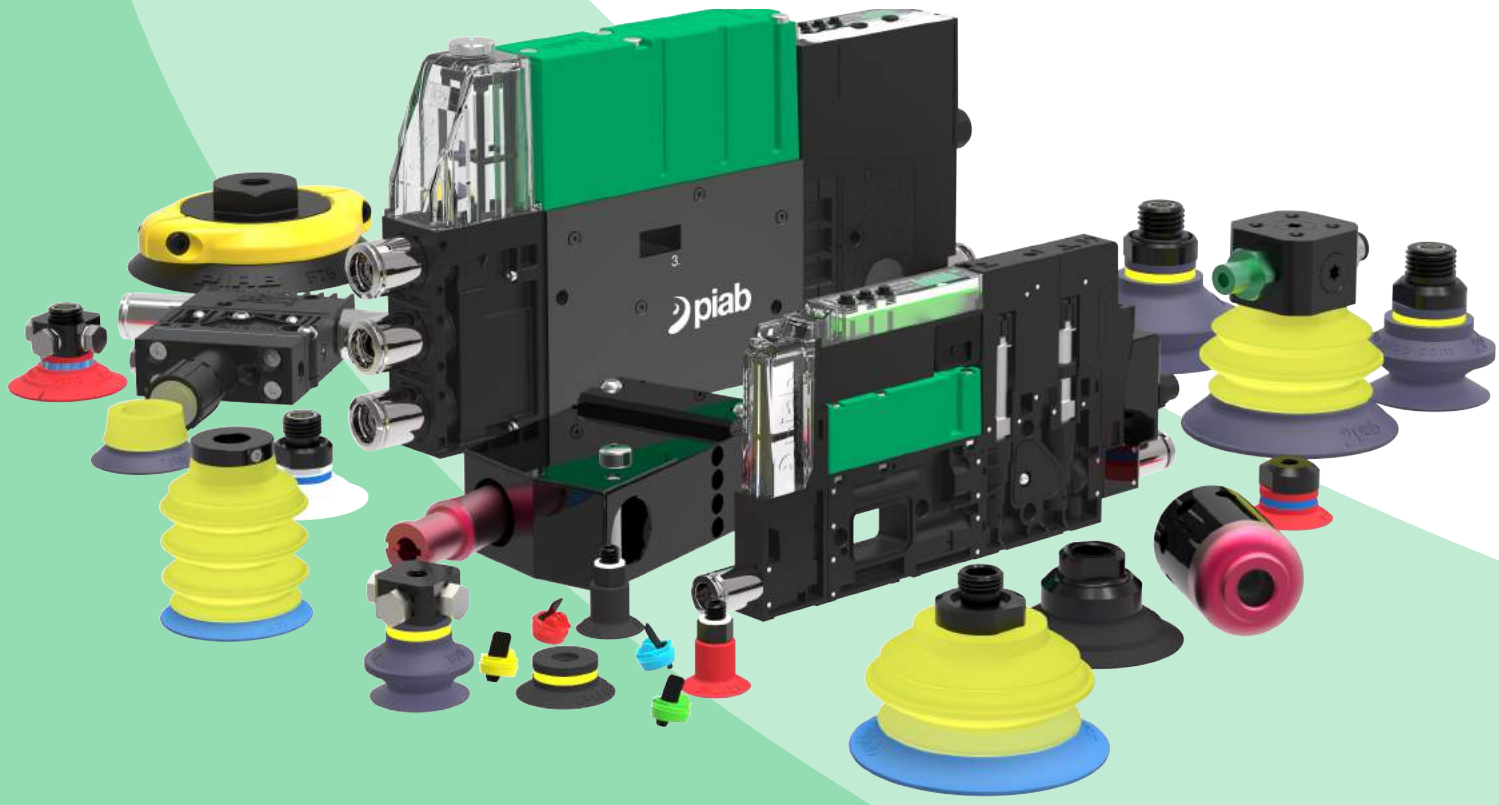
piab

VACUUM AUTOMATION 5.0

Improve your productivity and energy efficiency



Our Mission

The Piab mission is to increase productivity for industrial customers and provide energy saving solutions by promoting our superior technology universally.

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Piab Vacuum Academy

1951

In 1951, the company took its name from its first product, an innovative compass that simplified the work for designers and draftsmen. Pi, π (=3.14) AB.

Piab Vacuum Academy

Introducing Piab

"The Piab mission is to increase productivity for industrial customers and provide energy saving solutions by promoting our superior technology universally."

Giving you the best solution possible

We share our knowledge and experience with our customers and offer the vacuum solution most suited to their particular situation, contributing to reduced energy consumption, increased productivity and improved working environment.

Through vacuum expertise and industry competence

Piab's groundbreaking work within vacuum technology is based on investments in R&D and experience working with a broad variety of manufacturing industries globally. Combining expertise with an understanding of many different industry settings enables us to provide customers with the best vacuum solutions on the market.

Past & Present

The history of Piab starts in 1951 when the inventive company was established. The first product, an innovative pair of compasses, gave Piab (π + AB) its name. In 1960, the first Piab vacuum product, the "Pneucette", was developed for the electronic industry. The foundation for today's compressed- air driven vacuum system was laid in 1972 when the first multi-stage ejector was patented. Since then, Piab has continued to lead the way in the development of vacuum technology.

A powerful business partner

Piab's objective is to improve our customers' profitability and competitiveness. We strive to increase productivity, reinforcing their edge in the market. We also aim to contribute to our customers' reduced energy consumption and improve the work environment, aiding in their ability to attract and keep qualified personnel. Partnering with Piab means more than having a reliable vacuum solution supplier.

Technical leadership

We take pride in being the innovators in vacuum technology. Technical leadership means finding and developing solutions that have not yet been found. Our customers should feel confident in knowing that their relationship with us will keep them on the cutting edge.

Local presence and global competence

Being the global leader means designing, building and installing vacuum solutions in every corner of the world. Therefore, Piab has a worldwide organization with subsidiaries and distributors in more than 50 countries.

Contributing to a sustainable world

We believe strongly in taking responsibility for our shared environment. Therefore, we have developed an ambitious Environmental Policy and implemented an ISO 14001 certified Eco Management System. In addition, we always look for the most environmentally friendly means of transportation for our products, and encourage our suppliers to research and develop materials that allow for sound manufacture, function and recycling. For our customers, our vacuum solutions are in themselves a mean to reduce energy and hence contribute to a better environment.

Piab focuses on developing systems that consume minimal energy and have minimal environmental impact, reducing the user's carbon footprint. Performance is never sacrificed, so productivity is consistently maximized. Contact Piab for information about our Energy Saving Innovations that will increase your productivity.

piab

COAX® technology

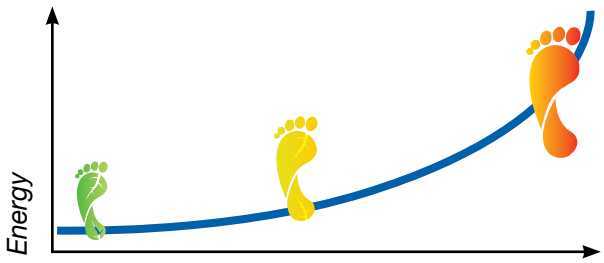
COAX® is an advanced solution for creating vacuum with compressed air. Based on Piab's multi-stage technology, COAX® cartridges are smaller, more efficient and more reliable than conventional ejectors, which allows for the design of a flexible, modular and efficient vacuum system.

Environmental index

At the basis of the highest performing, energy-efficient production process is an optimized handling solution. By never using more energy than absolutely necessary, companies can reduce their carbon footprint as well as their costs. From the vacuum pump itself down to each and every control accessory, Piab can work with you to achieve the lowest possible energy consumption.

Your pump will require less compressed air when it is placed close to the point of suction, thus reducing CO_2-emissions and energy consumption. The graph below demonstrates the relationship between environmental impact and the distance of the pump from the point of suction.

A vacuum system based on COAX® technology can provide you with three times more vacuum flow than conventional systems, allowing you to increase speed with high reliability, while reducing energy consumption.

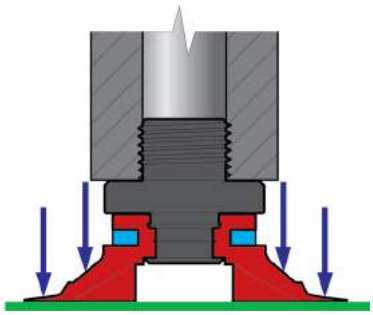


Vacuum theory

What is vacuum?

When using the terms "vacuum", "negative pressure", "suction", etc., we mean a pressure that is lower than the atmospheric pressure, which is the pressure of the weight of the air above us. At sea level it is usually 14.7 psi. Thats means that a column of air with a cross-sectional area of 1 ft^2 presses on the surface of the earth with a force of around 2,100 lbf. By reducing the pressure in a closed space the atmospheric pressure becomes a potential energy source.

A vacuum cleaner does not suck. Air and dust are pressed into the vacuum cleaner by the surrounding higher atmospheric pressure.

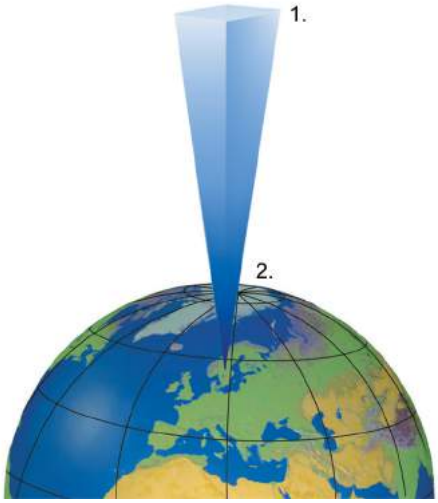


A suction cup adheres to a surface by the surrounding higher pressure.

Altitude above sea level

As the atmospheric pressure is the working force, the force will consequently change with the atmospheric pressure. This means that the present barometric pressure and the altitude above sea level must be taken into consideration. Up to 6,500 ft, the pressure is reduced by around 1% per 330 ft. An application which is dimensioned to hold 100 lb at sea level, can manage only 89 lb at an altitude of 3,280 ft.

The chapter "Tables" shows the effect of the atmospheric pressure on the vacuum level.



1. Atmospheric pressure = 0 at an altitude of 621 miles.
2. 14.7 psi at sea level.

At the summit of Mount Everest (29,030 ft) the atmospheric pressure is approximately 4.85 psi.

A definition for vacuum is:

1a. Absence of matter. b. A space empty of matter. c. A space relatively empty of matter. d. A space in which the pressure is significantly lower than atmospheric pressure.

Source: The American Heritage® Dictionary of the English Language: Fourth Edition.

Expressions and units

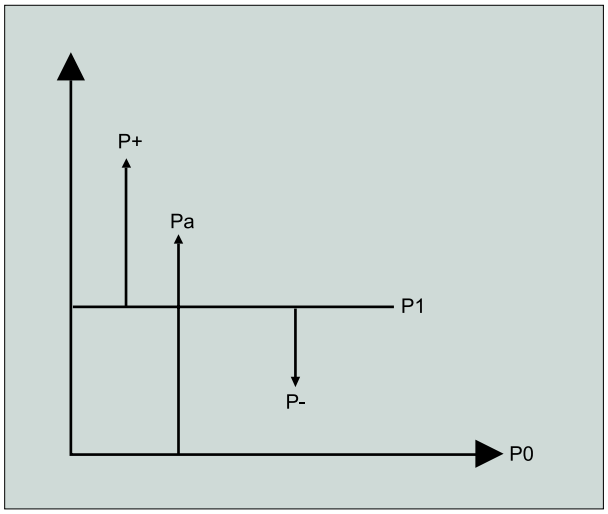
In everyday speech there are many different expressions and units for pressure below the atmospheric pressure. It is therefore important to relate to the same vocabulary in discussions. The adjoining table shows some common expressions and units used in connection with vacuum. For conversion tables between the different units, see tables No. 1, 2 and 3 in the “Tables” chapter.

Expressions
Under pressure
Absolute pressure
% vacuum (% of vacuum)
Negative pressure

Units	
-inHg	bar
-kPa	mm H_2O
mmHg	torr
hPa	mbar

Different terms for pressure in relation to ”absolute vacuum”

Physically there is only one kind of ”pressure” and that is the one that starts from ”0” or absolute vacuum. All above ”0” is pressure and correctly named absolute pressure. Normal atmospheric pressure (14.7 psi is used as a reference, which is why the terms “positive pressure” or “negative pressure” are used. Earlier the term “% vacuum” was used, where 0% was atmospheric pressure and 100% absolute vacuum.



Applied vacuum can normally be divided into three main categories

Blowers or low vacuum	0–6 -inHg	For ventilation, cooling, vacuum cleaning, ...
Industrial vacuum	6-29 -inHg	For picking, holding, automation, ...
Process vacuum	29 -inHg +	Deep vacuum for laboratories, manufacturing of microchips, plating, ...

Energy needs for different vacuum levels

The energy required to create vacuum increases asymptotically towards infinity with increased vacuum. To obtain optimum energy exchange it is very important to choose the least possible vacuum. To illustrate the energy needs, a cylinder with a piston (piston pump) is suitable.

According to Boyle's Law the pressure (p) in a gas is inversely proportional to its volume (V) at constant temperature:

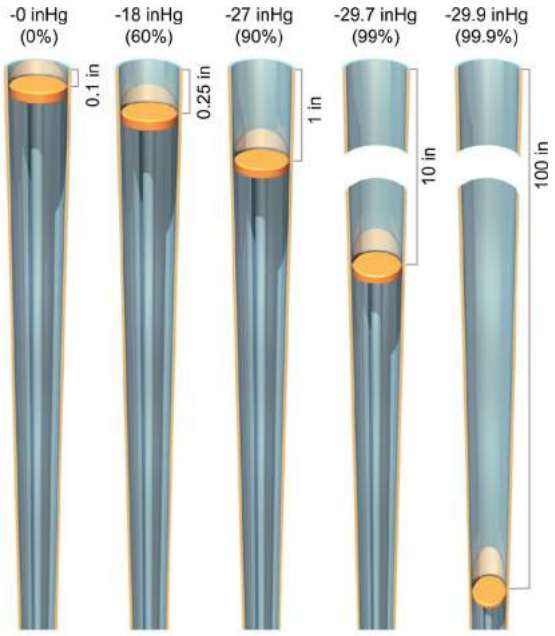
$P_1 \times V_1 = P_2 \times V_2$

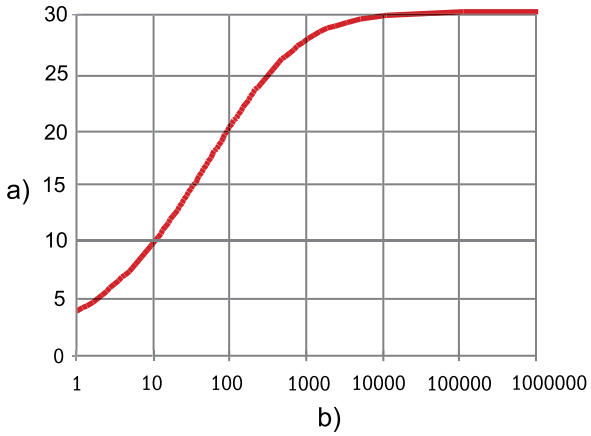
This means that increased volume gives a lower pressure.

By pulling the piston slowly, the distance extended will show the increased energy needs. The temperature is not constant in practice. However, at a slow operation the temperature effect is negligible.

Energy requirement at increased vacuum

The diagram illustrates the energy requirement at increased vacuum. As can be seen, the energy requirement increases drastically above 27 -inHg, which is why a vacuum level below this is always advisable.



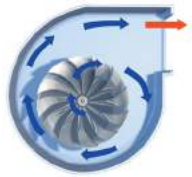
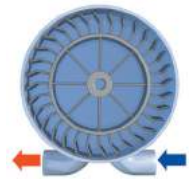


a) Pressure below atmospheric -inHg.
b) Energy factor.

Vacuum pumps

Mechanical pumps

The main principle for all mechanical pumps is that they convey, in one way or another, a certain volume of air from the suction side (the vacuum side) to the exhaust side. In that way they create a vacuum. Mechanical pumps usually have an electric motor as power source, but it can also be an internal combustion engine, a hydraulic or a compressed air-driven pump.

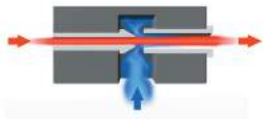
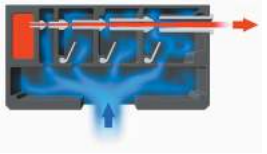
Fans		Advantages	Disadvantages
	Centrifugal blower	Few moving parts Large suction volumes Strong	Low maximum vacuum Slow start-up and long stop time High noise level
	Regenerative blower	Few moving parts Large suction volumes Low energy consumption	Low maximum vacuum Slow start-up and long stop time High noise level

Displacement pumps

Displacement pumps		Advantages	Disadvantages
	Piston pump	Relatively low price	High heat emission Low maximum vacuum
	Membrane pump	Few moving parts Compact Low price	Small suction volumes
	Vane pump	High vacuum and flow Relatively low noise level	Sensitive to contamination Relatively high price High service requirements High heat emission
	Roots pump	High flow Low service requirements	High price High heat emission High noise level

Compressed air-driven ejector pumps

All ejector pumps are driven with pressurized gas, usually compressed air. The compressed air flows into the ejector pump, where it expands in one or more ejector nozzles. When expanding, the stored energy (pressure and heat) is converted into motive energy. The speed of the compressed air jet increases rapidly, while the pressure and the temperature go down, attracting more air and thereby creating a vacuum on the suction side. Some ejector pumps may also be used to blow air.

Compressed air-driven ejector pumps		Advantages	Disadvantages
	Single-stage ejector	Low price No heat emission Compact	High noise level Gives either high flow or high vacuum Poor efficiency
	Multi-stage ejector	High efficiency Low energy consumption High reliability Low noise level No heat emission	
	COAX® technology	High efficiency Low energy consumption High reliability Low noise level No heat emission Operates even at low feed pressure Integrated features Modularly built Easy to supplement and upgrade later on Easy to clean	

Vacuum flow, how is it measured?

In order to obtain pressure lower than atmospheric pressure in a container, some of the air mass must be removed by a vacuum pump. For example, half the air mass must be removed to obtain a vacuum level of 15 -inHg. The air evacuated by the pump per unit of time is called the vacuum flow and is a measure of how quickly the pump can perform this function.

