy Access

Mounted as close as possible to the vacuum cups, the GEM vacuum pump can take on various positions.
Depending on the position selected for the pump, the vacuum switch can be oriented so as to optimize access to its display screen.
The different orientations possible are described (see p. 8/42).

GEM
Vacuum Pump with ASR
Selection Guide

Select Maximum Vacuum Level and Nozzle Diameter

The introductory guide in this catalogue 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 basic nozzle diameter which generates enough vacuum flow to respond in the time required by the application, based on a measurement of the material's leakage rate.
On the contrary, with airtight objects, the economical and effective vacuum used is 55% to 80%, obtained with a 85% max. vacuum pump.
The table below then helps to select the nozzle diameter which generates enough vacuum flow to respond in the time required by the application.



Porous Objects ▸ Maximum Vacuum Level: 60%

Time to create vacuum *(seconds)* for a volume of 1 liter								Air consumed *(SCFM)*	Air drawn in *(SCFM)*
vacuum achieved / *ø nozzle*		30 %	35 %	40 %	45 %	50 %	55 %		
also see LEM	**1.2 mm**	0.35	0.43	0.55	0.72	0.9	1.09	**2.30**	**2.54**
	1.5 mm	0.23	0.25	0.36	0.46	0.59	0.73	**3.43**	**3.88**
also see LEM+	**2 mm**	0.13	0.16	0.21	0.27	0.34	0.42	**6.32**	**6.67**
	2.5 mm	0.09	0.11	0.14	0.18	0.24	0.31	**9.18**	**9.71**
	3 mm	0.07	0.08	0.10	0.13	0.17	0.22	**13.60**	**13.60**

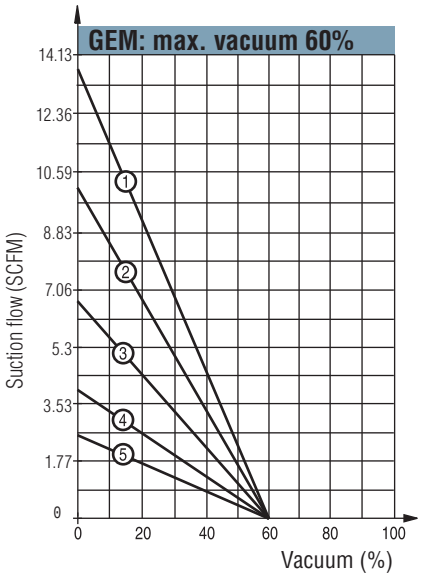
Airtight Objects ▸ Maximum Vacuum Level: 85%

Time to create vacuum *(seconds)* for a volume of 1 liter								Air consumed *(SCFM)*	Air drawn in *(SCFM)*
vacuum achieved / *ø nozzle*		55 %	60 %	65 %	70 %	75 %	80 %		
also see LEMAX	**1.2 mm**	1.01	1.19	1.40	1.62	1.98	2.37	**2.30**	**1.77**
	1.5 mm	0.66	0.73	0.93	1.08	1.33	1.59	**3.43**	**2.65**
also see LEMAX+	**2 mm**	0.38	0.46	0.55	0.65	0.80	0.95	**6.32**	**4.41**
	2.5 mm	0.26	0.30	0.35	0.41	0.50	0.59	**9.18**	**7.06**
	3 mm	0.21	0.24	0.28	0.33	0.40	0.48	**13.60**	**8.65**

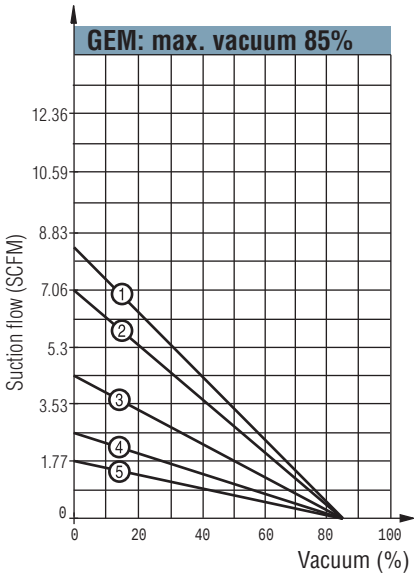
8

GEM

Suction Flow Rate / Vacuum Curves



1 - GEM60X30
2 - GEM60X25
3 - GEM60X20
4 - GEM60X15
5 - GEM60X12



1 - GEM90X30
2 - GEM90X25
3 - GEM90X20
4 - GEM90X15
5 - GEM90X12

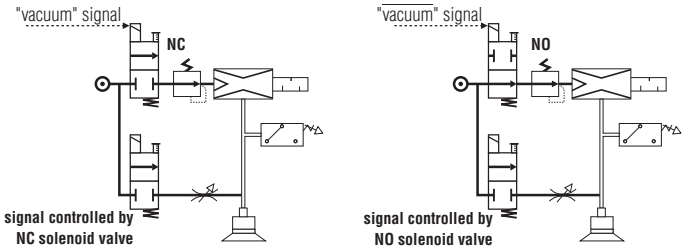
GEM

Vacuum Pump with ASR

Configuring a Vacuum Pump

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 shut-off, 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 the "vacuum" signal, which is noted as "$\overline{\text{vacuum}}$"



Select a Vacuum Switch Type

In addition to the electronic vacuum switch with display that supplies the full smart dialogue described on the previous page, the GEM range offers a selection of simplified vacuum switches for certain applications ➔ see their descriptions p. 8/42.

GEM	90	X	12	S		VA

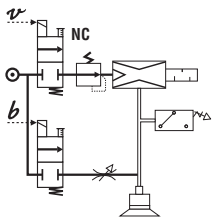
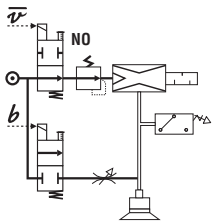
VACUUM LEVEL

maximum 60% vacuum optimum for porous objects	60
maximum 85% vacuum optimum for airtight objects	90

NOZZLE DIAMETER

ø 1.2 mm nozzle	12
ø 1.5 mm nozzle	15
ø 2 mm nozzle	20
ø 2.5 mm nozzle	25
ø 3 mm nozzle	30

COMPOSITION OF THE MODULE

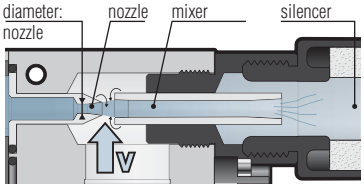
S	■ Vacuum controlled by an NC solenoid valve ■ Controlled blow-off ➔ 2 control signals	
V	■ Vacuum controlled by an NO solenoid valve ■ Controlled blow-off ➔ 2 control signals	

VACUUM SWITCH

VA	**Electronic vacuum switch with display** 2 outputs on M8 connector
VB	**Electronic vacuum switch** 1 output on M8 connector
VC	**Vacuum switch with electrical** contact 1 output on M12 connector
VO	**No vacuum switch**

Venturi: max. vacuum level and nozzle diameter.

The stream of compressed air draws on ambient air, which generates the vacuum.
- The mixer determines the maximum vacuum level: 60% or 85 %.
- The nozzle diameter determines the power expressed in vacuum flow rate and in air flow consumed, on the tables on the previous page.



Complete reference examples:

GEM60X30SVA
GEM vacuum pump, 60% max. vacuum, 3 mm nozzle diameter, vacuum controlled by NC solenoid valve and blow-off controlled by external signal, electronic vacuum-switch with display.

GEM90X20VVA
GEM vacuum pump, 85% max. vacuum, 2 mm nozzle diameter, vacuum controlled by NO solenoid valve and blow-off controlled by external signal, electronic vacuum-switch with display.

GEM

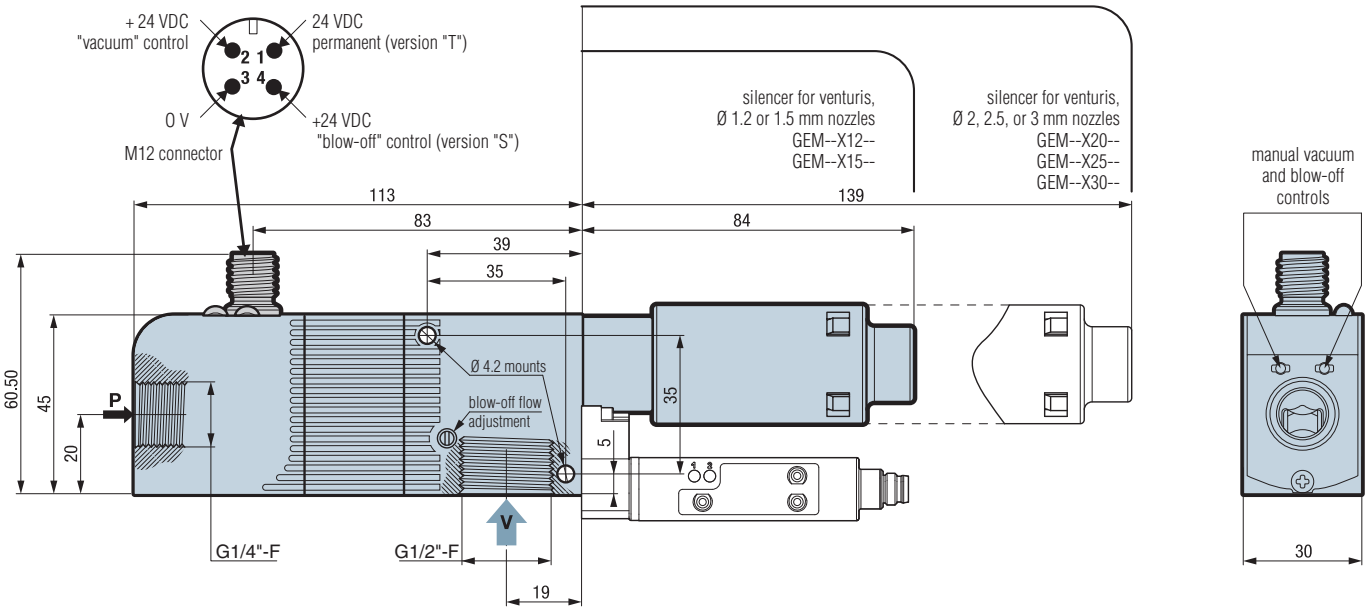
Vacuum Pump with ASR

Characteristics and Dimensions

Overall Characteristics

- Supply: non-lubricated air filtered to 5 microns according to standard ISO 8573-1 class 4.
- Electrical protection level: IP 65.
- Optimum operating pressure: 5 to 7 bar for GEM30.
- Blow-off: - network supply pressure,
  - adjustable flow
- Maximum vacuum: 60% or 85% depending on model (see p. 8/39).
- Suction rate: 1.77 to 13.60 SCFM depending on model (see p 8/39).
- Air consumption: 2.30 to 13.60 SCFM depending on model (see p. 8/39).
- Noise level: depending on the nozzle diameter selected:
  - ø 1.2, 1.5, and 2mm nozzle → 57 dBA
  - ø 2.5 mm nozzle → 65 dBA
  - ø 3 mm nozzle → 67 dBA
- Control voltage: 24 V DC (regulated ± 10%).
- Current draw: 30 mA (0.7 W) vacuum or blow-off.
- Max. operating frequency: 2 Hz.
- Number of operations: 10 million cycles.
- Weight: 250 g (depending on version).
- Materials: PA 6-6 15% FV, POM, PC 15% FV, brass, aluminum, NBR.
- Operating temperature: 50 to 140 °F

Dimensions and Connections



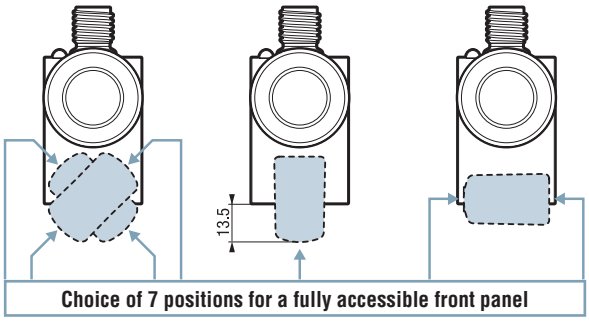
Note: Straight and angled M8 and M12 connectors shown p. 10/9.

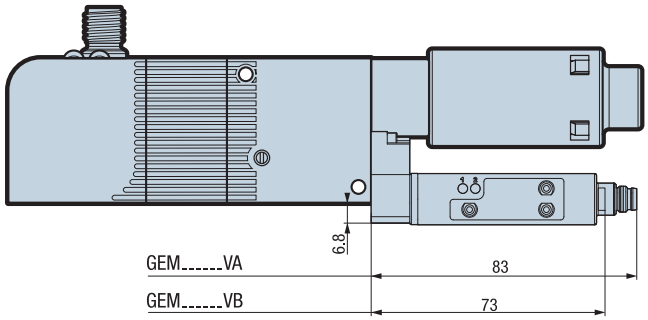
GEM

Vacuum Pump with ASR

Vacuum Switch Functions and Connections

1 - Modules with Electronic Indexable Vacuum Switch GEM------VA or GEM------VB



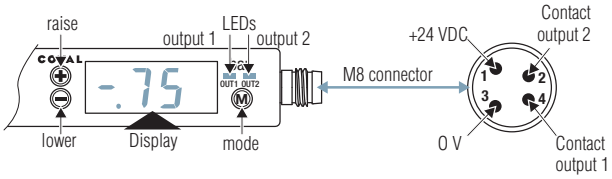


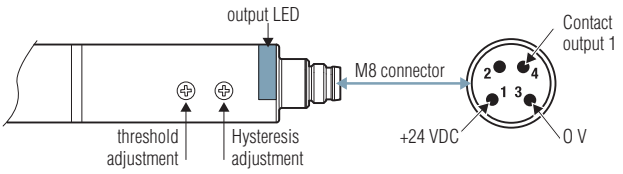
Vacuum switch with display, 2 outputs, GEM------VA

- compatible fluids: non-corrosive gas, dry, non-lubricated air.
- measuring range: -1 ... 0 bar
- hysteresis: configurable.
- maximum excess pressure: 3 bar.
- repetitivity: +/- 1% of the range.
- output thresholds: 2 x NO / NC.
- switching power: 125 mA transistor PNP
- threshold status display: 2 x LEDs.
- display unit: bar.
- Electrical connection: M8 (4 pins).
- supply voltage: 12 - 24 VDC ± 10%.
- current draw: < 60 mA.
- protection level: IP40.
- working temperature: 32 to 122 °F

Electronic vacuum switch, 1 output, GEM------VB

- compatible fluids: non-corrosive gas, dry, non-lubricated air.
- measuring range: -1 ... 0 bar
- hysteresis: configurable from 0 to 30%.
- maximum exsess pressure: 3 bar.
- repetitivity: +/- 1% of the range.
- output thresholds: 1 x NO.
- switching power: 125 mA transistor PNP
- threshold status display: 1 x LED.
- electrical connection: M8 (4 poles).
- supply voltage: 18 - 30 VDC (regulated).
- current draw: < 20 mA.
- protection level: IP50.
- working temperature: 32 to 122 °F

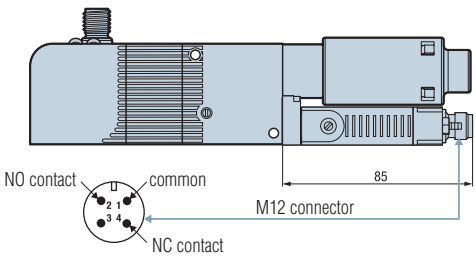




2 - Modules with Electrical Contact Vacuum Switch GEM------VC

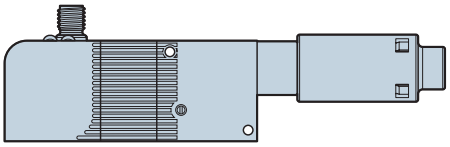
Contact vacuum switch, GEM------VC

- compatible fluids: non-corrosive gas, dry, non-lubricated air.
- measuring range: -350 to -850 mb.
- hysteresis: 125 mb.
- maximum overpressure: 2 bar.
- repetitivity: 3% of the range.
- breaking capacity: 1 x NO, 1 x NC.
- switching power: 3 A (breaker)
- electrical connection: M12 (4 poles).
- supply voltage: up to 125 V.
- protection level: IP40.
- working temperature: 14 to 122° F.
- number of operations: 5 million cycles.
- maximum throughput: 30 cycles perminute.



3 - Modules without Vacuum Switch GEM------V0

This model without vacuum switch must be accompanied by an independent vacuum switch on the vacuum circuit or a vacuum gauge for manually-controlled vacuum capacity.



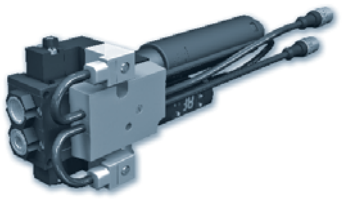
Note:

Screw-on electrical connectors, straight and angled M8 and M12 shown p. 10/9.

General points

Self-Regulating Vacuum Pumps

Applications



Description

GVMAX series of pumps are designed for gripping, handling and retaining airtight objects.

The principle is simple: as soon as the required level of vacuum is reached, the compressed air supply is stopped and the vacuum is maintained in the installation thanks to the non-return valve. Thus, the self-regulating system guarantees an optimum level of vacuum.

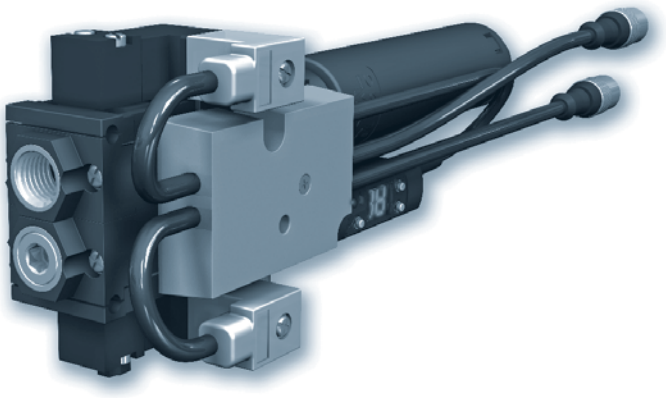
This approach considerably reduces both compressed air consumption and the noise level.

Moreover, thanks to their intelligent functions, they guarantee safety and optimum vacuum management for the application. COVAL recommends these pumps for applications involving airtight objects.

The Specific Functions of Vacuum-regulating Vacuum Pumps

They have the following characteristics:

- Vacuum generation by venturi effect (maximum pressure drop - 850 mbar or 85% vacuum).
- Air-saving, vacuum-regulating function.
- Adjustable blow-off.
- Visual and switching output control of vacuum level by digital electronic vacuum switch.
- Positive safety holds objects in case of electrical emergency stop (electrical outlets switched off) via its NO vacuum supply valve, maintenance can be carried out in complete safety.



8

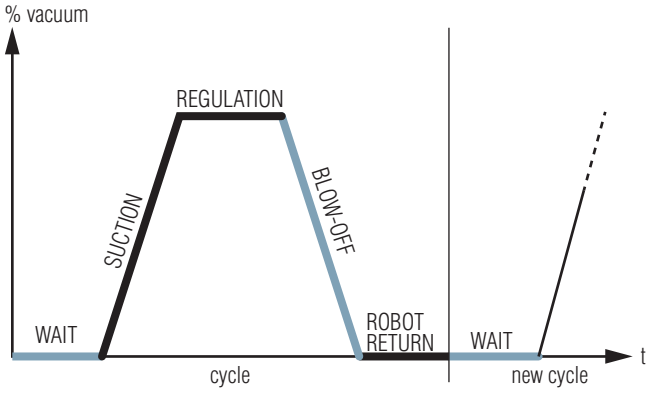
Operating Principle of a GVMAX Series Vacuum Pump

The cycle shows the three stages of a GVMAX:

Wait - Suction - Blow-off.

Regulation is automatically carried out by the equipment's internal loop. The interest of the GVMAX vacuum pump is based on these three stages:

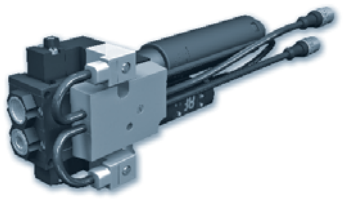
- Wait: no consumption, no clogging, no noise.
- Suction-regulation: the object is gripped and the vacuum pump automatically stops.
- Blow-off: automatically timed for release and return to neutral position in preparation for the next cycle.



General points

Self-Regulating Vacuum Pumps

General



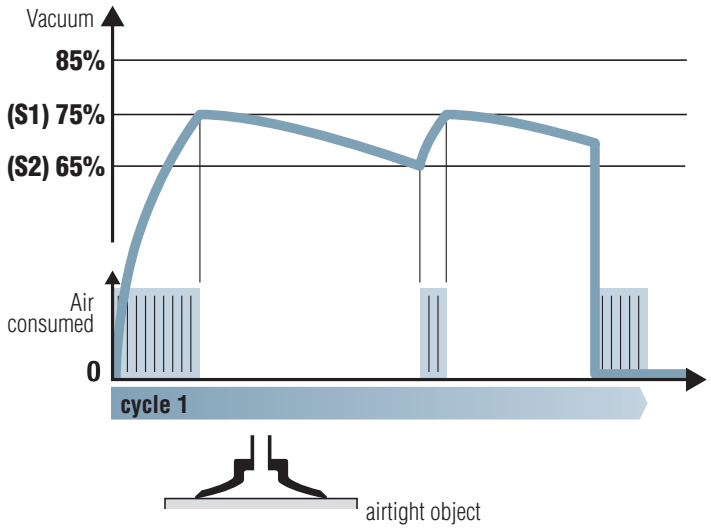
Regulating System in an Air-saving Vacuum Pump

The GVMAX vacuum pump is designed to save compressed air during a gripping cycle. The device stops consuming compressed air when the vacuum threshold pre-set in the vacuum switch is reached in the network. This is known as "regulation".

The diagram below shows the regulating system of a vacuum pump. As soon as optimum vacuum (vacuum threshold 1) is reached, the pumps maintain the vacuum until the level of vacuum descends to the hysteresis value after a period of time "t" due to leakage.

The self-regulating system guarantees that an optimum level of vacuum is maintained and reduces both air consumption and noise level throughout the cycle.

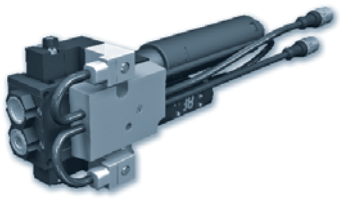
Vacuum Level in Relation to Time for a Regulation Cycle



GVMAX Vacuum Pump Yield

Volume of air consumed and time to create a vacuum in a 5 liter tank with a 4 bar GVMAX vacuum pump:

vacuum (%)	time to create a vacuum (s)	air consumed (SCFM)
10	0.2	0.03
20	0.3	0.06
30	0.6	0.10
40	0.8	0.15
50	1.1	0.21
60	1.5	0.28
70	2.1	0.38
80	3.0	0.55
85	4.0	0.74

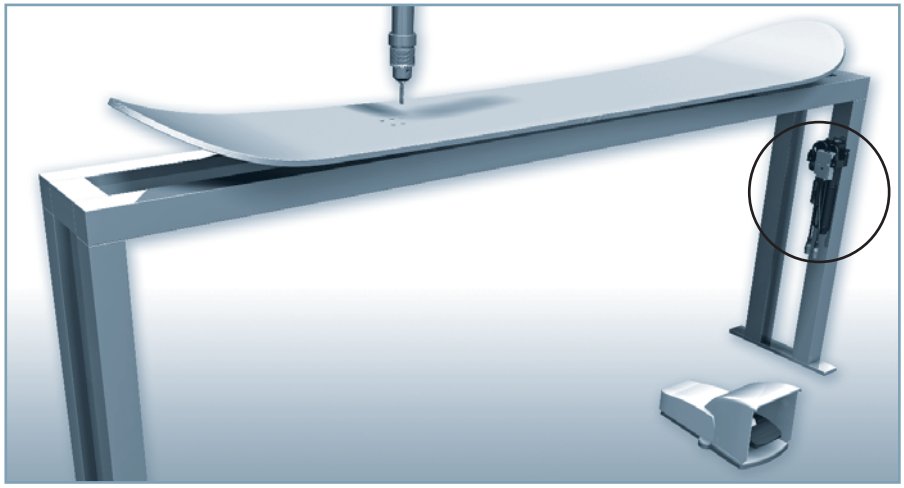


HOLDING

During the final phase of manufacture a snowboard must be held in position for several minutes.

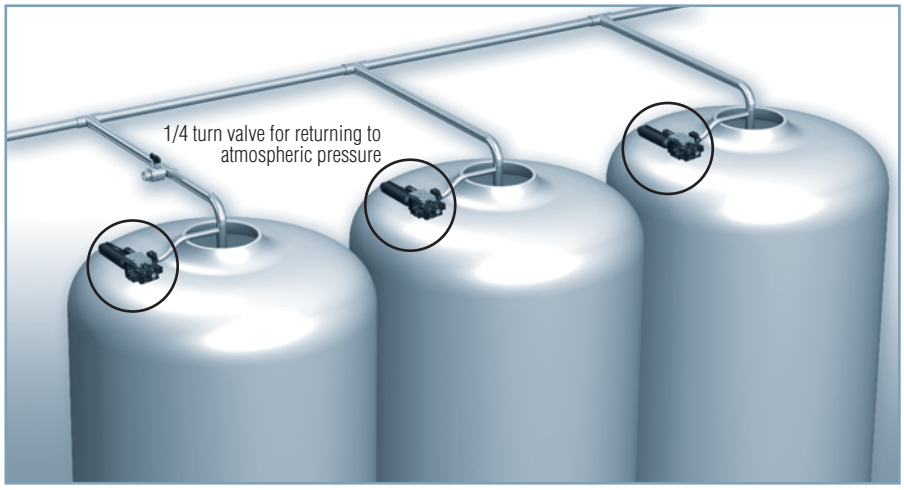
Using vacuum pumps with the air-saving function generates significant energy savings.

Also see the LEMAX series (p. 8/15) and **LEMAX+** series (p. 8/21).



EMPTYING A TANK

The regulation function of the vacuum pumps are used in this type of application. Hysteresis of the switching output regulation is adjustable between 1 and 25% vacuum on electric models.



Attention: For regulation of the vacuum level in tanks of more than 10 liters, consult us for the pneumatic versions.

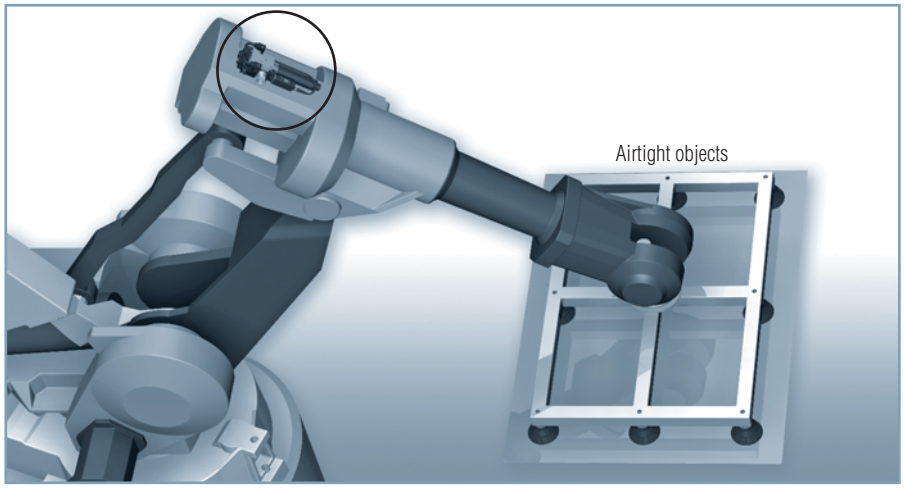
SAFE GRIPPING

■ Electric GVMAX

Grip is maintained on the object (airtight object) if there is a power failure.

■ Pneumatic GVMAX

Grip is maintained on the object (airtight object) if the pneumatic power is interrupted.

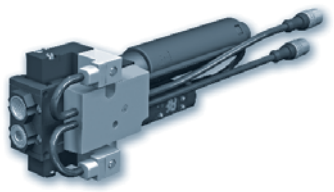


Grip is maintained if the electrical power or compressed air supply is interrupted.

GVMAX V2-2/V2-2R

Self-Regulating Vacuum Pumps

(Electric Vacuum and Blow-off Control)



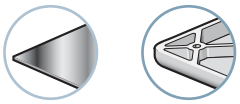
With GVMAXV2-2 and GVMAXV2-2R, COVAL offers two types of solutions based on a standard GVMAX electric vacuum pump.

These vacuum pumps provide an "all in one" solution by integrating all necessary functions, controls, valves, vacuum regulation, blow-off, product gripping control from an integrated vacuum switch, and silencer into a single, light and compact module.

The M12 connections dramatically simplify installation and use. They are available in two versions and are compatible with PLC safety:

- GVMAXV2-2: non-adjustable vacuum switch (factory configured)
- GVMAXV2-2R: adjustable vacuum switch

Industry-specific applications



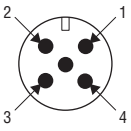
Characteristics

model	Ø nozzle (mm)	max. vacuum (%)	flow consumed at 4 bar (SCFM)	max. suction power (SCFM)	dynamic supply pressure	operating pressure	(g)
GVMAX V2-2	2.5	90	10.59	7.06	4.5 bar relative pressure	4.5 to 6 bar	550
GVMAX V2-2R	2.5	90	10.59	7.06	4.5 bar relative pressure	4.5 to 6 bar	550

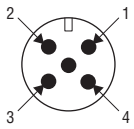
Applications

The two solutions, GVMAX V2-2 and GVMAX V2-2R are used for gripping airtight objects in the stamping, sheet-metal/bodywork and mounting industries for handling, transfer and holding operations. The GVMAX V2-2/V2-2R is designed for the Automotive sector.