Many manufacturers of mechanical vacuum pumps state vacuum flow in terms of the pump's displacement volume. This flow is called "displacement flow" or "volume flow". Displacement flow equals the chamber volume times the number of revolutions per unit time. It is often expressed as Actual Cubic feet per Minute (ACFM), Inlet Cubic Feet per Minute (ICFM) or even simply as Cubic Feet per Minute (CFM). In mechanical pumps, this value is constant and can lead the observer to think, incorrectly, that the vacuum flow is constant during the entire evacuation process.

In the evacuation process the air actually becomes thinner and thinner for every stroke of the cylinder until the pump reaches the maximum vacuum level which is that point where the vacuum flow would then be zero. The pump is still pumping the same volume flow but the air mass is so thin that compared to air at normal atmospheric pressure it is as if there was no air.

To account for the change in air mass during the evacuation process Piab provides flow data in terms of standard cubic feet per minute (SCFM). Also called free air flow, this method normalizes the flow to standard atmospheric conditions. As the vacuum becomes deeper and the air is thinner, a higher actual volume must be displaced to evacuate each standard cubic foot. The table below lists one pump's performance in terms of displacement flow (CFM) and free air flow (SCFM). At zero vacuum, the flows are equal. This is because the actual conditions are in fact standard conditions. But as the vacuum level increases, the values diverge. At 15 -inHg. (50%) vacuum, the displacement flow figure is twice the free air flow figure. At deeper vacuum levels, the difference is even greater.

Displacement flow vs free air flow

		Vacuum level -inHg								
	Units	0	3	6	9	12	15	18	21	24
Displacement flow	cfm	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16
Free air flow	scfm	2.16	1.94	1.73	1.51	1.30	1.08	0.86	0.65	0.43

Vacuum systems

When making a vacuum system/lifting device there are several different methods to increase safety and reliability. To give efficient operation and good economy it is important that the designed system is made for a specific application. In addition to the choice of suction cups with attachments, the type and size of vacuum pumps, accessories, safety level and type of system must also be decided upon.

Sealed systems

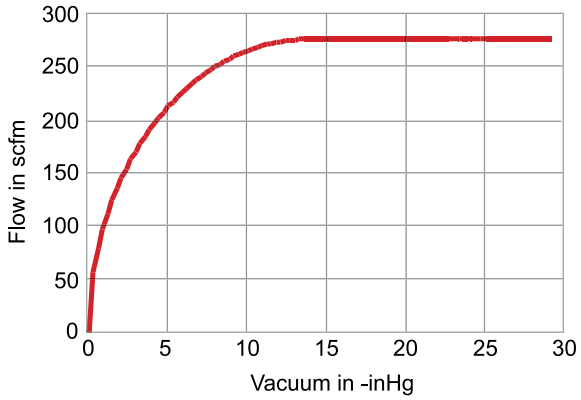
For sealed systems the capacity of the pump is determined by how fast the system can be evacuated to a certain vacuum level. This capacity is called the evacuation time of the pump and is normally specified in s/cf. This value is multiplied by the volume of the system in order to obtain the evacuation time to the desired vacuum level.

Non-sealed systems

With non-sealed systems (lifting of porous materials) the case is different. To maintain the desired vacuum level the pump must have the capacity to pump away the air leaking in. Leakage can be due to, for example, porous material or that one is forced to lift over holes. By establishing the leaking flow, it is possible, by reading the pump data, to find the right pump for the application in question.

If the leakage occurs via a known aperture, the flow can be established according to the adjoining diagram. The diagram gives values for leakage flow when the leakage area is known. The leakage flow is valid when there is an opening of 1 in2 (normal atmospheric pressure at sea level). To obtain the total flow, the value is multiplied by the total leakage area.

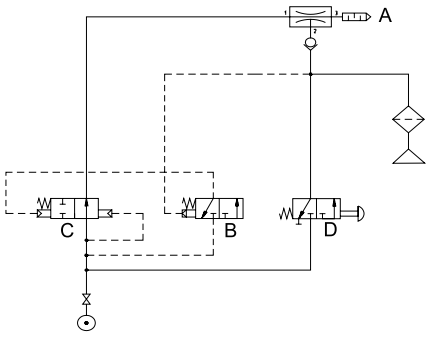
When the leakage occurs through a porous material or in an unknown way, the flow can be established by a test with a vacuum pump. The pump is connected to the system and the obtained vacuum level is read. (It should be at least 6 -inHg) The flow that is pumped away at this vacuum level can be seen on the page of the particular pump. This flow roughly corresponds to the leaking flow.



At 13.9 -inHg, the air reaches sonic velocity, and consequently the flow is constant.

Energy-saving systems

Electrically driven, mechanical vacuum pumps normally work during the whole operating cycle and the vacuum requirements are controlled by a valve on the vacuum side. In systems with compressed air-driven vacuum pumps it is often possible to save a lot of energy. As these pumps have a faster reaction time (fast start-up and stop time) the pump can be shut off when the vacuum is no longer needed. The principles of a simple energy-saving system are shown below. Many pumps can be delivered with an energy-saving system as standard.



A = Vacuum pump with non-return valve.
B = Vacuum control unit.
C = Feed valve for compressed air.
D = Release valve.

Vacuum system calculations

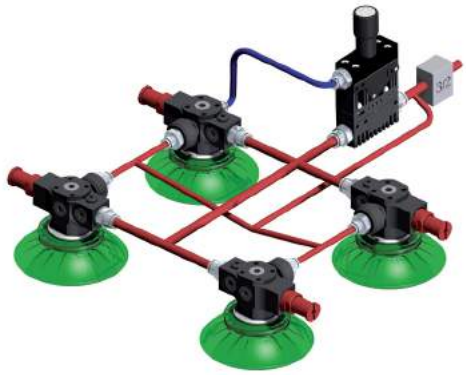
General input

Vacuum systems for material handling can be decentralized or centralized. A decentralized vacuum system is designed so that each suction cup has a dedicated, independent vacuum source. A centralized vacuum system is designed to have one vacuum source for multiple suction cups. Handling sheet metal is an example of a sealed system and handling cardboard is an example of a leaking system.

Those examples are calculated using the following general facts:

Initial flow required are for the sealed system examples 1.5 scfm per suction cup FC75P and the corresponding value is 2.5 scfm for the leaking system examples using BX75P. CO_2-emission, world index: 0.001 lb CO_2 per produced ft3 of compressed air and 0.01 lb CO_2 per kWh. Machine operating hours per year: 3000 h.

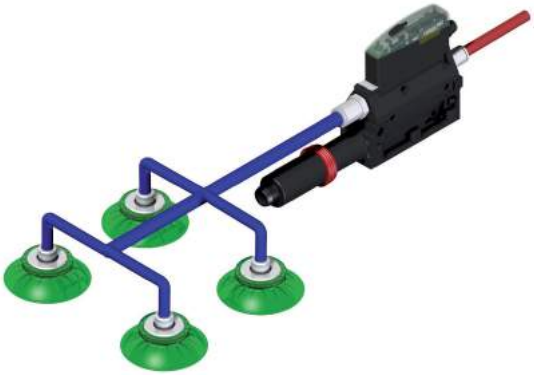
Sealed system/Handling non-porous material



System description:

Decentralized vacuum system using: Vacuum Gripper System VGS™3010 with suction cup FC75P and COAX® cartridge Xi10 2-stage vacuum pump with non return valve, AQR Atmospheric Quick Release, Vacustat and 3/2 on/off-valve.

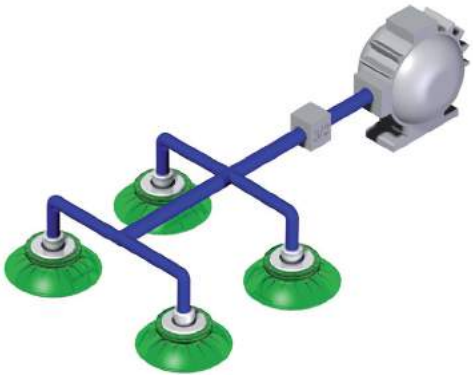
Annual Cost of Ownership: $243
Annual CO_2 emission: 29 lb
Annual energy usage: 17 kWh



System description:

Centralized vacuum system using: P5010 with AVM™ – Automatic Vacuum Management control, COAX® cartridge Xi40 3-stage vacuum pump with non return valve and suction cup FC75P.

Annual Cost of Ownership: $389
Annual CO_2 emission: 377 lb
Annual energy usage: 900 kWh



System description:

Centralized vacuum system using: 550 W Electro mechanical vacuum pump with suction cup FC75P and vacuum on/off-valve.

Annual Cost of Ownership: $933
Annual CO_2 emission: 977 lb
Annual energy usage: 1656 kWh

- Electric vane vacuum pumps are constantly running.
- Energy cost: 2.0 cents per produced 1 ft^3 compressed air and 15 cents per kWh.
- Annual Cost of Ownership, including: energy costs, purchase price -annual cost, service and CO_2-emission tax $0,03 per lb. Suction cups excluded.
- Interest rate: 5%.
- Life time: 5 years.

Red tubing = Compressed air
Blue tubing = Vacuum

Calculating carbon footprint:

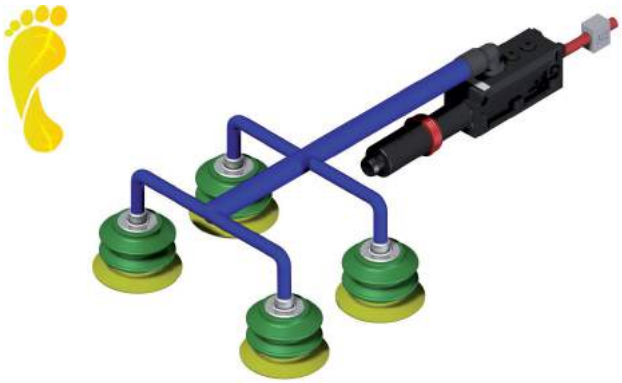
Based on the World average of power generation, 1 scfm of compressed air will result in a 0.019 oz CO_2-emission footprint. To calculate your specific footprint, just multiply your air consumption (scfm) by 0.019. The result is your CO_2-emission footprint per second.

Leaking System/Handling porous material

System description:

Decentralized vacuum system using: Vacuum Gripper System VGS™3010 with suction cup BX75P and COAX® cartridge Si08 3-stage vacuum pump and 3/2 on/off-valve.

Annual Cost of Ownership: $508
Annual CO_2 emission: 712 lb
Annual energy usage: 1701 kWh



System description:

Centralized vacuum system using: P5010 with COAX® cartridge Si32 3-stage vacuum pump, suction cup BX75P and 3/2 on/off valve.

Annual Cost of Ownership: $555
Annual CO_2 emission: 996 lb
Annual energy usage: 2381 kWh

System description:

Centralized vacuum system using: 750 W Electro mechanical vacuum pump with suction cup BX75P and vacuum on/off-valve.

Annual Cost of Ownership: $1,491
Annual CO_2 emission: 2,112 lb
Annual energy usage: 5040 kWh

Optimizing controls

Aside from placing the pump close to the point of suction, it is important to complete and optimize your vacuum system with control accessories that will limit the use of compressed air to the amount that the system requires. This way, you will have an efficient vacuum system with minimum usage of compressed air. Piab has a range of optimizing controls and this selection guide will help you to choose the one(s) optimal for your system.

Regulators

Energy saving can be achieved in many ways, but the most simple way is by using a pressure regulator to control your pump's optimum feed pressure.

piSAVE release

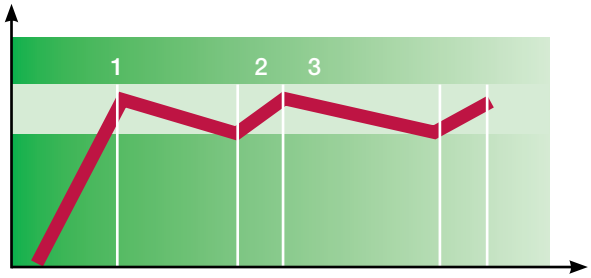
Instead of using compressed air to release objects you can use piSAVE release to provide a fast release. The piSAVE release is a valve that breaks vacuum seal in e.g. suction cups by equalizing pressure with atmospheric air and at the same time does not consume additional compressed air.

piSAVE optimize

The piSAVE optimize automatically regulates the feed pressure towards an optimal programmed vacuum level. Fluctuations in vacuum pressure caused by product variations or changes in cycle time allow the pump to only consume the amount of air that the optimized vacuum level requires.

piSAVE onoff

When handling sealed objects many times the vacuum pump can be turned off when not needed. The piSAVE onoff is a vacuum-controlled valve that shuts off the flow of compressed air to the pump when the pre-set vacuum level is reached (1). From micro leakage in the system, the vacuum level drops, and after a while the start-up level of the valve is reached (2). At this point, the pump will start and work until the shut-off level is reached again (3) etc.



AVM™ – Automatic vacuum management

Like the piSAVE onoff the AVM™ instantly shuts off the flow of compressed air when the preprogrammed vacuum level is reached and turns on again when the start-up level of the valve is reached. The AVM™ not only saves energy it also features a complete monitoring system with on/off valves and vacuum switches.

Contact Piab for information about our products that will increase your productivity and provide for energy savings.

Suction cups

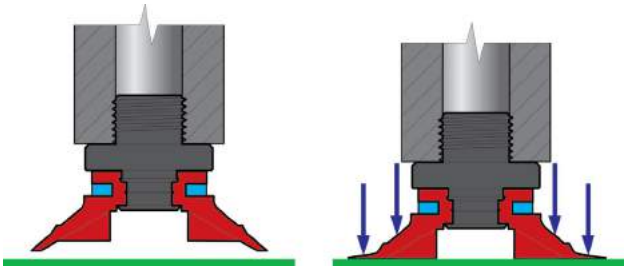
How does a suction cup work?

A suction cup adheres to a surface as the surrounding pressure (atmospheric pressure) is higher than the pressure between the suction cup and the surface. To create the low pressure in the suction cup it is connected to a vacuum pump. The lower the pressure (higher vacuum), the greater the force on the suction cup.

$$\Delta p = P_{AT} - P_1$$

Sizing suction cups

Suction cups have quite different capacities depending on the design. Please see the values in the tables for each respective suction cup.



Advantages and limitations of the suction cup

Material handling with suction cups is a simple, inexpensive and reliable technique. It is therefore a solution worth considering before going over to more complicated methods. Suction cups can lift, move and hold objects that weigh just a few ounces up to several hundred pounds.

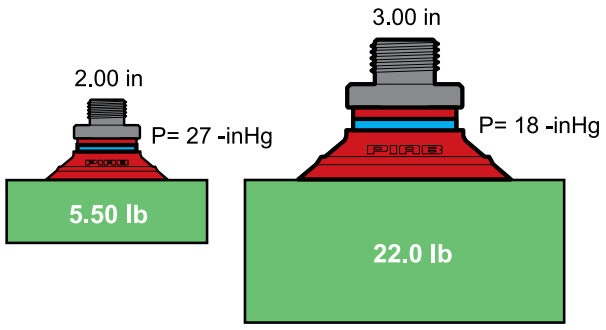
Advantages	Limitations
Easy installation	Limited force (atmospheric pressure)
Low service requirements	Positioning accuracy
Low price	
Does not damage the material handled	
Quick attachment and detachment	

Energy requirements at different vacuum levels

A deep vacuum means that the suction cup has to work harder and thus wears out quicker; also the energy requirements increase at higher vacuum levels. If the vacuum level increases from 18 to 27 -inHg, the lifting force increases by 1.5 times but with ten times the energy requirement. It is better to maintain a lower vacuum level and instead increase the suction cup area. In many applications, a good target for the vacuum level could be 18 -inHg; at this level you get a high lifting force with relatively low energy requirements.

Consider the height above sea level

Atmospheric pressure decreases with increased height. This means that the available force decreases at the same rate. An application designed for lifting 100 lb at sea level, can only manage to hold 89 lb at 3,330 feet. A vacuum gauge is normally calibrated with atmospheric pressure as a reference. This means that the gauge shows available vacuum levels at different heights



Lifting force in different directions

A suction cup can be used irrespective of whether the force is perpendicular or parallel to the surface. If the force is parallel, it is transferred through friction between the suction cup and the surface. A suction cup with cleats is most suitable in this case because it is rigid and provides high friction.

Thread systems

ISO thread:

- Cylindrical metric thread: designated with the letter M. Example M5.
- Cylindrical inch thread (also called Unified thread): designated with the letter UNF. Example 10-32UNF.

Dry seal thread (American system of pipe threads):

The dry seal system consists of cylindrical and conical pipe-threads. The threads have a 60° profile angle and are sealed without packing or seal rings (please note that when these are used in other combination of thread systems, that “sealing” is not applicable). The dimensions are given in inches and Piab´s catalog uses the letters NPT and NPSF:

- Conical thread is designated NPT. Example: 1/8”NPT.
- Cylindrical thread is noted as the letters NPSF: Example: 1/8”NPSF.

BSP thread (British system of pipe threads):

- The threads have a 55° profile angle and are dimensioned in inches.
- Cylindrical thread is designated with the letter G. Example: G1/8”.

Compatibility of different thread systems

Please note that some thread size in different thread systems not always fit. See below table:

	M5 male	M5 female	G1/8” male	G1/8” female	G1/4” male	G1/4” female	G3/8” male	G3/8” female	G1/2” male	G1/2” female	G3/4” male	G3/4” female	G1” male	G1” female	G2” female
10-32UNF female or male	●●	●●●													
1/8” NPSF female			●●●												
1/8”NPT female or male			●	●●											
1/4”NPSF female					●●										
1/4”NPT female or male					●	●									
3/8”NPSF female							●								
3/8”NPT female or male							●	●							
1/2”NPSF female									●●						
1/2”NPT female or male									●	●●●					
3/4’NPSF female											●●				
3/4”NPT female or male											●	●●●			
1”NPT female or male													●	●	
2”NPT female or male															●

●●● Fits, ●● Fits with short thread, ● Does not fit.

Tables

In everyday speech, many different expressions and units are used for both pressure and flow. It is important to agree on what is meant by them.

Pressure

P=F/A (Force/Area). SI unit (Système International d'Unités): Pascal (Pa). 1 Pa = 1 N/m^2. Common multiple units: MPa and kPa.

Pa (N/m^2)	bar	atm (kp/cm^2)	torr	psi (lb/in^2)
1	0.00001	$10.1972x10^{-6}$	$7.50062x10^{-3}$	$0.145038x10^{-3}$
100 000	1	1.01972	750.062	14.5038
98 066.5	0.980665	1	735.559	14.2233
133.322	$1.33322x10^{-3}$	$1.35951x10^{-3}$	1	$19.3368x10^{-3}$
6 894.76	$68.9476x10^{-3}$	$0.145038x10^{-3}$	51.7149	1

Pressure above atmospheric

kPa	bar	psi	atm (kp/cm^2)
1013	10.13	146.9	10.3
1000	10	145	10.2
900	9	130.5	9.2
800	8	116	8.2
700	7	101.5	7.1
600	6	87	6.1
500	5	72.5	5.1
400	4	58	4.1
300	3	43.5	3.1
200	2	29	2
100	1	14.5	1
0	0	0	0

Pressure below atmospheric

	kPa	mbar	torr	-kPa	-mmHg	-inHg	% vacuum
Sea level	101.3	1013	760	0	0	0	0
	90	900	675	10	75	3	10
	80	800	600	20	150	6	20
	70	700	525	30	225	9	30
	60	600	450	40	300	12	40
	50	500	375	50	375	15	50
	40	400	300	60	450	18	60
	30	300	225	70	525	21	70
	20	200	150	80	600	24	80
	10	100	75	90	675	27	90
Absolute vacuum	0	0	0	101.3	760	30	100

Change in atmospheric pressure in relation to altitude (height above sea level)

A vacuum gauge is normally calibrated with normal atmospheric pressure at sea level as a reference, 14.7 psi, and is influenced by the surrounding atmospheric pressure in accordance with the table below.

The vacuum gauge shows the differential pressure between atmospheric pressure and absolute pressure. This means that the gauge shows what vacuum level is available at different heights.

Atmospheric pressure

Barometric pressure			The reading on the vacuum gauge at 14.7 psi				
mmHg	psi	Equivalent ft above sea level	18 -inHg	22.5 -inHg	25.5 -inHg	27 -inHg	29.7 -inHg
593	11.4	6,562	11.7	16.2	19.2	20.7	23.4
671	12.9	3,281	14.8	19.4	22.4	23.9	26.6
690	13.3	2,553	15.6	20.1	23.1	24.6	27.3
700	13.5	2,149	16.0	20.5	23.5	25.0	27.7
710	13.7	1,788	16.4	20.9	23.9	25.4	28.1
720	13.9	1,532	16.8	21.3	24.3	25.8	28.5
730	14.1	902	17.2	21.7	24.7	26.2	28.9
740	14.3	656	17.6	22.1	25.1	26.6	29.3
750	14.5	364	17.9	22.4	25.4	26.9	29.6
760	14.7	0	18.0	22.5	25.5	27.0	29.7

Flows

Flows, volume per unit of time. Quantity designations: Q, q, = V/t (volume/time).
SI Unit: cubic meters per second (m^3/s).
Common multiple units: scfm, l/min, l/s, m^3/h.

m^3/s	m^3/h	l/min	l/s	ft^3/min (cfm)*
1	3600	60000	1000	2118.9
$0.28x10^{-3}$	1	16.6667	0.2778	0.5885
$16.67x10^{-6}$	0.06	1	0.0167	0.035
$1x10^{-3}$	3.6	60	1	2.1189
$0.472x10^{-3}$	1.6992	28.32	0.4720	1

Leakage flows

The table below shows the leakage flow at different vacuum levels through an opening of 1 in^2.

Vacuum level -inHg	Leakage flow cf/m and in^2
3.0	167
6.0	222
9.0	253
12.0	268*

* From about 13.0 to 29.5 -inHg the flow is constant.

Pressure drop in compressed air hoses

When installing compressed air hoses it is important that the dimension (diameter) and length do not lead to excessive pressure drops. Piab vacuum pumps are supplied with recommended hose dimensions that will not cause excessive pressure drops at lengths below 6.5 ft.

In cases when the pressure drop has to be calculated, the formula below can be used.

ΔP	=	Pressure drop in psi
qv	=	Flow in scfm
d	=	Inner diameter in inches.
L	=	Length of compressed air hoses in ft
P1	=	Absolute starting pressure in psi

$$\Delta P = \frac{6.82 \times 10^{-4} \times qv^{1.85} \times L}{d^5 \times P1}$$

$$d = \left(\frac{6.82 \times 10^{-4} \times qv^{1.85} \times L}{\Delta P \times P1}\right)^{0.2}$$

Material

Name	Color	Hardness, Shore A°	Temperature, °F
Chloroprene (CR)	Black	50	-40–230
Conductive Silicone (CSIL)	Black	50	-67–446
Ethylene Propylene (EPDM)	Black	50	-40–248
HNBR	Blue	50	-22–284
Nitrile (NBR)	Black	50	-4–212
Nitrile-PVC (NPV)	Black	50	32–194
Polyurethane (PU30)	Yellow	30	50–122
Polyurethane (PU40)	Red transparent	40	50–122
Polyurethane (PU50)	Blue transparent	50	50–122
Polyurethane (PU55)	Orange	55	50–122
Polyurethane (PU60)	Green transparent	60	50–122
Polyurethane (PU70)	Black	70	50–122
Silicone (SIL)	Red	50	-40–392
Silicone (SIL)	White	30	-40–392
Silicone (SIL FDA)	Transparent	50	-40–392
Silicone (SIL FDA detectable)	Blue	40	-40–392
Silicone (SIL FDA detectable)	Transparent	40	-40–392
Thermoplastic Polyurethane (TPE-U)	White transparent	81	-4–176

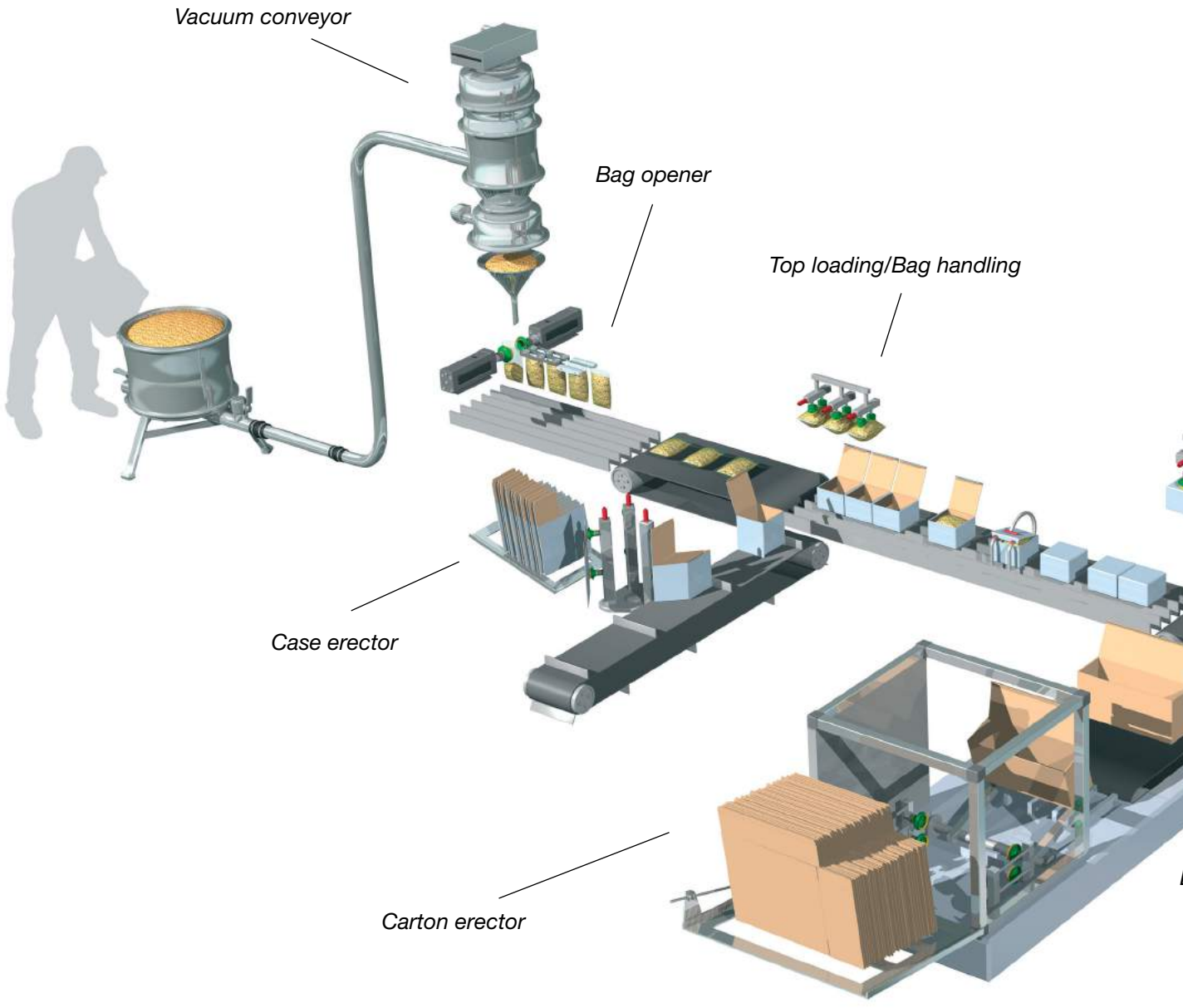
Material resistance

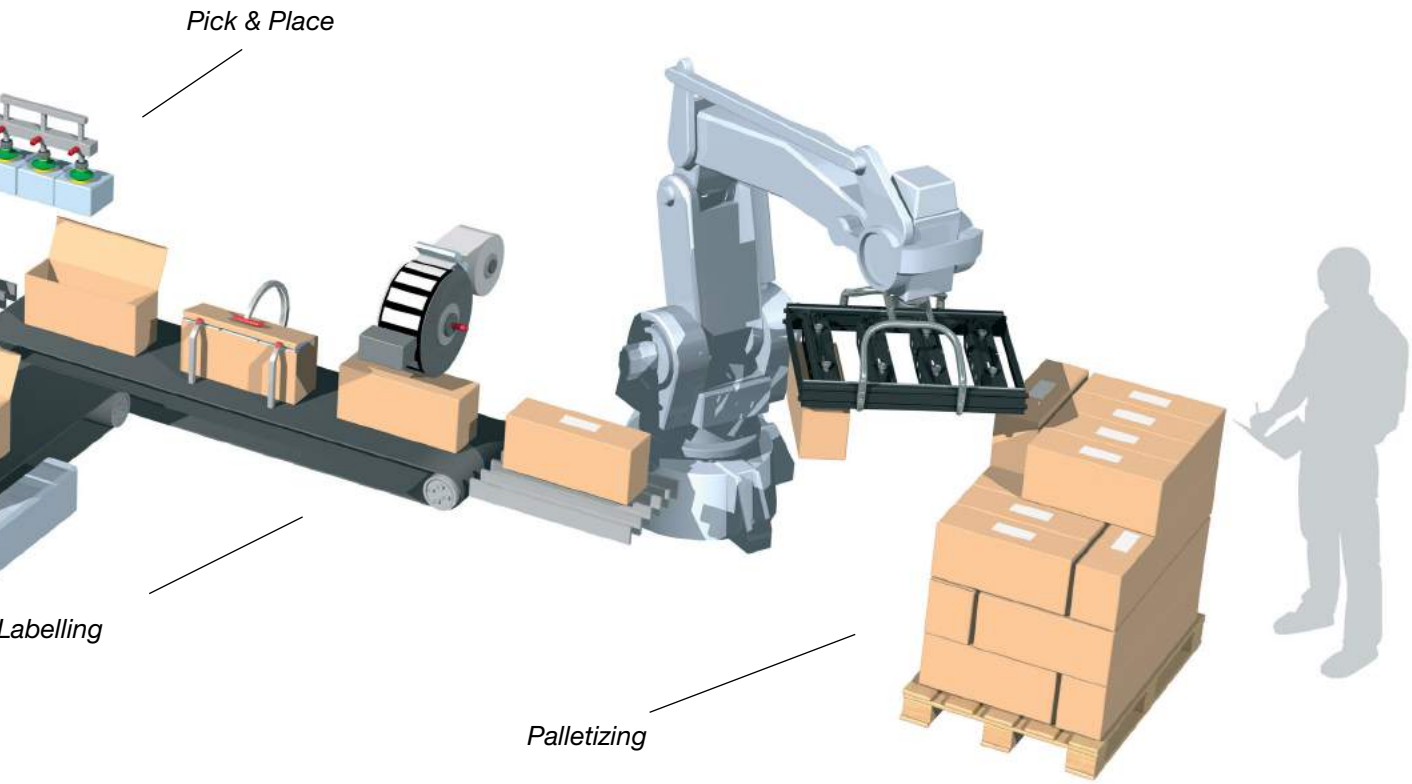
●●●● Excellent
●●● Good
●● Fair
● Poor

Name	Wear resistance	Oil	Weather and ozone	Hydrolysis	Gasoline	Concentrated acids	Alcohol	Oxidation
Chloroprene (CR)	●●●●	●●	●●●	●●●	●●	●	●●●	●●●
Conductive Silicone (CSIL)	●●●	●	●●●●	●●	●	●	●●●	●●●●
Ethylene Propylene (EPDM)	●●	●	●●●●	●●●	●	●	●●●●	●●●●
HNBR	●●●●	●●●●	●●●●	●●●	●●●●	●●	●●●	●●●●
Nitrile (NBR)	●●●●	●●●●	●●	●●●	●●●	●●	●●●	●●●
Nitrile-PVC (NPV)	●●●●	●●●●	●●●	●●●	●●●●	●●	●●●	●●●
Polyurethane (PU)	●●●●	●●●●	●●●●	●●	●●	●●	●●/●*	●
Silicone (SIL)	●●●	●	●●●●	●●	●	●	●●●	●●●●
Thermoplastic Polyurethane (TPE-U)	●●●●	●●●●	●●●●	●	●	●	●●●	●●●

●●●● Excellent, ●●● Good, ●● Fair, ● Poor, * Ethanol / methanol.

Applications and solutions



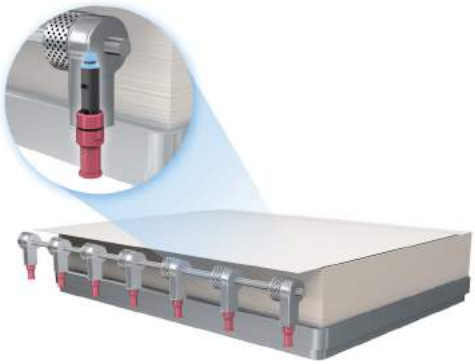

Pick & Place
Labelling
Palletizing

Applications and solutions

Injection molding

Pick-and-place

Vacuum molding tires



Sheet brake

Press to press transfer

Suction cups

piGRIP®

Thousands of suction cups ready to improve your machine

The piGRIP® is a unique configurable suction cup concept with individually optimized parts for gripping, lifting and height compensation. Also a large selection of fittings makes it ready to fit new machines and easy to retrofit existing cups. The fittings available are both threaded and push on fittings.

Fitting & Flow Restrictors

A large selection of fittings makes piGRIP® cups ready to fit new machines and easy to retrofit existing cups. Available are both threaded and push on fittings. There is also a fitting that has an ejector integrated, the COAX® in piGRIP® for creating a decentralized pump. piSAVE restrict and piSAVE sense are options that are suitable for handling different sized or a variable number of objects.

Filters

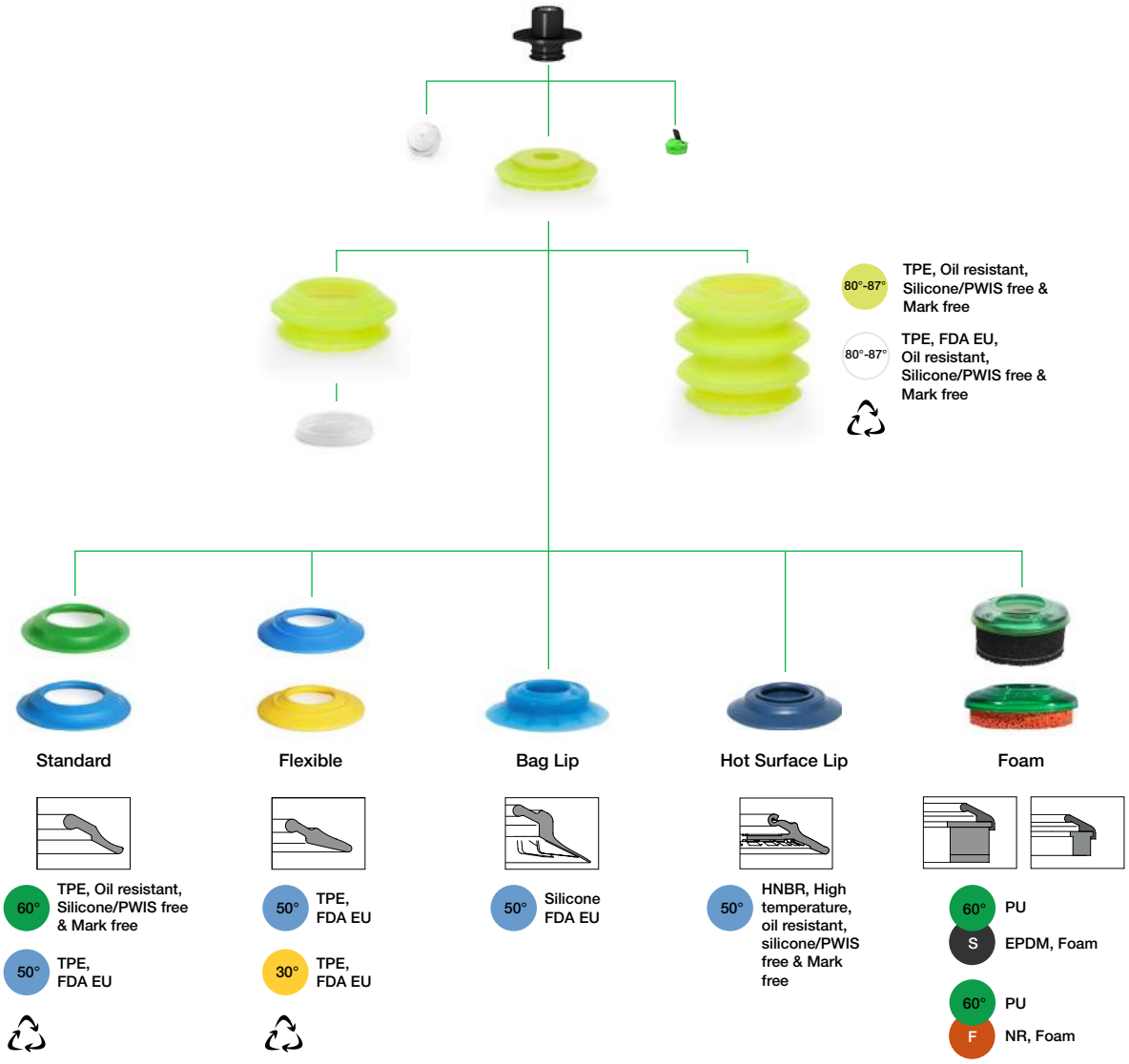
A low micron filter disc inside the bellows traps dust and particles increasing system reliability. A mesh filter is available in the fitting.