Electrical connections

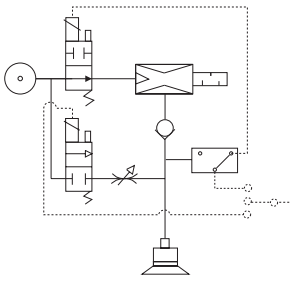


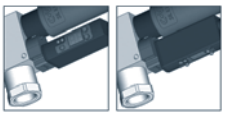
■ Automaton input
5-pole M12 connector
(**1**) Inlet connector - brown, 24 V DC
(**3**) 0 Volt (or –) - blue
(**4**) Vacuum switch threshold 2 outlet - black

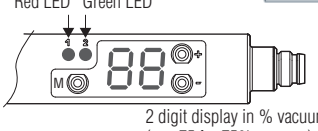


■ Automaton output
5-pole M12 connector
(**2**) Blow-off control - white, 24 V DC
(**4**) Vacuum immobilization in waiting position (neutral position) - black, 24 V DC

- Pneumatic supply maintained on the "compressed air" inlput of the vacuum pump.
- Electric power supply
  Suction: 24 V DC NO solenoid valve. From rest to suction (must be powered to stop suction).
  Blow-off: 24V DC NC solenoid valve







2 digit display in % vacuum
(e.g. 75 for 75% vacuum)

Evacuation Time in Seconds per Liter

% vacuum	10	20	30	40	50	60	70	80	85
GVMAX V2-2/V2-2R	0.03	0.07	0.11	0.16	0.22	0.30	0.41	0.60	0.77

Advantages

In relation to the standard GVMAX the GVMAX V2-2 and GVMAX V2-2R solutions offer the following advantages:

- Safety: vacuum generation in case of power failure by air inlet solenoid valve in normally open operation (24 V DC).
- Powerful, controllable blow-off.
- Data processing circuit (connection cable).
- Connection by 2 male 5 pin M12 connectors, (Input/ Output).
- Non-adjustable vacuum switch (factory-set) with the GVMAX V2-2 and adjustable vacuum switch with the GVMAX V2-2R.
- Compatible with safety PLCs and other safety systems.

Specifications

Base body	Aluminium (AU 4 PB)
Valve body	POM (black polyacethal)
Silencer	Black PC with felt internal element
Vacuum switch	PA66, PC, brass, NBR seal
Electric wiring	PA66
Screw	Zinc-plated steel
Inside parts	Brass; Aluminum; Desmopan
Seals	NBR
Membrane	NBR with nylon substrate

Vacuum switch display legibility

The GVMAX is fitted with an indexable vacuum switch (45°, 90°, 180°). This vacuum switch is set to the following values (values used in the automotive industry):

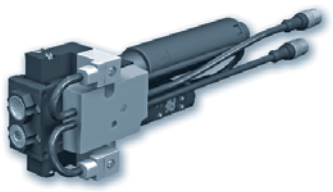
GVMAX V2-2 or V2-2R	Function	Threshold	Hysteresis
Threshold 1: vacuum regulation	NO	H1: 75 %	h1: 10 %
Threshold 2: object detected	NO	H2: 65 %	h2: 10 %

For all orders, please specify: **GVMAX V2-2** (Non-adjustable vacuum switch)
GVMAX V2-2R (Adjustable vacuum switch)

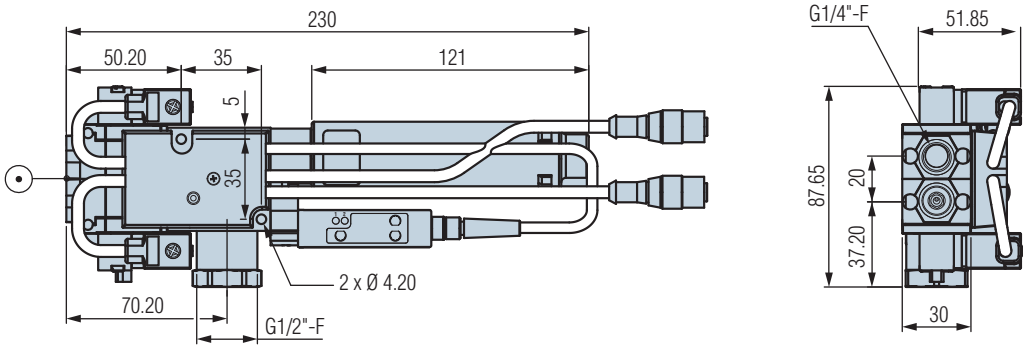
GVMAX V2-2/V2-2R

Self-Regulating Vacuum Pumps

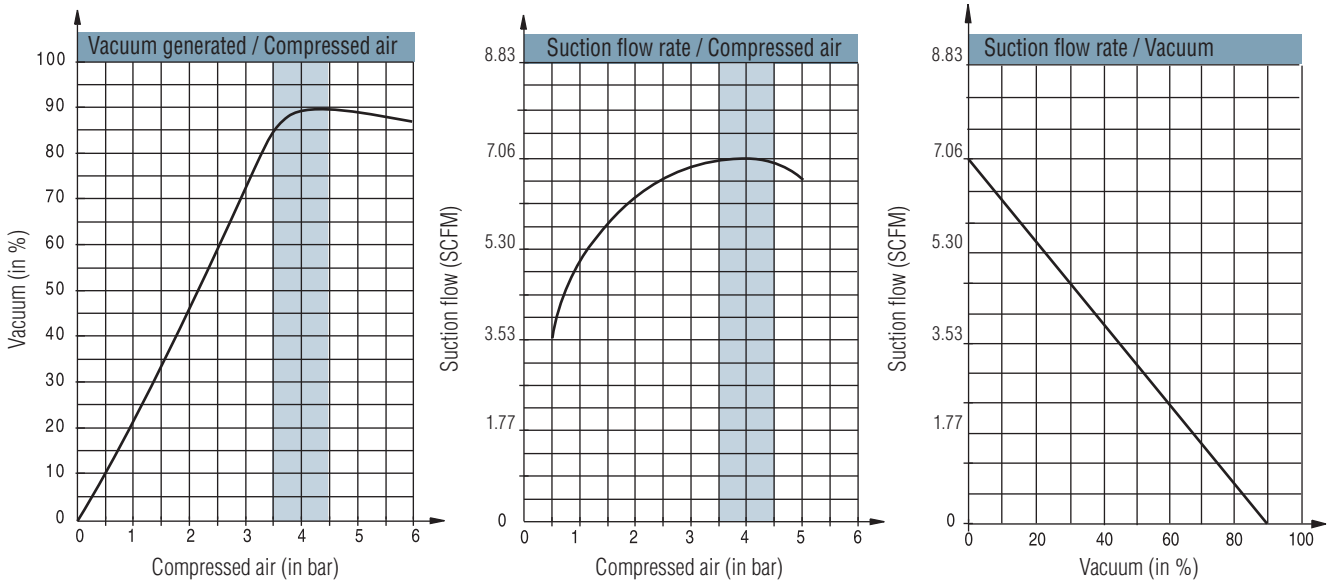
Dimensions, Curves, Options



Dimensions



Curves



Options

■ Manifold mounting

The GVMAX V2-2 and V2-2R can also be manifold-mounted.

Up to 4 vacuum pumps can be installed on one base.

Manifold references (example with GVMAX V2-2)

GVMAX V2-2 B1 (Base + 1 x GVMAX V2-2)

GVMAX V2-2 B2 (Base + 2 x GVMAX V2-2)

GVMAX V2-2 B3 (Base + 3 x GVMAX V2-2)

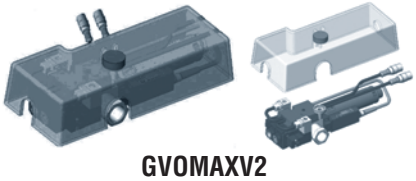
GVMAX V2-2 B4 (Base + 4 x GVMAX V2-2)

GVMAX V2-2 B4

■ Protective housing for GVMAX, Part No. GVOMAXV2

The protective housing for the GVMAX is transparent and removable.

Coval recommends using a protective housing to protect the vacuum pump.



GVOMAXV2

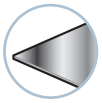
GVMAX

Self-Regulating Vacuum Pumps

(Electric Vacuum and Blow-off Control)

The communication between both elements, electronic vacuum switch and gripping valve control, enables the consumption of compressed air to be regulated and in particular significantly reduced. This range of vacuum pumps is strongly recommended for gripping airtight objects, clamping, and for medium or long cycles. Electrically controllable blow-off is integrated for release.

Industry-specific applications



Materials

Similar to GEM (see page 8/37).

Safety

The GVMAX E1 has a non-return valve installed as standard which enables it to maintain the vacuum within the circuit if there is a power failure. This function guarantees maximum safety conditions for operators during handling.

Characteristics

model	Ø nozzle (mm)	max. vacuum (%)			air drawn in (SCFM)			L2 (mm)		(g)
		X	T	N	X	T	N	S	K(1)	
GVMAX E1	2.5	50	75	90	12.71	8.48	7.06	60	121	510

(1) delivered as standard on version X.

Evacuation Time in Seconds per Liter

% vacuum	Ø nozzle	10			20			30			35	40			45	50		60		70		80	85
versions	(mm)	X	T	N	X	T	N	X	T	N	X	X	T	N	X	T	N	T	N	T	N	N	N
GVMAX E1	2.5	0.02	0.03	0.03	0.04	0.06	0.07	0.08	0.10	0.11	0.01	0.14	0.14	0.16	0.19	0.21	0.22	0.30	0.30	0.50	0.41	0.60	0.77

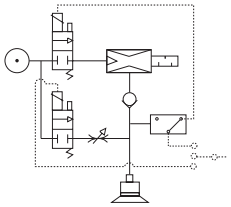
Operating Principle

When the selected vacuum level is reached, the compressed air supply stops. This interruption does not have any effect as the non-return valve maintains the vacuum and thus the grip. The vacuum switch continually analyzes the vacuum requirements. As soon as the minimum threshold is reached, it activates the vacuum generation valve to return to the pre-set value.

See page 8/43.

Specifications

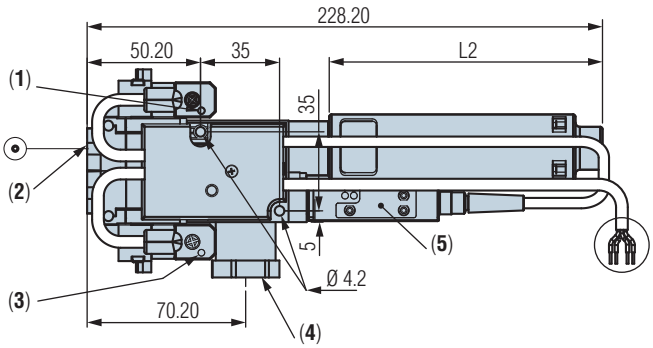
Supply	Non-lubricated filtered air, 2 to 6 bar, optimum at 4 bar
Temperature	32 to 140 °F
Contact output	PNP switching output NO or NC, adjustable hysteresis
Anti-parasite function	Integrated with display LED
Suction rate	Adjusted by flow restrictor

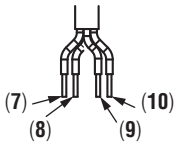


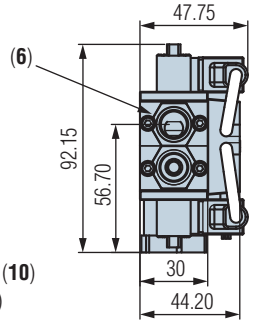
Curves: see page 8/47

Dimensions

(1) LED gripping display
(2) Compressed air input
(3) LED blow-off display
(4) Vacuum G1/2"-F Gas
(5) PSA100C vacuum switch
(6) G1/4"-F
(7) White: Contact output
(8) Brown: 24 V DC (gripping)
(9) Blue: common
(10) Black: 24 V DC (blow-off)







For all orders, please specify:

Model + Characteristic + Silencer + C.A. fitting + Pilot
Example: GVMAXNK14E1

1: Model	2: Characteristic		3: Silencer		4: C.A. fitting		5: Pilot	
GVMAX	X	50 % vacuum	-	Without silencer	14	G1/4"-F	E1	24 V DC NC
	T	75 % vacuum	S	Diffuser				
	N	90 % vacuum	K	Through-type				

GVMAX

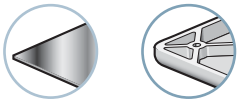
Self-Regulating Vacuum Pumps

(Pneumatic Vacuum and Blow-off Control)

The communication between both elements, pneumatic vacuum switch and gripping valve control, enables the consumption of compressed air to be regulated and in particular significantly reduced. This range of vacuum pumps is strongly recommended for gripping airtight objects, clamping, and for medium or long cycles in explosive environments. Pneumatically controllable blow-off is integrated for release.

Note: The volume of the piping must not exceed 10 liters. For higher volumes, please consult us.

Industry-specific applications



Materials

Similar to GEM (see page 8/41).

Safety

The GVMAX P1 has two non-return valve functions installed as standard which enables it to maintain the vacuum within the circuit if the pneumatic power is interrupted. This function guarantees maximum safety conditions for operators during handling.

Characteristics

model	Ø nozzle (mm)	max. vacuum (%)			air drawn in (SCFM)			L2 (mm)		(g)
		X	T	N	X	T	N	S	K(1)	
GVMAX P1	2.5	50	75	90	12.71	8.48	7.06	60	121	440

(1) delivered as standard on version X.

Evacuation Time in Seconds per Liter

% vacuum	Ø nozzle	10			20			30			35	40			45	50		60		70		80	85
versions	(mm)	X	T	N	X	T	N	X	T	N	X	X	T	N	X	T	N	T	N	T	N	N	N
GVMAX P1	2.5	0.02	0.03	0.03	0.04	0.06	0.07	0.08	0.10	0.11	0.01	0.14	0.14	0.16	0.19	0.21	0.22	0.30	0.30	0.50	0.41	0.60	0.77

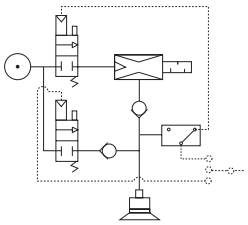
Operating Principle

When the selected vacuum level is reached, the compressed air supply stops. This interruption does not have any effect on the operation in progress as the no-return valve maintains the vacuum and thus the grip. The vacuum switch continually analyzes the vacuum requirements. As soon as the minimum threshold is reached, it activates the vacuum generation valve. The chosen level of vacuum is immediately re-established. See page 8/43.

Specifications

Supply	Non-lubricated filtered air, 2 to 6 bar, optimum at 4 bar
Temperature	32 to 140 °F
Vacuum switch	PSE100PKNO
Pressure at the vacuum switch	Equal to or greater than vacuum pumps supply pressure
Hysteresis	100 mbar max.

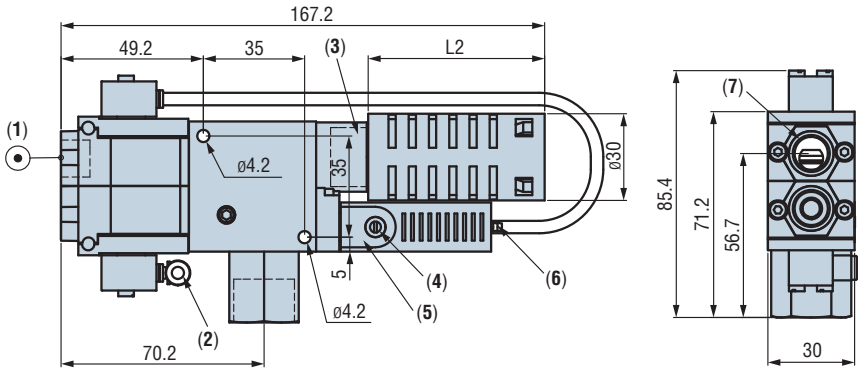
Curves: see page 8/47



Note: to ensure optimum operation, we advise you to ensure the vacuum network is airtight. For this purpose we recommend using NVS vacuum feeders and screwed vacuum fittings with O-rings (RDV, RCOV).

Dimensions

(**1**) 5.5 bar compressed air input
(**2**) Fast 2.7x4 blow-off control
(**3**) G1/2"-F Gas Exhaust
(**4**) Regulation threshold adjustment
(**5**) PSE100PKNO vacuum switch
(**6**) Hollow shaft for vacuum control vacuum switch pressurization
(**7**) G1/4"-F



For all orders, please specify:

Model + Characteristic + Silencer + C.A. fitting + Pilot
Example: GVMAXNK14P1

1: Model	2: Characteristic		3: Silencer		4: C.A. fitting		5: Pilot
GVMAX	X	50 % vacuum	-	Without silencer	14	G1/4"-F	P1
	T	75 % vacuum	S	Diffuser			
	N	90 % vacuum	K	Through-type			

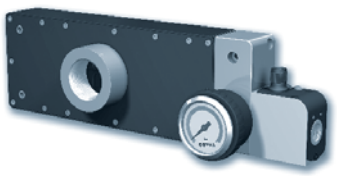
8

GVMAX

High Flow Vacuum Generator

Chapter 9

CMS



Mutli-stage Vacuum Pump

- Multi-stage technology
- 2 vacuum flow rates: 31.8 and 63.6 SCFM
- Optional control valve for vacuum and release cycles
- (M12 connectors)
- Optional vacuum gauge
- For applications requiring a high suction flow rate
- Emptying of large tanks
- Handling porous materials
- Remotely power vacuum chambers
- MVG and CVG Series

P 9/2

M--C

Air Amplifiers

- Operating principle based on the COANDA effect
- Bore diameter (Ø): 6, 10, 20, 30, 40 mm
- Flow rate: between 7.06 and 177 SCFM depending on the supply pressure (between 1.5 and 6 bar)
- Body material: aluminum
- Recommended for gripping lightweight, porous products: foam, carpet, cakes, leather, etc.
- Transport of powdery materials: powders, granules,etc.
- Transporting small, lightweight objects: paper clips, rice, coffee, etc.
- Smoke evacuation, depressurizing chambers

P 9/4

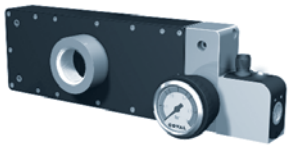
TVM

Pipe for Air Amplifiers

- Flexible polyurethane hose with steel spiral reinforcement.
- 4 sizes available: Ø 25, 40, 50 and 60 mm
- Anti-static properties according to DIN 53486
- Commonly used with COVAL air amplifiers (M--C series)
- High resistance to abrasion, cutting lubricant and UV rays

P 9/7

CMS
Multi-stage Vacuum Pump



With its multi-stage ejectors, CMS series, COVAL proposes an adapted response to all applications which need high suction flow; like emptying of high volume tanks or handling of porous objects.
Thanks to their characteristics, the CMS multi-stage vacuum generators are perfectly suited to feed vacuum grippers at a distance.

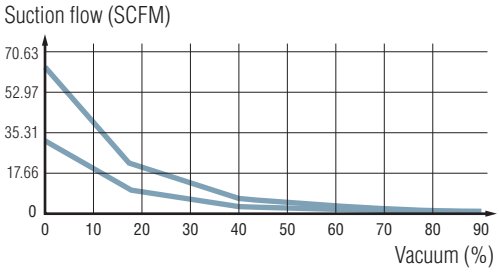
- Optional control valve for vacuum and release cycles
- M12 Connector

Industry-specific applications

Characteristics

Model	Consumption (SCFM)	Suction rate (SCFM)	Maximum vacuum (%)	Supply pressure (bar)	Optimal pressure (bar)	Noise level (dBA)	(Kg)
CMS90X50…	6.71	31.8	85	5-7	6	65	1
CMS90X100…	13.42	63.6	85	5-7	6	65	1

Performance Curves

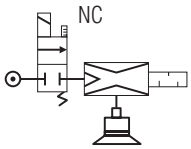


Control Versions

Option R

NC vacuum control, without blow-off :
CMS90X_ _**R**V_

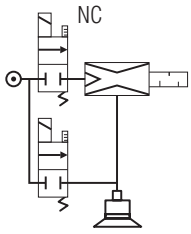
- 1 control signal.
- NC vacuum control valve.



Option S

NC vacuum control, with controlled blow-off:
CMS90X_ _**S**V_

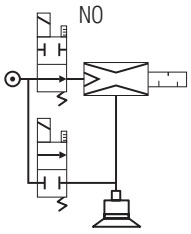
- 2 control signals.
- NC vacuum control valve.
- blow-off controlled by external signal (NC control valve).



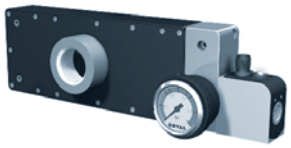
Option V

NO, vacuum control, with controlled blow-off:
CMS90X_ _**V**V_

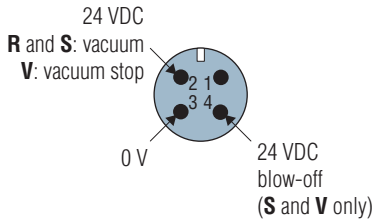
- 2 control signals.
- NO vacuum control valve.
- blow-off controlled by external signal (NC control valve).



CMS
Multi-stage Vacuum Pump



M12 Electrical Connection



Electrical Characteristics

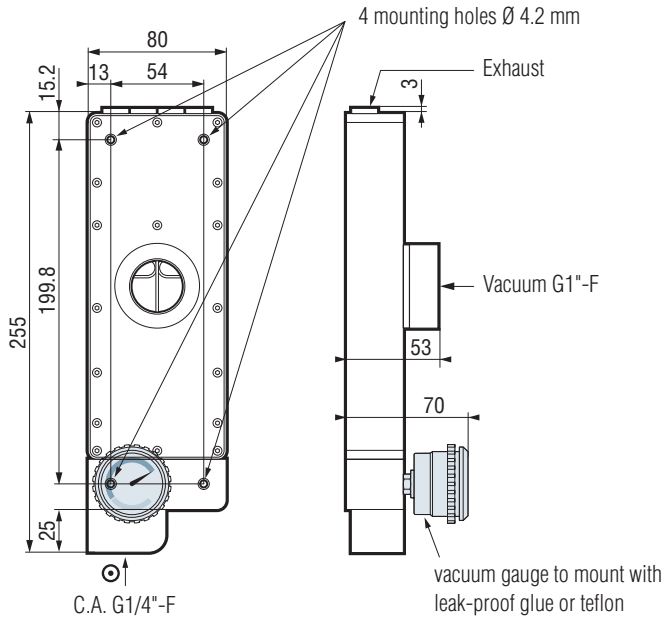
- Control voltage: 24 VDC (regulated) +/- 10%.
- Current draw: 30 mA (0.7 W) vacuum or blow-off.
- Max. operating frequency: 2 Hz.
- Number of operations: 10 million cycles.

Materials used

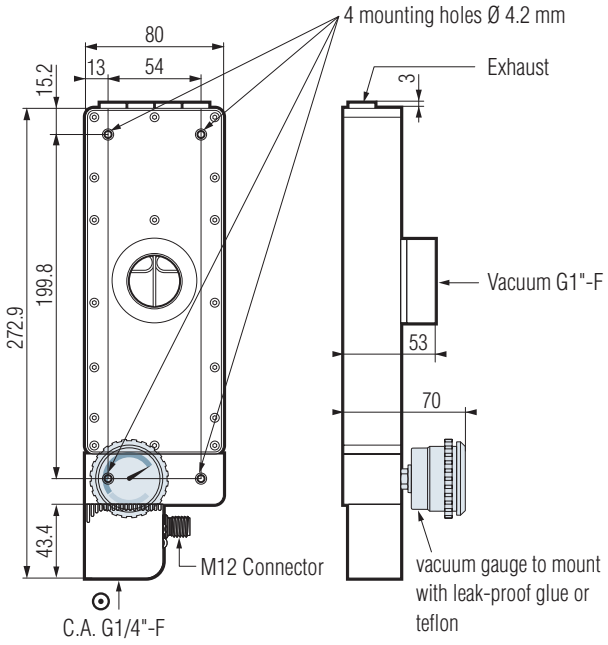
Base body	Glass-fiber reinforced PA 6	**Screws**	Zinc-plated steel.
Valve body	Glass-fiber reinforced PA 6	**Seals**	NBR.
Silencer	Aluminum with felt internal element	**Membrane**	NBR.
Internal components	Brass; Aluminum		

Dimensions

■ **CMS WITHOUT CONTROL VALVE:**
- CMS90X_ _**N** V_



■ **CMS WITH CONTROL VALVE:**
- CMS90X_ _**R** V_
- CMS90X_ _**S** V_
- CMS90X_ _**V** V_



Needle dial vacuum gauge:

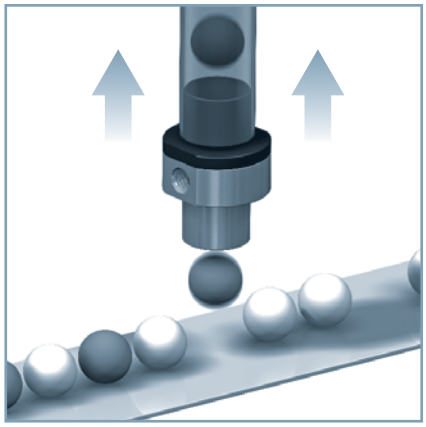
CMS 90 X --- VF
- Damping: by silicone movement (patented).
- Measuring: Bourdon tube in CuSn.
- Precision: +/- 2.5% of max. scale value
- Frame: black ABS.

To place an order, specify:
Model + Vacuum level + X + Suction flow + Control + Monitoring
Example: CMS90X100RVF

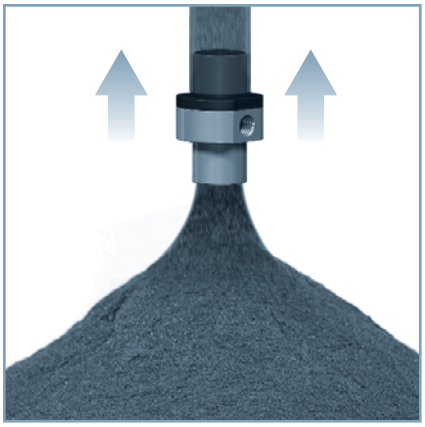
1: Model	2: Vacuum level		3: Suction rate		4: Control		5: Monitoring	
CMS	90	85%	50	31.8 SCFM	N	Without control	VO	without
			100	63.6 SCFM	R	NC Vacuum control	VF	Vacuum gauge
					S	NC Vacuum and NC blow-off control		
					V	NO Vacuum and NC blow-off control		

BLOW-OFF, CLEANING, WASTE SUCTION

SORTING BY WEIGHT

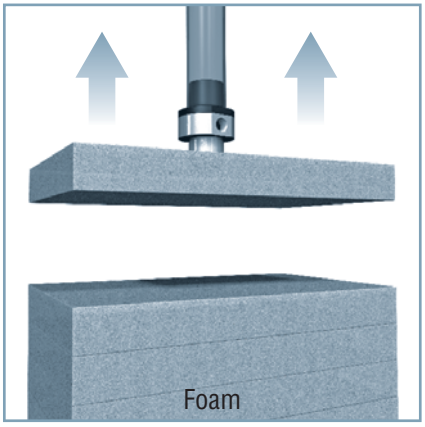


TRANSPORT OF GRANULES (rice, grains of wheat or coffee, etc.)



DEGASSING, SMOKE EVACUATION

GRIPPING AND / OR UNSTACKING VERY POROUS LOADS



M--C
Air Amplifiers

By virtue of the COANDA effect, the motor flux draws in air at room temperature. This physical phenomenon greatly amplifies the flow which results in very high suction produced with low consumption.

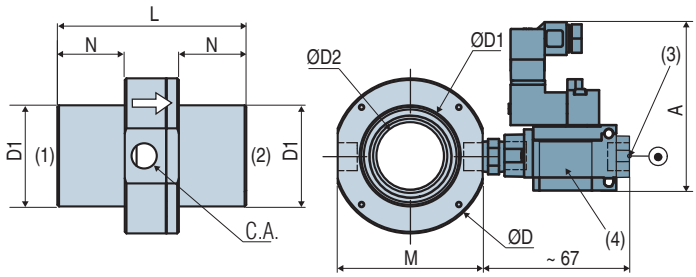
- Gripping of very porous, lightweight products: foam, carpet, cakes, leather, etc.
- Transport of powdery materials: powders, granules,etc.
- Transporting small, lightweight objects: paper clips, rice, coffee, etc.
- Smoke evacuation, chamber depressurization, etc.

Operation requirement
Compressed air filtration at 5 microns for the M6C model and 20 microns for the other models.

Characteristics

	L	N	M	C.A.	ØD	ØD1	ØD2	(g)
M 6 C	77	27.5	37	G1/8"-F	39	20	6	100
M 10 C	60	20	36	G1/8"-F	40	25	10	100
M 20 C	90	30	55	G1/4"-F	60	40	20	295
M 30 CV	105	35	72	G1/4"-F	77	50	30	495
M 40 CV	112	40	86	G3/8"-F	92	60	40	600

Note: all dimensions are shown in (mm).



(1) Suction
(2) Discharge
(3) G1/4"-F
(4) Control valve, optional. Note: the valve is incompatible with the M40C model.
A =
- 77 mm for an AP2 valve + DIN connection (connector supplied)
- 68 mm for an AP2 valve + M12 connection (connector not supplied)
- 44 mm for an AP2 + pneumatic connection for 2.7x4 tube

Specifications

Compressed air	Dry non-lubricated 1.5 to 5 bar
Maximum pressure drop	see table page 9/6
Materials	Aluminum body
Temperature	-4 to 176°F

Additional information

- Stainless steel versions are available on request.
- The 5 products present the best amplification ratio (consumption/suction). COVAL can study smaller amplification ratios (higher consumption) but higher maximum vacuum for transporting heavy objects.

For all orders, please specify:
Model + bore Ø + C.A. control + C.A. fitting + valve controls
Example : M30CVAP214E1

1: Model	2: Bore Ø		3: C.A. controls		4: Valve controls	
M	6 C	6 mm	-	Without control valve	P1	Pneumatic
	10 C	10 mm	AP214	C.A. control valve	E1	24 V DC DIN
	20 C	20 mm				
	30 CV	30 mm				
	40 CV	40 mm				

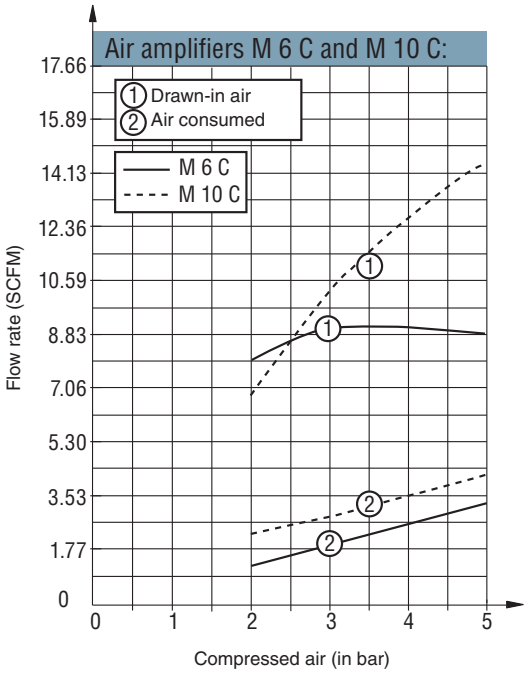
M--C
Air Amplifiers
Performance Curves

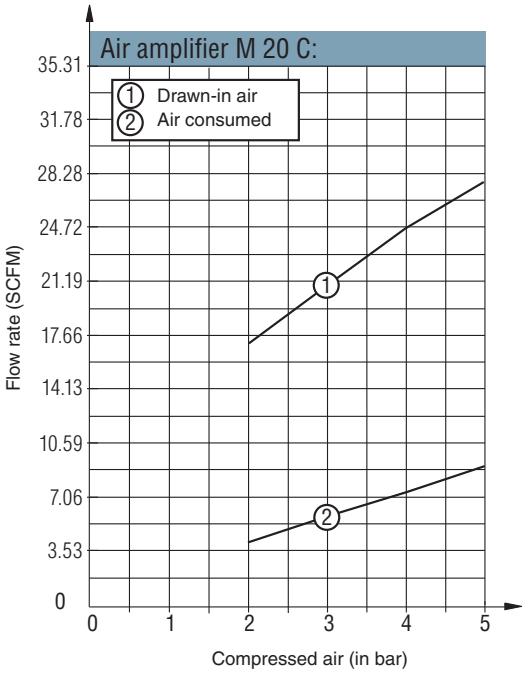
Maximum Vacuum / Supply Pressure

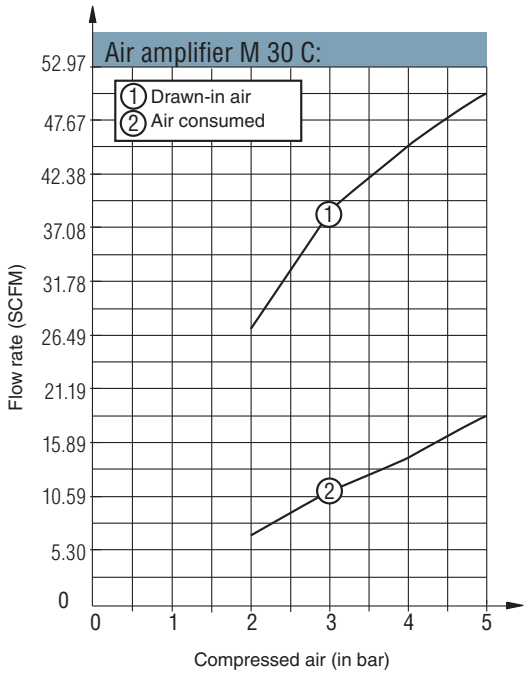
	Supply pressure / Maximum vacuum (in Bar) (in mm CE)			
	2	**3**	**4**	**5**
M 6 C	900	1500	2000	2600
M 10 C	200	500	700	1000
M 20 C	207	310	400	510
M 30 CV	90	130	220	280
M 40 CV	140	200	284	360

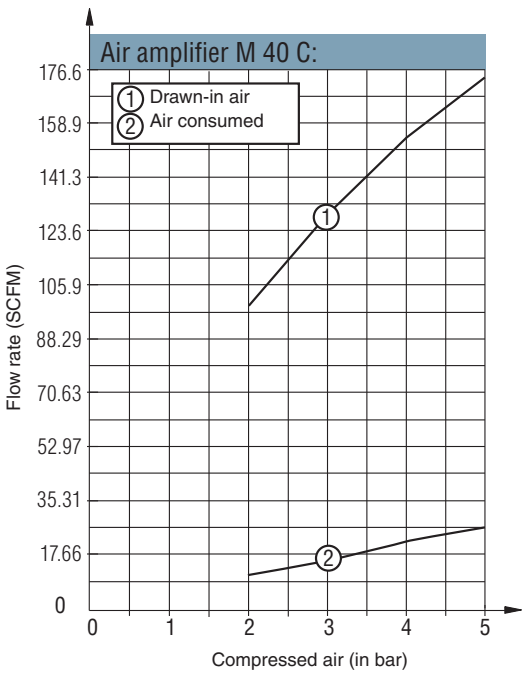
Maximum Overpressure / Supply Pressure

	Supply pressure / Maximum vacuum (in Bar) (in mm CE)			
	2	**3**	**4**	**5**
M 6 C	100	550	1300	2000
M 10 C	400	700	1500	2000
M 20 C	220	340	500	600
M 30 CV	45	70	100	160
M 40 CV	96	145	199	290









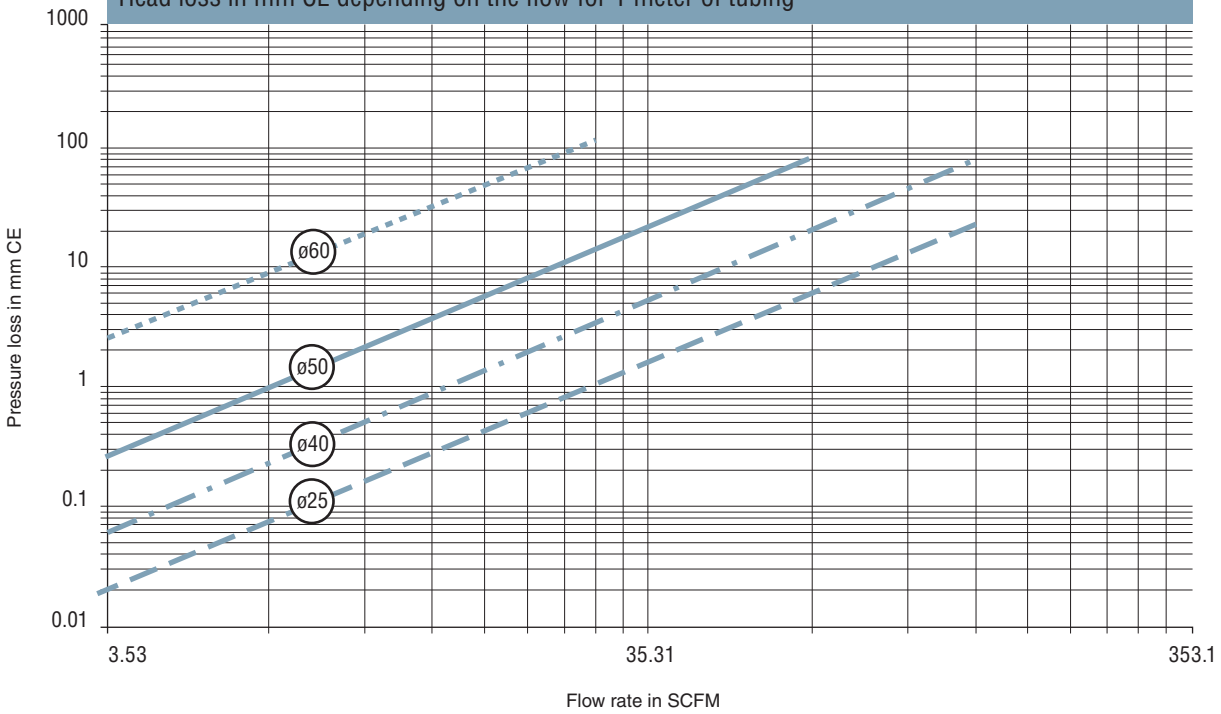
TVM
Pipe for Air Amplifiers

Flexible polyurethane tube reinforced with a steel spiral covered in PVC.
Highly resistant to abrasion, cutting fluids and UV light.

- Anti-static treatment in compliance with standard DIN 53486.

Specifications	
Diameter D (mm)	Ø 25 - Ø 40 - Ø 50 - Ø 60
Bend radius	10 x D
Maximum pressure drop	–250 mbar
Maximum pressure	1 bar
Temperature	-40 to 212°F
Anti-static	R < 108 Ohm

Head loss in mm CE depending on the flow for 1 meter of tubing



For all orders, please specify :
Model + Diameter + Length
Example: TVM4010

1: Model	2: Diameter		3: Length (m)	
TVM	25	Ø 25 mm	-	In meters
	40	Ø 40 mm	10	A ring
	50	Ø 50 mm		
	60	Ø 60 mm		

Vacuum Pump Accessories

Chapter 10

SIL GV

Diffuser-type Silencer

- Noise reduction of between 30 and 39 dBA
- Passage of air through a soundproof material
- Available in 4 sizes
- 4 types of fitting, M-5F, G1/8", G1/4", G 1/2"
- Very good sound reduction
- Air outlet gently diffused
- Reduced size

P 10/2

SIL K--C

Through Type Silencer

- Through type silencer
- Noise reduction of between 30 and 33 dBA
- Noise absorbed laterally by sound-proof textile
- Available in 5 sizes
- 3 types of fitting, G1/8", G1/4", G1/2"
- Noise reduction mastered
- No clogging
- No pressure loss
- Ideal for dusty environments
- Possibility of collecting the exhaust

P 10/2

MS

Blow-off Device

- Direct connection on the micro- and mini-ejectors via an M5 fitting
- Pressure connection by push fitting for Ø 4x6 or 2.7x4 tube
- 3.53 SCFM blow-off flow at 5 bar
- Allows direct blow-off on the VR type micro-ejectors or any other M5 fitting
- Reduces cycle times
- Avoids using a vacuum-proof distributor

P 10/3

FVI

Vacuum Filter

- A range of 8 different models of vacuum filters for optimum adaptation depending on the source of vacuum generation
- 3 filtration materials: paper, polyester and stainless steel
- 6 types of fitting, depending on the model: G3/8", G1/2", G3/4", G1"1/4, G1"1/4 and G2".
- Ideal vacuum filter for high suction flow rate vacuum sources
- Solution optimized to suit each operating environment thanks to three types of filtering material used in the filter cartridges
- A wide range adapted to your application
- Easy-to-replace cartridges in case of clogging

P 10/4

FVUM
FVUG

Vacuum Filter

- A range of 4 models
- 2 sizes and 3 types of fittings: G1/4", G3/8" and G1/2"
- Transparent tank
- Transparent tank, visual checking on clogging possible
- Different models mean you can select a solution adapted to your application

P 10/6

FVG

Mini Vacuum Filters

- A range of 4 models
- Ideal for mounting with micro and mini in-line ejectors
- Easy-to-replace cartridges in case of clogging

P 10/7

FVL12

In-line Filter

- 400 micron stainless steel screen
- Easy to mount in-line on the vacuum network or directly on the vacuum pump

P 10/8

FVL68

In-line Vacuum Filter

- Simple push connection for 6x8mm hose
- Quick integration into vacuum network

P 10/8

CD
CC

Screw-type Electrical Connectors

- M8 and M12
- 4 and 5 poles
- Straight or elbow(90°)

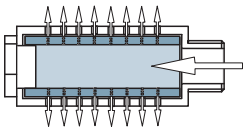
P 10/9

SIL GV. SIL K -- C

Diffuser Type Silencer, Through-type Silencer

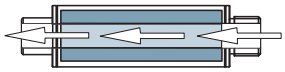
From when it was founded, COVAL has always given particular attention to reducing the noise of vacuum pumps and improving their performance.

Often copied, never equalled, the acoustic performance of COVAL vacuum pumps stems from the inside shape of the venturi system and the innovative design of the hit-tech soundproof materials used for the silencers.



Diffuser type silencer

- Very good noise reduction
- Air output gently diffused.



Through-type silencer

- Noise reduction mastered.
- No clogging.
- No pressure loss.

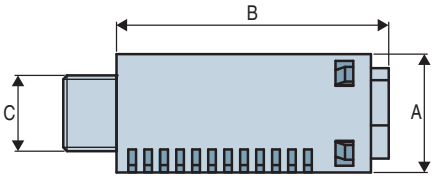
SIL GV series diffuser-type silencer

Noise reduction by breaking up the air jet in a baffle inside the diffuser.
Passage of air through a soundproof material.

Characteristics

Models	ØA	ØB	ØC	Weight (g)	Medium-level noise reduction (dBA)
SIL GV 10 M5 F	18	36	M5-F	5	30
SIL GV 10	18	36	G1/8"-M	5	30
SIL GV 15	20	46	G1/4"-M	10	35
SIL GV 20	30	62	G1/2"-M	29	39

Note: all dimensions are shown in (mm)



Specifications

Material	POM (Polyoxymethylene)
Temperature	14 to 122 °F

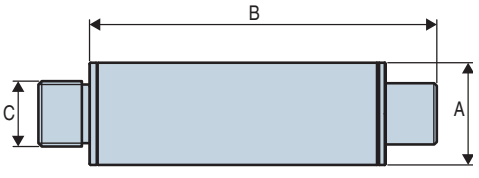
SIL K -- C series through-type silencer

- Noise absorbed laterally by soundproof material.
- Free output without pressure loss or clogging.

Characteristics

Models	ØA	ØB	ØC	Weight (g)	Medium-level noise reduction (dBA)	Materials
SIL K 18 C	20	68	G1/8"-M	22	33	thread: aluminum
SIL K 14 C	20	68	G1/4"-M	25	31	tube: polycarbonate
SIL K 38 C	30	121	G3/8"-M	90	33	polycarbonate
SIL K 12 C	30	121	G1/2"-M	92	33	
SIL K 12 CS	30	54	G1/2"-M	61	28	

Note: all dimensions are shown in (mm)



Specifications

Material	Black anodized aluminum or black polycarbonate (according to Ø) interior: Textile soundproof material
Temperature	14 to 122 °F

Special:

COVAL develops tailor-made through-type silencers according to specifications, male of female fitting, length, diameter, characteristics on request.

MS
Quick Release Device

Economical solution developed especially for Coval micro-ejectors to suit applications requiring blow-off combined with very reduced size and weight. This device enables the user to connect the compressed air network directly onto the M5 fitting.

Advantages

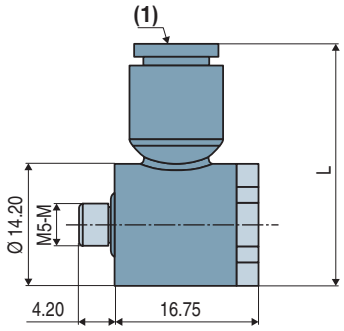
- Allows blow-off on VR or any other M5 fitting
- Reduces cycle times
- Avoids using a vacuum-proof distributor.

Technical Characteristics

Model	Push fitting	L
MS2M5	Ø 2.7x4	25.8
MS4M5	Ø 4x6	28.10

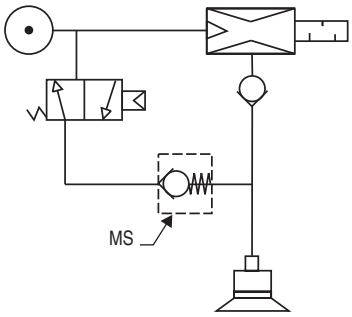
- Pressure connection by push fitting for Ø 4x6 or 2.7x4 tube
- Connection to the vacuum network by M5 male threaded fitting
- Blow-off flow rate at 5 bar: 3.53 SCFM
- Materials: polyamide PA 6.6 + brass (CuZn) + nitrile (NBR)

Dimensions



(**1**) Push fitting

Pneumatic Diagram



For all orders, please specify:
Model + Push fitting
e.g. : MS2M5

1: Model	2: Push fitting
MS2M5	Ø 2.7x4
MS4M5	Ø 4x6

Note: all dimensions are shown in (mm)

FVI
Vacuum Filter

The FVI range is compatible with pneumatic vacuum generators (venturi) or electric vacuum pumps (the FVI 2 model is suitable for a suction turbine). Each filter is fitted with an interchangeable cartridge treated to guarantee long life expectancy for the whole unit.

The filtering element consists of a 5 micron filter (made of paper for version C), which is sufficient to protect pumps and venturi under normal operating conditions.

Note: For filtration leaving large deposits (powder), mount the filter horizontally or upside down.

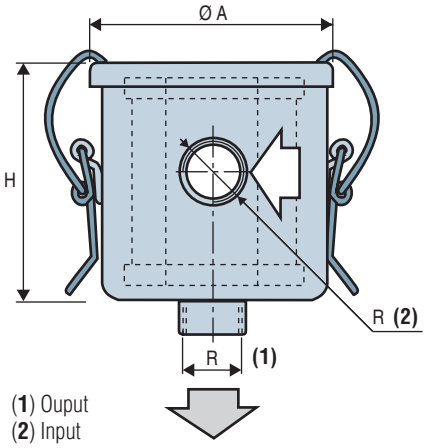
Important: These filters are designed for vacuum. They cannot withstand pressure greater than atmospheric pressure.

Filter cartridge available in 3 versions: paper, polyester and stainless steel.

Characteristics

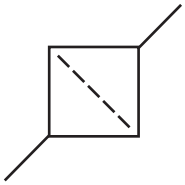
Models	A	H	R	Flow rate (SCFM)	Weight (g)
FVI 38	79	76	G3/8"-F	14.13	270
FVI 12	101	86	G1/2"-F	21.19	600
FVI 34	101	86	G3/4"-F	21.19	600
FVI 114	135	96	G1"1/4-F	49.44/42.38	1050
FVI 114 G	173	156	G1"1/4-F	49.44/42.38	1850
FVI 2	201	258	G2"-F	176.6	3900

Note: all dimensions are shown in (mm)



Specifications

Body material	Stamped steel sheet
Treatment	Black paint
Filtration	5 microns with a paper cartridge
	3 microns with a polyester cartridge
	60 microns with a stainless steel cartridge
Pressure loss	2 to 4% vacuum with a new filter
	5 to 7% vacuum with average clogging



For all orders, please specify:
Model + Fitting + Filtering material
e.g.: FVI34P

1: Model	2: Fitting		3: Filtering material	
FVI	38	G3/8"	C	Paper
	12	G1/2"	P	Polyester
	34	G3/4"	I	Stainless steel
	114	G1"1/4		
	114G	G1"1/4		
	2	G2"		

FVI
Filters and Filtration
Accessories

Filter

Models	Use
FVI 38	GVP 20
FVI 12	GVP 25 - 30 - PVR 6 (211.88 Cf)
FVI 34	Vacuum pumps: 353/565 Cf
FVI 114	Vacuum pumps: 706/882 Cf
FVI 2	Turbine

Filtration

COVAL offers three filtration principles:

Model C: CE filtration element
- Paper cartridge with 5 micron filtration.
- No damp cleaning process possible.
- Incompatible to very humid conditions

Model P: PE filtration element
- Polyester cartridge with 3 micron filtration.
- Damp cleaning possible.

Model I: IE filtration element
- Stainless steel cartridge, 60 micron filtration.
- For use in very damp environments (water, liquid)

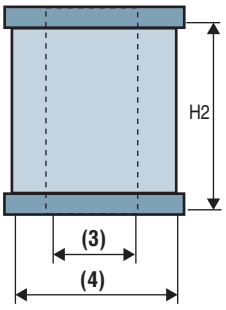
Accessories

Models	Replacement cartridge (*)	External Ø	Internal Ø	H2
FVI 38	FVI 38*E	51	23	57
FVI 12	FVI 12*E	64	38	68
FVI 34	FVI 12*E	64	38	68
FVI 114	FVI 114*E	98	60	71
FVI 114 G	FVI 114G*E	125	64	125
FVI 2	FVI 2*E	149	88	221

(*) Specify the filter material: **C** (paper) ; **P** (polyester) ; **I** (stainless steel).

Note: all dimensions are shown in (mm)

Replacement cartridge



(**3**) inside Ø
(**4**) outside Ø

Other Models

FVG 11-2-3-5-6 series vacuum filters, for micro-ejectors
- Polyester cartridge
- See page 10/7

FVUM 14-38 series vacuum filters for GVP 12 and 15 vacuum pumps
- FVUG 38-12 vacuum filters, in-line stainless steel cartridge for GVP 15 and 25 vacuum pumps and small electric vacuum pumps.
- See page 10/6

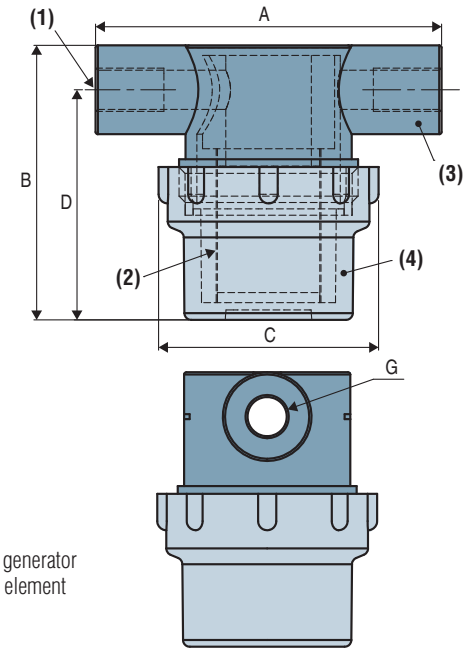
FVUM. FVUG
In-line Filters

The advantage of this range of filters is that they are equipped with a transparent tank so that clogging is visible.

Characteristics

Models	A	B	C	D	G	Flow rate (SCFM)
FVUM 14	75	60	49.5	49.5	G1/4"-F	5.30
FVUM 38	75	64	49.5	51.5	G3/8"-F	12.36
FVUG 38	90.5	126.5	75	112.5	G3/8"-F	12.36
FVUG 12	90.5	130	75	114.5	G1/2"-F	17.66

Note: all dimensions are shown in (mm)



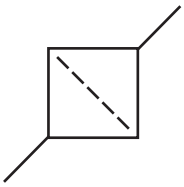
(**1**) Vacuum generator
(**2**) Filtering element
(**3**) Body
(**4**) Tank

Operating range

■ - 1 to 10 bar

Specifications

Body material	High: nylon 6.6 Tank: transparent polyamide
Filtration	Two options available: 50 micron stainless steel grill or Polyethylene 70 micron
Temperature	32 to 122°F



For all orders, please specify:
Model + Size + Fitting + Type of cartridge
e.g. : FVUG38P

1: Model	2: Size		3: Fitting		4: Cartridge	
FVU	M	Mini	14	G1/4" for M series	-	Stainless steel
	G	Large	38	G3/8" for M and G series	P	Polyethylene
			12	G1/2" for G series		

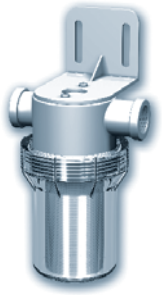
To order a replacement filtering element, please specify:
e.g. : FVUM12E

Model	Reference of the filtering element
FVUM14 and 38	FVUM12E (Stainless steel)
FVUG12 and 38	FVUG12E (Stainless steel)
FVUM14P and 38P	FVUM12PE (Polyethylene)
FVUG12 and 38P	FVUG12PE (Polyethylene)

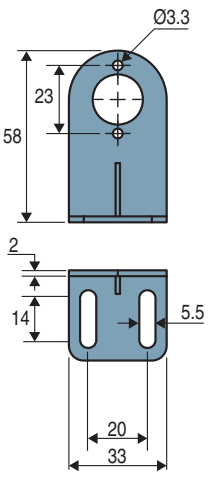
Mounting bracket for vacuum filter

Materials: Polyethylene 20% fiber glass.

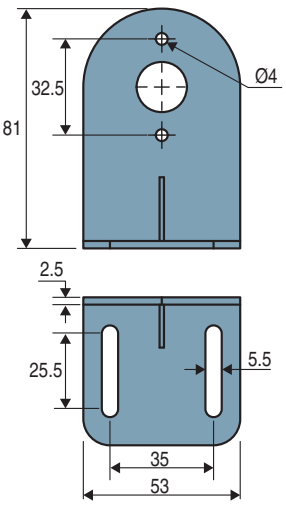
Model	
FVUFIXM	Mounting bracket for filter FVUM
FVUFIXG	Mounting bracket for filter FVUG



FVUFIXM



FVUFIXG



Please specify part n°, eg: FVUFIXM
Please see table above

FVG
Mini Vacuum Filters

FVG series vacuum filters are especially recommended for fine filtration.
Their light weight allows easy on-board installation.

Mini-filters

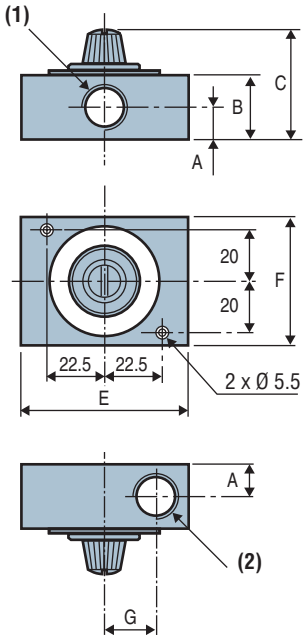
Models	Vacuum pumps
FVG 3	GVP 10 - VR 07 - VR 09
FVG 5	GVP 12 and 14
FVG 6	GVP 20

Characteristics

Models	A	B	C	E	F	G	D1	D2
FVG 3	8	16	33	55.5	50.5	18	G1/8"-F	G1/8"-F
FVG 5	12.5	25	42	65	50	23	G1/4"-F	G1/4"-F
FVG 6	15	30	47	70	60	23	G3/8"-F	G3/8"-F

Note: all dimensions are shown in (mm)

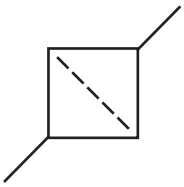
FVG 3/5/6



(**1**) D1 (input)
(**2**) DE (Output)

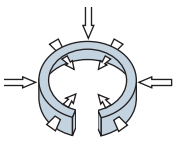
Specifications

Operating pressure	-1 to 5 bar
Temperature	32 to 140 °F
Filtration (µ)	FVG 3-5-6 : 40
Weight (g)	FVG 3/5/6 : 45/90/150/235
Material	Anodized aluminum



Accessories

Replacement cartridges: interchangeable filtration element.
Add E to the filter model reference to order the replacement cartridge.



Filtration angle 300°

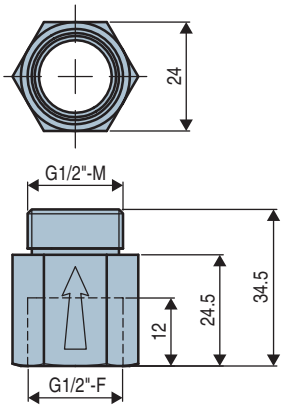
For all orders, please specify:
Model + Type + Filters or Cartridge
e.g.: FVU5E

1: Model	2: Type		3: Filters or Cartridge	
FVU	3	FVG 3	-	Filter
	5	FVG 5	E	Cartridge
	6	FVG 6		

FVL 12
In-line Filter

The FVL12 in-line filter allows quick integration for vacuum pumps GVP, GVPD, GEMP and GEM.

Specifications	
Material	Body: Nickel-plated brass Grille: 400 micron stainless steel
Weight	50 g



Mounting on option

The FVL 12 series in-line filter can also be mounted as a GVO P option on GVP series vacuum pumps. See page 8/12.

Note: all dimensions are shown in (mm)

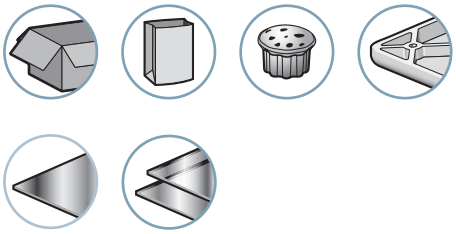
For all orders, please specify: FVL12

FVL 68
In-line Vacuum Filter

The FVL68 in-line filter ensures quick integration into a vacuum network, thanks to its push fitting for 6 x 8 calibre pipes.

Ideal for protecting a vacuum generator from normal clogging.
The FVL is equipped with a 400 micron filtering grille.

Industry-specific applications

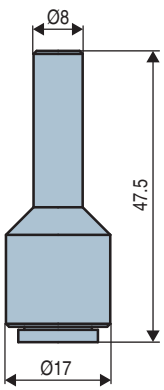


Applications

The FVL68 in-line filter is ideal for protecting LEM mini vacuum pumps. Installation directly onto the vacuum outlet of the pump, using a 6 x 8 push fitting.

Specifications	
Material	Body: POM Grille: 400 micron stainless steel Push fitting Brass – Steel and polymer
Weight	7 g.