Bellows

Firm and Stable 1-, 3- and 6- folded bellows allows for faster machine speeds. Thin-wall design makes them faster to compress using less force and energy. The strength of the material increases lifting capacity between 30–50% compared to similar conventional cups. FDA-approved (EU 1935/2004) material available (transparent).

Lips

Get an excellent grip on almost anything with the right lip for your application. Choose standard lips from 60° shore to extremely flexible, soft lips in 30° shore. Tailor-made Bag lips for handling bags and pouches. Foam lips for objects which are difficult to grip rough surfaces with traditional cups. High temperature lips are also available when so needed.


80°-87°
TPE, Oil resistant, Silicone/PWIS free & Mark free
80°-87°
TPE, FDA EU, Oil resistant, Silicone/PWIS free & Mark free
Standard
Flexible
Bag Lip
Hot Surface Lip
Foam
60°
TPE, Oil resistant, Silicone/PWIS free & Mark free
50°
TPE, FDA EU
50°
TPE, FDA EU
30°
TPE, FDA EU
50°
Silicone FDA EU
50°
HNBR, High temperature, oil resistant, silicone/PWIS free & Mark free
60°
PU
S
EPDM, Foam
60°
PU
F
NR, Foam

Product Group
piGRIP®
G

Lip			
Dimension & Type		Material & Durometer	
S25	Ø 25 mm Standard lip	T60 T50	TPE 60° Shore A TPE 50° Shore A
S35	Ø 35 mm Standard lip		
S50	Ø 50 mm Standard lip		
S70	Ø 70 mm Standard lip		
FX28	Ø 28 mm Flexible lip	T50 T30	TPE 50° Shore A TPE 30° Shore A
FX39	Ø 39 mm Flexible lip		
FX55	Ø 55 mm Flexible lip		
FX77	Ø 77 mm Flexible lip		
FLI25S	Ø 25 mm Foam lip	S	Foam EPDM (soft)
FLI35S	Ø 35 mm Foam lip		
FLI50S	Ø 50 mm Foam lip		
FLI70S	Ø 70 mm Foam lip		
FLI25F	Ø 25 mm Foam lip	F	Foam NR (firm)
FLI35F	Ø 35 mm Foam lip		
FLI50F	Ø 50 mm Foam lip		
FLI70F	Ø 70 mm Foam lip		
BGI25	Ø 25 mm Bag lip with retainer	S50	Silicone 50° Shore A
BGI34	Ø 34 mm Bag lip with retainer		
BGI41	Ø 41 mm Bag lip with retainer		
BGI48	Ø 48 mm Bag lip with retainer		
BGI63	Ø 63 mm Bag lip with retainer		
BGI80	Ø 80 mm Bag lip with retainer		
HS29	Ø 29 mm HS29	HN50	HNBR 50° Shore A
HS39	Ø 39 mm HS39		
HS58	Ø 58 mm HS58		
HS79	Ø 79 mm HS79		

Lips are available as spare parts.

Bellows or Flat Cup	
B1	1 bellows
B3	3 bellows
B6	6 bellows (3+3)
F	No bellows

Support	
S1	Support type 1

G . S50T60 . B3 . S1 . G38M . 01 . ( )

piab

Fitting

Type		Size		Style	
G NT	G-Thread NPT-Thread	18	1/8"	M	Male
		14	1/4"		
		38	3/8"		
		12	1/2"		
GL NTL	G-Thread low NPT-Thread low	18	1/8"	M	Male
		14	1/4"		
		38	3/8"		
NS G	NPSF-Thread G-Thread	18	1/8"	F	Female
		14	1/4"		
		38	3/8"		
		12	1/2"		
		518	5x1/8"		
NT	NPT-Thread	14	1/4"	F	Female
		38	3/8"		
M	M-Thread	M6	M6*	M	Male
		MF8	M8x1*		
		M10	M10		
		M12	M12		
		MF14	M14x1		
		MF16	M16x1.5		
M	M-Thread	M5	M5	F	Female
		M6	M6		
		M8	M8		
		M10	M10		
		M12	M12		
		MF16	M16x1.5		
U	UNC-Thread	12	1/2"	F	Female
C	COAX® in piGRIP®	S	High flow	X	No style
		T	Extra high flow		
X	No type	X	No size	X	No style

* Steel material.
Push-on fitting sold separately.

Option

00	No Filter
01	Filter mesh
02	Filter disc (only bellows cup)
03	piSAVE restrict Ø 0.7
04	piSAVE restrict Ø 1.0
05	piSAVE restrict Ø 1.3
06	piSAVE restrict Ø 0.7 and filter disc
07	piSAVE restrict Ø 1.0 and filter disc
08	piSAVE restrict Ø 1.3 and filter disc
13	piSAVE sense 03/60, C/M*-flow: 0.81/0.21 scfm
14	piSAVE sense 04/60, C/M*-flow: 1.12/0.36 scfm
15	piSAVE sense 05/60, C/M*-flow: 1.55/0.57 scfm
16	piSAVE sense 03/60, C/M*-flow: 0.81/0.21 scfm & filter disc
17	piSAVE sense 04/60, C/M*-flow: 1.12/0.36 scfm & filter disc
18	piSAVE sense 05/60, C/M*-flow: 1.55/0.57 scfm & filter disc

*C/M = Closing/Minimum

FDA EU approved option includes material certificate

	No*
FDA	US Food and Drug Admini stration

* Leave blank for no certificate.

Lifting forces and general specifications – piGRIP® F

Lip	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallel to the surface, lbf, at vacuum level		Outer diameter	Min. curve radius at 18 -inHg	Max vertical movement	Volume
	12 -inHg	18 -inHg	12 -inHg	18 -inHg	in	in	in	in^3
S25T50	2.56	3.82	1.28	1.91	0.98	0.98	0.08	0.05
S25T60	2.63	4.02	1.33	2.02	0.98	0.98	0.07	0.05
S35T50	5.40	7.76	2.70	3.87	1.38	1.57	0.11	0.09
S35T60	5.62	8.09	2.81	4.05	1.38	1.57	0.10	0.09
S50T50	11.2	16.1	5.62	8.07	1.97	2.95	0.16	0.24
S50T60	11.7	16.5	5.87	8.27	1.97	2.95	0.15	0.24
S70T50	22.7	32.7	11.4	16.4	2.76	3.15	0.22	0.67
S70T60	23.3	33.3	11.6	16.6	2.76	3.15	0.20	0.67
FX28T30	3.03	4.25	1.51	2.14	1.10	0.98	0.11	0.03
FX28T50	3.35	4.79	1.66	2.41	1.10	0.98	0.10	0.03
FX39T30	6.02	8.39	3.01	4.20	1.54	1.57	0.15	0.08
FX39T50	6.50	9.22	3.26	4.61	1.54	1.57	0.15	0.08
FX55T30	12.2	16.9	6.09	8.43	2.17	2.95	0.21	0.24
FX55T50	12.7	18.2	6.36	9.10	2.17	2.95	0.21	0.24
FX77T30	24.1	33.8	12.0	16.9	3.03	3.54	0.30	0.65
FX77T50	25.2	35.7	12.6	17.9	3.03	3.54	0.29	0.65
FLI25F	0.49	0.85	0.25	0.43	1.00	*	0.15	0.05
FLI25S	*	*	*	*	1.00	*	0.20	0.03
FLI35F	1.30	2.47	0.65	1.24	1.40	*	0.15	0.10
FLI35S	*	*	*	*	1.40	*	0.28	0.05
FLI50F	2.25	3.60	1.12	1.80	2.01	*	0.22	0.32
FLI50S	*	*	*	*	2.01	*	0.64	0.31
FLI70F	7.19	13.5	3.60	6.74	2.80	*	0.22	0.93
FLI70S	*	*	*	*	2.80	*	0.65	1.18
HS29HN50	3.57	5.24	3.03	4.45	1.14	0.71	0.09	0.05
HS39HN50	6.65	9.49	5.67	8.07	1.61	0.98	0.11	0.13
HS58HN50	14.8	21.2	12.6	18.1	2.32	1.50	0.19	0.43
HS79HN50	28.1	40.0	23.9	34.0	3.15	2.01	0.25	1.06

* Dependent on application.

Lifting forces and general specifications – piGRIP® B1

Lip	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallel to the surface, lbf, at vacuum level		Outer diameter	Min. curve radius at 18 -inHg	Max vertical movement	Volume
	12 -inHg	18 -inHg	12 -inHg	18 -inHg	in	in	in	in³
S25T50	2.56	3.82	1.28	1.91	0.98	0.47	0.20	0.13
S25T60	2.63	4.02	1.33	2.02	0.98	0.47	0.19	0.13
S35T50	5.40	7.76	2.70	3.87	1.38	0.67	0.28	0.33
S35T60	5.62	8.09	2.81	4.05	1.38	0.67	0.28	0.33
S50T50	11.2	16.1	5.62	8.07	1.97	1.18	0.40	0.96
S50T60	11.7	16.5	5.87	8.27	1.97	1.18	0.39	0.96
S70T50	22.7	32.7	11.4	16.4	2.76	1.97	0.56	2.62
S70T60	23.3	33.3	11.6	16.6	2.76	1.97	0.54	2.62
FX28T30	3.03	4.25	1.51	2.14	1.10	0.59	0.23	0.11
FX28T50	3.35	4.79	1.66	2.41	1.10	0.59	0.22	0.11
FX39T30	6.02	8.39	3.01	4.20	1.54	0.79	0.32	0.32
FX39T50	6.50	9.22	3.26	4.61	1.54	0.79	0.32	0.32
FX55T30	12.2	16.9	6.09	8.43	2.17	1.57	0.46	0.95
FX55T50	12.7	18.2	6.36	9.10	2.17	1.57	0.45	0.95
FX77T30	24.1	33.8	12.0	16.9	3.03	2.17	0.64	2.61
FX77T50	25.2	35.7	12.6	17.9	3.03	2.17	0.63	2.61
FLI25F	0.49	0.85	0.25	0.43	1.00	*	0.27	0.13
FLI25S	*	*	*	*	1.00	*	0.32	0.11
FLI35F	1.30	2.47	0.65	1.24	1.40	*	0.32	0.34
FLI35S	*	*	*	*	1.40	*	0.46	0.30
FLI50F	2.25	3.60	1.12	1.80	2.01	*	0.46	1.03
FLI50S	*	*	*	*	2.01	*	0.88	1.03
FLI70F	7.19	13.5	3.60	6.74	2.80	*	0.56	2.89
FLI70S	*	*	*	*	2.80	*	0.99	3.13
BGI25S50	1.15	1.66	0.58	0.83	0.98	0.43	0.17	0.13
BGI34S50	2.32	3.37	1.17	1.69	1.34	0.63	0.18	0.20
BGI41S50	3.62	5.28	1.82	2.65	1.61	0.75	0.22	0.48
BGI48S50	4.70	6.86	2.36	3.44	1.89	1.38	0.24	0.76
BGI63S50	8.97	13.1	4.50	6.54	2.48	1.54	0.31	1.64
BGI80S50	14.9	21.7	7.44	10.9	3.15	2.28	0.39	3.97
HS29HN50	3.57	5.24	3.03	4.45	1.14	0.59	0.21	0.13
HS39HN50	6.65	9.49	5.67	8.07	1.61	0.79	0.28	0.37
HS58HN50	14.8	21.2	12.6	18.1	2.32	1.06	0.44	1.14
HS79HN50	28.1	40.0	23.9	34.0	3.15	1.57	0.59	3.01

* Dependent on application.

Lifting forces and general specifications – piGRIP® B3

Lip	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallel to the surface, lbf, at vacuum level		Outer diameter	Min. curve radius at 18 -inHg	Max vertical movement	Volume
	12 -inHg	18 -inHg	12 -inHg	18 -inHg	in	in	in	in^3
S25T50	2.56	3.82	1.28	1.91	0.98	0.47	0.54	0.32
S25T60	2.63	4.02	1.33	2.02	0.98	0.47	0.53	0.32
S35T50	5.40	7.76	2.70	3.87	1.38	0.67	0.76	0.85
S35T60	5.62	8.09	2.81	4.05	1.38	0.67	0.75	0.85
S50T50	11.2	16.1	5.62	8.07	1.97	1.18	1.08	2.48
S50T60	11.7	16.5	5.87	8.27	1.97	1.18	1.07	2.48
S70T50	22.7	32.7	11.4	16.4	2.76	1.97	1.51	6.79
S70T60	23.3	33.3	11.6	16.6	2.76	1.97	1.49	6.79
FX28T30	3.03	4.25	1.51	2.14	1.10	0.59	0.57	0.30
FX28T50	3.35	4.79	1.66	2.41	1.10	0.59	0.56	0.30
FX39T30	6.02	8.39	3.01	4.20	1.54	0.79	0.80	0.85
FX39T50	6.50	9.22	3.26	4.61	1.54	0.79	0.79	0.85
FX55T30	12.2	16.9	6.09	8.43	2.17	1.57	1.13	2.47
FX55T50	12.7	18.2	6.36	9.10	2.17	1.57	1.13	2.47
FX77T30	24.1	33.8	12.0	16.9	3.03	2.17	1.59	6.77
FX77T50	25.2	35.7	12.6	17.9	3.03	2.17	1.58	6.77
FLI25F	0.49	0.85	0.25	0.43	1.00	*	0.61	0.32
FLI25S	*	*	*	*	1.00	*	0.66	0.30
FLI35F	1.30	2.47	0.65	1.24	1.40	*	0.80	0.87
FLI35S	*	*	*	*	1.40	*	0.93	0.82
FLI50F	2.25	3.60	1.12	1.80	2.01	*	1.14	2.55
FLI50S	*	*	*	*	2.01	*	1.56	2.54
FLI70F	7.19	13.5	3.60	6.74	2.80	*	1.51	7.05
FLI70S	*	*	*	*	2.80	*	1.94	7.30
BGI25S50	1.15	1.66	0.58	0.83	0.98	0.43	0.50	0.32
BGI34S50	2.32	3.37	1.17	1.69	1.34	1.18	0.53	0.45
BGI41S50	3.62	5.28	1.82	2.65	1.61	0.75	0.70	1.01
BGI48S50	4.70	6.86	2.36	3.44	1.89	1.38	0.71	1.29
BGI63S50	8.97	13.1	4.50	6.54	2.48	1.54	0.98	3.16
BGI80S50	14.9	21.7	7.44	10.9	3.15	2.28	1.34	8.14
HS29HN50	3.57	5.24	3.03	4.45	1.14	0.59	0.55	0.32
HS39HN50	6.65	9.49	5.67	8.07	1.61	0.79	0.75	0.90
HS58HN50	14.8	21.2	12.6	18.1	2.32	1.06	1.11	2.66
HS79HN50	28.1	40.0	23.9	34.0	3.15	1.57	1.54	7.18

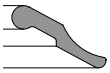
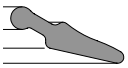
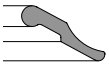
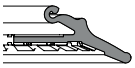
* Dependent on application.

Lifting forces and general specifications – piGRIP® B6

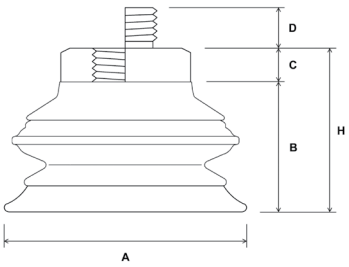
Lip	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallel to the surface, lbf, at vacuum level		Outer diameter	Min. curve radius at 18 -inHg	Max vertical movement	Volume
	12 -inHg	18 -inHg	12 -inHg	18 -inHg	in	in	in	in³
S25T50	2.56	3.82	1.28	1.91	0.98	0.47	1.00	0.59
S25T60	2.63	4.02	1.33	2.02	0.98	0.47	0.99	0.59
S35T50	5.40	7.76	2.70	3.87	1.38	0.67	1.40	1.62
S35T60	5.62	8.09	2.81	4.05	1.38	0.67	1.39	1.62
S50T50	11.2	16.1	5.62	8.07	1.97	1.18	2.00	4.71
S50T60	11.7	16.5	5.87	8.27	1.97	1.18	1.99	4.71
S70T50	22.7	32.7	11.4	16.4	2.76	1.97	2.80	12.9
S70T60	23.3	33.3	11.6	16.6	2.76	1.97	2.78	12.9
FX28T30	3.03	4.25	1.51	2.14	1.10	0.59	1.03	0.57
FX28T50	3.35	4.79	1.66	2.41	1.10	0.59	1.02	0.57
FX39T30	6.02	8.39	3.01	4.20	1.54	0.79	1.44	1.62
FX39T50	6.50	9.22	3.26	4.61	1.54	0.79	1.44	1.62
FX55T30	12.2	16.9	6.09	8.43	2.17	1.57	2.06	4.70
FX55T50	12.7	18.2	6.36	9.10	2.17	1.57	2.05	4.70
FX77T30	24.1	33.8	12.0	16.9	3.03	2.17	2.88	12.9
FX77T50	25.2	35.7	12.6	17.9	3.03	2.17	2.87	12.9
FLI25F	0.49	0.85	0.25	0.43	1.00	*	1.07	0.59
FLI25S	*	*	*	*	1.00	*	1.12	0.57
FLI35F	1.30	2.47	0.65	1.24	1.40	*	1.44	1.64
FLI35S	*	*	*	*	1.40	*	1.57	1.59
FLI50F	2.25	3.60	1.12	1.80	2.01	*	2.06	4.78
FLI50S	*	*	*	*	2.01	*	2.48	4.78
FLI70F	7.19	13.5	3.60	6.74	2.80	*	2.80	13.2
FLI70S	*	*	*	*	2.80	*	3.23	13.4
BGI25S50	1.15	1.66	0.58	0.83	0.98	0.43	0.96	0.59
BGI34S50	2.32	3.37	1.17	1.69	1.34	1.18	0.99	0.72
BGI41S50	3.62	5.28	1.82	2.65	1.61	0.75	1.34	1.78
BGI48S50	4.70	6.86	2.36	3.44	1.89	1.38	1.36	2.06
BGI63S50	8.97	13.1	4.50	6.54	2.48	1.54	1.91	5.39
BGI80S50	14.9	21.7	7.44	10.9	3.15	2.28	2.63	14.3
HS29HN50	3.57	5.24	3.03	4.45	1.14	0.59	1.01	0.59
HS39HN50	6.65	9.49	5.67	8.07	1.61	0.79	1.40	1.67
HS58HN50	14.8	21.2	12.6	18.1	2.32	1.06	2.04	4.89
HS79HN50	28.1	40.0	23.9	34.0	3.15	1.57	2.83	13.3

* Dependent on application.

Suction cup dimensions, in

Lip type & size		Dim. A	Dim. B			
			F (Flat)	B-1 (1 Bellows)	B-3 (3 Bellows)	B-6 (3+3 Bellows)
	S25	0.98	0.43	0.74	1.17	1.92
	S35	1.38	0.49	0.92	1.53	2.57
	S50	1.97	0.58	1.19	2.06	3.55
	S70	2.76	0.70	1.56	2.78	4.86
	FX28	1.10	0.45	0.76	1.19	1.94
	FX39	1.50	0.52	0.94	1.56	2.59
	FX55	2.17	0.62	1.23	2.10	3.59
	FX77	3.03	0.76	1.61	2.83	4.91
	FLI25S	0.98	0.69	1.00	1.43	2.18
	FLI35S	1.38	0.85	1.28	1.89	2.93
	FLI50S	1.97	1.26	1.88	2.75	4.23
	FLI70S	2.76	1.34	2.20	3.42	5.50
	FLI25F	0.98	0.63	0.94	1.37	2.12
	FLI35F	1.38	0.67	1.10	1.71	2.75
	FLI50F	1.97	0.83	1.44	2.31	3.80
	FLI70F	2.76	0.91	1.77	2.99	5.07
	BGI25	0.98	—	0.89	1.33	2.07
	BGI34	1.34	—	0.98	1.41	2.16
	BGI41	1.61	—	1.16	1.77	2.81
	BGI48	1.89	—	1.22	1.83	2.87
	BGI63	2.48	—	1.57	2.44	3.93
	BGI80	3.15	—	1.94	3.17	5.24
	HS29	1.14	0.53	0.56	1.00	1.74
	HS39	1.54	0.61	0.77	1.38	2.42
	HS58	2.28	0.77	1.08	1.98	3.46
	HS79	3.11	0.96	1.54	2.76	4.84

Build height:



B + C = H

Ex. 0.74 + 0.20 = 0.94

Fitting dimensions, in

Type	Code	Dim. C	Dim. D	Description	Recommended fitting size for best performance* S25 FX28 FLI25 BGI25 BGI34 HS29	S35 FX39 FLI35 BGI41 BGI48 HS39	S50 FX55 FLI50 BGI63 HS58	S70 FX77 FLI70 HS79 BGI80
	G18M	0.20	0.24	Fitting G1/8" male	●	●	●	
	G14M	0.24	0.35	Fitting G1/4" male	●	●	●	●
	G38M	0.24	0.39	Fitting G3/8" male		●	●	●
	G12M	0.24	0.39	Fitting G1/2" male			●	●
	GL18M	0.06	0.24	Fitting G1/8" low male	●	●	●	
	GL14M	0.06	0.35	Fitting G1/4" low male	●	●	●	●
	GL38M	0.06	0.39	Fitting G3/8" low male		●	●	●
	NT18M	0.20	0.28	Fitting 1/8" NPT male	●	●	●	
	NT14M	0.24	0.43	Fitting 1/4" NPT male	●	●	●	●
	NT38M	0.24	0.45	Fitting 3/8" NPT male		●	●	●
	NT12M	0.24	0.59	Fitting 1/2" NPT male			●	●
	NTL18M	0.06	0.28	Fitting 1/8" NPT low male	●	●	●	
	NTL14M	0.06	0.43	Fitting 1/4" NPT low male	●	●	●	●
	NTL38M	0.06	0.45	Fitting 3/8" NPT low male		●	●	●
	MM6M	0.20	0.24	Fitting M6 male	●	●		
	MMF8M	0.20	0.24	Fitting M8 x 1 male	●	●	●	
	MM10M	0.24	0.39	Fitting M10 male	●	●	●	
	MM12M	0.24	0.39	Fitting M12 male	●	●	●	
	MMF14M	0.24	0.47	Fitting M14 x 1 male	●	●	●	●
	MMF16M	0.24	0.47	Fitting M16 x 1.5 male		●	●	●

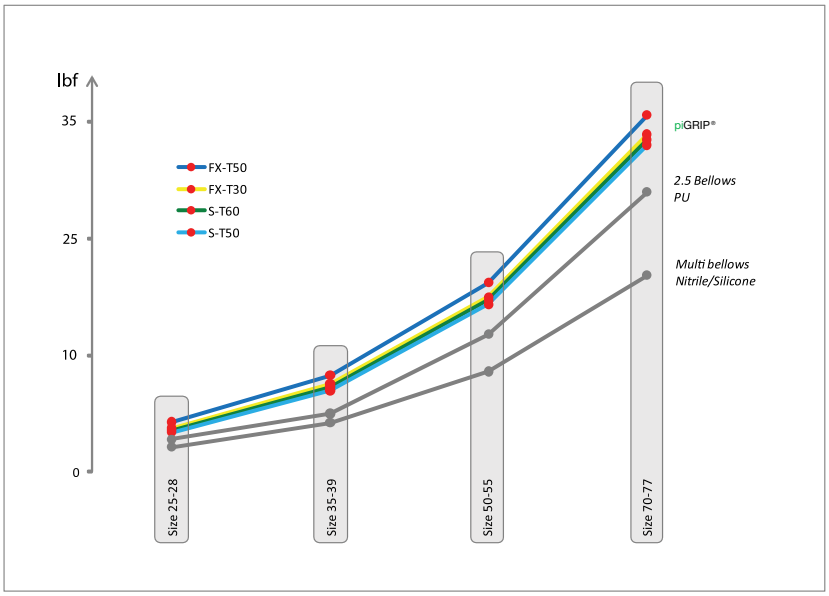
Type	Code	Dim. C	Dim. D	Description	Recommended fitting size for best performance* S25 FX28 FLI25 BGI25 BGI34 HS29	S35 FX39 FLI35 BGI41 BGI48 HS39	S50 FX55 FLI50 BGI63 HS58	S70 FX77 FLI70 HS79 BGI80
	G14F	0.39	—	Fitting G1/4" fem	●	●	●	
	G38F	0.51	—	Fitting G3/8" fem		●	●	●
	G12F	0.55	—	Fitting G1/2" fem			●	●
	NS18F**	0.28	—	Fitting 1/8" NPSF fem	●	●	●	
	NS14F	0.39	—	Fitting 1/4" NPSF fem	●	●	●	●
	NS38F	0.51	—	Fitting 3/8" NPSF fem		●	●	●
	NS12F	0.55	—	Fitting 1/2" NPSF fem			●	●
	NS518F**	0.71	—	Fitting 5x1/8" NPSF fem	●	●	●	
	NT14F	0.47	—	Fitting 1/4" NPT fem	●	●	●	●
	NT38F	0.51	—	Fitting 3/8" NPT fem		●	●	●
	U12F	0.47	—	Fitting 1/2" UNC fem			●	●
	MM5F	0.24	—	Fitting M5 fem	●	●		
	MM6F	0.24	—	Fitting M6 fem	●	●		
	MM8F	0.28	—	Fitting M8 fem	●	●	●	
	MM10F	0.28	—	Fitting M10 fem	●	●	●	
	MM12F	0.47	—	Fitting M12 fem	●	●	●	
	MMF16F	0.51	—	Fitting M16 x 1.5 fem		●	●	●

* No flow restriction or excessive volume to evacuate, which will deteriorate the performance of the vacuum system. ** Fitting code G18F and G518F are automatically changed to NS18F and NS518F due to identical threads.

Go to suction cup selection guide on piab.com to configure your suction cup.

piGRIP® Material Data

Up to 50% improved lifting force with piGRIP®. Use fewer cups or smaller sizes. See suction cup selection guide on piab.com for specified performance data



Proven function and lifting capacity within specified area of operation.

Material Specifications

Material	Hardness, Shore A °	Item(s)	Color	Temp. range, °F	Special qualities
TPE	80–87	Support S1	Lime/Transparent	-4–140/212*	FDA EU**, silicone/PWIS free, mark free, oil resistant
TPE	87	Bellows	Lime/Transparent	-4–140/212*	FDA EU**, silicone/PWIS free, mark free, oil resistant
TPE	60	Standard Lip (S) T60	Green	-4–140/248*	Silicone/PWIS free, mark free, oil resistant
TPE	50	Standard Lip (S) T50	Blue	-4–140/248*	FDA EU
TPE	50	Flexible Lip (FX) T50	Blue	-4–140/248*	FDA EU
TPE	30	Flexible Lip (FX) T30	Yellow	-4–140/212*	FDA EU
EPDM	—	Foam Lip (FLI-S)	Green/Black	-4–176	Ultra soft cellular rubber
NR	—	Foam Lip (FLI-F)	Green/Orange	-4–176	Firm natural rubber
Silicone	50	Bag Lip (BGI)	Blue	-4–392	FDA EU
HNBR	50	Hot Surface Lip (HS)	Blue	-22–248/302*	PWIS free, mark free
PU	60	Foam Lip holder	Green	50–122	

* Max Temperature short term contact, <10 sec and 50% intermittence, ambient temperature 59-86 °F, mechanical properties will start to degrade. ** FDA EU approved option in transparent material.

Flat family (F)

There is a variety of cups in this family to suit a number of different flat surfaces, e.g. cardboard, glass and metal sheets. The cleats stop deformation by preventing suction of the object into the cup. The suction cup has good stability and very little movement. Also suitable when the lifting force is parallel to the surface as the cleats increase friction. There is also a variety in materials from mark-free to high temperature applications and FDA compliant material (FDA 21 CFR 177.2600) that meets EU's regulation EU 1935/2004.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level			Lifting force parallell to the surface, lbf, at vacuum level		
	6 -inHg	18 -inHg	27 -inHg	6 -inHg	18 -inHg	27 -inHg
F15	0.79	1.91	2.47	0.79	1.46	1.69
F20	1.35	3.26	4.27	1.12	1.80	1.91
F25	2.02	4.38	5.62	1.80	2.02	2.25
F30-2	2.70	5.62	6.97	2.47	3.60	4.50
F40-2	4.50	8.99	11.2	3.37	5.62	6.74
F50-2	8.09	16.6	21.6	5.40	8.99	11.2
F75	18.0	45.0	60.7	13.5	24.7	31.5
F110	31.5	94.4	125.9	31.5	56.2	67.4
F150	67.4	191.1	247.3	56.2	134.9	179.8
F26 FDA	2.47	5.62	6.97	2.02	4.72	5.85
F33 FDA	3.60	8.54	11.0	3.03	7.31	9.33
F75P	15.7/18.4*	43.4/51.9*	61.4/74.2*	9.89/10.6*	39.6/25.4*	69.2/38.0*
F110P	37.5/42.9*	97.1/112.0*	132.9/158.5*	33.5/66.8*	99.1/117.6*	138.7/149.3*
F15MF	0.90	1.80	2.70	1.01	2.02	3.26
F20MF	0.81	3.26	4.95	1.80	3.26	4.72
F25MF	1.42	5.51	7.89	2.02	5.51	8.16
F30MF	2.47	7.76	10.8	3.06	6.29	9.44
F40MF	4.05	12.8	18.7	3.60	11.0	12.8
F50MF	5.51	20.7	31.7	6.97	18.4	24.1
XLF150	74.2/116.9**	112.4/173.1**	175.4/254.0**	63.2	95.5	149.0
XLF200	170.9/231.6**	254.0/339.5**	386.7/494.6**	145.2	216.0	328.7
XLF250	294.5/368.7**	438.4/553.0**	645.2/795.8**	250.4	372.7	548.5
XLF300	483.3/589.0**	719.4/845.3**	1040.9/1225.2**	411.0	611.5	884.8

* PU30°/PU60° / PU60°, ** Inner/Outer lip

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
F15	0.62	0.43	0.51	0.04	0.02
F20	0.87	0.31	0.71	0.06	0.06
F25	1.06	0.35	0.87	0.06	0.07
F30-2	1.26	0.41	0.98	0.08	0.12
F40-2	1.65	0.51	2.05	0.10	0.29
F50-2	2.09	0.69	2.17	0.12	0.61
F75	3.03	0.51	5.91	0.12	1.22
F110	4.41	0.79	9.84	0.16	4.27
F150	5.98	1.04	19.7	0.24	9.76
F26 FDA	1.02	0.93	0.98	0.06	0.10
F33 FDA	1.30	0.93	1.38	0.06	0.13
F75P	3.03	0.51	5.91	0.08	1.16
F110P	4.53	0.79	9.84	0.16	3.66
F15MF	0.65	0.43	0.67	0.04	0.02
F20MF	0.87	0.31	0.71	0.08	0.06
F25MF	1.06	0.35	0.91	0.06	0.07
F30MF	1.26	0.39	1.73	0.06	0.12
F40MF	1.65	0.51	2.36	0.08	0.29
F50MF	2.09	0.69	3.74	0.08	0.61
XLF150	6.02	1.06	19.7	0.31	8.85
XLF200	8.03	1.06	31.5	0.31	16.8
XLF250	9.84	1.06	51.2	0.31	26.5
XLF300	12.0	1.06	74.8	0.31	40.6

Available materials

	Chloroprene, CR	HNBR	Nitrile-PVC, NPV	PU30°/PU60°	PU60°	Silicone, SIL	Silicone FDA EU, SIL FDA	Thermoplastic Polyurethane, TPE-U
F15	●					●	●	
F20	●					●	●	
F25	●					●	●	
F75		●	●			●	●	
F110		●	●			●	●	
F150			●			●	●	
F26 FDA							●	
F33 FDA							●	
F30-2	●					●	●	
F40-2			●			●	●	
F50-2		●	●			●	●	
F75P				●	●			

	Chloroprene, CR	HNBR	Nitrile-PVC, NPV	PU30°/PU60°	PU60°	Silicone, SIL	Silicone FDA EU, SIL FDA	Thermoplastic Polyurethane, TPE-U
F110P				●	●			
F15MF								●
F20MF								●
F25MF								●
F30MF								●
F40MF								●
F50MF								●
XLF150			●					
XLF200			●					
XLF250			●					
XLF300			●					

Material resistance

For more material information go to page 23.

Applications

Table shows typical applications for the suction cup. For more detailed information, please visit piab.com.

	Dry sheet metal	Bag opening/ thin paper – slip sheets/ film	FDA EU-standard compliant	Glass handling	High/low temp cup (plastic)	Mark free	Plastic injection molded parts
F15	●		●				
F20	●		●				
F25	●		●				
F75	●		●	●	●	●	●
F110	●		●	●	●	●	●
F150	●		●				
F26 FDA		●	●				
F33 FDA		●	●				
F30-2	●		●				
F40-2	●		●				
F50-2	●		●	●	●	●	●
F75P	●					●	
F110P	●					●	
F15MF						●	
F20MF						●	
F25MF						●	
F30MF						●	

	Dry sheet metal	Bag opening/ thin paper – slip sheets/ film	FDA EU-standard com-pliant	Glass handling	High/low temp cup (plastic)	Mark free	Plastic injec-tion molded parts
F40MF						●	
F50MF						●	
XLF150	●			●		●	
XLF200	●			●		●	
XLF250	●			●		●	
XLF300	●			●		●	

Fittings

For a table of possible fittings to use go to page 80 for technical information on all fittings visit piab.com.

Ordering information

For a complete list of available cups and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Flat Concave family (FC)

The friction cups in flat concave shape and in the material DURAFLEX® suction cups have been developed to meet the strict demands of the automotive industry and designed for flat and curved surfaces. A typical application is the feeding of sheet metal into a press tool. The FCF-P design is especially suitable for oily surfaces, slightly domed and flat surfaces, e.g., such as those encountered when handling metal sheets in press lines. The suction cups have support cleats that prevent thin objects from being disfigured.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level			Lifting force parallell to the surface, lbf, at vacuum level		
	6 -inHg	18 -inHg	27 -inHg	6 -inHg	18 -inHg	27 -inHg
FC20P	1.01	2.70	3.60	1.01	2.02	2.70
FC25P	1.80	4.50	6.07	2.02	2.70	4.05
FC35P	2.47/2.47*	8.09/7.64*	11.5/11.0*	6.07/6.07*	11.5/9.22*	13.9/11.5*
FC50P	6.29/6.29**	17.3/17.3**	23.2/23.4**	11.0/11.7**	18.4/20.9**	22.5/25.0**
FC75P	16.4/16.4**	35.3/37.8**	48.3/50.6**	24.1/20.9**	45.0/50.6**	51.7/57.3**
FC100P	30.8/34.2**	63.8/73.7**	84.8/100.3**	39.6/25.2**	71.5/59.3**	94.4/85.9**
FC150P	61.6/63.8**	145.5/161.0**	207.3/209.5**	77.1/48.3**	172.0/127.7**	202.8/194.0**
FCF25P	–	4.27/4.27***	6.29/6.52***	–	1.57/1.12***	2.25/1.62***
FCF35P	–	9.44/7.64***	13.0/11.2***	–	6.74/5.85***	9.44/7.19***
FCF50P	–	17.5/16.2***	23.8/22.7***	–	17.3/11.7***	23.6/15.7***
FCF75P	–	38.4/36.6***	53.1/51.3***	–	37.3/23.4***	47.4/31.2***
FCF100P	–	78.0/53.1***	110.2/67.0***	–	75.8/31.2***	108.8/46.1***
FCF125P	–	106.8/91.0***	146.1/99.4***	–	100.0/43.6***	135.3/53.1***

* PU50°/PU60°, ** PU40°/PU60°, *** Dry metal sheet/Oily metal sheet.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
FC20P	0.86	0.37	0.98	0.07	0.06
FC25P	1.12	0.43	1.77	0.16	0.18
FC35P	1.38	0.59	1.26	0.22	0.31
FC50P	1.97	1.32	2.09	0.20	0.61

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
FC75P	2.95	0.94	3.07	0.26	1.83
FC100P	3.94	1.06	4.33	0.40	4.88
FC150P	5.91	1.59	6.50	0.56	15.26
FCF25P	0.98	1.10	1.06	—	0.34
FCF35P	1.38	1.14–1.88*	1.57	0.08	0.31
FCF50P	1.97	1.22–1.96*	1.97	0.12	0.61
FCF75P	2.95	1.22–1.61*	3.94	0.16	1.83
FCF100P	3.94	1.42–1.77*	5.91	0.24	4.27
FCF125P	4.96	1.65–2.02*	5.91	0.31	6.10

* Height range includes fittings.