Dimensions



Example usage

Note: all dimensions are shown in (mm)

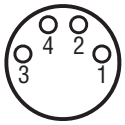
Specify part n°: FVL68

CD-CC

Screw-type Electrical Connectors, M8 and M12

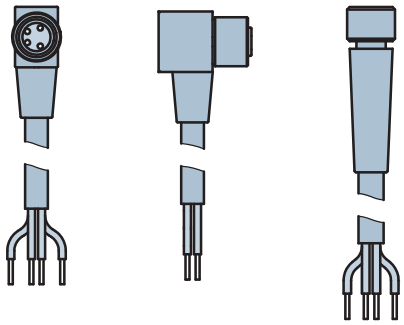
M8 Connector Characteristics

Models	Connectors	No. of pins	Orientation	Cable length
CDM8	M8	4	Straight	2 m
CDM8N	M8	4	Straight	0.5 m
CCM8	M8	4	Elbow	2 m



1: Brown
2: White
3: Blue
4: Black

M8



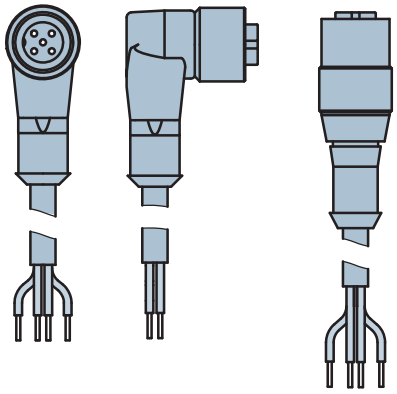
M12 Connector Characteristics

Models	Connectors	No. of pins	Orientation	Cable length
CDM12N	M12	4	Straight	2 m
CDM12L5	M12	4	Straight	5 m
CCM12	M12	4	Elbow	2 m
CDM125PL2	M12	5	Straight	2 m
CDM125PL5	M12	5	Straight	5 m
CCM125PL2	M12	5	Elbow	2 m

1: Brown
2: White
3: Blue
4: Black

1: Brown
2: White
3: Blue
4: Black
5: Gray

M12



Specifications

Female screw-type connector.
PVC cable
Protection : IP 65

Specify part n°, eg: CDM8N
Refer to characteritics table above

Vacuum Switch Range

Chapter 11

PSK

Mini Vacuum Switch

- 1 digital output
- Adjustable vacuum threshold
- 3 vacuum port sizes available
- M8 connection
- Ultra-compact and lightweight
- LED visual indicators

P 11/3

PSA 100 C

Electronic Vacuum Switch with Display

- 2 configurable digital outputs
- NO or NC ouputs
- Adjustable hysteresis
- IP 65
- The PSA100 C electronic vacuum switch is the most efficient vacuum measuring component in the COVAL range.
- It can be easily installed on all machines and robots, etc. thanks to its compact lightweight design.

P 11/4

PSD 100

Vacuum Switch with 3-colour Display

- 1 to 5 VDC analog output
- Response time: < 5ms
- 2 vacuum fittings available
- M8 connection
- The compact PSD100 electronic vacuum switch is used to check the exact level of vacuum in the system.
- Analog output

P 11/5

PSP 100

Electronic Vacuum Switch

- 1 configurable digital output
- Response time: < 5ms
- 3 vacuum fittings available
- 2 electric fittings available
- The PSP100 electronic switch reduces size while accurately monitoring the vacuum level
- Adjustable digital output and hysteresis.

P 11/7

PSP 100 ANA

Electronic Vacuum Switch Analog Output

- 1 Analog output from 1V to 5 VDC
- Response time: < 5ms
- 2 vacuum port sizes available
- M8 connections
- The PSP100 ANA electronic switch reduces size while accurately monitoring the vacuum level
- Analog output

P 11/8

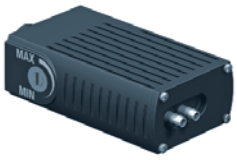
PSE 100 E

Electric Vacuum Switch

- Adjustment range -300mb to -850mb
- All voltages
- Cable or M12 connector outputs
- The PSE 100 E vacuum switch with electric output is used to check the vacuum level in the circuit.
- It is adapted to all electrical automated systems.
- The choice between the NO or NC function is made during wiring.

P 11/9

PSE 100 P



Pneumatic Vacuum Switch

- 2 versions available (NO or NC)
- Adjustment range: -300mb to -850mb
- The PSE 100 E series vacuum switch with pneumatic output enables the vacuum level in the system to be checked by means of a patented system.
- This vacuum switch exists in two versions:
- NO version, recommended for "air-saving" on the vacuum pump
- N.C. version to cover the "safety" function (object detected, etc.) and "SFC signal" function.

P 11/10

Vacuum Switch Range

Chapter 11

PSE 100 PK

Pneumatic Vacuum Switch

- 2 versions available (NO or NC)
- Adjustment range:
  - NC: -250 to -830mb
  - NO: -350 to -880mb
- The vacuum switch with pneumatic output is used to check the vacuum level in the circuit. It is recommended for measuring slowly changing vacuum levels such as regulating or checking vacuum levels in networks over 1 liter.
- NO version, recommended for "air-saving" on the vacuum pump.
- NC version to cover the "safety> function (object detected, etc.) and "SFC signal" function.

P 11/11

VAF 111

Needle Vacuum Gauge

- VAF 111 series vacuum gauges are recommended for viewing the level of vacuum on a network for maintenance, checking and adjustment purposes (Green zone of use: -0.65 to -1 bar)
- 3 diameters available: 40, 50 and 63 mm
- Zone for use printed red and green

P 11/12

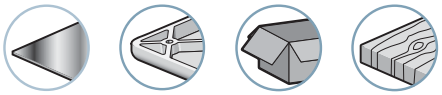
PSK
Mini Vacuum Switch

The PSK series adjustable vacuum switches, due to a compact and ultra-light design, enable installation close to the suction cups for reduced reponse times.

PSKs are ideal for applications requiring only a simple "object gripped" signal, and offer an economical and effective solution for applications with one vacuum generator per suction cup.

- Simple installation, plug-in port or thread-in fitting
- Compact size : 26 x 10 x 10.4 mm
- Weight: 8.3 g

Industry-specific applications



Specifications

Model	PSK 100
Setting pressure range	0 to 100% vacuum (0~-101.3 kPa)
Withstand pressure	0.6 MPa
Fluid	Air, Non-corrosive/Non-flammable gas
Power supply voltage	10.8 to 30 VCC
Load current	80mA max.
Internal voltage drop	≤ 0.8 V
Current consumption	10 mA max.
Sensor type	PNP
Output short circuit protection	Yes
Setting method	Adjusting by VR
Response time	Approx.1ms
Repeatability	≤+/-1% F/S/
Hysteresis	3% F.S. max.
Indicator	Red LED turns ON
Enclosure	IP 40
Temperature characteristic	≤ +/-3% F/S/ of detected pressure (77°F) at temp. Range of 32~122°F
Ambient temp. range	Operation: 0 ~ 60°C (32 ~ 140°F), Storage: -20 ~ 70°C (-4 ~ 158°F) (No condensation or freezing)
Ambient humidity range	Operation/Storage: 35 85% RH (No condensation)
Vibration	Total amplitude 1.5 mm, 10Hz-55Hz-10Hz scan for 1 minute, two hours each direction of X, Y and Z
Shock	980m/s² (100G), 3 times each in direction of X, Y and Z
vacuum connection	Push-in tube or thread-in
Electrical connection	M8 connection 3-pin (Cable L:150 mm)
Weight	Approx. 8.3 g (with M8, 3-pin male connector)

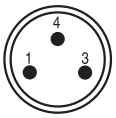
Advantages

- Simple installation:
Plug-in port for push-to-connect fittings
- Compact size:
Extremely compact size to fit the most confined areas

Additional Information

Electrical connections

- M8, 3-pin male connector

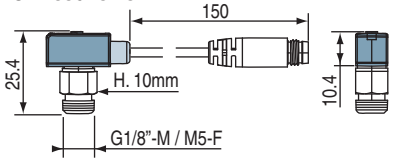


1 = + (Brown)
2 = - (Blue)
4 = out (Black)

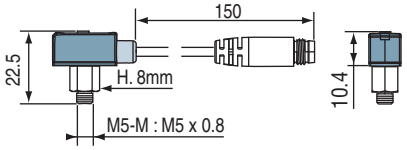
- Ø6mm stem for one-touch push fitting, Male M5 or G1/8"-M.

Dimensions

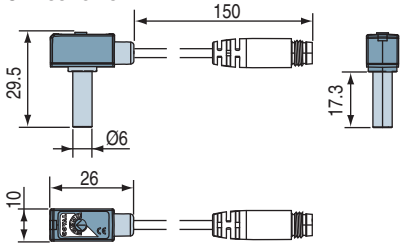
PSK 100G18M8



PSK 100M5M8



PSK 100D6M8



For all orders, please specify:
Model + Measuring range + Vacuum connection + Connection
Example: PSK100G18M8

1: I	2: Measuring range		3: Vacuum connection		4: Connection	
PSK	100	0 to 100% vacuum	D6	Ø 6 mm	M8	M8, 3-pin male connector
			G18	G 1/8"-M, M5-F		
			M5	M5 male		

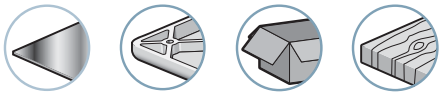
PSA 100 C
Electronic Vacuum Switch with Display

The PSA100C series electronic vacuum switch is the most efficient COVAL vacuum measuring component. It can be easily installed on all machines and robots, etc. thanks to its compact lightweight design.

Moreover it has a digital vacuum level display with two independently-adjustable digital outputs. Every aspect has been designed to make it easy to use.

Advantages: front panel programming, simplified adjustment and threshold locking, display inversion, your choice of NO or N.C. outlets (hysteresis can be independently adjusted for each output).

Industry-specific applications

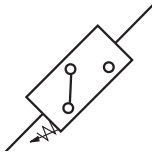


Specifications

Compatible fluids	All non-corrosive, filtered, non-lubricated gases
Supply	12 to 24 V CC ± 10%
Current consumed	≤ 60 mA
PNP transistor output	125 mA with 24 V DC, programmable NO or NC
Output viewing	Led
Output 1	Green LED
Output 2	Red LED
Programming	Keyboard
Display	Bar
EMC	Industrial standard Class B
Protection	IP 40
Electrical connection	M8, 4-pin connector
Pneumatic connection	G1/8" or M5-F
Shock resistance	100 G on XYZ
Display resolution	1%
Adjustment resolution	1%
Rating range	0.10 ~ -1.00 bar
Setting range	0.00 ~ -1.00 bar
Maximum overpressure	3 bar
Weight	30 g

Advantages

- 2 configurable digital outputs
- Adjustable hysteresis
- M8 F connector
- LED display
- PNP



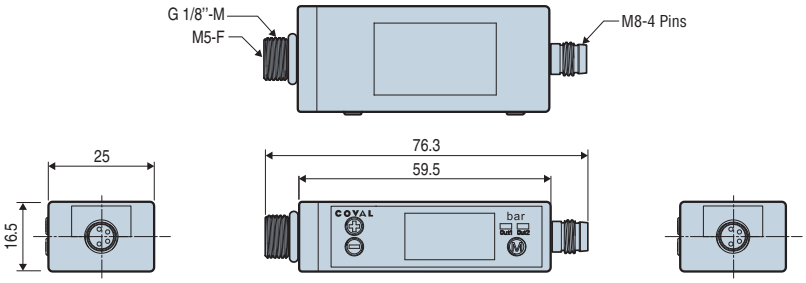
Additional Information

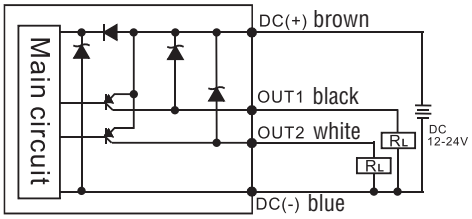
Electrical connections

- M8 connector

1 = + 24 V DC
2 = Output 2
3 = Common
4 = Output 1

Dimensions





Accessories

- Straight or elbow connector, see page 10/9.
- Mounting on vacuum pump:
  - GVP / GVPS / GVPD series: GVO PSA 100 C
  - GEM / GEMP series: VA option

Note: all dimensions shown in (mm)

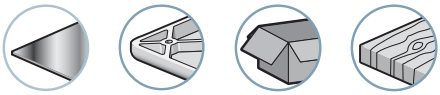
For all orders, please specify: PSA 100 C

PSD 100

Vacuum Switch with 3-color Display

The new PSD100 series mini-vacuum switch with display offers easy reading thanks to the size of its screen and its 3-color display.
Its compactness and lightness facilitate its integration on all machines.
Easily adjustable, it is equipped with an extremely precise electronic vacuum level sensor and has an adjustable digital output as well as an analog output.
The PSD100 has mounting accessories on option, making it very easy to install.

Industry-specific applications



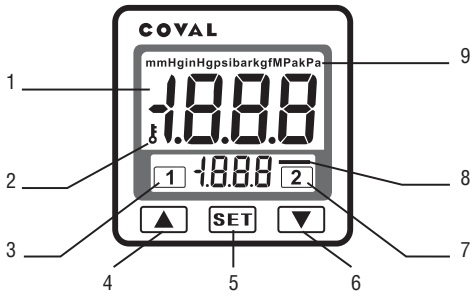
Specifications

Pressure rating range		0.0 ~ -101.3 kPa						
Pressure setting range		10.0 ~ -101.3 kPa						
Max. pressure		300 kPa						
Fluid		Air, non-corrosive/non-flammable gas						
Pressure setting resolution	kPa 0.1	MPa /	kgf/cm² 0.001	bar 0.001	psi 0.01	inHg 0.1	mmHg 1	
Power supply voltage		12 to 24 V DC ±10%, ripple (P-P) 10% or less						
Current consumption		≤ 40 mA (without load)						
Switch output		1 PNP digital output (2x on PNP2 version) Max. load current: 125 mA Max. supply voltage: 24 VDC Residual voltage: ≤ 1.5 V						
Repeatability (Switch output)		≤ ± 0.2% F.S. ±1 digit						
Hysteresis	**Threshold mode**	Adjustable (1 to 8 digits)						
	Hysteresis mode	Adjustable						
	Window comparator mode	Adjustable (1 to 8 digits)						
Response time		≤ 2.5ms (anti-vibration function: 25 ms,100 ms, 250 ms, 500 ms, 1000 ms and 1500 ms selection)						
Output short circuit protection		Yes						
7 segment LCD display		Two colour (red / green) main display, orange sub-display (refresh rate: 5 times / 1sec.)						
Indicator accuracy		≤ ± 2% F.S. ± 1 digit (ambient temperature: 77 ± 37.4°F)						
Switch ON indicator		Orange OUT 1 / OUT 2 (PNP2 only)						
Analog output (voltage power) (PNP version only)		Output voltage: 1 to 5 V ≤ ± 2.5% F.S. (within rated pressure range), linearity: ≤ ± 1% F.S. / Output impedance: approx. 1 kΩ						
Environnement	Enclosure	IP40						
	Ambient temp. range	operation: 32 – 122° F / storage: 14 – 140° F (no condensation or freezing)						
	Ambient humidity	Operation / Storage: 35-85% RH (no condensation)						
	Permissible voltage	1000 V AC in 1-min (between case and lead wire)						
	Insulation resistance	50 M Ohm min. (at 500 V DC, between case and lead wire)						
	Vibrations	Total amplitude 1.5 mm or 10 G, 10 Hz-150 Hz-10 Hz scan for 1 minute, two hours in each direction of X, Y and Z						
	Shocks	100 m/s² (10 G), 3 times each in direction of X, Y and Z						
Temperature characteristic		≤ ± 2% FS. of detected pressure (77°F) at temp. range of 32~122°F						
Port size		G1/8", M5-F						
Lead wire		Oil-resistance cable (0.15 mm²)						
Weight		Approx. 45 g (with M8, 4-pin male connector)						

Advantages

- 3-colour digital LCD display, easy readability.
- 6 pressure units available (kPa, bar, psi, inHg, mmHg, kgf/cm²).
- PNP version:
  - 1 PNP digital output (NO or NC).
  - 1 analog output (1-5V).
- PNP2 version:
  2 PNP digital outputs (NO or NC).
- Double display showing the measured value and threshold value at the same time.
- "Key lock function" with indicator light, «Lock» mode with light indicator to prevent an accidental misadjustment.
- "Power-save function" with indicator light.
- 3 mounting solutions.

Panel Description



1 - 2-colour main display
2 - Lock indicator
3 - Output 1 indicator
4 - Button
5 - Setting button
6 - Button
7 - Output 2 indicator (PNP2 version)
8 - Setting mode (sub-display section)
9 - Pressure unit display section

For all orders, please specify:
Model + Electrical connection + Outputs.
Example: PSD100CPNP2

1: Model	2: Electrical connection		3: Outputs	
PSD100	L	2 m cable	PNP	1 digital output PNP 1 analog output
	C	M8 connector	PNP2	2 digital outputs PNP

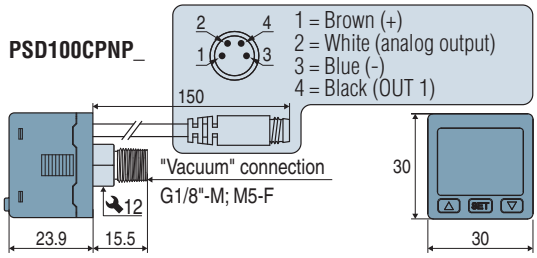
Accessories

- CDM8: M8 Female connector – 4 poles, 2 m.
- PSDFIXA: Vertical attachment bracket.
- PSDFIXB: Horizontal attachment bracket.
- PSDFIXC: Front attachment kit.
- PSDFIXD: Front attachment kit + front protective lid.

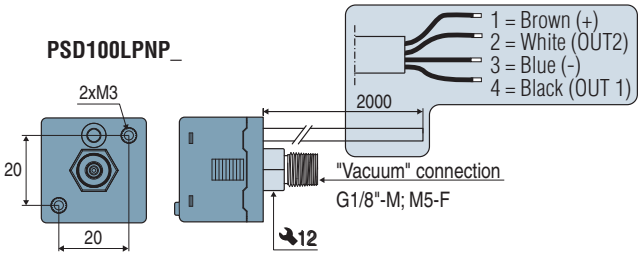
PSD 100
Vacuum Switch with 3-color Display

Electrical Diagrams - Dimensions

■ M8 Connector-4 poles

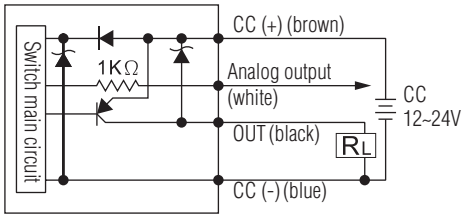


■ 2 m. cable

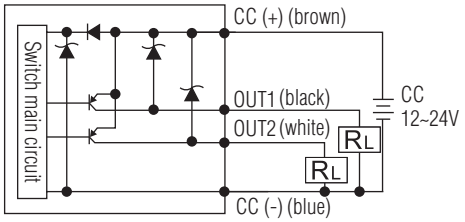


Electrical Diagrams

PSD100_PNP



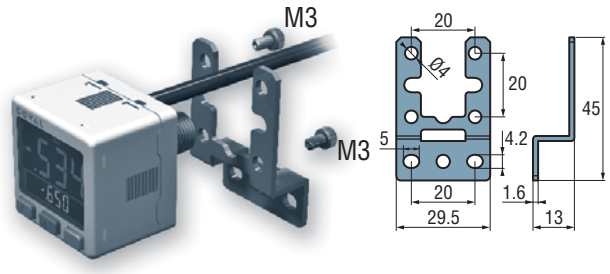
PSD100_PNP2



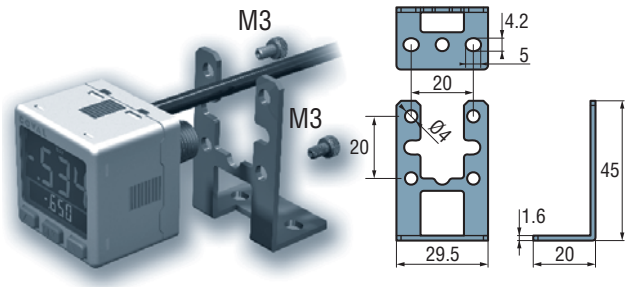
Mounting Solutions

Mounting brackets

■ **PSDFIXA**, vertical attachment.



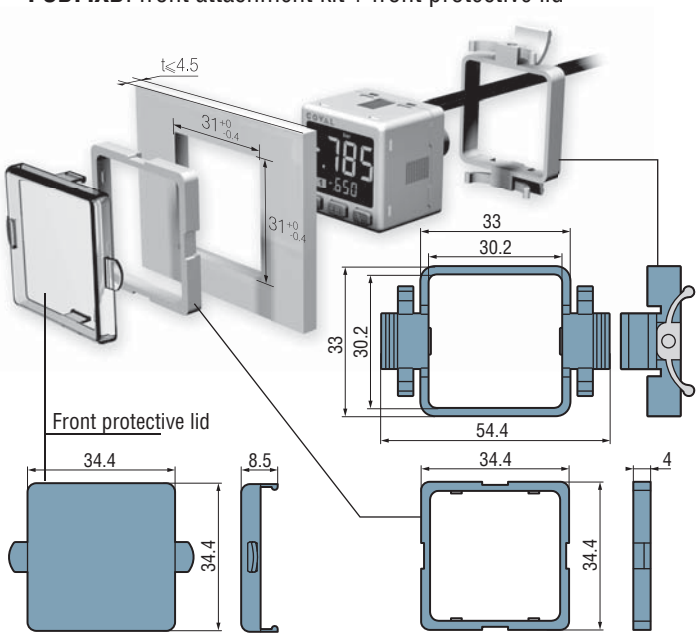
■ **PSDFIXB**, horizontal attachment.



Panel mounting kits

■ **PSDFIXC**: front attachment kit.

■ **PSDFIXD**: front attachment kit + front protective lid

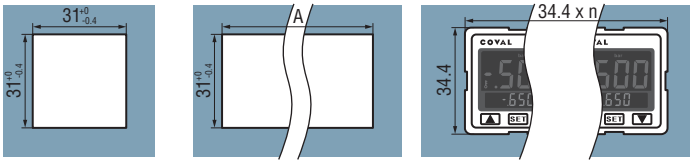


Panel opening (max. thickness: 4.5 mm)

For 1 vacuum switch

For multiple vacuum switches:
A = (34.4 x n) -3.4
n = number of switches

Dimensions after installation
n = number of switches

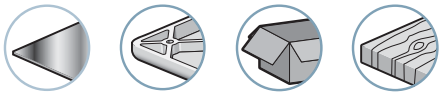


Note: all dimensions shown in (mm)

PSP 100
Electronic Vacuum Switch

PSP series electronic vacuum switches have integrated threshold and hysteresis adjustment as standard. 3 vacuum fittings (G1/8" Male, M5 female or M5 F Base) and 2 electrical connections (2 meter cable and M8 connector) make up the standard range.

Industry-specific applications

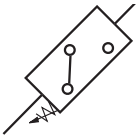


Specifications

Models	PSP 100 L	PSP 100 LM5	PSP 100 C	PSP 100 CM5
Compatible fluids	All non-corrosive, filtered, non-lubricated gases			
Supply	Regulated 18-30 V DC, polarity inversion protection			
Current consumed	< 20 mA			
Transistor output	NO 125 mA with 24 VDC			
Thermal drift	± 3% of the measuring scale between 32 and 122°F			
Output viewing	LED			
Response time	< 5 ms			
Threshold adjustment	By 3/4 turn potentiometer			
Hysteresis adjustment	0 to 30% adjustment by 3/4 turn potentiometer			
EMC	Industrial standard class B			
Materials	PA 66 and brass	PA 66 and Alu.	PA 66 and brass	PA 66 and Alu.
Temperature	Operation: 32 to 122 °F Storage: 14 to 140 °F			
Protection	IP 50			
Electrical connection	PVC cable (length 2m)		M8 connector (4 poles)	
Pneumatic connection	G1/8"-M or M5-F	Base M5-F	G1/8"-M or M5-F	Base M5-F
Weight	62 g	67 g	22 g	27 g
Adjustment range	0 to –1 bar			

Advantages

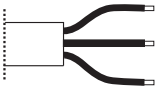
- 1 configurable digital output
- Adjustable hysteresis
- Measuring range: 0 / -1 bar
- Overpressure: +3 bar
- PNP



Additional Information

Electrical connections

- PVC cable (length 2m)

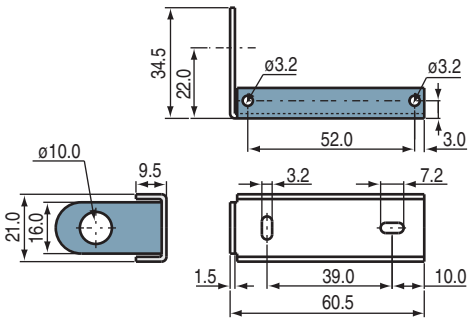


Brown (+24 V)
Blue (0 V)
Black (Contact)

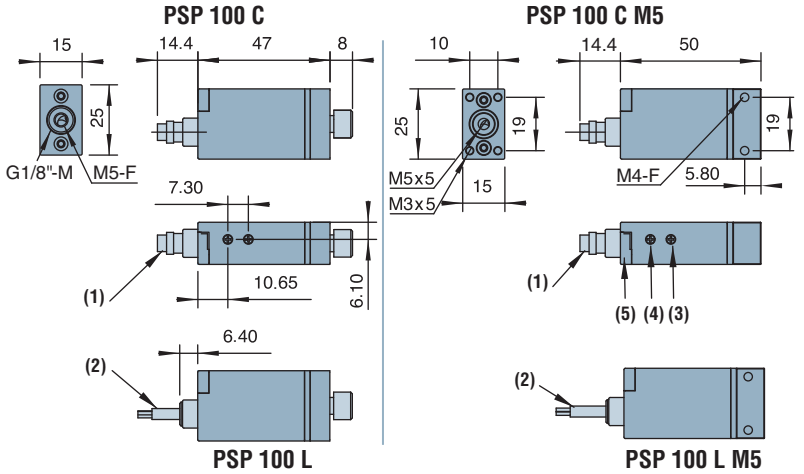
- M8 connector

1 = + 24 V - Brown
2 = -
3 = 0 V - Blue
4 = Contact - Black

Vacuum switch attachment - Clip Part No: PSE.F



Dimensions



(**1**) M8 4 pole connector version
(**2**) PVC cable version (2 m)
(**3**) Hysteresis adjustment
(**4**) Threshold adjustment
(**5**) Threshold display LED

Note: all dimensions shown in (mm)

Accessories

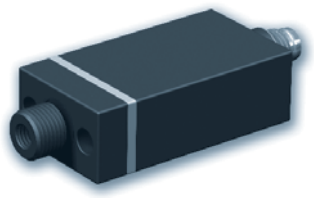
- Straight or angled connector, see page 10/9.
- Mounting on vacuum pump:
  - GVP / GVPS / GVPD series: GVO PSP 100 C
    GVO PSP 100 L
  - GEM / GEMP series: VB option

For all orders, please specify:
Model + Electrical connection + Vacuum connection.
Example: PSP100C

1: Model	2: Electrical connection		3: Vacuum connection	
PSP 100	L	2 m cable	-	G1/8"-M or M5-F
	C	M8 connector	M5	Base M5-F

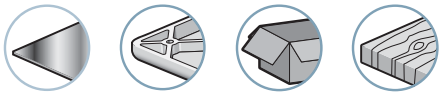
PSP 100 ANA

Electronic Vacuum Switch Analog Output



The PSP 100 ANA contains an analog output. It is fitted with 2 vacuum connections as standard (G1/8" male or M5 Female) and one M8 electrical connector.

Industry-specific applications



Specifications

Compatible fluids	All filtered, non-corrosive, non-lubricated gases
Supply	24 V DC (18 V DC min / 30 V DC max)
Current draw	< 20 mA
Analog output	1 to 5 VDC from 0 to –1 bar
Thermal drift	± 3% of the measuring scale between 32 and 122°F
Response time	< 5 ms
EMC	Industrial standard Class B
Materials	PA 66 and brass
Temperature	Operation: 32 to 122 °F Storage: 14 to 140 °F
Protection	IP 50
Electrical connection	M8 connector (4 pins)
Pneumatic connection	G1/8" Male and M5 Female
Weight	22 g

Advantages

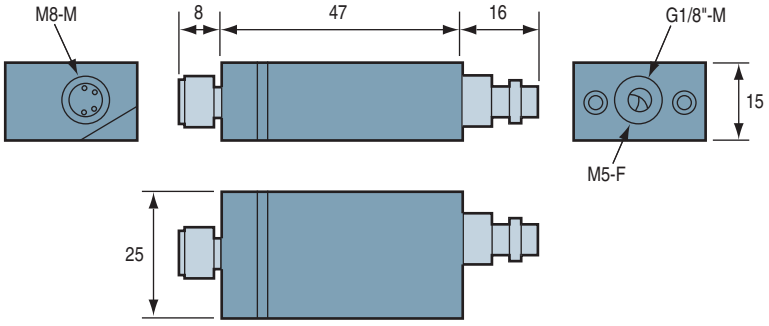
- 1 analog output from 1 to 5 VDC
- Measuring range: 0 / -1 bar
- Overpressure: +3 bar max.
- PNP

Electrical Diagrams

- M8 connector

1 = + 24 V (Brown)
2 = analog output from 1 to 5 VDC (white)
3 = 0 V common (blue)

Dimensions



Note: all dimensions shown in (mm)

Accessories

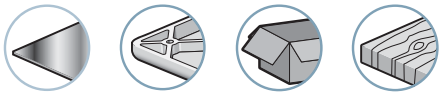
- Straight or elbow connector, see page 10/9.