Available materials

	PU40°	PU50°	PU55°/PU60°	PU60°
FC20P		●		
FC25P		●		
FC35P		●		●
FC50P	●			●
FC75P	●			●
FC100P	●			●
FC150P	●			●
FCF25P			●	
FCF35P			●	
FCF50P			●	
FCF75P			●	
FCF100P			●	
FCF125P			●	

Material resistance

For more material information go to page 23.

Applications

Table shows typical applications for the suction cup. For more detailed information, please visit piab.com.

	Oily sheet metal	Dry sheet metal	Mark free
FC20P		●	●
FC25P		●	●
FC35P		●	●
FC50P		●	●
FC75P		●	●

	Oily sheet metal	Dry sheet metal	Mark free
FC100P		●	●
FC150P		●	●
FCF25P	●		
FCF35P	●		
FCF50P	●		
FCF75P	●		
FCF100P	●		
FCF125P	●		

Fittings

For a table of possible fittings to use go to page 80 for technical information on all fittings visit piab.com.

Ordering information

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Bellows family (B)

The bellows family is suitable for height differences and slightly uneven or curved surfaces. Several short bellows cups in one lifting device can handle objects with height differences and varying shapes. The bellows also provide a slight lifting movement to separate thin items. This family is available, among other material in FDA compliant material, or the durable DURAFLEX® as Mark Free or even for oily surfaces.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level			Lifting force parallell to the surface, lbf, at vacuum level		
	6 -inHg	18 -inHg	27 -inHg	6 -inHg	18 -inHg	27 -inHg
B5	0.07	0.18	0.22	–	–	–
B8	0.18	0.36	0.56	–	–	–
B10-2	0.34	0.76	1.10	–	–	–
B15-2	0.65	1.33	2.00	–	–	–
B20	1.33	2.20	3.15	–	–	–
B30	2.70	4.95	6.07	–	–	–
B30-2	2.70	4.95	6.07	–	–	–
B40	4.95	8.77	11.02	–	–	–
B50	7.42	14.6	18.4	–	–	–
B50-2	7.42	14.6	18.4	–	–	–
B75	16.6	37.5	50.8	–	–	–
B75-2	16.6	37.5	50.8	–	–	–
B110	30.8	77.1	103.6	–	–	–
B110-2	30.8	77.1	103.6	–	–	–
B150	66.1	154.2	198.5	–	–	–
B75P	13.7/18.7*	33.5/44.1*	45.4/57.3*	9.89/27.2*	21.6/51.5*	25.6/67.0*
B10XP	0.58/0.70*	0.85/1.03*	1.01/1.24*	0.22/0.22*	0.45/0.56*	0.56/0.67*
B15XP	1.12/1.35*	2.02/2.02*	2.47/2.70*	0.56/0.56*	1.12/1.12*	1.80/2.02*
B20XP	1.75/1.96*	3.37/4.43*	4.50/5.17*	0.79/1.57*	1.57/2.47*	2.25/3.37*
B25XP	2.18/2.70*	4.27/6.07*	4.95/6.74*	1.80/2.25*	2.70/2.92*	3.37/4.05*
B35XP	3.82/4.27*	8.77/10.8*	11.2/14.8*	3.37/3.82*	6.74/7.42*	8.99/11.2*
B52XP	8.09/9.55*	18.9/24.5*	22.9/33.7*	6.74/8.77*	13.5/15.7*	19.1/20.2
B75XP	16.9/19.3*	39.6/49.9*	51.3/69.0*	13.5/18.0*	33.7/45.0*	40.5/51.7*
B110XP	42.7/45.0*	85.4/98.9*	105.7/112.4*	38.2/42.7*	78.7/85.4*	96.7/103.4*

	Lifting force vertical to the surface, lbf, at vacuum level			Lifting force parallell to the surface, lbf, at vacuum level		
	6 -inHg	18 -inHg	27 -inHg	6 -inHg	18 -inHg	27 -inHg
B15MF	0.90	1.80	2.70	1.01	1.57	2.25
B20MF	1.01	3.48	4.72	1.42	2.47	4.27
B30MF	2.70	8.99	12.3	3.26	7.19	9.22
B40MF	4.05	12.81	16.2	3.06	8.99	10.6
B50MF	6.74	20.91	30.6	5.17	14.2	21.8
BF80P	16.4/22.0**	35.3/50.6**	44.1/66.1**	12.1/15.3**	19.8/28.6**	26.3/37.3**
BF110P	28.8/36.2*	51.5/75.1*	50.6/65.9*	23.8/27.7*	47.2/51.9*	55.3/68.6*
BFF30P	—	5.40/5.17***	6.07/6.74***	—	2.47/1.24***	3.03/1.75***
BFF40P	—	9.67/10.1***	12.6/13.5***	—	13.5/7.87***	18.2/10.1***
BFF60P	—	17.3/18.4***	25.2/23.8***	—	20.2/17.1***	27.4/20.9***
BFF80P	—	39.6/39.1***	53.1/46.5***	—	45.2/24.7***	54.0/36.0***
BFF110P	—	62.7/63.8***	84.8/77.6***	—	67.0/52.8***	77.8/56.9***

* PU30°/PU60° / PU60°, ** PU30°/PU50° / PU60°, *** Dry metal sheet/Oily metal sheet.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
B5	0.22	0.36	0.06	0.06	0.003
B8	0.35	0.47	0.07	0.14	0.01
B10-2	0.43	0.65	0.16	0.18	0.03
B15-2	0.62	0.78	0.20	0.26	0.07
B20	0.87	0.75	0.39	0.39	0.16
B30	1.34	1.02	0.59	0.59	0.61
B30-2	1.34	1.03	0.59	0.59	0.61
B40	1.69	1.10	0.79	0.47	0.92
B50	2.09	1.39	1.18	0.75	1.95
B50-2	2.09	1.39	1.18	0.75	1.95
B75	3.07	1.47	1.57	0.94	6.71
B75-2	3.07	1.46	1.57	0.94	6.71
B110	4.53	2.14	2.36	1.38	18.92
B110-2	4.53	2.14	2.36	1.38	18.92
B150	6.10	2.81	2.95	1.77	39.67
B75P	3.11	1.47	3.54	0.79	6.71
B10XP	0.43	0.55	0.16/0.24**	0.12	0.01
B15XP	0.63	0.58	0.22/0.39**	0.13	0.02
B20XP	0.83	0.41	0.22/0.35**	0.18	0.06
B25XP	1.02	0.53	0.43/0.35**	0.22	0.10
B35XP	1.46	0.73	0.69/0.63**	0.37	0.27
B52XP	2.09	1.06	1.14/0.98**	0.44	0.81
B75XP	3.05	1.35	2.36/1.97**	0.63	2.61
B110XP	4.48	1.91	3.54/3.15**	0.92	7.51
B15MF	0.63	0.77	0.43	0.08	0.07

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
B20MF	0.91	0.75	0.43	0.31	0.23
B30MF	1.34	1.02	0.65	0.47	0.61
B40MF	1.69	1.10	0.87	0.43	0.92
B50MF	2.24	1.38	1.02	0.51	1.95
BF80P	3.31	1.73	1.97	0.59	2.44
BF110P	4.53	2.09	2.17/2.76*	0.94	6.71
BFF30P	1.18	1.18	0.59	0.20	0.31
BFF40P	1.77	1.26–2.03***	0.91	0.28	0.61
BFF60P	2.40	1.42–2.18***	1.38	0.39	1.22
BFF80P	3.35	1.81–2.20***	1.97	0.55	3.05
BFF110P	4.53	2.09–2.85***	3.74	0.83	6.71

* PU30° / PU30°/PU60°, ** PU30°/PU60° / PU60°, *** Height range includes fittings

Available materials

	Chloroprene, CR	Conductive silicone, CSIL	HNBR	Nitrile-PVC, NPV	PU30°/PU50°	PU30°/PU60°	PU55°/PU60°	PU60°	Semi-conductive EPDM	Silicone, SIL	Silicone FDA EU, SIL FDA	TPE-U
B5	●	●	●						●	●	●	
B8	●	●	●							●	●	
B20			●								●	
B40			●								●	
B50			●								●	
B75			●	●						●	●	
B110			●	●						●	●	
B150				●						●	●	
B10-2	●		●							●	●	
B15-2	●		●							●	●	
B30-2			●								●	
B50-2											●	
B75-2				●						●	●	
B110-2				●						●	●	
B75P						●		●				
B10XP						●		●				
B15XP						●		●				
B20XP						●		●				
B25XP						●		●				
B35XP						●		●				
B52XP						●		●				
B75XP						●		●				

	Chloroprene, CR	Conductive silicone, CSIL	HNBR	Nitrile-PVC, NPV	PU30°/PU50°	PU30°/PU60°	PU55°/PU60°	PU60°	Semi-conductive EPDM	Silicone, SIL	Silicone FDA EU, SIL FDA	TPE-U
B110XP						●		●				
B15MF												●
B20MF												●
B30MF												●
B40MF												●
B50MF												●
BF80P					●			●				
BF110P						●		●				
BFF30P							●					
BFF40P							●					
BFF60P							●					
BFF80P							●					
BFF110P							●					

Material resistance

For more material information go to page 23.

Applications

Table shows typical applications for the suction cup. For more detailed information, please visit piab.com.

	Oily sheet metal	Dry sheet metal	Corrugated / cardboard	FDA EU-standard compliant	Glass handling	Electronic / semi-conductor	High/low temp cup (plastic)	Mark Free	Plastic injection molded parts
B5		●		●	●	●	●	●	●
B8		●		●	●	●	●	●	●
B20		●		●	●		●	●	●
B30		●							●
B40		●		●	●		●	●	●
B50		●		●	●		●	●	●
B75		●		●	●		●	●	●
B110		●		●				●	
B150		●		●					●
B10-2		●		●	●		●	●	●
B15-2		●		●	●		●	●	●
B30-2		●		●	●		●	●	●

	Oily sheet metal	Dry sheet metal	Corrugated / cardboard	FDA EU-standard compliant	Glass handling	Electronic / semi-conductor	High/low temp cup (plastic)	Mark Free	Plastic injection molded parts
B50-2		●		●					●
B75-2		●		●					●
B110-2		●		●					●
B10XP		●	●		●				●
B15XP		●	●		●				●
B20XP		●	●		●				●
B25XP		●	●		●				●
B35XP		●	●		●				●
B52XP		●	●		●				●
B75XP		●	●		●				●
B110XP		●	●		●				●
B75P		●						●	●
B15MF								●	
B20MF								●	
B30MF								●	
B40MF								●	
B50MF								●	
BF80P		●			●			●	
BF110P		●			●			●	
BFF30P	●								
BFF40P	●								
BFF60P	●								
BFF80P	●								
BFF110P	●								

Fittings

For a table of possible fittings to use go to page 80 for technical information on all fittings visit piab.com.

Ordering information

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Multibellows family (BX/BL)

This family is designed for height differences, slightly curved planes and uneven surfaces. Applications such as bag handling, cardboard, high temperature or if the need is specifically to touch a food item as they are also available in material that complies with the FDA (FDA 21 CFR 177.2600) and meets EU's regulation EU 1935/2004.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level			Lifting force parallell to the surface, lbf, at vacuum level		
	6 -inHg	18 -inHg	27 -inHg	6 -inHg	18 -inHg	27 -inHg
BX10P	0.22	0.52	0.83	—	—	—
BX15P	0.45/0.45*	0.90/1.35*	1.01/1.35*	—	—	—
BX20P	1.01/1.08*	1.57/1.57*	2.14/2.47*	—	—	—
BX25P	1.80/2.02*	2.92/3.15*	4.05/4.05*	1.12/1.57*	2.25/2.47*	2.7/3.37*
BX35P	2.70/3.37*	4.5/5.62*	6.29/6.74*	3.15/4.95*	6.07/6.74*	7.64/8.09*
BX52P	7.19/8.32*	12.6/13.3*	16.9/18.0*	6.29/6.07*	9.89/11.0*	12.1/12.6*
BX75P	13.9/18.0*	24.7/27.0*	31.7/37.3*	8.77/17.5*	18.7/25.6*	26.1/33.7*
BX110P	35.5/40.7*	68.8/95.8*	77.8/95.3*	18.7/35.5*	58/54.9*	58.5/65.9*
BL20-2	0.07/0.72**	0.14/1.39**	—	—	—	—
BL30-2	0.14/1.44**	0.36/3.60**	—	—	—	—
BL40-2	0.25/2.47**	0.49/4.95**	—	—	—	—
BL50-2	0.38/3.82**	0.97/9.67**	—	—	—	—
BL30-3P	2.25	4.95	6.29	2.02	2.25	3.60
BL40-3P	4.50	9.67	12.4	2.92	5.40	8.09
BL50-3P	5.40	13.5	16.9	4.95	11.0	13.5
BL30-4	1.80***	—	—	—	—	—
BL40-4	2.25	3.37	4.95	2.02	3.60	5.85
BL50-4	1.80	5.62	—	—	—	—
BL30-5	1.80	2.02	—	—	—	—
BL40-5	2.92	3.37	—	—	—	—
BL50-5	1.80	5.62	—	—	—	—
B-BL40-2	0.25/2.47**	0.49/4.95**	—	—	—	—
B-BL40-2 FDA, detectable	3.51	7.67	10.2	—	—	—

* PU30°/PU60° / PU60°, ** With reinforcement ring, *** The suction cup is not intended for deeper vacuum levels than 6 -inHg.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
BX10P	0.43	0.65	0.16/0.24*	0.18	0.03
BX15P	0.63	0.73	0.22/0.24*	0.22	0.06
BX20P	0.83	0.60	0.39/0.33*	0.30	0.07
BX25P	1.02	0.75	0.24/0.31*	0.33	0.18
BX35P	1.46	1.06	0.39	0.55	0.61
BX52P	2.09	1.54	1.26	0.75	1.83
BX75P	3.05	2.04	0.91	1.02	4.88
BX110P	4.48	2.91	2.17	1.54	14.04
BL20-2	0.79	0.90	0.16	0.51	0.24
BL30-2	1.18	1.28	0.31	0.79	0.61
BL40-2	1.57	1.67	0.43	1.30	1.65
BL50-2	1.97	2.09	0.51	1.34	3.23
BL30-3P	1.18	1.40	0.24	0.55	0.85
BL40-3P	1.57	1.67	0.51	0.83	1.65
BL50-3P	1.89	2.09	0.63	1.02	3.30
BL30-4	1.20	0.65	0.79	0.75	0.25
BL40-4	1.58	1.57	0.59	0.71	0.92
BL50-4	1.98	2.09	1.18	0.87	2.14
BL30-5	1.20	1.44	0.67	0.43	0.52
BL40-5	1.57	1.57	0.87	0.79	0.85
BL50-5	1.97	2.09	1.18	0.71	1.59
B-BL40-2	1.67	1.50	0.43	1.30	1.65
B-BL40-2 FDA, detectable	1.67	1.50	0.43	0.87	1.77

* PU30°/PU60° / PU60°.

Available materials

	Chloroprene, CR	HNBR	PU30°/PU60°	PU60°	PU30°/PU70°	Silicone, SIL	Silicone FDA EU, SIL FDA	Silicone FDA EU detecta-ble, SIL FDA DET
BX10P			●	●				
BX15P			●	●				
BX20P			●	●				
BX25P			●	●				
BX35P			●	●				
BX52P			●	●				
BX75P			●	●				
BX110P			●	●				
BL20-2	●	●				●	●	
BL30-2	●					●	●	

	Chloroprene, CR	HNBR	PU30°/PU60°	PU60°	PU30°/PU70°	Silicone, SIL	Silicone FDA EU, SIL FDA	Silicone FDA EU detecta-ble, SIL FDA DET
BL40-2	●					●	●	
BL50-2	●					●	●	
BL30-3P					●			
BL40-3P					●			
BL50-3P					●			
BL30-4						●	●	
BL40-4						●	●	
BL50-4						●	●	
BL30-5						●	●	
BL40-5						●	●	
BL50-5						●	●	
B-BL40-2							●	
B-BL40-2 FDA, detectable								●

Material resistance

For more material information go to page 23.

Applications

Table shows typical applications for the suction cup. For more detailed information, please visit piab.com.

	Dry sheet metal	Bag handling	Corrugated / cardboard	FDA EU-standard compliant	FDA EU detectable	Mark Free	Plastic injec-tion molded parts
BX10P	●		●			●	●
BX15P	●		●			●	●
BX20P	●		●			●	●
BX25P	●		●			●	●
BX35P	●		●			●	●
BX52P	●		●			●	●
BX75P	●		●			●	●
BX110P	●		●			●	●
BL20-2		●		●		●	
BL30-2		●		●			
BL40-2		●		●			
BL50-2		●		●			
BL30-3P		●					
BL40-3P		●					
BL50-3P		●					

	Dry sheet metal	Bag handling	Corrugated / cardboard	FDA EU-standard compliant	FDA EU detectable	Mark Free	Plastic injection molded parts
BL30-4		●		●			
BL40-4		●		●			
BL50-4		●		●			
BL30-5		●		●			
BL40-5		●		●			
BL50-5		●		●			
B-BL40-2				●			
B-BL40-2 FDA, detectable					●		

Fittings

For a table of possible fittings to use go to page 80 for technical information on all fittings visit piab.com.

Ordering information

For a complete list of available cups and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Deep family (D)

This family is designed for curved and irregular surfaces. Can lift even over corners and edges. This product is also available in material that is compliant by FDA (FDA 21 CFR 177.2600) and meets EU's regulation EU 1935/2004.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level			Lifting force parallell to the surface, lbf, at vacuum level		
	6 -inHg	18 -inHg	27 -inHg	6 -inHg	18 -inHg	27 -inHg
D15-2	0.65	1.75	2.47	–	–	–
D20-2	1.33	3.37	4.05	–	–	–
D30-2	3.15	5.85	6.97	–	–	–
D50	8.09	17.54	22.03	–	–	–

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
D15-2	0.63	0.65	0.24	0.12	0.05
D20-2	0.87	0.52	0.31	0.18	0.15
D30-2	1.26	0.76	0.51	0.20	0.31
D50	2.09	1.24	0.98	0.39	0.92

Available materials

	Chloroprene, CR	Silicone, SIL	Silicone FDA EU, SIL FDA
D15-2	●	●	●
D20-2	●	●	●
D30-2	●	●	●
D50	●	●	●

Material resistance

For more material information go to page 23.