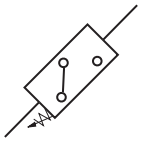
For all orders, please specify: PSP 100 ANA

PSE 100 E
Electric Vacuum Switch

The PSE 100 E series vacuum switch with electric output allows the vacuum level in the system to be checked by means of a patented system.
- It is adapted to all electrical automated systems.
- The choice between the NO or NC function is made during wiring.

Industry-specific applications



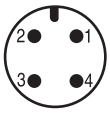


Specifications

Models	**Two versions: PSE 100 E and PSE 100 EC**
Compatible fluids	All non-corrosive gases
Switching power	250 V - 5 A with cable 125 V - 3 A with M12 connector
Electrical connection	M12 female connector or 3 wire PVC cable, length 2 m
Adjustment range	-300 mb to -850 mb
Precision	3%
Hysteresis	125 mb
Repetitivity	< 3% of the whole range
Maximum speed	30 cycles per minute
Permissible overpressure	2 bar (destructive at 5 bar)
Mechanical endurance	5 x 10^6 operations
Materials	Body: Polyacetal - Vacuum sensor: nitrile membrane
Protection	IP 54 with hollow shaft connected - IP 40 without this fitting
Weight	PSE 100 E: 165 g and PSE 100 EC: 37 g
Temperature	14 °F to 176 °F

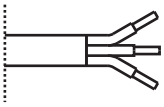
Electrical Connection

M12 connector



1 : Common
2 : NO Contact
3 : -
4 : NC Contact

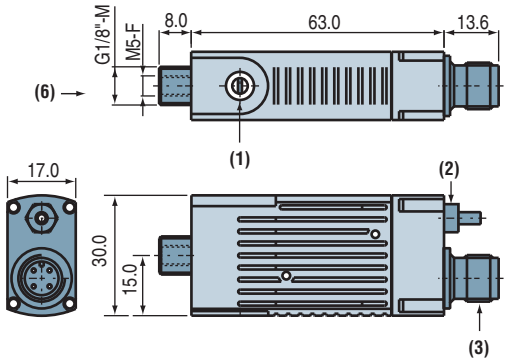
PVC cable (length 2m)

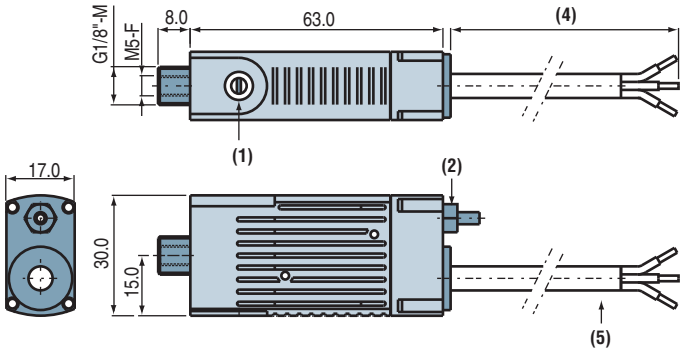


Brown: Common
White: NO Contact
Black: NC Contact

Connection for EC version (M12)
Straight PVC cable, 2 meters: Part No CD M12.
Elbow PVC cable, 2 meters: Part No CC M12.
See page 10/9.

Dimensions

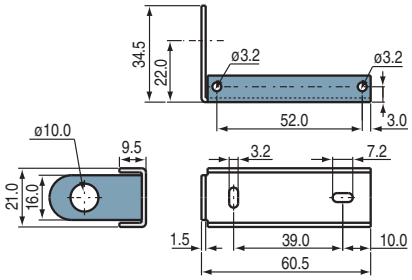




(**1**) Adjustment screw
(**2**) Atmospheric pressure hollow shaft fitting for tube, inside Ø 2.7mm
(**3**) M12 male connector
(**4**) Approx. 2 meters
(**5**) Cable, 3 conductors
(**6**) Vacuum

Additional Information

Vacuum switch attachment - Clip Part No: PSE.F

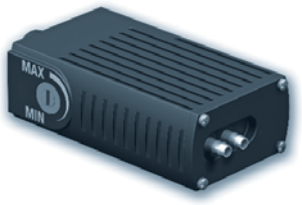


For all orders, please specify: Model + Version.
Example: PSE100EC

1: Model	2: Version	
PSE 100 E	-	PVC cable, length 2m
	C	M12 connector

Note: all dimensions shown in (mm)

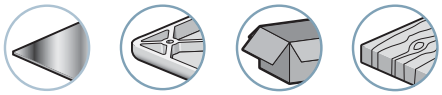
PSE 100 P
Pneumatic Vacuum Switch

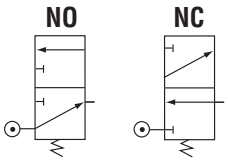


The PSE 100 P series vacuum switch with pneumatic output allows the vacuum level in the system to be checked by means of a patented system

This vacuum switch exists in two versions: NO version recommended for the "air saving" function on a venturi and NC version for the "safety" function (object detected, etc.) and "SFC signal".

Industry-specific applications

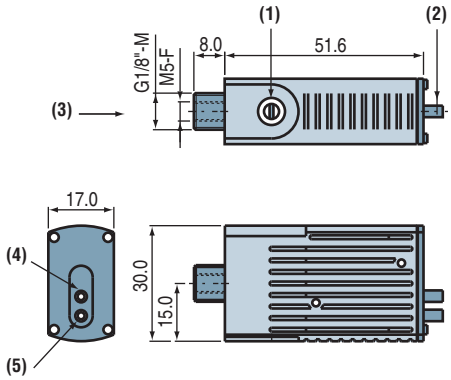




Specifications

Models	**Two versions: NO and NC**
Compatible fluids	All non-corrosive gases
Pression d'utilisation	2 to 6 bar
Adjustment range	- 300 mb to -850 mb
Precision	3%
Hysteresis	80 to 100 mb
Repetitivity	< 3% of the whole range
Maximum speed	30 cycles per minute
Permissible overpressure	2 bar (destructive at 5 bar)
Mechanical endurance	5 x 10^6 operations
Materials	Body: Polyacetal - Vacuum sensor: nitrile membrane
Weight	32 g
Temperature	14 °F to 176 °F
Flow rate at 6 bar	2.47 SCFM

Dimensions

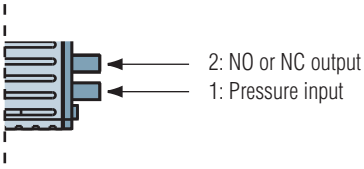


(**1**) Vacuum threshold - Adjustment screw
(**2**) Hollow shaft for tube, inside Ø 2.7 mm
(**3**) Vacuum
(**4**) NO or NC output
(**5**) Pressure input

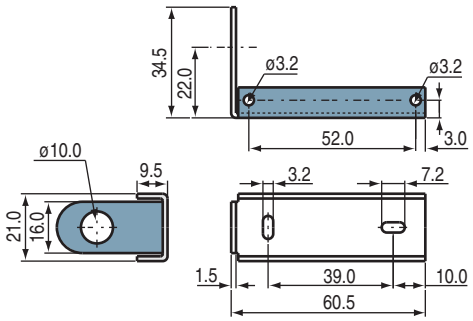
Additional Information

■ Mounting as GVO option in the GVP / GVPS / GVPD vacuum pump range.

Pneumatic connection



Vacuum switch attachment - Clip Part No: PSE.F



For all orders, please specify:
Model + Version.
Example: PSE100PNO

1: Model	2: Version	
PSE 100 P	NO	Normally Open (NO)
	NF	Normally Closed (NC)

Note: all dimensions shown in (mm)

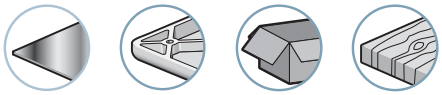
PSE 100 PK
Pneumatic Vacuum Switch

The PSE 100 K vacuum switch with pneumatic output is used to check the vacuum level in the circuit.

It is recommended for measuring slowly changing vacuum levels such as regulating or checking vacuum levels in networks over 1 liter.

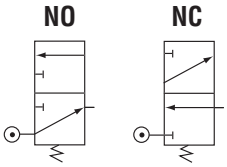
This vacuum switch exists in two versions: NO version recommended for the "air saving" function on a venturi and NC version for the "safety" function (object detected, etc.) and "SFC signal".

Industry-specific applications

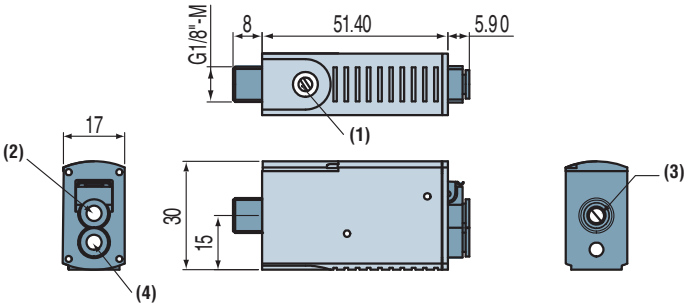


Specifications

Models	**Two versions: NO and NC**
Compatible fluids	All non-corrosive, non-lubricated gases
Operating pressure	2 to 6 bar
Adjustment range	NF: -250 to -830 mb, NO: -350 to -880 mb
Precision	± 10 %
Hysteresis	NF: 10 mb - NO: 200 mb
Repetitivity	< 3% of the whole range
Maximum speed	30 cycles per minute
Permissible overpressure	2 bar (destructive at 5 bar) (on vacuum measuring orifice)
Mechanical endurance	5 x 10^6 operations
Materials	Body: Polyacetal - Vacuum sensor: nitrile membrane
Weight	32 g
Temperature	14 °F to 176 °F
Flow rate at 6 bar	2.33 SCFM



Dimensions

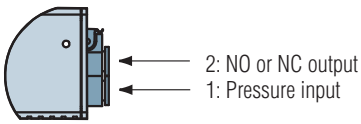


(**1**) Vacuum threshold adjustment
(**2**) Signal output, NC or NO tube
(**3**) M5 Vacuum input
(**4**) Pressure input Ø4 tube

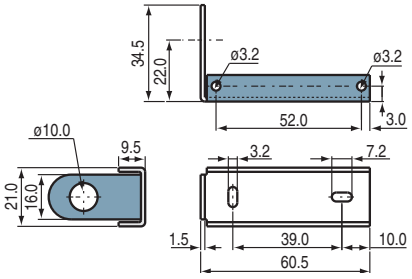
Additional Information

■ Mounting in GVO option in the GVP / GVPS / GVPD vacuum pump range.

Pneumatic connection



Vacuum switch attachment - Clip Part No: PSE.F



For all orders, please specify:
Model + Version.
Example: PSE100PKNO

1: Model	2: Version	
PSE 100 PK	NO	Normally Open (NO)
	NF	Normally Closed (NC)

Note: all dimensions shown in (mm)

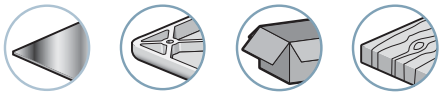
VAF 111
Vacuum Gauge

VAF 111 series vacuum gauges are recommended for visually checking the vacuum level for maintenance, monitoring and adjustment purposes.

They are mounted as options on modular vacuum pumps GVP series, reference GVO VAF11140.

See page 8/11.

Industry-specific applications



Characteristics

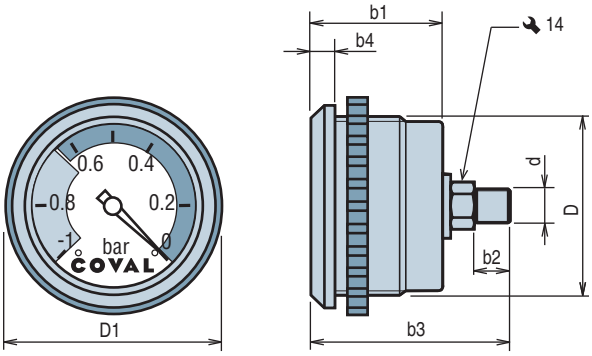
Models	D (1)	D1	b1	b2	b3	b4	d
VAF 111 40	40	43	32.5	12	52	4	G1/8"-M
VAF 111 50	50	54	32.5	12	52	4	G1/4"-M
VAF 111 63	63	68	32.5	12	52	4	G1/4"-M

(1) Flush-mounting diameter.
All dimensions shown in (mm)

Specifications

Damping	By silicone movement - Patented
Ring	Chrome
Measuring	Bourdon tube in CuSn
Precision	cl.2.5 (± 2.5% of max. scale value)
Housing	Black ABS
Temperature	32 to 140°F
Flush-mounting	Ring included in the delivery
Option	as per quantity, possibility of customized dial.

Dimensions



For all orders, please specify:
Model + Version.
Example: VAF11150

1: Model	2: Version	
VAF 111	40	Ø 40 mm
	50	Ø 50 mm
	63	Ø 63 mm

Peripheral Devices

Chapter 12

NVS
NVR
NVA

Vacuum Feeders

- Vacuum feeders, 1 input, 4 to 8 outputs
- NVS: Screwed feeder fittings
- NVR: Push fitting feeder fittings
- NVA: Threaded aluminum feeder
- Facilitates optimum vacuum management by improved distribution
- Eliminates air pressure loss
- Simplifies connection
- Less time-consuming installation
- Compact and lightweight

P 12/2

RDV
RCOV
Y

Screwed Vacuum Fittings with O-ring

- RDV, RCOV and RY series: Straight, adjustable elbow or Y fitting
- Diameter options: 5.5/8, and 6/8, 7/10, 8/10,1 0/12
- Gas fittings options: 1/2", 1/4", 1/8", 3/8"
- 100% vacuum-tight
- Integrated O-ring
- Improved circuit sealing
- Can be removed and reinstalled without requiring preparation of the tubing

P 12/3

RVM
RVF
RVT
TVR
COV

Fittings, Vacuum Tubes, Collars

- Rigid tubes allow a vacuum network to be installed with no pressure loss
- Barbed fittings guarantee a rigid connection between the source and the vacuum tube
- Collars used on TVR type pipes to guarantee network sealing

P 12/4

REV 38

Vacuum Regulator

- Adjustment precision: 0.13 mbar
- Materials used in the VITON body and lacquered aluminum foundry
- Adjustment by threaded pin
- G3/8" fitting attachment bracket
- Direct connection to a vacuum pump
- Very fine adjustment

P 12/5

AG

Vacuum Valves, 3 channels

- Connection to the vacuum network
- Electric control
- Voltage: 12 VDC, 24 VDC or VAC, 110 VAC, 220 VAC
- NO or NC for the vacuum or compressed air supplied servo
- Facilitates vacuum or compressed air network management
- NO or NC option allows adaptation to suit the application

P 12/6

PA

Angular Jaw Clamps

- Adjustment of finger speed with compressed air regulator
- 3 models
- For use on all types of manipulators
- Recommended for injection press unloading robots for parts or sprue

P 12/7

NVS, NVR, NVA
Vacuum Feeders

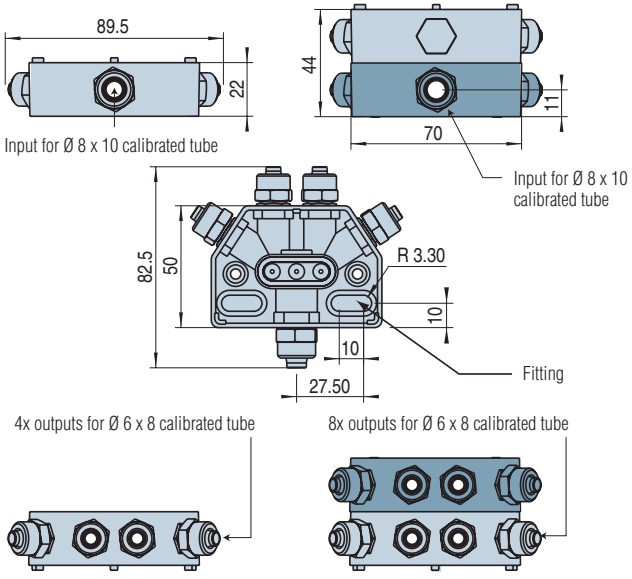
The NVS and NVR series vacuum feeders enable distribution of the vacuum in 4 to 8 channels by a simple unit. The 8/10 inputs and 4 or 8 6/8 outputs eliminate pressure loss.

Characteristics

		Screwed vacuum fittings		Push fittings		Threaded
Models		**NVS 4**	**NVS 8**	**NVR 4**	**NVR 8**	**NVA 4**
Material	Body	PA 6.6 – 30 % fiber glass, black, ULVO94				Aluminium 2014 A
	fitting	Nickel-plated brass		PA		
For tube		calibrated polyamide or polyurethane (PUR)				4 x G1/4"-F and 1 x G3/8"-F
Vacuum		■ ++	■ ++	■	■	■ ++
Pressure (up to 10 bar max.)		-	-	■	■	■

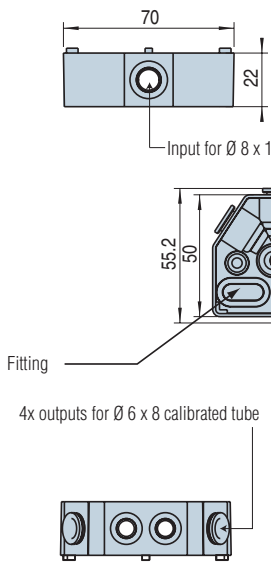
■ ++ Recommended for vacuum networks with regulation

NVS 4

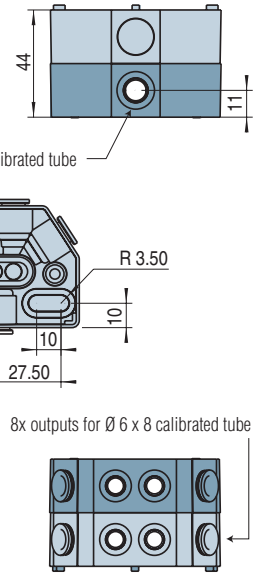


NVS 8

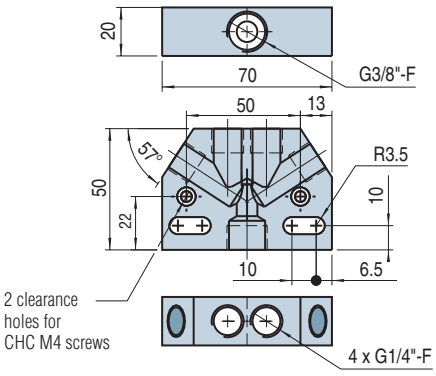
NVR 4



NVR 8



NVA 4



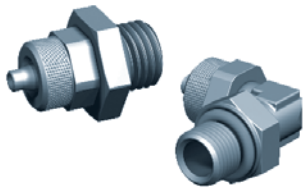
For all orders, please specify:
Model + Type + Number of outlets
e.g.: NVS8

1: Model	2: Type		3: Number of outlets	
NV	S	screwed fittings	4	4 outputs - 1 input
	R	push fittings	8	8 outputs - 1 input
	A	threaded		

Note: All dimensions are in mm

Note: for NVA series, one reference only: NVA4

RDV, RCOV, Y
Screwed Vacuum Fittings with O-ring



Characteristics

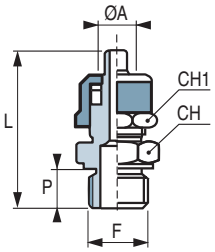
Range of special vacuum-tight fittings, fitted with O-ring (blue).

- 100% vacuum-tight and improved circuit sealing
- Can be removed and reinstalled without requiring preparation of the tubing
- Adjustable fittings for improved vacuum distribution
- Material: nickel-plated brass

RDV Series Straight Fitting

Ref.	ØA	F	CH	CH1	P	L
RDV1868	6/8*	G1/8"-M	14	14	6	26
RDV1468	6/8*	G1/4"-M	17	14	8	29
RDV14810	8/10	G1/4"-M	17	16	9	30.5
RDV3868	6/8*	G3/8"-M	19	14	9	30.5
RDV38810	8/10	G3/8"-M	19	16	9	32
RDV38812	8/12	G3/8"-M	19	19	9	32.3
RDV12810	8/10	G1/2"-M	24	16	10	33.5
RDV381012	10/12	G3/8"-M	19	19	9	32.3
RDV12812	8/12	G1/2"-M	24	19	10	34.5
RDV121012	10/12	G1/2"-M	24	19	10	34

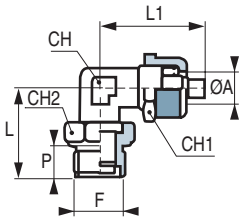
* 6/8 fittings are 5.5/8 compatible.



RCOV Series Elbow Fitting

Ref.	ØA	F	CH	CH1	CH2	P	L	L1
RCOV1868	6/8*	G1/8"-M	10	14	14	7	24	22
RCOV1468	6/8*	G1/4"-M	13	14	17	9	28.5	27.5
RCOV14810	8/10	G1/4"-M	13	16	17	9	28.5	28
RCOV3868	6/8	G3/8"-M	13	14	22	9	29	27.5
RCOV38810	8/10	G3/8"-M	13	16	22	9	29	28
RCOV12810	8/10	G1/2"-M	17	16	26	10	35	34
RCOV121012	10/12	G1/2"-M	17	19	26	10	35	34

* 6/8 fittings are 5.5/8 compatible.



Y Fitting, Y Series

Ref.	ØE	ØS
Y68	6/8*	6/8*
Y810	8/10	8/10
Y81068	8/10	6/8
Y812	8/12	8/12
Y81268	8/12	6/8
Y1012	10/12	10/12
Y1012810	10/12	8/10

* 6/8 fittings are 5.5/8 compatible.

Note: All dimensions are in mm

RVM, RVF, RVT, TVR, COV
Fittings, Vacuum Tubes, Collars

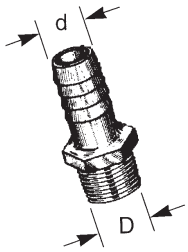
Fittings RVM, RVF, RVT

Barbed fittings used to connect the vacuum source to the vacuum tube to guarantee a rigid connection.

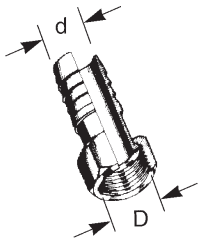
Material: **brass**

Models	D	D1	D2	d*
RVM 1014	G1/4"-M	-	-	10
RVM 1038	G3/8"-M	-	-	10
RVM 1538	G3/8"-M	-	-	15
RVM 1512	G1/2"-M	-	-	15
RVM 2012	G1/2"-M	-	-	20
RVM 2034	G3/4"-M	-	-	20
RVF 1038	G3/8"-F	-	-	10
RVF 1512	G1/2"-F	-	-	15
RVF 2034	G3/4"-F	-	-	20
RVT 1012	-	G1/2"-F	G3/8"-M	10
RVT 1534	-	G3/4"-F	G1/2"-M	15

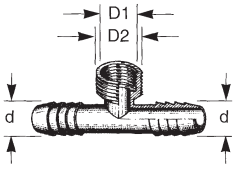
(*) Inside diameter of the suitable pipe



RVM



RVF



RVT

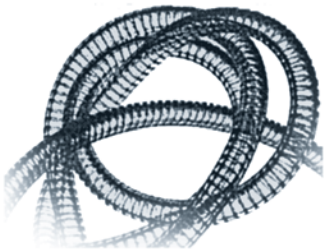
Vacuum Tubes TVR

Thanks to their rigid design and steel coil, they ensure there is no pressure loss on the vacuum network.

Colour: **Crystal**

Models	inside Ø	outside Ø	r*
TVR 10	10	26	18
TVR 15	15.5	22.5	30
TVR 20	19.5	27.5	37

*r: minimum curve fitting



TVR vacuum tubes hold a 90% vacuum with an ambient temperature of 86°F.

Collars COV

Accessory to be used for attaching TVR type pipes to guarantee perfect sealing.

Material: **stainless steel**

Models	Tube réf.	L
COV 10	TVR 10	7
COV 15	TVR 15	7
COV 20	TVR 20	7

Other dimensions and shapes on request.

Note: All dimensions are in mm

REV 38
Vacuum Regulator

When connected to an electric vacuum pump, the REV series vacuum regulator ensures a precise, stable vacuum. The user can obtain very fine adjustment thanks to the adjustment knob.

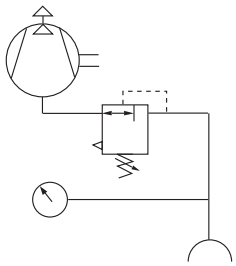
Characteristics

- Vacuum supply (Max): -1013 mbar
- Adjustment precision: 3.4 mbar
- Through flow: 3 SCFM to -846 mbar
- Operating temperature : 40 to 194°F

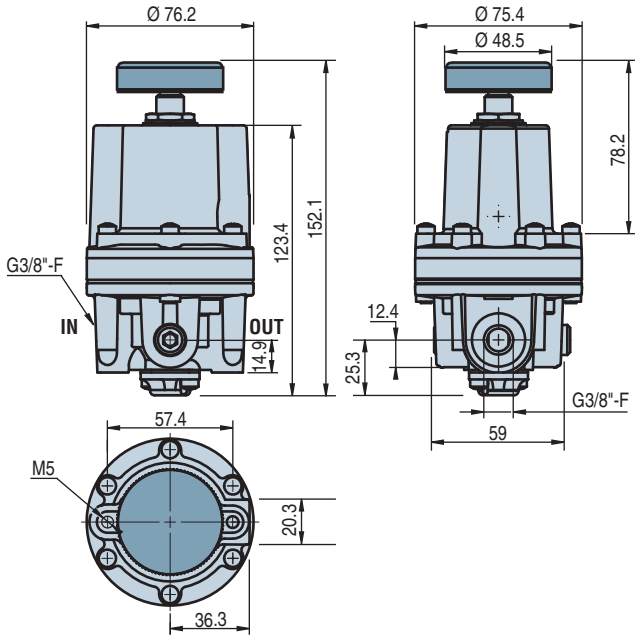
Specifications

Adjustment	By threaded pin

Material:
Body: **Aluminum**
Internal system: **brass, zinc-plated steel**
Elastomer: **Nitrile**



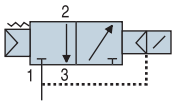
Dimensions



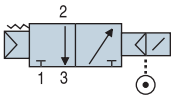
For all orders, please specify: REV 38

AG
Vacuum Valves, 3 channels

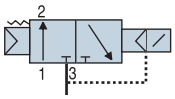
NC vacuum supplied servo
3: Exhaust
2: Use
1: Pump



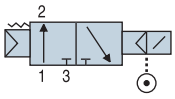
NC C.A. supplied servo
3: Exhaust
2: Use
1: Pump



NO vacuum supplied servo
3: Exhaust
2: Use
1: Pump



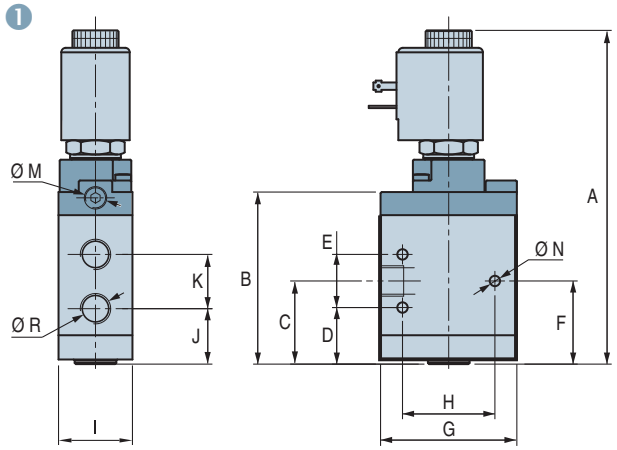
NO C.A. supplied servo
3: Exhaust
2: Use
1: Pump



Characteristics and Dimensions

Ref. NO C.A. servo	Ref. NC C.A. servo	Ref. NO Vacuum servo	Ref. NC Vacuum servo	Ø R	Diagram	A	B	C	D	E	F	G	H	I	J	K	L	Ø M	Ø N
AG 3002	AG 3001	-	-	G1/8"-F	1	102	48.5	16	5.3	-	15.8	36	28	25	7	17.5	-	M5-F	4.5
AG 3010	AG 3009	AG 3211	AG 3210	G1/4"-F	1	140.5	74	36	24.5	23	35.5	59	40	32	24	22.5	-	G1/8"-F	4.5
AG 3012	AG 3011	AG 3215	AG 3214	G3/8"-F	1	140.5	74	36	24.5	23	35.5	59	40	32	24	22.5	-	G1/8"-F	4.5
AG 3021	AG 3020	AG 3223	AG 3222	G1/2"-F	2	154	100	78.5	75	63	54.5	21	30	50.5	35	41	47	G1/8"-F	6.4
AG 3041	AG 3040	AG 3233	AG 3232	G3/4"-F	2	154	100	78.5	75	63	54.5	21	30	50.5	35	41	47	G1/8"-F	6.4
AG 3051	AG 3050	AG 3243	AG 3242	G1"-F	2	175	115	101	89	76	62.5	25.5	38	64	40	51	55	G1/8"-F	8.4
AG 3063	AG 3062	AG 3257	AG 3256	G1"1/2-F	2	245.5	150	158	138	113.5	113	34	68	96	59	68	85	G1/8"-F	11

❶



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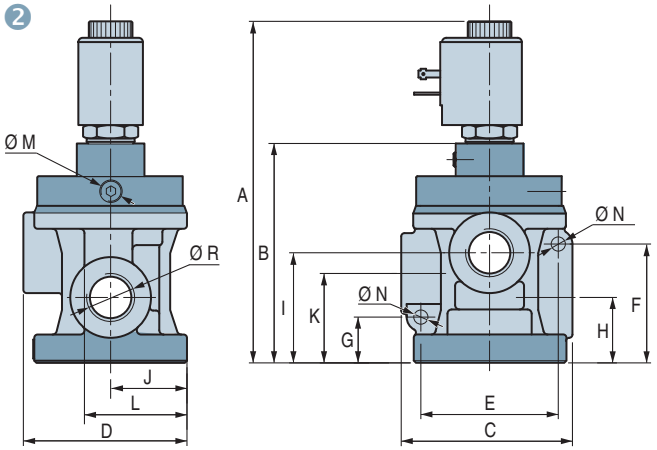


Specifications

Fluid	Non-lubricated 50 micron filtered air. If lubrication is used it must be uninterrupted	
Maximum vacuum	97 %	
Operating temperature	-4 to 104 °F	
Fluid temperature	max 104 °F	
Dynamic seal	polyurethane	
Static seal	NBR	
Coil power	11 VA	10 VA
Voltage	12 VDC / 24 VDC	24 VAC / 110 VAC / 220 VAC
Minimum vacuum for vacuum supplied servo	20 %	-

Flow Rate

Fitting	G1/8"	G1/4"	G3/8"	G1/2"	G3/4"	G1"	G1"1/2
Nominal diameter [mm]	5.5	8	10	15	19	25	39
Flow rate [m^3/h]	1.5	4	10	20	35	90	180
Response time (activation) (1)	15	18	18	20	20	20	60
Response time (deactivation)(1)	25	28	28	40	40	45	40
Minimum control pressure (bar) for C.A. servo	1.5	2.5	2.5	3	3	3	4

(1) with monostable electrical control

Note: All dimensions are in mm

Voltage code

Code	E1	E2	E3	E4	E5	E6	E7
Voltage	24 VDC	220 VAC	24 VAC	110 VAC	48 VAC	24 VDC NO	12 VDC

For all orders, please specify:
Model + Voltage
e.g.: AG3215E1

PA
Angular Jaw Clamps

The PA series angular jaw clamps are used in robotics and the plastics industry and more generally on all types of manipulators. They are particularly recommended for use on injection press unloading robots.