Applications

Table shows typical applications for the suction cup. For more detailed information, please visit piab.com.

	Dry sheet metal	FDA EU-standard compliant	Plastic injection molded parts
D15-2	●	●	●
D20-2	●	●	●
D30-2	●	●	●
D50	●	●	●

Fittings

For a table of possible fittings to use go to page 80 for technical information on all fittings visit piab.com.

Ordering information

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Universal family (U)

This family is designed for flat or slightly curved surfaces. They are available in a number of different materials such as DURAFLEX® silicone and also a material that is compliant by FDA (FDA 21 CFR 177.2600) and meets EU's regulation EU 1935/2004.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level			Lifting force parallell to the surface, lbf at vacuum level		
	6 -inHg	18 -inHg	27 -inHg	6 -inHg	18 -inHg	27 -inHg
U2	0.01	0.02	0.03	–	–	–
U3	0.02	0.09	0.15	–	–	–
U4	0.04	0.20	0.29	0.04	0.18	0.22
U6	0.11	0.38	0.56	0.11	0.34	0.45
U8	0.22	0.65	0.88	0.22	0.65	0.76
U10	0.34	0.99	1.55	0.34	0.99	1.10
U15	0.79	1.89	2.47	0.79	1.21	1.33
U20	1.33	2.70	3.60	1.33	1.98	2.20
U30	2.70	5.62	6.74	1.75	2.20	2.47
U40-2	4.50	8.77	11.0	3.15	4.95	6.07
U50-2	7.87	16.4	20.7	4.50	8.32	9.89
U15-3	0.79	1.89	2.47	0.79	1.21	1.33
U20-2P	0.67/0.67/0.67*	2.36/2.59/3.15*	3.15/3.37/4.72*	0.34/0.34/0.67*	0.67/0.67/1.35*	1.35/1.35/1.80*

* PU40° / PU50° / PU60°.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
U2	0.10	0.14	0.16	0.0039	0.0002
U3	0.15	0.18	0.20	0.01	0.0003
U4	0.20	0.24	0.12	0.01	0.002
U6	0.28	0.28	0.20	0.01	0.003
U8	0.35	0.28	0.24	0.02	0.01
U10	0.43	0.41	0.31	0.02	0.01

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
U15	0.65	0.45	0.31	0.06	0.03
U20	0.87	0.31	0.51	0.10	0.06
U30	1.26	0.37	0.79	0.14	0.12
U40-2	1.61	0.51	1.18	0.18	0.34
U50-2	2.02	0.69	1.38	0.24	0.73
U15-3	0.65	0.45	0.31	0.06	0.03
U20-2P	0.34	0.55	0.04/0.35/0.47*	0.20	0.04

* PU40° / PU50° / PU60°.

Available materials

	Chloroprene, CR	Conductive Silicone, CSIL	HNBR	Nitrile-PVC, NPV	PU40°	PU50°	PU60°	Silicone, SIL	Silicone, SIL FDA EU
U2		●							
U3		●							
U4	●							●	●
U6	●		●					●	●
U8	●							●	●
U10	●		●					●	●
U15	●		●					●	●
U20	●		●					●	●
U30				●				●	●
U40-2				●				●	●
U50-2				●				●	●
U15-3								●	
U20-2P					●	●	●		

Material resistance

For more material information go to page 23.

Applications

Table shows typical applications for the suction cup. For more detailed information, please visit piab.com.

	Dry sheet metal	FDA EU-standard compliant	Electronic / semicondu-ctor	Plastic injection molded parts	Mark Free	High/low temp cup (plastic)	Glass handling	Bag ope-ning/thin paper - slip sheets/film
U2			●					
U3			●					
U4	●	●		●				
U6	●	●		●	●			

	Dry sheet metal	FDA EU-standard compliant	Electronic / semicondu-ctor	Plastic injection molded parts	Mark Free	High/low temp cup (plastic)	Glass handling	Bag ope-ning/thin paper - slip sheets/film
U8	●	●		●				
U10		●		●	●	●	●	
U15		●		●	●	●	●	
U20		●		●	●	●	●	
U30	●	●		●				
U40-2	●	●		●				
U50-2	●	●		●				
U15-3								●
U20-2P					●			●

Fittings

For a table of possible fittings to use go to page 80 for technical information on all fittings visit piab.com.

Ordering information

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Oval Bellows family (OB)

The oval suction cups are suitable for handling of long and narrow objects and surfaces when maximum lifting force is desired. Oval suction cups are specially suitable for irregular surfaces and when level compensation is desired. This program of oval suction cups has characteristics that are specially suited for handling of metal-sheet material.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level			Lifting force parallell to the surface, lbf, at vacuum level		
	6 -inHg	18 -inHg	27 -inHg	6 -inHg	18 -inHg	27 -inHg
OB20x60P	2.92	7.64	12.8	2.92	8.32	10.8
OB35x90P (PU30°/PU60°)	9.44	26.8	39.1	10.8	16.4	22.5
OB35x90P (PU60°)	9.44	26.3	41.6	7.19	19.1	25.0
OB50x140P (PU30°/PU60°)	13.0	52.8	82.3	24.7	58.5	78.5
OB50x140P (PU60°)	17.3	51.9	82.7	27.4	65.6	89.0
OB65x170P (PU30°/PU60°)	26.8	75.3	121.6	31.7	85.2	119.6
OB65x170P (PU60°)	29.2	69.7	119.8	38.2	98.9	134.9
OBF35x90P	—	31.5/24.3*	44.5/35.3*	—	28.1/23.6*	40.2/33.9*
OBF50x140P	—	73.1/55.3*	98.5/83.6*	—	73.7/60.9*	93.3/78.0*
OBF65x170P	—	89.2/90.6*	128.1/112.9*	—	98.2/120.9*	139.2/149.5
OBL40x90P (PU60°)	9.89	23.6	36.0	8.99	19.6	27.2
OBL40x90P (PU70°)	11.0	26.3	40.0	10.1	21.8	30.3

* Dry metal sheet/Oily metal sheet.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
OB20x60P	2.44x0.93	0.93	0.28	0.18	1.46
OB35x90P	3.76x1.67	1.07	1.18	0.41	2.32
OB50x140P	5.75x2.32	1.36	0.91/1.02**	0.44	5.80
OB65x170P	6.97x2.99	1.63	1.50	0.63	10.68
OBF35x90P	4.13x1.97	1.54–1.89*	1.18	0.43	2.20

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
OBF50x140P	6.18x2.64	1.85–2.20*	1.97	0.51	5.80
OBF65x170P	7.36x3.23	2.13–2.47*	1.97	0.59	12.2
OBL40x90P	3.65x1.77	2.48–2.87*	1.10	1.22	6.41

* Height range includes fittings, ** PU30°/PU60° / PU60°.

Available materials

	PU30°/PU60°	PU55°/PU60°	PU60°	PU70°
OB20x60P			●	
OB35x90P	●		●	
OB50x140P	●		●	
OB65x170P	●		●	
OBF35x90P		●		
OBF50x140P		●		
OBF65x170P		●		
OBL40x90P			●	●

Material resistance

For more material information go to page 23.

Applications

Table shows typical applications for the suction cup. For more detailed information, please visit piab.com.

	Oily sheet metal	Corrugated / cardboard	Glass handling	Mark Free
OB20x60P				●
OB35x90P		●		●
OB50x140P		●		●
OB65x170P		●		●
OBF35x90P	●			
OBF50x140P	●			
OBF65x170P	●			
OBL40x90P			●	●

Fittings

For a table of possible fittings to use go to page 80 for technical information on all fittings visit piab.com.

Ordering information

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Oval Flat family (OF)

Oval suction cups are specially suitable for long and narrow objects. This program of oval suction cups has characteristics that are specially suited for handling of metal-sheet material.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level			Lifting force parallell to the surface, lbf, at vacuum level		
	6 -inHg	18 -inHg	27 -inHg	6 -inHg	18 -inHg	27 -inHg
OF10x30P	0.90	2.47	3.82	1.35	2.70	3.82
OF15x45P	2.02	6.07	9.22	1.35	4.50	7.64
OF25x70P (PU40°)	5.40	14.8	24.1	10.3	20.2	23.6
OF25x70P (PU60°)	5.40	17.3	26.5	9.44	28.6	36.2
OF40x110P (PU40°)	15.5	45.6	65.9	27.0	51.7	66.5
OF40x110P (PU60°)	16.6	45.0	68.1	22.0	51.3	92.2
OF55x150P (PU40°)	29.4	82.3	118.5	34.8	78.7	102.3
OF55x150P (PU60°)	30.1	84.5	125.4	28.8	76.0	107.2
OF70x175P (PU40°)	42.7	119.1	176.5	38.2	98.9	141.6
OF70x175P (PU60°)	40.5	128.1	193.3	45.0	124.8	168.6

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
OF10x30P	1.21x0.43	0.57	0.59	0.04	0.03
OF15x45P	1.77x0.59	0.68	1.18	0.04	0.06
OF25x70P	2.85x1.07	0.91	1.97	0.07	0.37
OF40x110P	4.45x1.69	0.69	3.03	0.12	1.28
OF55x150P	6.06x2.32	0.83	5.91	0.12	2.26
OF70x175P	7.09x2.95	0.98	5.12	0.22	4.88

Available materials

	PU40°	PU50°	PU60°
OF10x30P		●	
OF15x45P		●	
OF25x70P	●		●
OF40x110P	●		●
OF55x150P	●		●
OF70x175P	●		●

Material resistance

For more material information go to page 23.

Applications

Table shows typical applications for the suction cup. For more detailed information, please visit piab.com.

	Dry sheet metal	Corrugated / cardboard	Mark Free	Plastic injection molded parts
OF10x30P			●	
OF15x45P			●	
OF25x70P	●	●	●	●
OF40x110P	●	●	●	●
OF55x150P	●	●	●	●
OF70x175P	●	●	●	●

Fittings

For a table of possible fittings to use go to page 80 for technical information on all fittings visit piab.com.

Ordering information

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Oval Concave family (OC)

Suitable for handling long oblong objects with flat or curved surfaces with thick durable lip. Some of these cups have support cleats that prevent thin objects from being disfigured.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level			Lifting force parallell to the surface, lbf, at vacuum level		
	6 -inHg	18 -inHg	27 -inHg	6 -inHg	18 -inHg	27 -inHg
OC60x140	29.7	83.9	116.9	41.8	83.9	114.7
OC35x90P	11.0/11.0*	26.3/29.7*	38.4/38.4*	11.9/15.3*	25.2/36.2*	33.0/46.3*
OCF20x80P	–	16.9/18.4*	25.0/20.2*	–	17.5/7.87*	25.2/10.8*
OCF30X90P	–	25.0/25.9*	35.3/35.7*	–	24.1/11.5*	36.0/16.6*
OCF40X110P	–	40.0/41.6*	55.1/55.3*	–	37.5/12.1*	52.2/17.5*

* PU40° / PU60°.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
OC60x140	5.43x2.40	1.18	7.87	0.30	3.17
OC35x90P	3.70x1.46	0.57	–	0.12	1.22
OCF20x80P	3.31x0.94	1.06–1.69*	0.79	0.12	0.92
OCF30X90P	3.64×1.28	1.16	0.98	0.16	1.04
OCF40X110P	4.45x1.69	1.28–1.40*	1.65	0.20	2.07

* Height range includes fittings.

Available materials

	Nitrile, NBR	PU40°	PU55°/PU60°	PU60°
OC60x140	●			
OC35x90P		●		●
OCF20x80P			●	
OCF30X90P			●	
OCF40X110P			●	

Material resistance

For more material information go to page 23.

Applications

Table shows typical applications for the suction cup. For more detailed information, please visit piab.com.

	Oily metal sheet	Dry metal sheet	Mark Free
OC60x140		●	
OC35x90P			●
OCF20x80P	●		
OCF30X90P	●		
OCF40X110P	●		

Fittings

For a table of possible fittings to use go to page 80 for technical information on all fittings visit piab.com.

Ordering information

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Suction cup accessories

Suction cup accessories	
	Mounting Elements
	Level compensators
	Ball joints
	Suction cup valves
	Fittings
	Other

Features and benefits
The mounting element program consists of mounting brackets, height adjusters and suction cup extensions. The parts are designed to fit together for different sizes and applications. The parts are easily mounted on several standard extruded profile systems, not just suitable for one brand of profile. All parts of the same size-category fit perfectly together and thereby create an easy-to-use, compact and flexible/adjustable mounting “assembly kit” for cups.
Adjust differences in levels, for example on lifting devices with several suction cups. There is then less demand for exact positioning of vacuum handling device. Level compensators will also provide a certain degree of shock and vibration absorption.
To avoid bending stress, a suction cup can be fitted with a ball joint.
Valves to minimize the energy consumption. Gives a flexibility on number of objects to be handled.
A variety of fittings for suction cups.
Angle adaptors, t-slot adaptors etc.

Mounting Elements

Mounting bracket MB

- Mounting brackets suitable for extruded profile systems.
- Level compensators and height adjusters with external thread in sizes M12, M16, M20 and M25 are ideal for clamping on the mounting brackets.
- Facilitates the installation of a suction cup and positioning in X-direction.
- Long and short versions available.

Height adjuster HA

- Facilitates the positioning (y-direction) of a suction cup.
- Provides an adjustable height extension between a mounting bracket (MB) and a suction cup.
- Can be used with a suction cup / rod extension to further elongate the cup position.
- Key handle to avoid rotation when connecting vacuum ports.

Suction cup extension SE

- Solid rod extension with air/ vacuum channel.
- For mounting a suction cup.
- Available in several sizes.
- Can be used with a height adjuster (HA) or level compensator (LC).

Technical Data

Description	Load, vertical, max.	Load, torque, max.	Load, horizontal, max.	Action range/ Stroke
Mounting bracket MB12S, MB16S, MB20S	45.0 lbf	5.16 lb ft	–	–
Mounting bracket MB12L, MB16L, MB20L	45.0 lbf	5.16 lb ft	–	–
Mounting bracket MB25S, MB25L	67.4 lbf	11.1 lb ft	–	–
Height adjuster HA12	9.89 lbf	–	6.97 lbf	1.97 in
Height adjuster HA16	19.6 lbf	–	13.7 lbf	1.97 in
Height adjuster HA20	48.1 lbf	–	33.7 lbf	1.97 in
Suction cup extension 50, G3/8” male x G3/8” female	157 lbf	–	89.9 lbf	–
Suction cup extension SE12	9.89 lbf	–	6.97 lbf	–
Suction cup extension SE16	19.6 lbf	–	13.7 lbf	–
Suction cup extension SE20	48.1 lbf	–	33.7 lbf	–

Ordering information

For a complete list of available mounting elements visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Level Compensators

Level compensator LC

- Adjust differences in levels, for example on lifting devices with several suction cups.
- Less demand for exact positioning of vacuum handling device.
- Provides a certain degree of shock and vibration absorption.
- Allows for soft placement of cups on sensitive or thin objects.
- Non-rotational design, suitable for use with oval suction cups.
- Wide range of thread connections and stroke lengths.

Level compensators

- Adjust differences in levels, for example on lifting devices with several suction cups on a frame.
- A level compensator is often advantageous since it places less demand on exact vertical positioning, for example on a handling robot.
- The level compensator provides a certain degree of shock absorbtion.

Level compensator LC30

- Tailor made for the Vacuum Gripper System, VGS™, but can also be used together with other Piab products.
- Developed for use with standard profile systems.
- Easy installation with the option of fine adjustments and positioning of the suction cup.
- Non-rotational for use with, for example, oval suction cups. Can easily be made rotational.
- Quiet and reliable level compensation with load protection and shock absorbtion.

Technical Data

Description	Load, vertical, max.	Spring force	Action range/ Stroke	Thread
Level compensator LC12-F0510 / LC12-M0510	–	0.43–0.92 lbf	0.39 in	M5
Level compensator LC12-F0525 / LC12-M0525	–	0.45–1.12 lbf	0.98 in	M5
Level compensator LC16-F1820 / LC16-M1820	–	0.81–2.02 lbf	0.79 in	G1/8”
Level compensator LC16-F1835 / LC16-M1835	–	0.97–2.14 lbf	1.38 in	G1/8”
Level compensator LC20-F1425 / LC20-M1425	–	0.92–2.47 lbf	0.98 in	G1/4”
Level compensator LC20-F1450 / LC20-M1450	–	0.97–2.56 lbf	1.97 in	G1/4”
Level compensator LC25-F3840 / LC25-M3840	–	1.26–3.71 lbf	1.57 in	G3/8”
Level compensator LC25-F3880 / LC25-M3880	–	1.35–3.82 lbf	3.15 in	G3/8”
Level compensator G1/2” with stiffer spring	110 lbf	20.2–33.7 lbf	0.59 in	G1/2”
Level compensator M5	6.61 lbf	0.45–1.12 lbf	0.28 in	M5
Level compensator G1/8”	55.1 lbf	0.67–2.11 lbf	0.79 in	G1/8”
Level compensator G1/2”	110 lbf	5.4–8.32 lbf	0.59 in	G1/2”
Level compensator LC30	157 lbf	1.12–9.44 lbf	1.18 in	G3/8”

Ordering information

For a complete list of available level compensators visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Level compensator LC30 EOAT

- Easy installation with the option of fine adjustments and positioning of the suction cup.
- Conical spring means very low total height in relation to stroke. For example, that can help increase cycle speed in sheet metal press-to-press stamping applications.
- Non-rotational for use with, for example, oval suction cups. Can easily be made rotational.
- Mounting interfaces for standard flexible end-of-arm-tooling (EOAT) systems.
- Quiet and reliable level compensation with load protection and shock absorption.

Level compensator – profile mount

- Compensates for differences in height.
- Provides certain degree of shock absorption.
- Fits on standard size extrusion.

Vactivator V18

- Actuated by vacuum only.
- Automatic extension and retraction.
- Self-adjusting stroke, the piston with a suction cup returns home as soon as it seals off the object.
- Suction cup ordered separately.
- Simple solution for high picking speed.
- Easy installation.
- Designed for millions of cycles under normal industrial conditions.

Technical Data

Description	Load, vertical, max.	Action range/Stroke	Thread
Level compensator LC30 EOAT	157 lbf	1.18 in	G3/8” / 1/8”NPSF
Level compensator – profile mount	157 lbf	1.97 in	G3/8” / 3/8” NPT
Vactivator V18/20	1.10 lbf	0.79 in	G1/8”
Vactivator V18/40	1.10 lbf	1.57 in	G1/8”

Ordering information

For a complete list of available level compensators visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Ball Joints

Ball joints

- Ball joint fittings could be used when lifting sheet metal with a device using several suction cups.
- To avoid bending stress a suction cup can be fitted with a balljoint.