Choose a clamp with a theoretical force Coval to at least twice the effective force required.

The clamping forces in the table above are theoretical forces and are given for a pressure of 6 bar. Gripping force is inversely proportional to the distance between the gripping point and the fulcrum.

For example, for a PA 20 clamp with the gripping point 25mm from the fulcrum, the clamping force will be:

F = 10.1 (table below) x 15/25 = 6.06 kg.

The weight of the objects to be handled is added to that of the clamp and must not exceed 1/20th of the force exerted on the gripping point.

The opening and closing speed of the fingers can be adjusted with the compressed air regulator.

- **DE:** double action clamp using compressed air.
- **SEF:** closure by compressed air, opening by return spring (simple closing effect).
- **SEO:** opening by compressed air, closure by return spring (simple opening effect).

Characteristics

Models	Clamping force(kg)	Min. pressure (bar)	Weight (g)	Magnetic sensor option
PA 16 SEF	4	2.5	120	-
PA 16 SEO	5.2	2.5	120	-
PA 16 DE (1)	5.5 to 6.5	1.5	120	-
PA 20 SEF	7.5	2	190	yes
PA 20 SEO	8.5	2	190	yes
PA 20 DE (1)	10.1 to 12.2	1.2	190	yes
PA 32 SEF	16.5	1.8	490	yes
PA 32 SEO	19.5	1.8	490	yes
PA 32 DE (1)	22 to 24	1	490	yes
PA 50 DE (1)	52 to 60	0.8	1660	yes

(1) The clamping force above is given in bar at a distance of 15 mm from the fulcrum for models PA 16 - 20 - 32 and 30 mm from the fulcrum for models PA 50.

Specifications

Compressed air	Filtered, lubricated or non-lubricated
Maximum pressure	10 bar
Material	Anodized aluminum
Seal	Nitrile (NBR)
Heat treatment	On and fingers
Operating temperature	14 to 158 °F

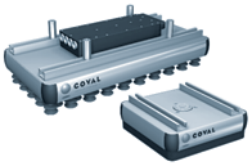
For all orders, please specify: Model + Action + Magnetic sensor e.g.: PA20SEOM

1: Model	2: Actions		3: Magnetic sensors	
PA 16 to PA 50	SEF	Simple closing effect	-	Without
	SEO	Simple opening effect	M	For PA 20 - 32 - 50
	DE	Double action		

Gripping Solutions

Chapter 13

MVG

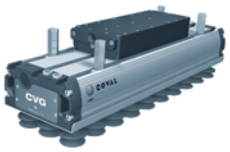


Modular Vacuum Grippers

- Custom sizing from 150x150 to 1200x1000 mm
- Ultra-light
- Configurable gripping interface (foam, suction cups, COVAL-flex)
- Multi-zone
- Thanks to their high degree of modularity, The MVGs vacuum grippers provide the optimal handling solution for products of varied sizes, shapes and weight,
- Staggered or multiple grip/release
- External or independant vacuum generation
- Adaptation to all activity field

P 13/2

CVG

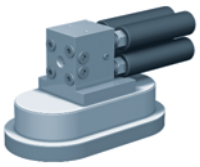


Customized Vacuum Grippers

- 3 standard lenghts (424, 624, 824 mm)
- light and compact
- Configurable gripping interface (foam or suction cups)
- Configurable following applications
- Random Gripping of various products
- Vacuum generators intgrated or separated
- Adaptable to all activity sectors

P 13/10

CSGS

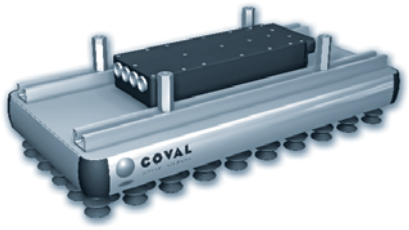


Bags/sacks Gripping System

- 2 suction cups sizes are available
- 2 lifting capacity: 35 and 60 kgs
- 4 suction power
- Ropust and compact
- The CSGS is a complete assembly, suction cup + vacuum pump, for paper or plastic sacks handling of 25 to 60 kgs load
- Quick and economical installation

P 13/18

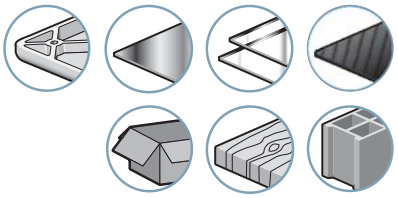
MVG
Modular Vacuum Grippers
General Information



COVAL's MVG series vacuum grippers correspond perfectly to the expectations of integrators and users: thanks to their high degree of modularity, they provide the optimal handling solution for products of varied sizes, shapes and weights.

With a single MVG gripper, easily integrated into the process, the user can carry out single or multiple grips of diverse products, both simply and safely.

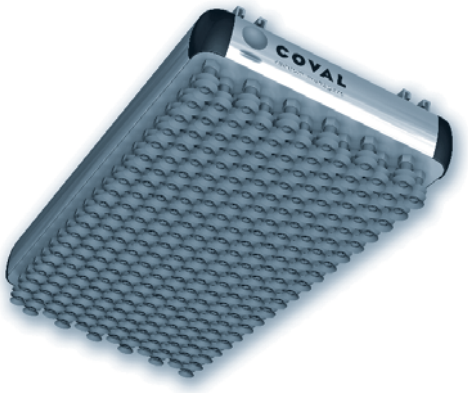
Industry-specific



Standard Customization

The modular design, in standard variations, of the MVG series vacuum grippers gives it a high degree of flexibility with regards to format, gripping interface and vacuum pump, to respond perfectly to application requirements.

Furthermore, to optimize production cycles and palletization planning, MVG grippers can be equipped with several independent gripping zones (multi-zone), ensuring multiple or staggered gripping/release points.



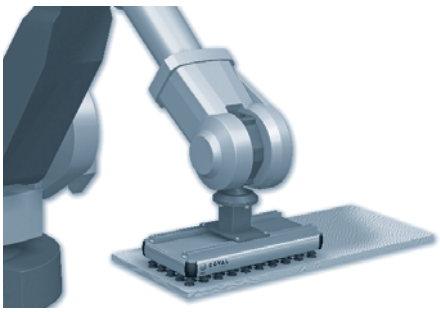
Advantages

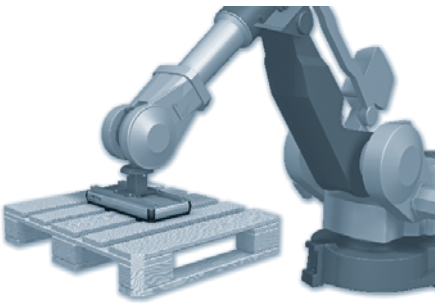
- Customized formats
- Compact and lightweight
- Adaptation to products
- Multi-zone
- Adaptation to installation
- Simple to install and use
- Readily available
- COVAL service

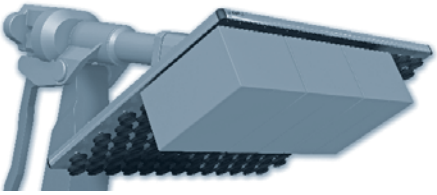
Applications

MVG series vacuum grippers offer a unique solution for handling products in different industrial sectors:

- Packaging
- Plastics
- Metal
- Glass
- Concrete/stone
- Carbon
- Wood

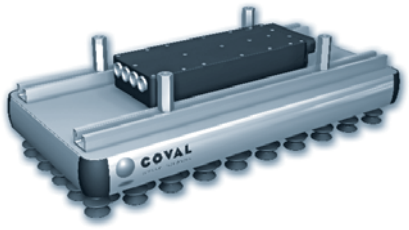






COVAL-flex

MVG
Modular Vacuum Grippers
General Information

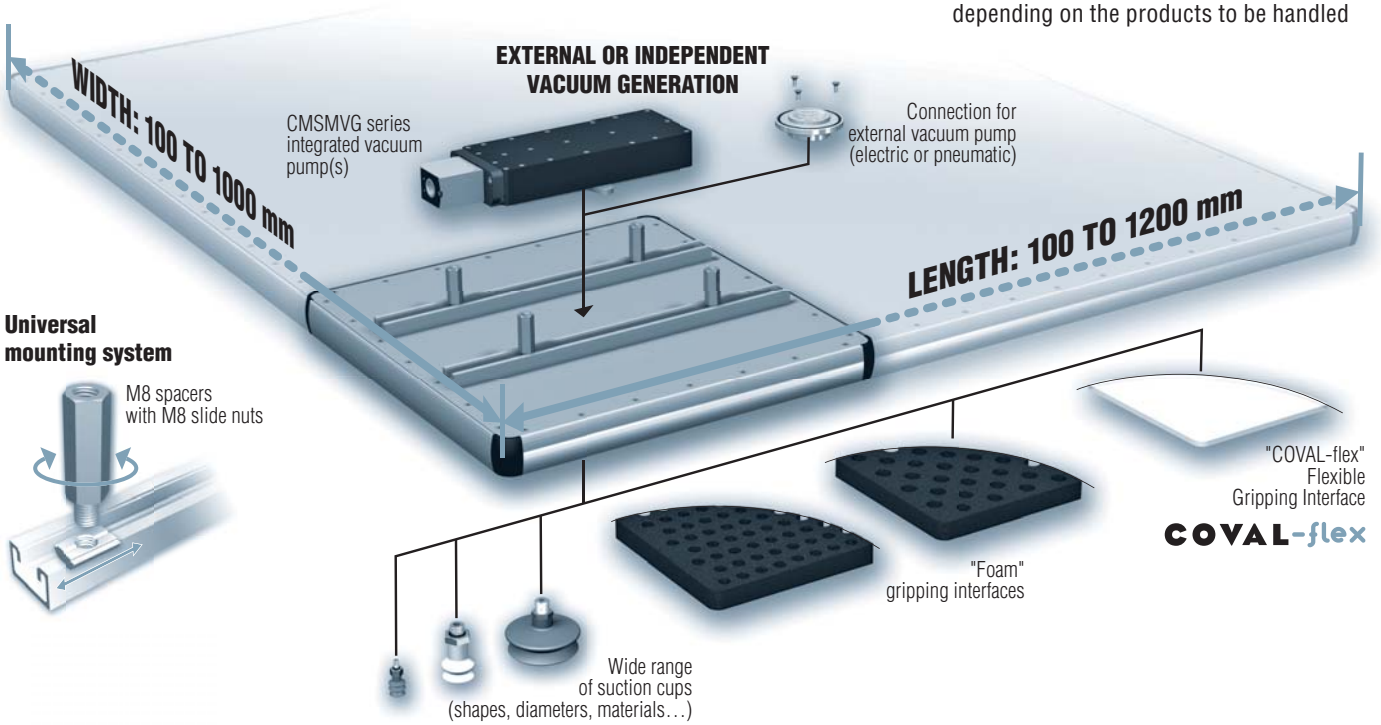


Customized Modular Grippers

Custom sizing
From (150x150) to (1200x1000) mm

Ultra-light
Reduced payload weight

Configurable gripping interface
depending on the products to be handled

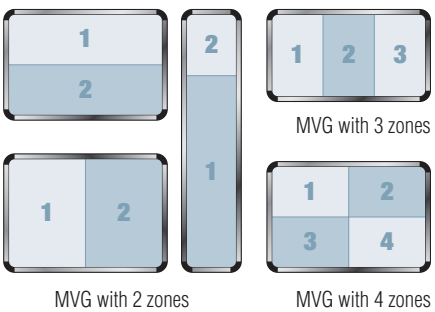


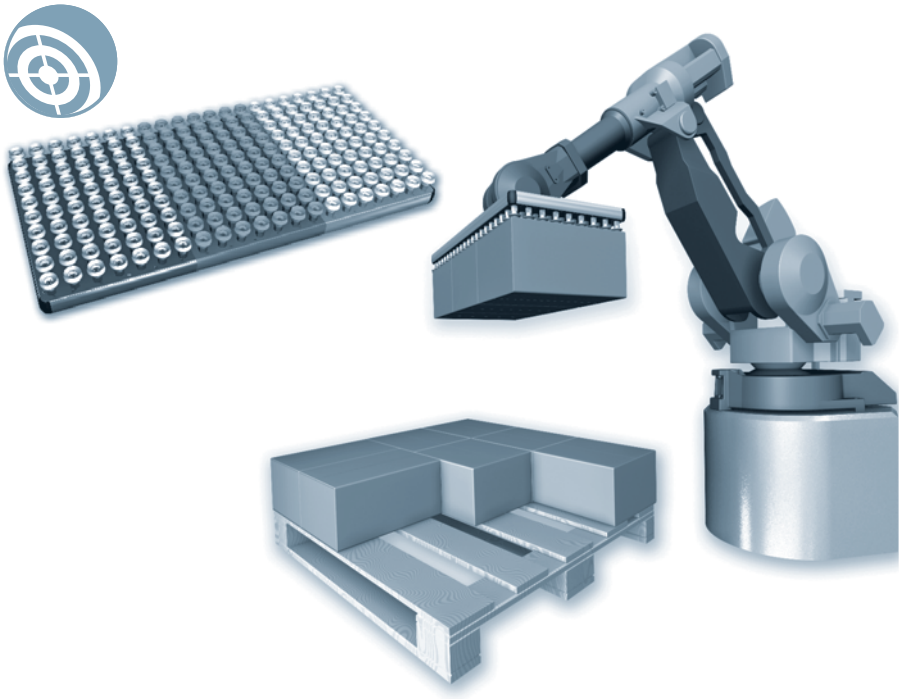
Multi-zone

MVG vacuum grippers can create independent gripping zones, guaranteeing optimization of vacuum management (increased vacuum level, reduced leaks and energy consumption).

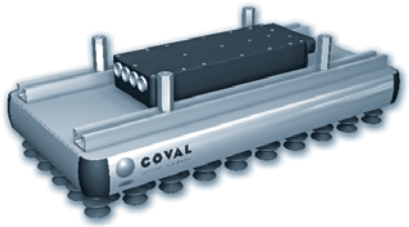
➔ Staggered grip/release points.
➔ Management of formats to be handled.
➔ Pallet Layer Optimization.
➔ Simple or multiple grip/release points.

Examples of configuration:





MVG
Modular Vacuum Grippers
Integrated Technologies



With MVG, COVAL gives you a choice of 3 complementary gripping interface technologies: vacuum grippers with foam, suction cup grippers and grippers with our new "COVAL-Flex" interface.

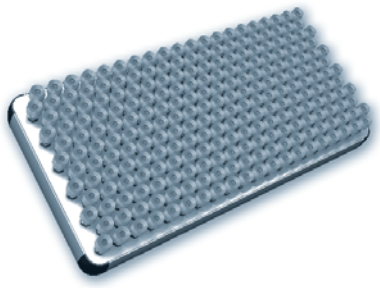
In order to optimize the performance of the MVG series for different applications, the vacuum grippers are available in different gripping patterns, hole diameters, and cup sizes.
➔ A broad range which meets all application requirements.

Choice of Gripping Interface

"FOAM" interface
- Handling of rigid products
- Gripping textured or uneven surfaces
- 2 standard hole diameters (Ø 12 and Ø 16 mm)
- 2 standard hole patterns

"SUCTION CUP" interface
- Handling of flexible products
- Wide range of options
- 3 types of standard suction cups (Ø 14, Ø 25 and Ø 33 mm)
- 3 standard cup patterns

"COVAL-FLEX" interface
- Handling of aluminum cans, canned food, glass containers…
- Flexible interface, extremely tear-resistant
- 2 thicknesses available: 3 and 6 mm
- Hole pattern dependent upon application requirements, completely customizable

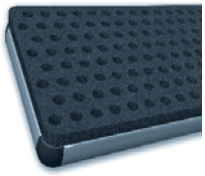


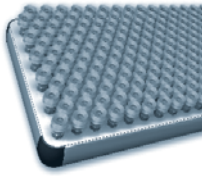
Standard Hole/Cup Patterns

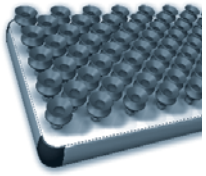
"MINI" type interfaces
- Reduced hole spacing, allowing small, flexible pieces to be gripped
- The multitude of gripping points guarantee a strong grip, even with random positioning of products
- Sizes, see page 13/7.

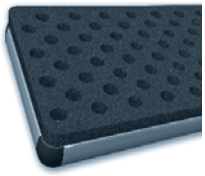
"MEDIUM" type interfaces
- Intermediary gripping point distribution between the mini and maxi interfaces
- Ideal for handling dense loads, where gripping surfaces are reduced
- Sizes, see page 13/7.

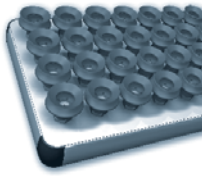
"MAXI" type interfaces
- Large gripping point surfaces, allowing heavy loads to be gripped
- Ideal for gripping products with rigid gripping surfaces
- Sizes, see page 13/7.







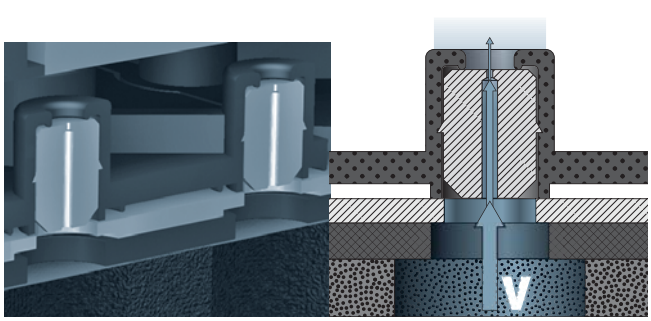




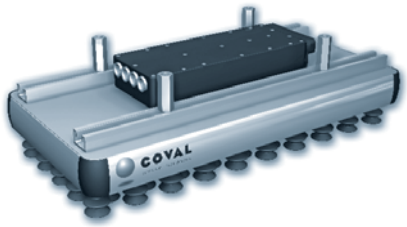
Flow Management

Flow control nozzles
This technology enables calibration of vacuum leakage, and is easily customizable by COVAL. The controlled flow will ensure maximum gripping potential through reduced leakage in the system.

This system guarantees the requisite vacuum level necessary to grip the piece.



MVG
Modular Vacuum Grippers
Integrated Technologies



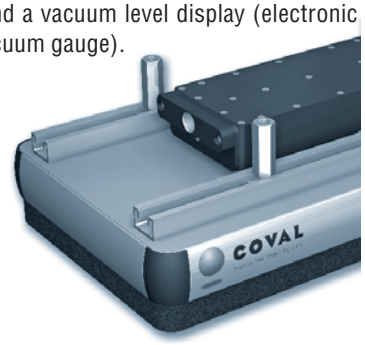
Vacuum Generation

Integrated vacuum generator, CMSMVG Series

Integration of a multi-stage vacuum generator on the MVG gripper provides a comprehensive and compact gripping solution, as well as easy integration in your process.
Options: integration of a vacuum and/or blow-off solenoid control valve with M12 connector and a vacuum level display (electronic vacuum switch display or vacuum gauge).

Advantages

- A comprehensive solution
- 3 standard sizes
- Option: vacuum and/or blow-off control valve
- Option: visual display of vacuum level

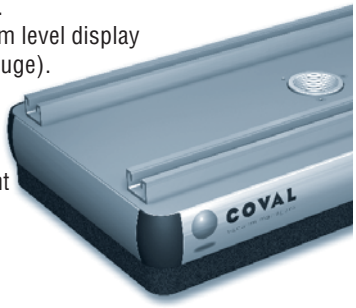


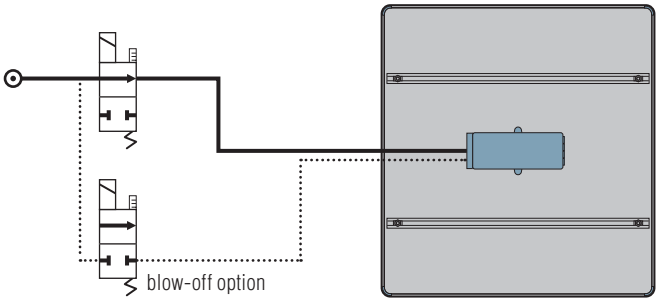
External vacuum generator

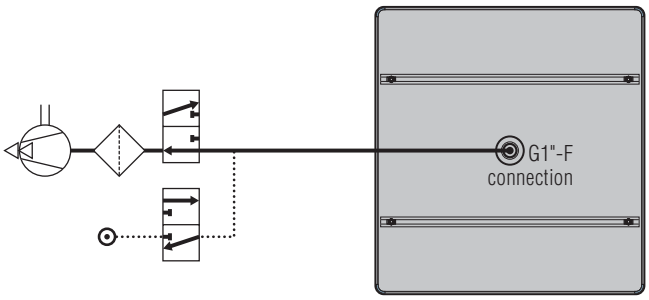
MVG vacuum grippers can be used with an external vacuum pump. Depending on the application, an independent generator is necessary (a regenerative blower, an electric vacuum pump or a pneumatic generator – see page 9/2). This version of the MVG series is equipped with a G1"-F interface enabling the vacuum source to be easily connected.
Option: integration of a vacuum level display (vacuum switch or vacuum gauge).

Advantages:

- Reduced weight
- Adaptation to user environment
- Option: visual display of vacuum level





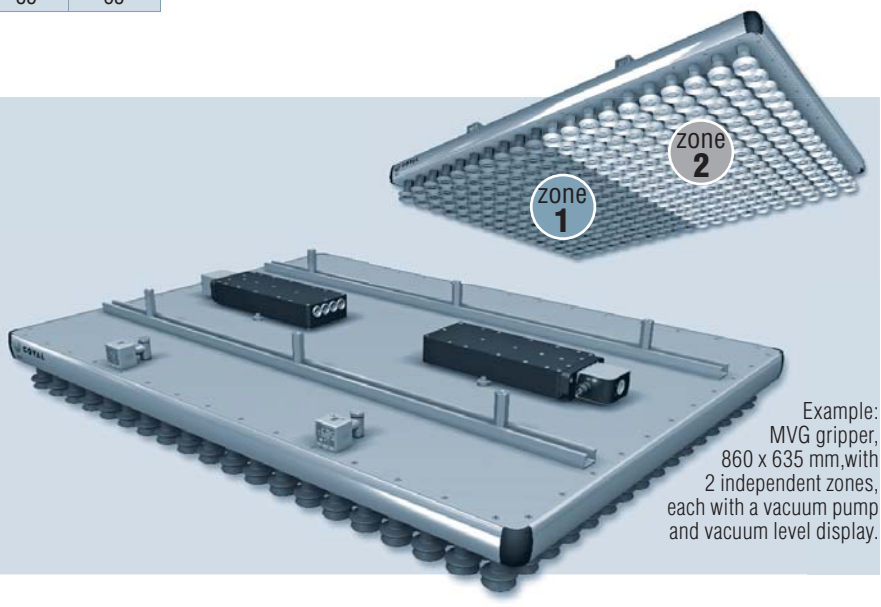


Integrated generator	Model	Con-sumption (SCFM)	Flow rate (SCFM)	Max. vacuum (%)	Sound level (dBA)
CMSMVG 50	MVG _ _...**E1** _ _ _	6.71	31.78	85	65
CMSMVG 100	MVG _ _...**E2** _ _ _	13.42	63.57	85	65
2xCMSMVG 100	MVG _ _...**E3** _ _ _	26.84	127.13	85	65

VACUUM GENERATION AND MULTI-ZONE

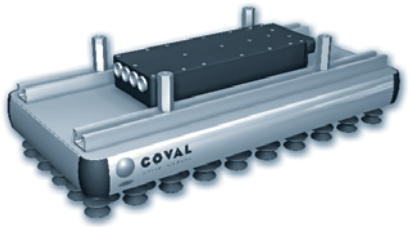
COVAL's Multi-zone technology provides independently defined vacuum zones on the same gripper. For this reason, each zone has a separate vacuum pump, either integrated or external.

As each multi-zone application is different, we will work with you to determine the best configuration for your process.



Example:
MVG gripper,
860 x 635 mm,with
2 independent zones,
each with a vacuum pump
and vacuum level display.

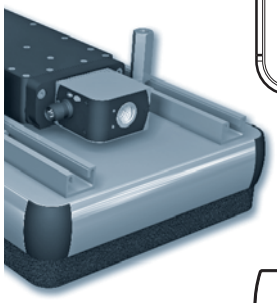
MVG
Modular Vacuum Grippers
Control and Visualization

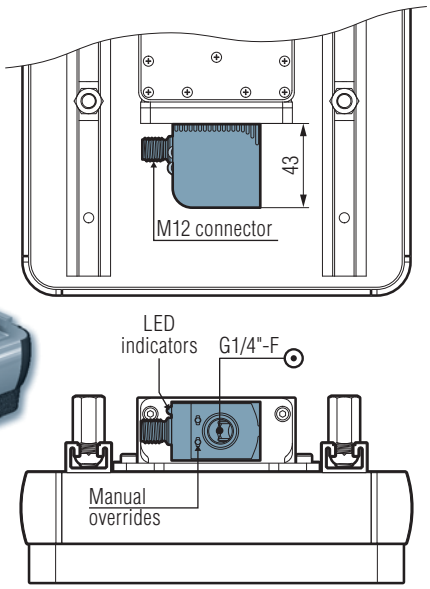


Vacuum Pump Control

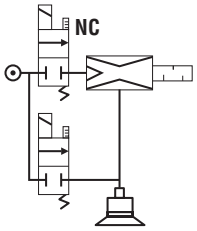
When necessary, the MVG vacuum grippers can be equipped with a vacuum control valve and/or blowoff to optimize product release. This also enables cleaning of the vacuum network and flow restricting nozzles.
A vacuum switch or analog gauge is available as an option for those requiring a visual display of the vacuum level in the system.

IMPLEMENTATION

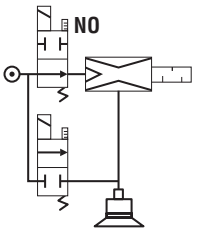




■ **Option S - NC vacuum control, with controlled blow-off:**
MVG_X_ _ _**S**_
- 2 control signals.
- NC vacuum control valve.
- Blow-off controlled by external signal (NC control valve).

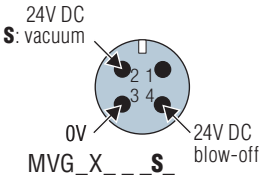


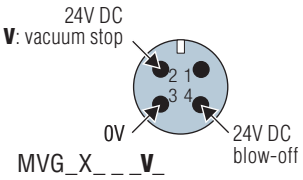
■ **Option V - NO vacuum control, with controlled blow-off:**
MVG_X_ _ _**V**_
- 2 control signals.
- NO vacuum control valve.
- Blow-off controlled by external signal (NC control valve).



ELECTRICAL CONTROL
- Control voltage: 24VDC (regulated) +/- 10 %.
- Current draw: 30 mA (0.7 W) vacuum or blow-off.
- Maximum usage frequency: 2 Hz.
- Number of operations: 10 million cycles.

ELECTRICAL M12 CONNECTIONS





Visualization of Vacuum Level

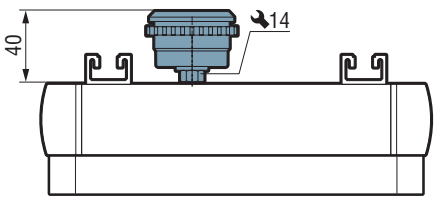
When required, MVG series grippers can incorporate a vacuum level display with an electronic vacuum switch or vacuum gauge: :

■ **Option VA - electronic vacuum switch with 3-color display** (PSD100CPNP):
MVG_X_ _ _ _**VA**

- Pressure rating range: 0.0 ~ -101.3 kPa.
- Pressure setting range: 10.0 ~ -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.
- Electrical connection: M8 (4-pin).
- Protection: IP40.
- Ambient temperature range: 32 to 122°F (operation).
- Material (enclosure): PA 6.6 20%GF.

■ **Option VF - vacuum gauge**
(VAF11140):
MVG_X_ _ _ _**VF**

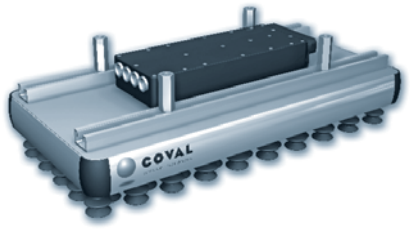
- Vacuum gauge with needle.
- Damping: by silicone movement (patented).
- Measuring: Bourdon tube in CuSn.
- Precision: cl. 2.5 (+/- 2.5% of max. scale value).
- Frame: black ABS



MVG

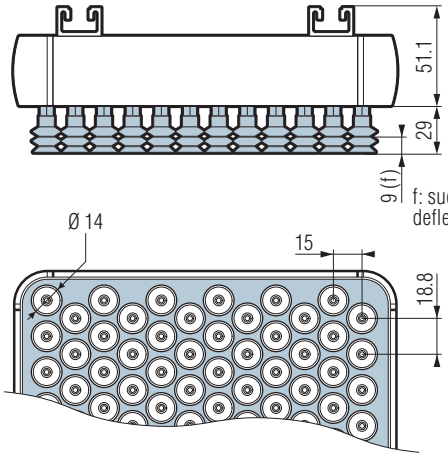
Modular Vacuum Grippers

Dimensions, Mounting Options

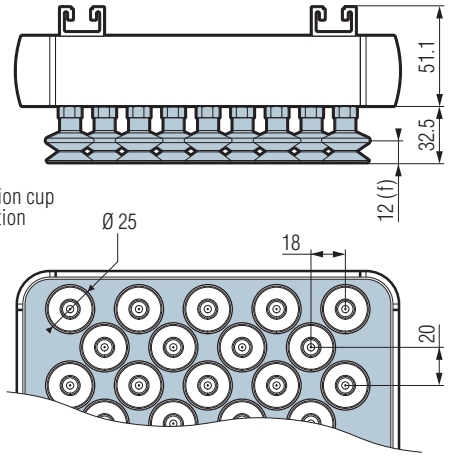


MVG Series with Suction Cup Gripping Interface

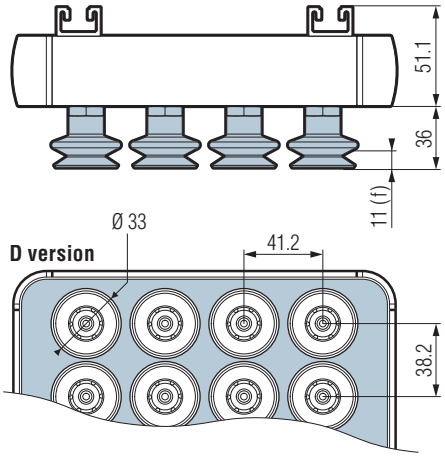
"mini" type suction cup interface

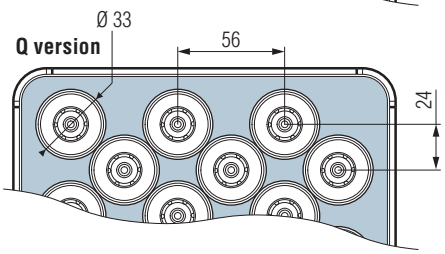


"medium" type suction cup interface



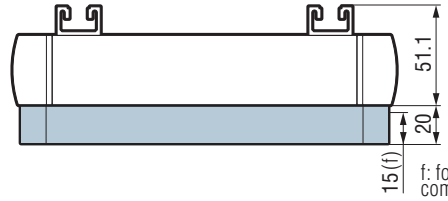
"maxi" type suction cup interface



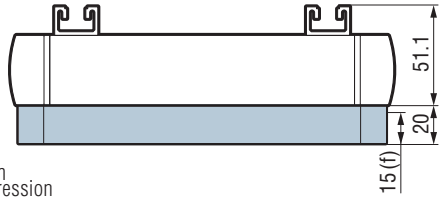


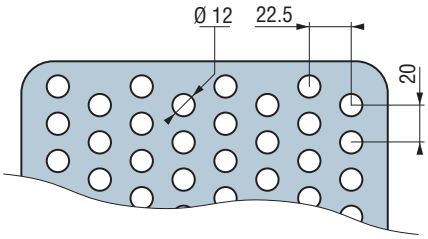
MVG Series with Foam Gripping Interface

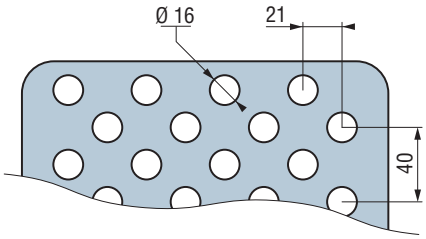
"mini" type foam interface



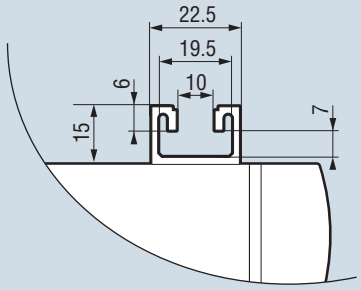
"maxi" type foam interface







Mounting rail



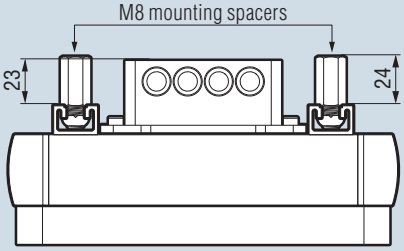
MVG Series with "COVAL-flex" Gripping Interface

3 mm thick "COVAL-flex" interface

COVAL-flex

6 mm thick "COVAL-flex" interface

MVG Series with CMSMVG pump



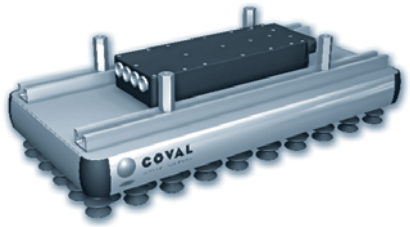
MVG

13

MVG

Modular Vacuum Grippers

Configuring a Modular Vacuum Gripper



MVG	1200	X	1000	D	VSA33JK		E3		S	VA

LENGTH

Overall length (mm): 150 to 1200 mm

150 ... 1200

WIDTH

Overall width (mm): 150 to 1000 mm

150 ... 1000

HOLE/CUP PATTERN LAYOUT

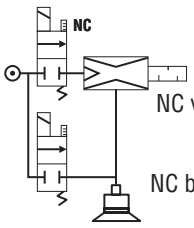
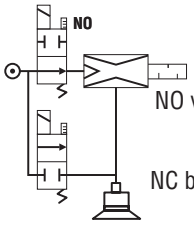
Staggered	Q
Straight*	D

** Only available for "maxi" type gripping interface with suction cup ø mini 26mm.*

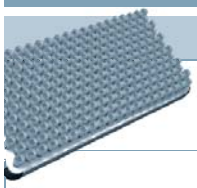
VACUUM GENERATOR

Without vacuum generator	G0
1 x CMSMVG 50	E1
1 x CMSMVG 100	E2
2 x CMSMVG 100	E3

VACUUM GENERATOR CONTROL

Without control	N
 NC vacuum control & NC blow-off control	S
 NO vacuum control & NC blow-off control	V

GRIPPING INTERFACES



SUCTION CUP GRIPPING INTERFACE

"mini" type interface: 2.5 bellows suction cups ø 14 mm in silicone 30 Shore with flow control nozzles.	VSP14BF
"medium" type interface: 1.5 bellows suction cups ø 25 mm in natural rubber with flow control nozzles.	VSA25JI
"maxi" type interface: 1.5 bellows suction cups ø 33 mm in natural rubber with flow control nozzles.	VSA33JK
See "COVAL CUSTOMIZATION".	...

FOAM GRIPPING INTERFACE

Foam "mini" type interface, EPDM.	FS
Foam "maxi" type interface, EPDM.	FB

"COVAL-flex" GRIPPING INTERFACE

COVAL-flex

"COVAL-FLEX" gripping interfaces are designed to respond to specific applications.
They will be recommended and specified by our sales department if your application can benefit from their special features.

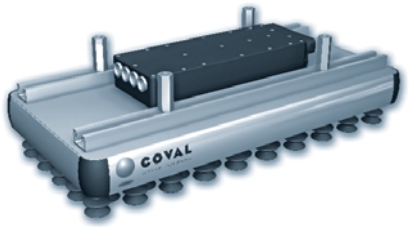
VACUUM LEVEL DISPLAY

Without display	V0
 Electronic display type vacuum switch	VA
 Vacuum gauge	VF

MVG

Modular Vacuum Grippers

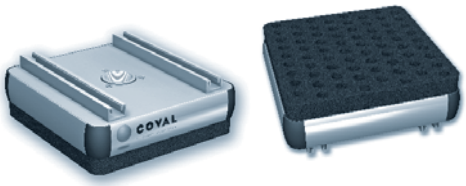
Examples of Part Numbers & Specifications



Examples of Composed Part Numbers

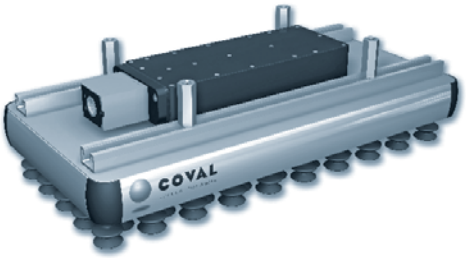
MVG200X200QFSG0

MVG vacuum gripper, 200 x 200 mm, staggered rows, "mini" EPDM type foam gripping interface, without integrated vacuum pump.



MVG400X200DVSA25JIE2SV0

MVG vacuum gripper, 400 x 200 mm, straight rows, "medium" type gripping interface, 1.5 bellows suction cups Ø 25 mm in natural rubber with flow control nozzles, 1 CMSMVG100 vacuum pump, with NF control and NF blow-off, without vacuum level display.



MVG1200X1000DVSA33JKG0NVA

MVG vacuum gripper, 1200 x 1000 mm, straight rows, "maxi" type gripping interface, 1.5 bellows suction cups Ø 33 mm in natural rubber with flow control nozzles, without vacuum pump, with visual display by electronic vacuum switch.

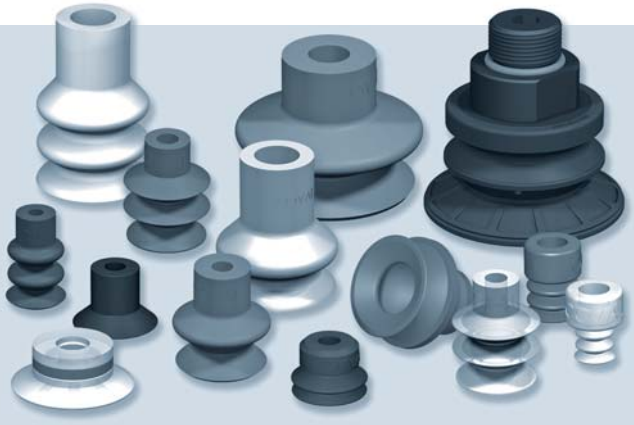
General Characteristics

- Compressed air supply for MVG vacuum grippers with generator CMSMVG:
  - 5µ filtered, non-lubricated air relevant to ISO 8573-1 class 4 standard.
  - 1 supply for generator type E1 and E2 (1/4 G pressure connection).
  - 2 supplies for generator type E3 (1/4 G pressure connection).
  - Optimal working pressure: 6 bar (maximum pressure 8 bar).
- Blow-off: network supply pressure.
- Protection of the valve: IP 65.
- Temperature: 50 to 140°F.
- Material of the gripper: aluminium, PA 6.6 15% GF, brass, stainless steel, neoprene.
- Material of the valve: PA 6.6 15% GF, POM, PC 15% GF, brass, aluminium, NBR.
- Foam gripping interface material: EPDM.
- Suction cup gripping interface materials:
  - "mini" type interface: silicone 30 Shore.
  - "medium" or "maxi" type interfaces: natural rubber 50 Shore.

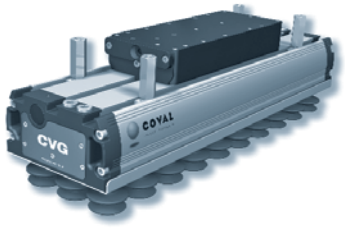
COVAL CUSTOMIZATION

Sometimes, there are instances where the standard MVG configurations available here will not match your application requirements.

COVAL can provide customized solutions, based on your operating specifications, integrating specific functions (e.g. multi-zoning) or by suggesting a gripping interface based on the COVAL range of suction cups (a wide choice of shapes, diameters and materials) to efficiently meet all your requirements.



CVG
Customized Vacuum Grippers
General Information

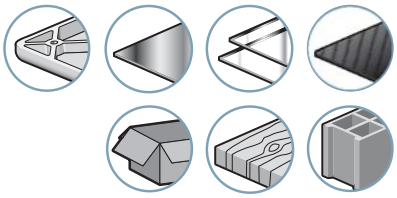


With the CVG series, COVAL introduces the universal solution of the vacuum gripper: flexible, simple and economic.

The handling of parts with different sizes, shapes and weights is not a complex, expensive and laborious task anymore.

With a single CVG module, easily integrated into the process, the user can make random gripping of different parts in a simple and secure way.

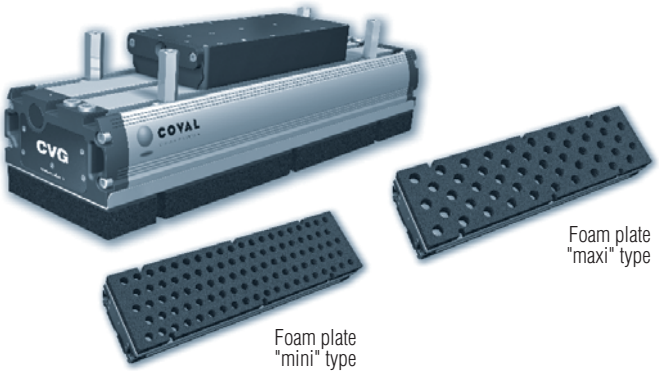
Industry-specific



Advantages

The CVG series are fitted with standard sub-units which allow offering a customized solution and fit to the applications and requirements of the integrators and users:

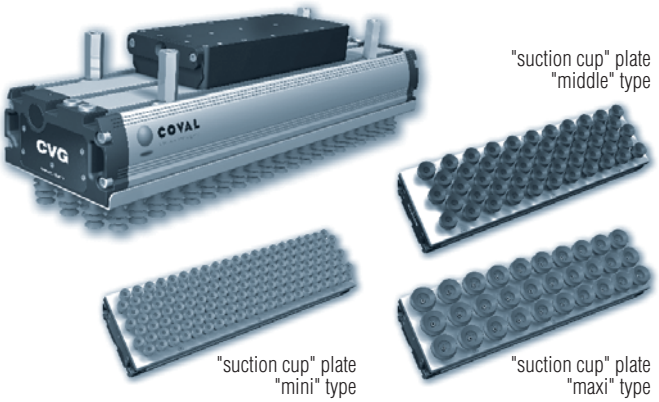
- Compact
- Lightweight
- Integrated functions
- Modularity
- Performance
- Ease of use
- Universal mounting
- …



A Complete System

1 light and robust aluminium profile
1 universal mounting system
3 standard lengths (424, 624, 824mm)
3 generator sizes
2 plate technologies (foam or suction cups)
3 gripping point distributions (mini or maxi)
2 flow rate control technologies (check valves or flow resistors)
2 control versions (vacuum and blow-off)
2 solutions for vacuum monitoring
+ **The Vacuum Manager experience of COVAL**

= **YOUR CVG SOLUTION**



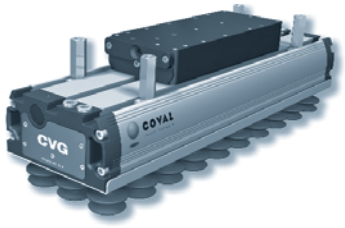
Applications

The CVG series vacuum grippers offer a single solution for the handling of products in different industrial sectors:

- Packaging.
- Plastics.
- Metal.
- Glass.
- Concrete/stone.
- Carbon.
- Wood…

The adaptability and the flexibility of COVAL vacuum grippers CVG series respond to the multiple robotic applications.

CVG
Customized Vacuum Grippers
General Information



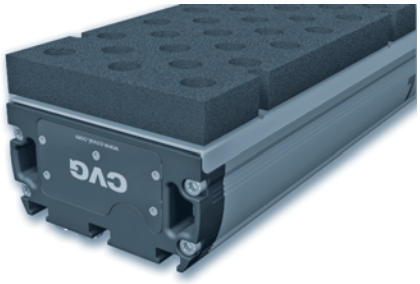
From now on, thanks to the **CVG** series, COVAL offers 2 complementary technologies for the vacuum handling: the vacuum grippers with foam and the vacuum grippers with cups:
➔ A wide range adaptable to all your applications.

Technology Regarding the Gripping Plate

The CVG vacuum gripper range offers 2 technologies regarding the gripping plate and meets the requirements of all applications.

"FOAM" plate
- Handling of rigid products.
- Gripping on structured and irregular surface conditions.
- Flow resistor or check valve.
- 2 diameters (ø 12 and 16mm) and 2 gripping point distributions.
- 3 standard lengths (424, 624 and 824mm).

"SUCTION CUP" plate
- Handling of flexible or deformable products.
- Wide range of variants.
- Flow resistor (different diameters).
- 3 types of suction pads for standard models (Ø 14, Ø 25 and Ø 33mm).
- 3 gripping point distributions.
- 3 standard lengths (424, 624 and 824mm) … or tailored length.



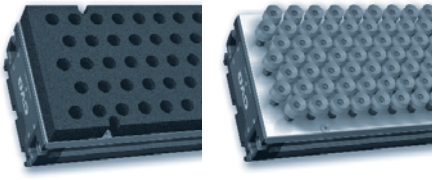
Gripping Point Distribution

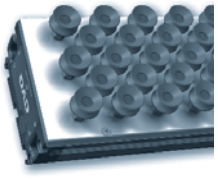
In order to optimize the performances of the CVG vacuum grippers according to the applications, spacing and gripping point diameters are optimized for each variant.

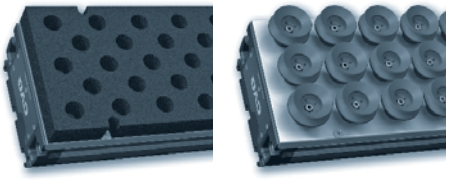
"MINI" type plate
- Reduced centre distance ensuring the gripping of small parts.
- Multiple gripping points ensuring the gripping even in case of random position of the part.
- Dimensions, refer to page 13/15.

"MIDDLE" type plate
- An intermediate distribution of gripping points between the "mini" and "maxi" type of plates.
- Ideal for the handling of dense loads with reduced gripping surface.
- Dimensions, refer to page 13/15.

"MAXI" type plate
- Large surface of the gripping points which allows the gripping of heavy loads.
- Ideal for the gripping of parts with rigid gripping surface.
- Dimensions, refer to page 13/15.





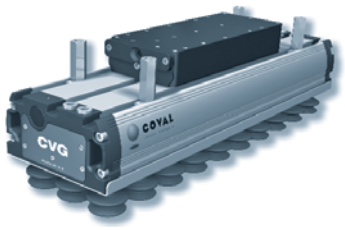


Gripping Force of the Vacuum Grippers

Part number	Total length of the vacuum gripper (mm)	Force at 85% vacuum (lbf)*	Force at 45% vacuum (lbf)*
CVG 424_ _ _ _	424	247.3	134.9
CVG 624_ _ _ _	624	370.9	202.3
CVG 824_ _ _ _	824	494.6	269.8

** Indicative force for a vacuum gripper covered at 100% by the load, without safety factor, on rigid and airtight surface.*

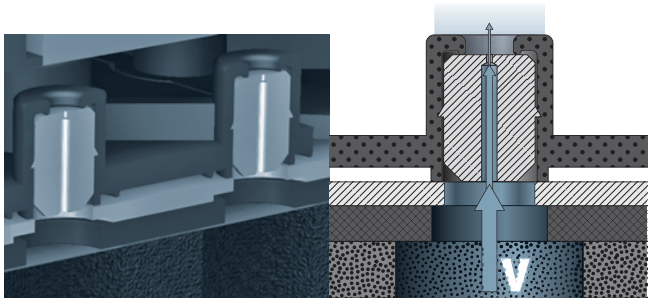
CVG
Customized Vacuum Grippers
Integrated Technologies

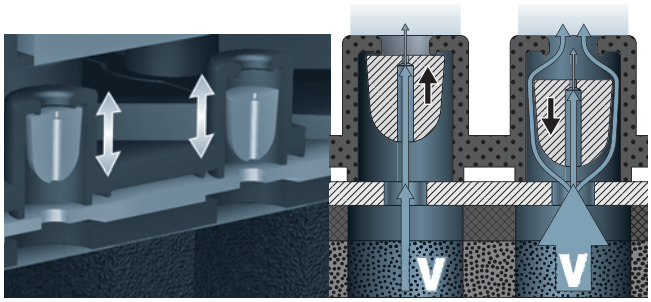


Flow Rate Control Technologies

Flow resistors
This simple and energy saving technology, available for the two types of gripping plates, allows calibrating precisely the vacuum leakage.
It is easily adaptable by COVAL, thanks to a precise sizing according to the application. This system ensures the required vacuum level for the part gripping.

Check valves (Coval patent)
This technology (only available on the "foam" plates) ensures an instant gripping thanks to a high suction flow rate. The valves transfer the suction flow rate only when the part to handle is present and close automatically if the part is absent.
This system ensures an optimal gripping. It is therefore ideal for applications with short and dynamic cycles.

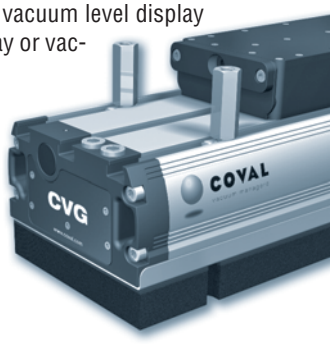


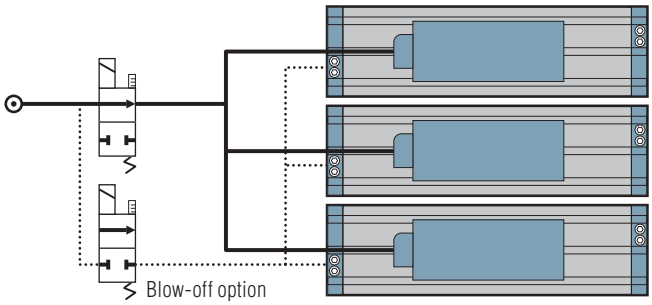


Vacuum Generation

Integrated vacuum generator, CMSE Series
Integration of a multi-stage vacuum generator on the CVG gripper provides a comprehensive and compact gripping solution, as well as easy integration in your process.
Options: integration of a vacuum and/or blow-off solenoid control valve with M12 connector and a vacuum level display (electronic vacuum switch display or vacuum gauge).

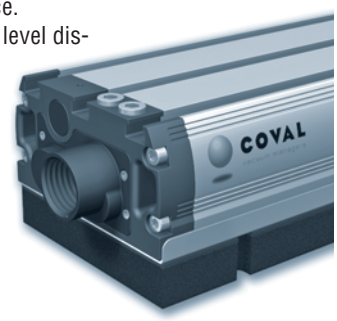
Advantages:
- A comprehensive solution
- 3 standard sizes
- Option: vacuum and/or blow-off control valve
- Option: visual display of vacuum level

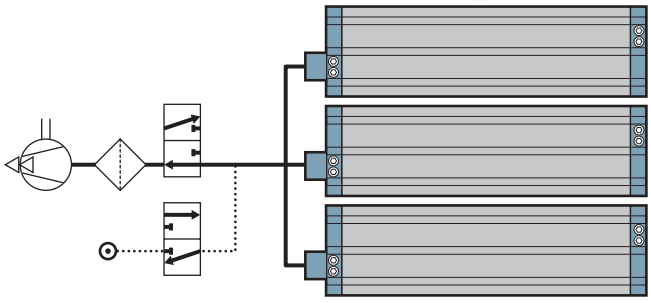




External vacuum generator
The CVG vacuum grippers may also be used with an independent vacuum generator. According to the application, an external generator may be necessary (a blower, an electrical vacuum pump or a pneumatic generator, see page 9/2). The CVG series vacuum gripper G0 version is fitted with a G3/4"-F flange allowing the simple connection of the vacuum source.
Option: integration of a vacuum level display (vacuum switch or vacuum gauge).

Advantages:
- Reduced weight
- Adaptation to user enviroment
- Option: visual display of vacuum level





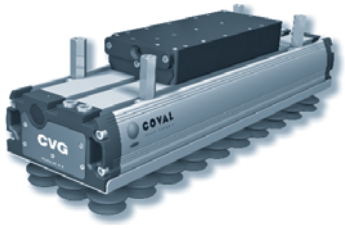
Technical data of the CMSE series integrated vacuum generators

Integrated vacuum generator	Model	Consumption (SCFM)	Flow rate (SCFM)	Max. vacuum (%)	Sound level (dBA)
CMSE 50	CVG_____**E1**	6.71	31.78	85	65
CMSE 100	CVG_____**E2**	13.42	63.57	85	65
2xCMSE 100	CVG_____**E3**	26.84	127.13	85	65

Configuration generators/vacuum gripper length

Vacuum generator	CVG 424 _____		CVG 624 _____		CVG 824 _____	
	Possible config.	(Kg)	Possible config.	(Kg)	Possible config.	(Kg)
G0	■	2.1	■	2.7	■	3.5
E1	■	3.2				
E2	■	3.3	■	4.6	■	5.0
E3			■	5.4	■	5.75

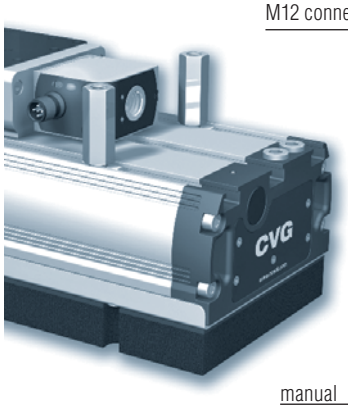
CVG
Customized Vacuum Grippers
Control and Visualization

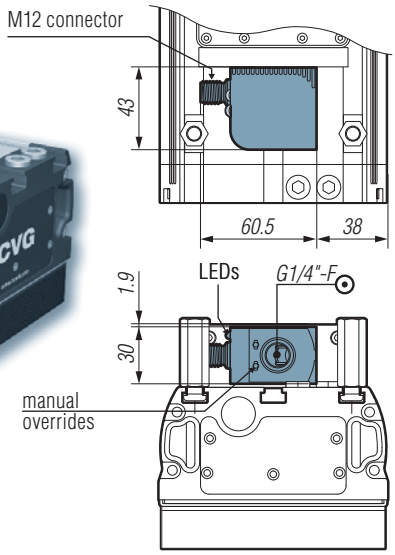


Vacuum Generator Control

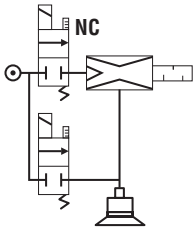
According to the need, the CVG series vacuum grippers may be fitted with a vacuum and/or blow-off control valve in order to optimize the release of the gripped parts and to ensure the cleaning of the network, the flow resistors or check valves. They may also have a built-in vacuum level monitoring thanks to the options: vacuum gauge or vacuum switch (see below).

IMPLEMENTATION

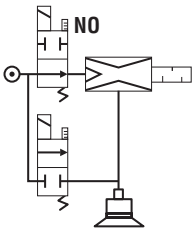




■ **Option S - NC vacuum control, with controlled blow-off:**
MVG_X_ _ _**S**_
- 2 control signals.
- NC vacuum control valve.
- Blow-off controlled by external signal (NC control valve).

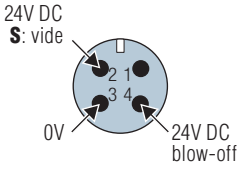


■ **Option V - NO vacuum control, with controlled blow-off:**
MVG_X_ _ _**V**_
- 2 control signals.
- NO vacuum control valve.
- Blow-off controlled by external signal (NC control valve).

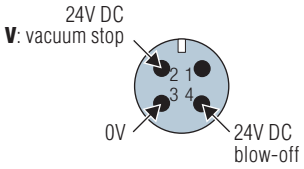


ELECTRICAL CONTROL
- Control voltage: 24VDC (regulated) +/- 10 %.
- Current draw: 30 mA (0.7 W) vacuum or blow-off.
- Maximum usage frequency: 2Hz.
- Number of operations: 10 million cycles.

ELECTRICAL M12 CONNECTION



CVG_ _ _ _ _ E_**S**V_

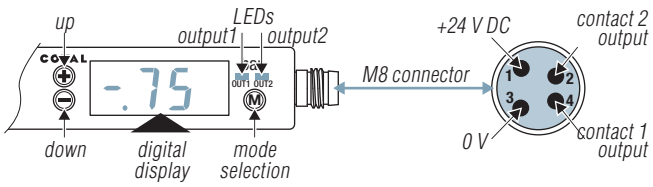


CVG_ _ _ _ _ E_**V**V_

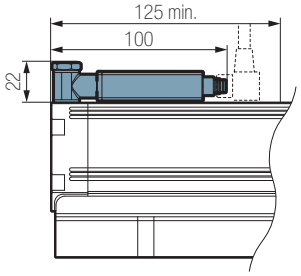
Vacuum Level Display

■ **CVG_____VA Display type electronic vacuum switch**

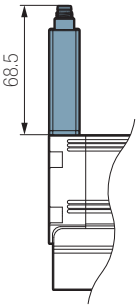
- Adjusting range: 0 ~ -10 bar
- Hysteresis: adjustable
- Maximum overpressure: 3 bar.
- Repeatability: +/-1% of the range.
- Output thresholds: 2 x NO/NF.
- Switching capacity: 125mA transistor PNP.
- Threshold state display: 2 x leds.
- Display unit: bar.
- Electrical connection: M8 (4 pins).
- Power supply: 18 to 24 V DC (regulated).
- Current draw: < 60 mA.
- Protection: IP 40.
- Frame material: PA 6.6 20 % GF.



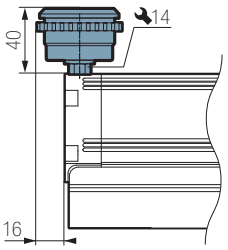
Mounting of the **VA** vacuum switch option for a gripper without vacuum generator (**G0**), or having a minimum space of 125mm depending on the length of the gripper and the choice of the vacuum generator.



Mounting of the **VA** vacuum switch option for a gripper with vacuum generator (version **E1**, **E2** or **E3**) and not having sufficient space for the horizontal mounting.



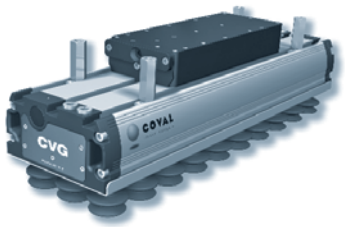
■ **CVG_____VF Vacuum gauge**
- Vacuum gauge with needle.
- Damping: by silicone movement (patented).
- Measuring: Bourdon tube in CuSn.
- Precision: cl. 2.5 (+/- 2.5% of max. scale value).
- Frame: black ABS



CVG

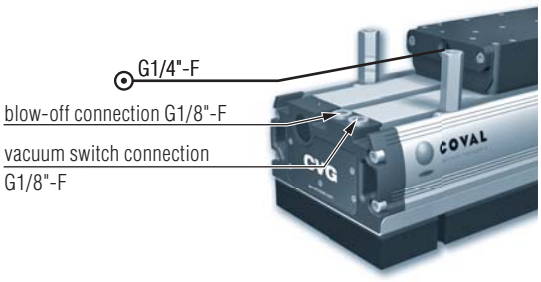
Customized Vacuum Grippers

Dimensions, Mounting Options



Dimensions and Connections

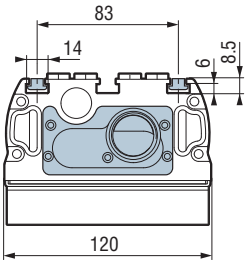
		CVG424	CVG624	CVG824
in mm	A	424	624	824
	B	384	584	784

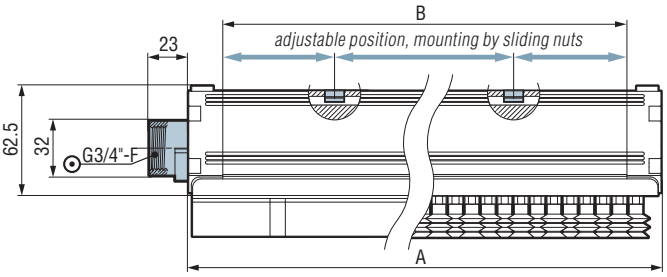


GO Versions

(with independent vacuum source).

The Coval vacuum grippers in series CVG are particularly simple to install and operate. Mounting on all types of automated systems or robots thanks to their universal fixing by 4 rectangular nuts sliding in the groove of the aluminium profile (fixation by 4 M8 screws). These nuts are fitted with a spring plate to allow keeping them in position during unscrewing.



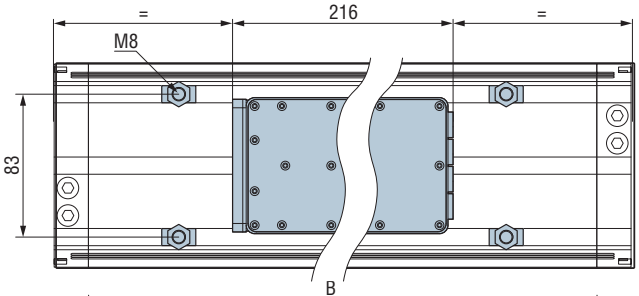


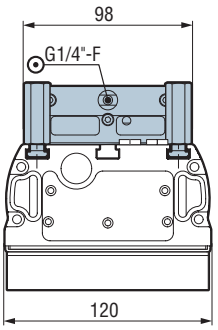
E1 or E2 Versions

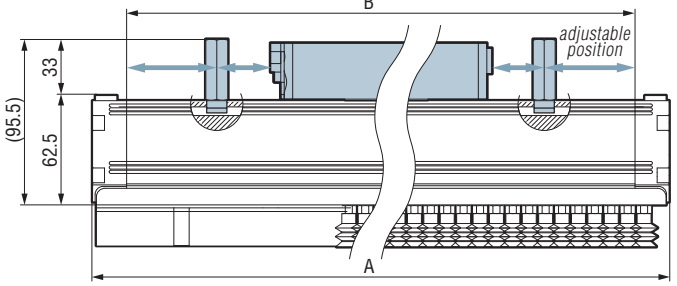
(1 integrated vacuum generator, CMSE series).

The CVG series COVAL vacuum grippers versions E1 and E2 are mounted on all types of automated systems or robots thanks to the 4 x M8 spacers on the groove of the aluminum profile (mounting by 4 x M8 screws).

For the CVG series vacuum grippers version E3, there are 6 x M8 spacers which can be adjusted as per the requirement.

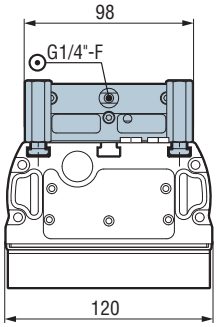


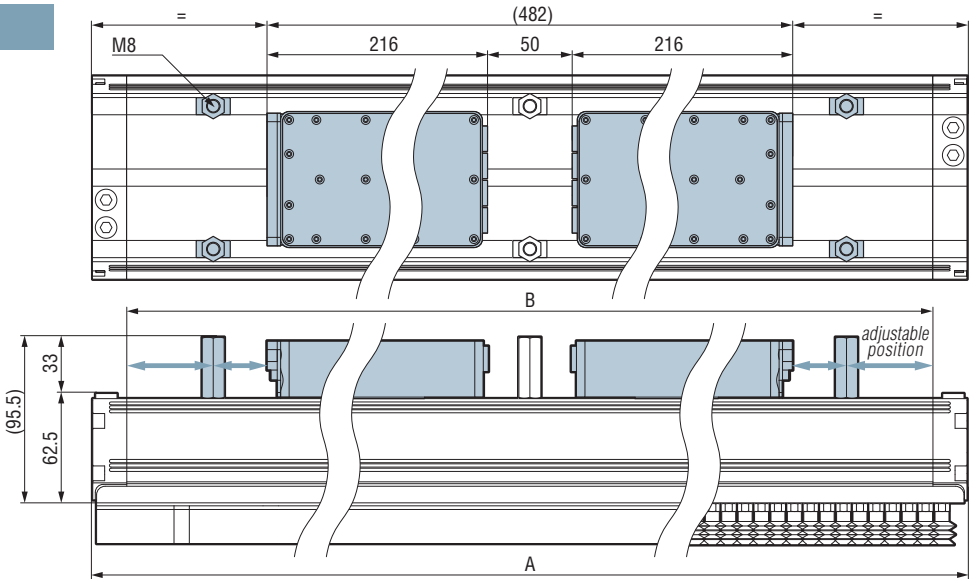




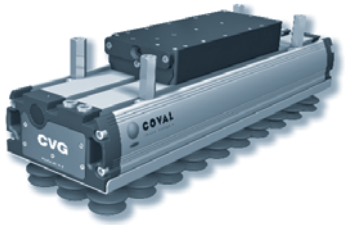
E3 Versions

(2 integrated vacuum generators, CMSE series).



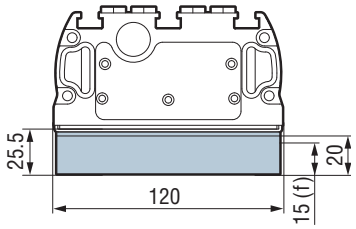


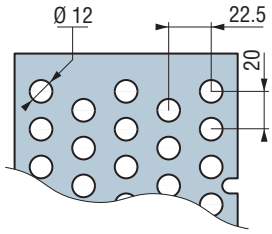
CVG
Customized Vacuum Grippers
Plates and Technical Data



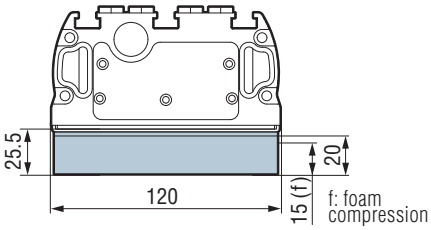
CVG Series with Foam Plate

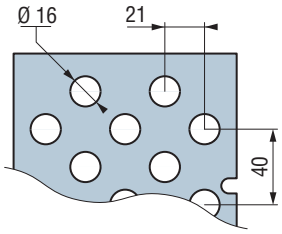
"mini" type foam plate





"maxi" type foam plate



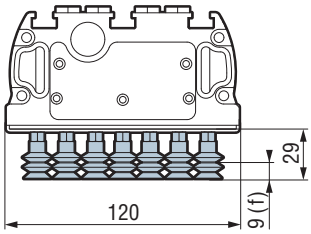


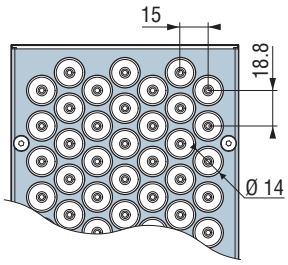
NUMBER OF GRIPPING APERTURES PER PLATE

	CVG 424	CVG 624	CVG 824
"mini" type plate aperture Ø 12 mm	98	128	198
"maxi" type plate aperture Ø 16 mm	50	75	100

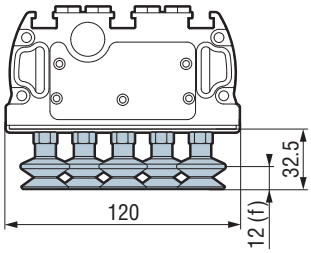
CVG Series with Suction Cup Plate

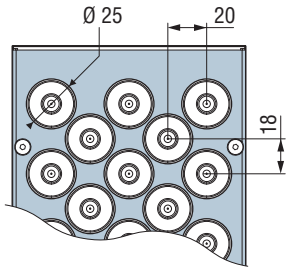
"Mini" type suction cup plate



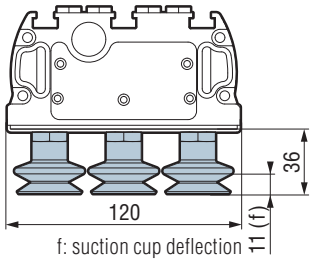


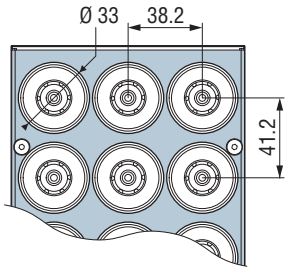
"Middle" type suction cup plate





"Maxi" type suction cup plate





NUMBER OF SUCTION CUPS PER PLATE

	CVG 424	CVG 624	CVG 824
"Mini" type suction cup plate Ø 14 mm (or Ø 16 mm max.)	150	220	297
"Middle" type suction cup plate Ø 25 mm (or Ø 18 to 25 mm)	53	83	113
"Maxi" type suction cup plate Ø 33 mm (or Ø 36 mm max.)	30	42	57

General Characteristics

- Supply: 5µ filtered, non-lubricated air relevant to ISO 8573-1 class 4 standard.
- Compressed air supply for CVG vacuum grippers with integrated generator CMSE:
  - 1 supply for generator type E1 and E2.
  - 2 supplies for generator type E3.
  (see drawings page 13/14: 1/4 G pressure connection).

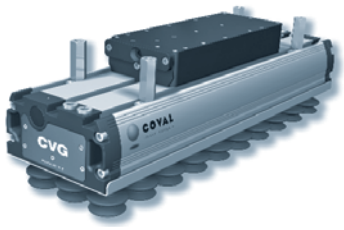
Optimal working pressure: 6 bar (maximum pressure 8 bar).
- Blow-off: network supply pressure.
- Protection of the valve: IP 65.
- Temperature: 50 to 140°F.
- Material of the gripper: aluminium, PA 6.6 15% GF, brass, stainless steel, neoprene.
- Material of the valve: PA 6.6 15% GF, POM, PC 15% GF, brass, aluminium, NBR.
- Foam material: EPDM.
- Suction cup material: - "mini" type plate: silicone 30 Shore.
  - "middle" or "maxi" type plate: natural rubber 50 Shore.

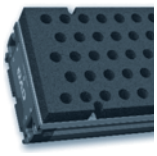
According to the constraints of your application, we can personalize your vacuum gripper with the COVAL standard cup range. A wide range of shapes, diameters and materials allows meeting all your requirements.

CVG

Customized Vacuum Grippers

Configuring a Vacuum Gripper





CVG Series with Foam Plate: one complete part number

CVG	424	V	S	F	E2		S	VA

GRIPPER LENGTH

424 mm	424
624 mm	624
824 mm	824

TECHNOLOGY

Check valves	V
Flow resistors	H

GRIPPING SURFACES DIA.

mini	S
maxi	B

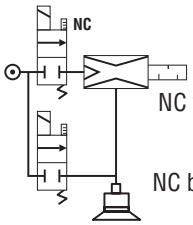
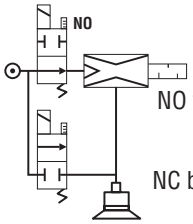
Integrated filter on the CVG series vacuum gripper with foam plate.

VACUUM GENERATOR *

G0	Without vacuum generator
E1	1 x CMSE 50
E2	1 x CMSE 100
E3	2 x CMSE 100

* see page 13/12 table of the possible configurations.

VACUUM GENERATOR CONTROL *

Without control	N
 NC vacuum control & NC blow-off control	S
 NO vacuum control & NC blow-off control	V

* only for E1 and E2

VACUUM LEVEL DISPLAY

V0	Without
VA	Electronic display type vacuum switch 
VF	Vacuum gauge 

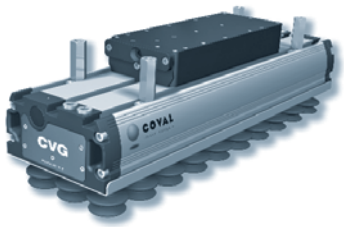
Example of composed part numbers:

CVG 424 V S F E2 S VA CVG vacuum gripper, length 424mm, check valve technology, foam plate "mini" type with filter, 1 integrated vacuum generator CMSE 100, NC vacuum and blow-off control, electronic display type vacuum switch.

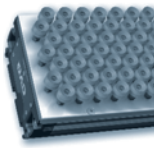
CVG

Customized Vacuum Grippers

Configuring a Vacuum Gripper



CVG Series with Suction Cup Plate: 2 individual part numbers



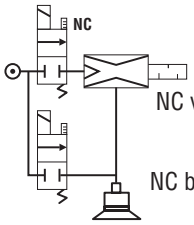
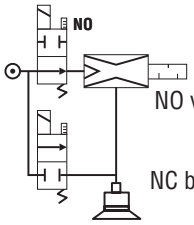
1- PART NUMBER OF THE FRAME

CVG	424	X	E2		S		VA

GRIPPER LENGTH	
424 mm	424
624 mm	624
824 mm	824
...	...

VACUUM GENERATOR*	
G0	Without vacuum generator
E1	1 x CMSE 50
E2	1 x CMSE 100
E3	2 x CMSE 100

* *see page 13/12 table of the possible configurations.*
E1/E2 : mini. length of the gripper 280 mm.
E3 : mini. length of the gripper 545 mm.

VACUM GENERATOR CONTROL*	
N	Without control
S	 NC vacuum control & NC blow-off control
V	 NO vacuum control & NC blow-off control

* *only for E1 and E2*

VACUUM LEVEL DISPLAY	
V0	Without
VA	Electronic display type vacuum switch 
VF	Vacuum gauge 

2- PART NUMBER OF THE SUCTION CUP PLATE

CP	424	VSP14BF

GRIPPER LENGTH			SUCTION CUP AND FLOW RESISTOR MODELS ACCORDING TO THE PLATE	
424 mm	424	VSP14BF	"Mini" type plate	2.5 bellows suction cups Ø 14 mm in silicone 30 Shore with flow resistors Ø 0.7 mm
624 mm	624	VSA25JI	"Middle" type plate	1.5 bellows suction cups ø 25 mm in natural rubber with flow resistors Ø 0.9 mm
824 mm	824	VSA33JK	"Maxi" type plate	1.5 bellows suction cups Ø 33 mm in natural rubber with flow resistors Ø 1.1 mm
...	...	...		Special version ↓

Example of composed part numbers:

CVG 424 X E2 S VA

+

CP 424 VSP14BF

CVG vacuum gripper length 424 mm without plate, with 1 integrated vacuum generator CMSE 100, NC vacuum and blow-off control, electronic display type vacuum switch.

Suction cup plate for vacuum gripper length 424 mm, fitted out with VSP cups Ø 14 mm Si3 and flow resistors Ø 0.7 mm.

SPECIAL VERSIONS

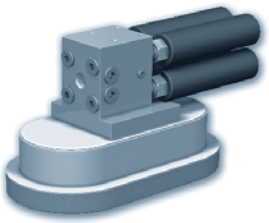
Your job may sometimes bring situations of use for which our standard versions are not fully adapted.

COVAL is able to give you a customized reply following your specifications by integrating specific functions or by offering you tailored vacuum grippers (adjustment of length or selection of suction cup type).

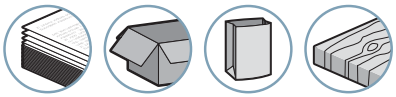
CSGS

Bags/sacks Gripping System

General Information



Industry-specific

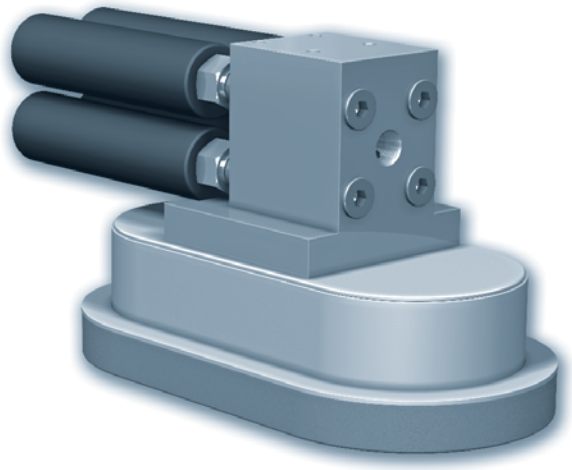


The CSGS system is a comprehensive package that includes a specific suction pad and an optimized vacuum generator and guarantees high reliability for handling plastic or paper bags from 25 to 60 kg, used for packing powder and/or granulated products.

It is particularly recommended for robotic palletizing and de-palletizing applications that require a quick and secure implementation.

Gripping capacity:

The CSGS…X35 models are equipped with a 250x150 mm suction pad allowing them handle loads of up to 35 kg, depending on the bag's resilience. The CSGS…X60 models are equipped with a 360x190 mm suction pad and can handle loads of up to 60 kg.



Advantages

- The CSGS system is designed to support the load handled by the suction pad and thus allows it to be installed directly onto the robot's arm.
- The CSGS system allows for a quick and cost-effective installation: it is fed by a single small-sized compressed air hose, which avoids the complexity of setting up a vacuum network consisting of large pipes and vacuum valves.
- The suction pad features a foam lip that ensures the maximum flexibility required for gripping a variety of product types.
- The specific vacuum generator has been designed to provide high air intake flow rates thus allowing for shorter response times and the handling of porous products.
- It does not include any membrane and has no internal moving parts. It therefore is clog-free and can be installed without requiring any filter on the vacuum network.
- Very low noise level thanks to external silencers.
- No heat emission, vibration-free.

Specifications

Feed pressure	Non-lubricated filtered air 2 to 6 bar
Optimal pressure	4 bar
Weight	From 7 to 8.3 kg, depending on model
Materials	NR, aluminum, CuZn, steel
Temperature	From 50 to 122 °F

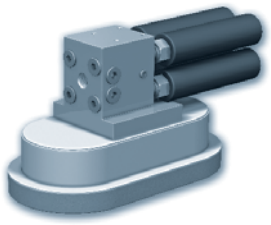
Characteristics

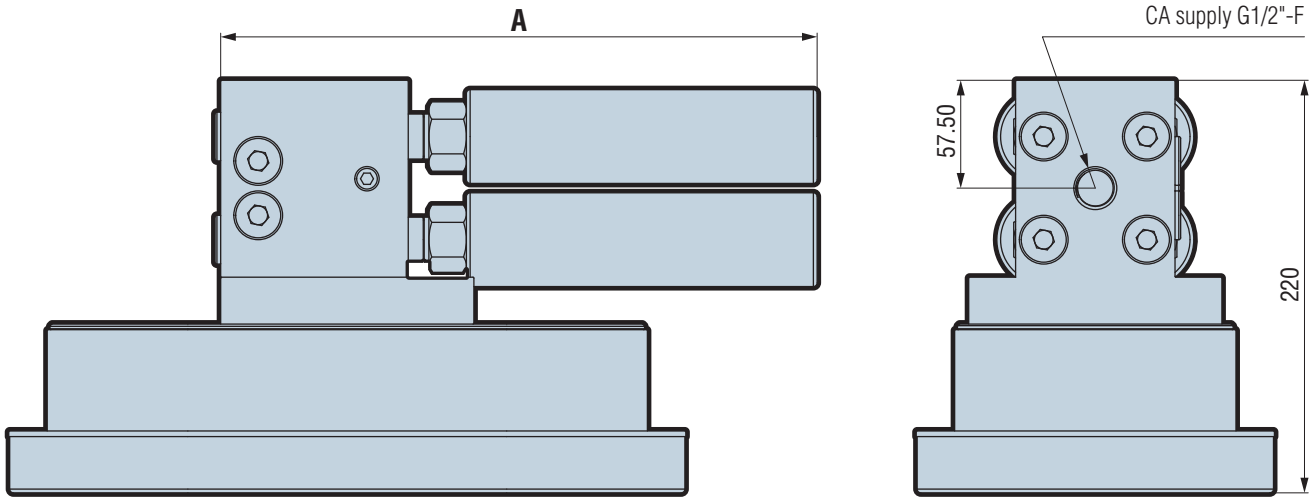
Model	Air consumed (SCFM)			Maximum vacuum (%)	Air drawn (SCFM)
	4 bar	5 bar	6 bar		
CSGS4X15X35	14.13	16.95	19.78	75	25.43
CSGS4X20X35	25.73	30.51	35.60	75	35.31
CSGS4X25X60	38.14	45.77	53.40	84	50.85
CSGS4X30X60	56.50	67.80	79.10	84	63.57

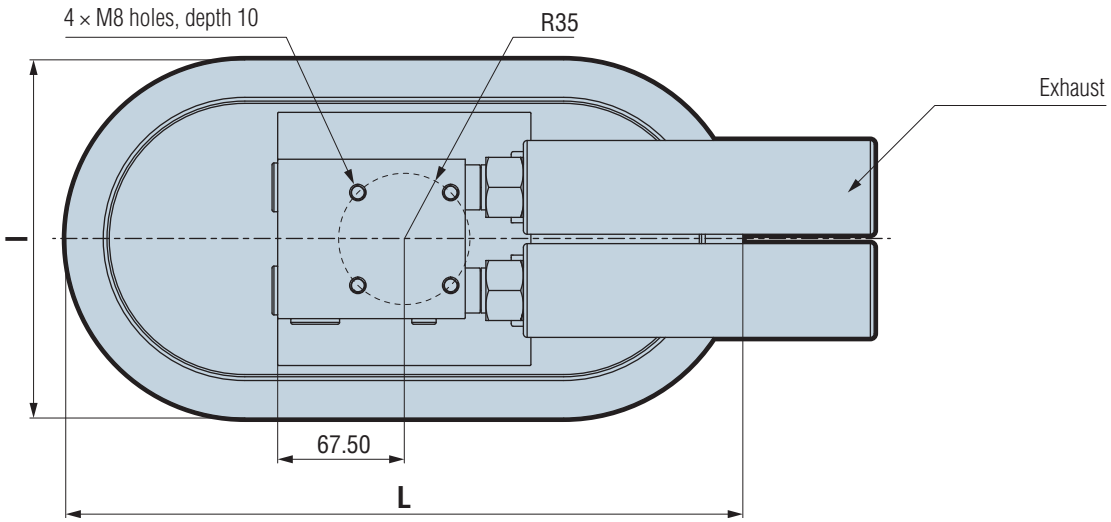
Please specify model, e.g.: CSGS4X15X35
Refer to characteristics table above

Bags/sacks Gripping System

Dimensions







Model	L	I	A	Silencer
CSGS4X15X35	250	150	229	SILK12C
CSGS4X20X35	250	150	229	SILK12C
CSGS4X25X60	360	190	318	SILK34C
CSGS4X30X60	360	190	390	SILK34C

All dimensions are in mm.

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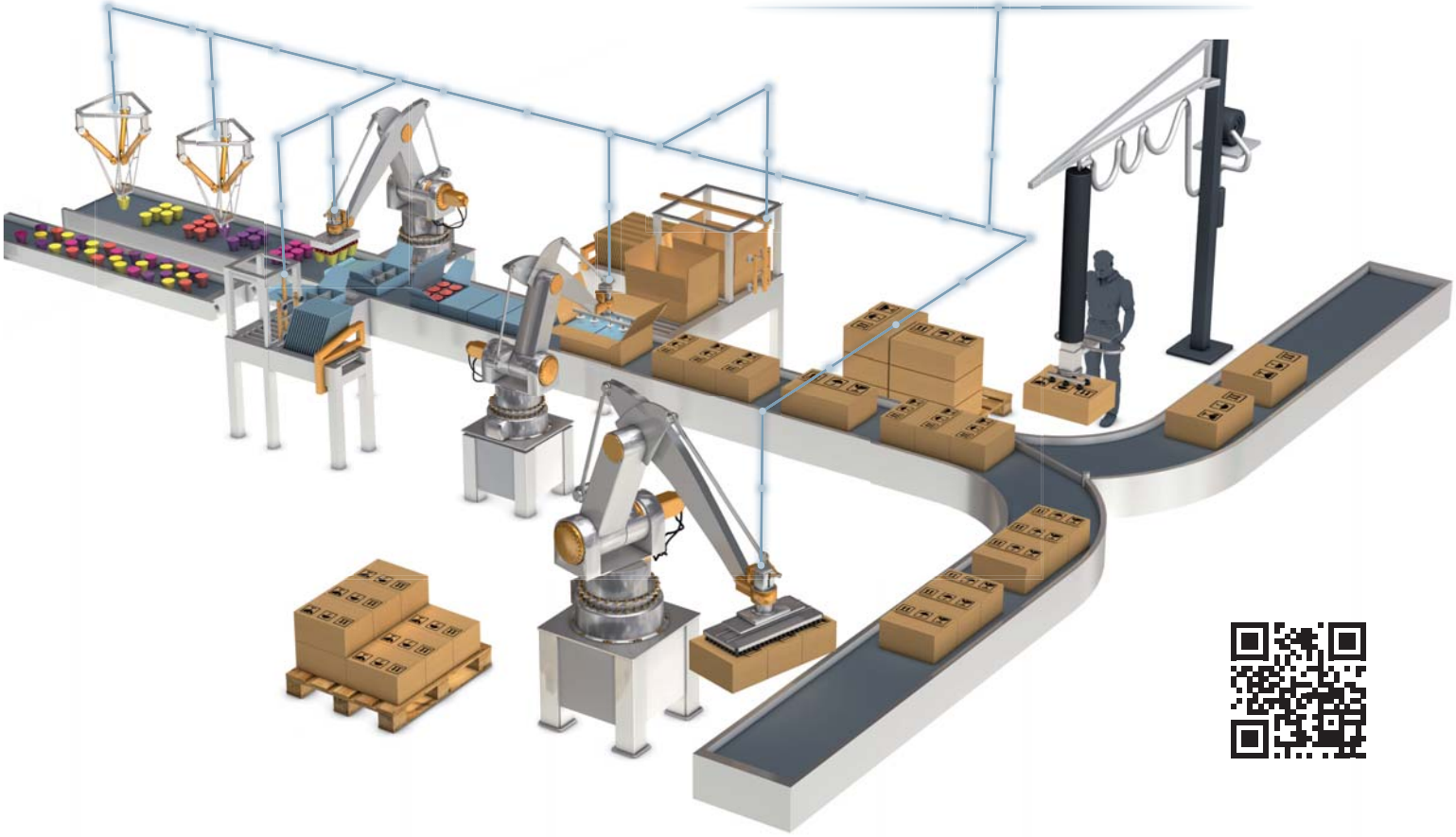

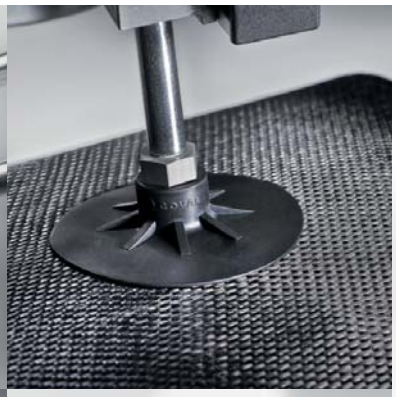

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Each year, we continue to develop our network of partners (subsidiaries, distributors and independent agents) as our objective is to assist our clients in their search for local and international markets.

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- Organizing specialized training programs for our clients and partners.
- Proposing efficient, economic and reliable solutions.
- Ensuring timely delivery and proper installation of our solutions.

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