Ball joint fitting

- Fitted to a suction cup to avoid bending stress.
- Non-leaking design to work with Vacuum Check Valve and Vacustat.
- Available in a loose-fit, a locking version or one with 5° movement.

Technical Data

Description	Load, max.	Movement, angular
Ball joint G1/8”	55.0 lb	±12 °
Ball joint G1/2”	110 lb	±12 °
Ball joint G3/4”	330 lb	±12 °
Ball joint fitting G3/8”	–	±20 °
Ball joint fitting G3/8”, locking	–	±20 °
Ball joint fitting G3/8”, limited movement	–	±5 °

Ordering information

For a complete list of available ball joints visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Suction Cup Valves

piSAVE sense

- Vacuum check valves which allows a few suction cups to miss the object(s) and still maintain enough vacuum level in the system with quick response and release times.
- The vacuum check valves shall be used in a centralized vacuum system, one for each suction cup.
- Designing with vacuum check valves will require a smaller vacuum pump and save energy.
- Suitable for handling different size or different number of leaking or sealed objects such as MDF boards, corrugated cardboards or metal sheets with a flexible handling device.
- Also suitable for objects with surface leakage around the lip of the suction cup.
- The smallest sizes are mainly suitable for sealed and smooth materials, such as metal and glass (02/06 for small cups and 03/60 for large cups).
- The valves are supplied separately for integration or mounted in an Al-fitting with female and male threaded connections to facilitate installation.

piSAVE restrict

- Vacuum flow restrictors which allows a few suction cups to miss the object(s) and still maintain enough vacuum level in the system.
- Suitable for handling different size sealed sheets/ objects with the same flexible lifting device.
- The vacuum flow restrictors shall be used in a centralized vacuum system, one for each suction cup.
- Designing with flow restrictors will require a smaller vacuum pump and save energy.
- Available in three sizes with different flow performance/characteristics to suit different size suction cups.
- The restrictors are integrated in an Al-fittng with female and male threaded connections to faciliate installation.

Technical Data

Description	Pump flow/cup min.	Pump flow/cup to close valve	Leakage flow, max.
piSAVE sense 02/60 (yellow)	0.002 (@ 13.3 -inHg) scfm	0.44 (@ 0.9 -inHg) scfm	–
piSAVE sense 03/60 (green)	0.13 (@ 13.3 -inHg) scfm	0.78 (@ 0.9 -inHg) scfm	–
piSAVE sense 04/60 (blue)	0.32 (@ 13.3 -inHg) scfm	1.17 (@ 2.1 -inHg) scfm	–
piSAVE sense 05/60 (red)	0.53 (@ 13.3 -inHg) scfm	1.53 (@ 3.3 -inHg) scfm	–
piSAVE restrict multiple port fitting 0.7	–	–	0.17 scfm
piSAVE restrict multiple port fitting 1.0	–	–	0.34 scfm
piSAVE restrict multiple port fitting 1.3	–	–	0.57 scfm

Ordering information

For a complete list of available suction cup valves visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

piSAVE release

- Equalizes pressure in the suction cups to provide fast release of the product.
- Extra fast release by accumulating and utilising the feed-air pressure as a boost.
- ON/OFF activated simultaneously with the ejector.
- No additional controls required — use a single 3/2 control valve for the ejector and piSAVE release.

AQR (Atmospheric Quick-Release Valve)

- Equalizes pressure in vacuum gripper systems to provide fast release of product.
- Consumes no additional compressed air.
- ON/OFF activated simultaneously with the ejector.
- No additional controls required — use a single 3/2 control valve for the pump and AQR.

Blow-off Check Valve G1/8”

- Prevents vacuum from being pulled through the blow-off lines, which means faster response time and completely independent vacuum units.
- Reliable quick-release function even in larger systems with several units, due to the very low feed pressure required to break away for blow-off.
- Suitable in applications where cleaning of the suction cup filters or cooling of the object to be picked is important.

Technical Data

Description	Flow, atmospheric	Flow rate
piSAVE release G1/8"	8.16 scfm	–
piSAVE release G1/4"	16.6 scfm	–
Atmospheric quick-release valve – AQR	6.99 scfm	–
Blow-off Check valve G1/8”	–	3.18–5.93 scfm (@ 44-101.5 psi)

Ordering information

For a complete list of available suction cup valves visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Suction Cup Fittings

Suction cup shape																		
F	FC	FCF	B	B-MF	BL-2	BX	BFF	D	U	OBF	BL-3P	BL-4	BL-5	BF-P	OB	OC	OCF	OF
									2–3									
15			5–15	15		10–15		15	4–15									
20–30	20–25		20	20	20	20–25		20–30	20–30									
						35												
40–50	35		30–50*	30–50	30–50*	52		50*	40–50*									
	50–75	25				75	30											
		35–125					40–110			All								
75	100		75															
110	150		110															
150			150															
XLF																		
						110												
																		10x30
												30	30					
											30–40	40	40					
											50	50	50					
															20x60			15x45
															OBL			25x70
														80		35x90		
														110	35x90–65x170			40x110–70x175
																60x140		
																	All	

	M2,5 Male	M5 Male	M5 Female	5xM5 Female	M10x1,5 Male	G3/4" Female	G1/2" Female	G1/2" Male	G3/8" Female	G3/8" Male	G1/4" Male	G1/8" Male	G1/8" M. / M5 F.	3/8" NPSF Female	1/8" NPSF Female	5x1/8" NPSF F.	3/8" NPT Female	3/8" NPT Male	1/2" NPT Male	1/4" NPT Female	1/4" NPT Male	1/8" NPT Male	G3/8" M. / 1/8" NPSF F.
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piab

Other

Angle Adaptors

- Angle adaptors facilitate vacuum connections when space and headroom are limited.
- Can also be used as T-connectors.

T-slot Adapters

- The Piab T-slot adapter enables Piab suction cups to mount to existing boom assemblies and end-of-arm tooling used in the automotive industry. The T-slot adapter threads into the Piab cup fitting and can then be mounted accordingly.
- The suction cups can be changed quickly and with great ease.
- Non-rotating feature — good when using oval suction cups.

Ordering information

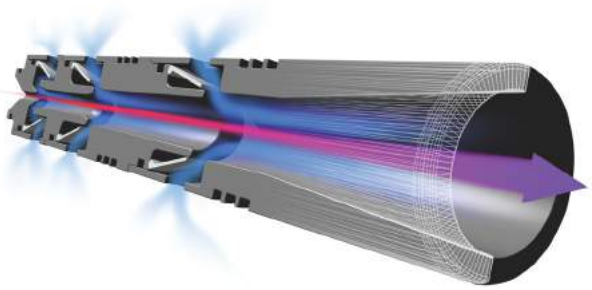
For a complete list of available adaptors visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Vacuum pumps/generators

COAX® technology

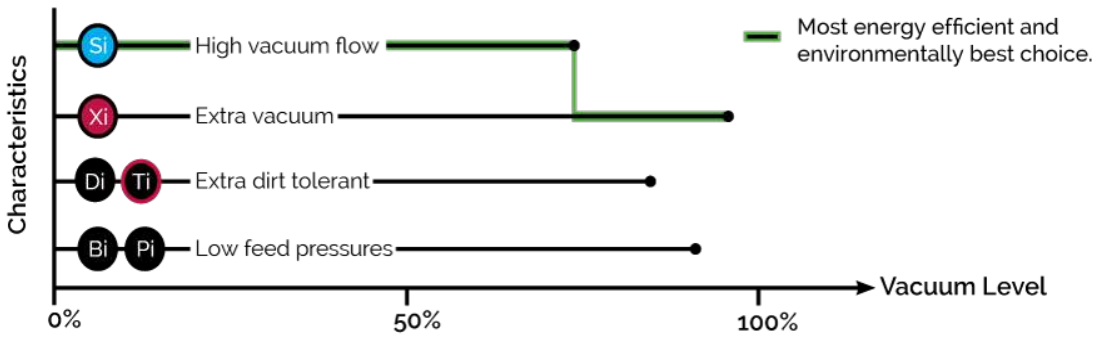
Piab vacuum pumps/generators are predominately based on the patented COAX® technology.

COAX® is an advanced solution for creating vacuum with compressed air. Based on Piab's multistage technology, COAX® cartridges are smaller, more efficient and more reliable than conventional ejectors, which allow for the design of a flexible, modular and efficient vacuum system. A vacuum system based on COAX® technology can provide you with three times more vacuum flow than conventional systems, allowing you to increase speed with high reliability while reducing energy consumption. COAX® cartridges exist in several sizes (MIDI, MINI & MICRO) and models (Bi, Pi, Si, Ti, Xi and Di), making them suitable for every application. The technology ensures excellent performance at both low and high feed pressures. Pumps based on COAX® technology can operate within the feed pressure range of 25 to 87 psi.



Custom integration

- The two-stage COAX® cartridge MICRO is probably the world's smallest multistage vacuum ejector. Its low weight makes it suitable to integrate close to the suction point in high speed pick and-place applications of small objects.
- The two-stage COAX® cartridge MINI has small mounting dimensions and the three-stage COAX® cartridge MINI has high initial vacuum flow.
- The two-stage COAX® cartridge MIDI has small mounting dimensions and the three-stage COAX® cartridge MIDI has high initial vacuum flow. The MIDI cartridges are efficient generators of blow-air and are also suitable for fast evacuation of large volumes.



COAX® MICRO family

MICRO Bi03-2

MICRO Si02-2

MICRO Ti05-2

MICRO Xi2.5-2

The two-stage COAX® cartridge MICRO is probably the world's smallest multistage vacuum ejector. Its low weight makes it suitable to integrate close to the suction point in high speed pick-and-place applications of small objects.

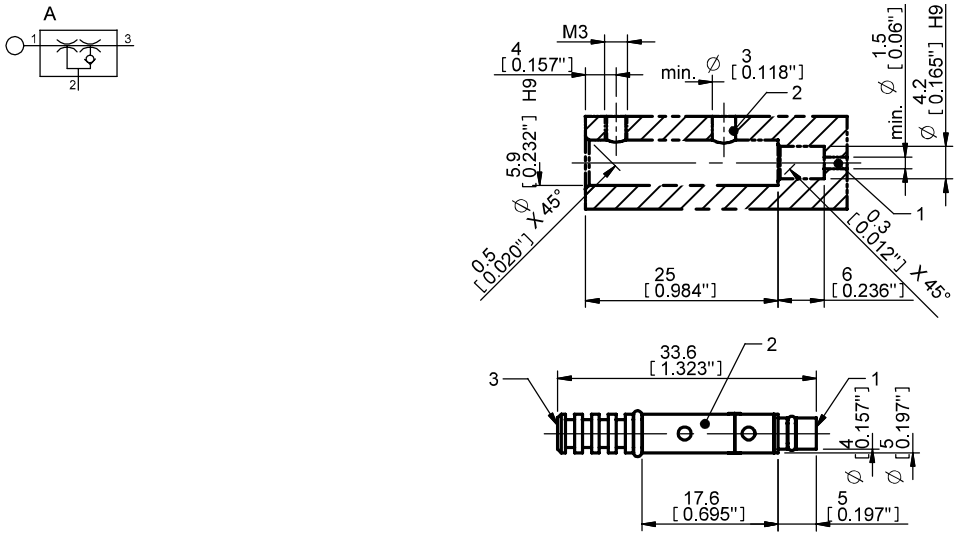
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)									Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	-inHg
MICRO Bi03-2	26	0.30	0.49	0.32	0.13	0.08	0.07	0.05	0.03	0.01	—	24.5
MICRO Si02-2	87	0.25	0.59	0.44	0.25	0.17	0.15	0.13	0.08	0.04	—	22.1
MICRO Ti05-2	58	0.57	0.68	0.59	0.49	0.36	0.21	0.15	0.08	0.04	0.01	24.8
MICRO Xi2.5-2	73	0.28	0.51	0.36	0.21	0.13	0.08	0.06	0.04	0.02	0.02	27.2

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)								Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	-inHg
MICRO Bi03-2	26	0.30	14.2	39.6	110	181	283	453	793	1444	24.5
MICRO Si02-2	87	0.25	11.6	28.6	56.9	93.4	139	195	289	—	22.1
MICRO Ti05-2	58	0.57	9.34	20.7	34	56.6	87.8	142	235	470	24.8
MICRO Xi2.5-2	73	0.28	13.9	34.8	70.2	127	207	320	510	793	27.2

Dimensional drawing



Ordering information

For a complete list of available pumps and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

COAX® MINI family


MINI Di16-2


MINI Pi12-2


MINI Pi12-3


MINI Pi12-3 FS


MINI Si08-2


MINI Si08-3 FS


MINI Si08-3


MINI Xi10-2


MINI Xi10-3


MINI Xi10-3 FS

The two-stage COAX® cartridge MINI has small mounting dimensions and the three-stage COAX® cartridge MINI has high initial vacuum flow.

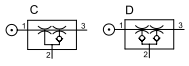
Vacuum flow

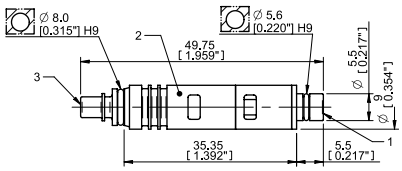
COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MINI Di16-2	87	1.59	1.36	1.21	1.04	0.87	0.74	0.61	0.38	0.08	—	—	73
MINI Pi12-2	46	0.93	1.44	1.27	0.93	0.57	0.40	0.30	0.21	0.13	0.06	—	90
MINI Pi12-3	46	0.93	2.97	1.27	0.93	0.57	0.40	0.30	0.21	0.13	0.06	—	90
MINI Pi12-3 FS	46	0.93	2.97	1.27	0.93	0.57	0.40	0.30	0.21	0.13	0.06	—	90
MINI Si08-2	87	0.93	1.63	1.42	1.08	0.70	0.49	0.34	0.25	0.17	—	—	75
MINI Si08-3	87	0.93	2.84	1.55	1.17	0.74	0.49	0.36	0.28	0.17	—	—	75
MINI Si08-3 FS	87	0.93	2.84	1.55	1.17	0.74	0.49	0.36	0.28	0.17	—	—	75
MINI Xi10-2	73	0.97	1.59	1.33	1.04	0.70	0.40	0.32	0.23	0.15	0.095	0.023	94
MINI Xi10-3	73	0.97	3.03	1.48	1.06	0.70	0.40	0.32	0.23	0.15	0.095	0.023	94
MINI Xi10-3 FS	73	0.97	3.03	1.48	1.06	0.70	0.40	0.32	0.23	0.15	0.095	0.023	94

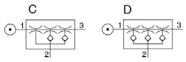
Evacuation times

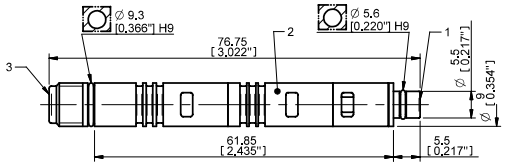
COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MINI Di16-2	87	1.59	4.81	9.91	16.4	23.8	32.6	44.7	70.5	—	—	73
MINI Pi12-2	46	0.93	4.81	9.06	16.4	31.1	51.0	76.5	113	181	—	90
MINI Pi12-3	46	0.93	2.27	6.51	13.9	28.3	48.1	73.6	110	178	—	90
MINI Pi12-3 FS	46	0.93	2.27	6.51	13.9	28.3	48.1	73.6	110	178	—	90
MINI Si08-2	87	0.93	3.96	8.78	15.6	25.5	39.6	59.5	87.8	—	—	75
MINI Si08-3	87	0.93	2.83	7.08	13.6	22.7	36.8	56.6	82.1	—	—	75
MINI Si08-3 FS	87	0.93	2.83	7.08	13.6	22.7	36.8	56.6	82.1	—	—	75
MINI Xi10-2	73	0.97	3.96	8.50	17.0	28.3	45.3	65.1	99.1	150	252	94
MINI Xi10-3	73	0.97	2.55	7.36	14.2	25.5	42.5	62.3	96.3	147	249	94
MINI Xi10-3 FS	73	0.97	2.55	7.36	14.2	25.5	42.5	62.3	96.3	147	249	94

Dimensional drawing









Ordering information

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COAX® MIDI family

MIDI Pi48-2 MIDI Pi48-3 MIDI Si32-2 MIDI Si32-3 MIDI Xi40-2 MIDI Xi40-3

The two-stage COAX® cartridge MIDI has small mounting dimensions and the three-stage COAX® cartridge MIDI has high initial vacuum flow. The MIDI cartridges are efficient generators of blow-air and are also suitable for fast evacuation of large volumes.

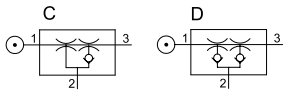
Vacuum flow

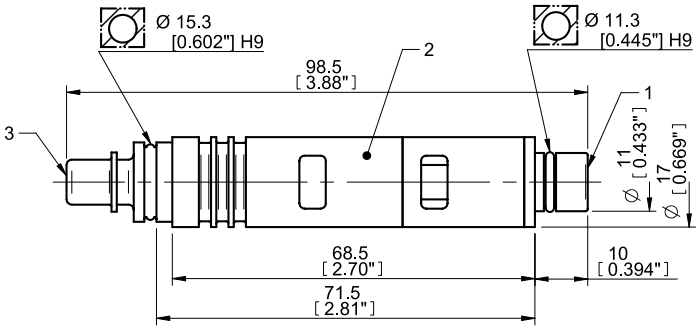
COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MIDI Pi48-2	45	4.24	5.9	5.3	3.8	2.3	1.4	1.1	0.7	0.5	0.2	—	26.6
MIDI Pi48-3	45	4.34	11.87	5.3	3.8	2.3	1.4	1.1	0.7	0.5	0.2	—	26.6
MIDI Si32-2	87	3.71	7.0	6.4	5.5	3.6	1.9	1.3	1.1	0.7	—	—	22.1
MIDI Si32-3	87	3.71	12.71	7.4	5.5	3.6	1.9	1.3	1.1	0.7	—	—	22.1
MIDI Xi40-2	65	3.88	5.9	4.9	3.4	2.1	1.5	1.2	0.9	0.7	0.4	0.1	28
MIDI Xi40-3	65	3.88	12.5	6.4	4.2	2.8	1.5	1.2	0.9	0.7	0.4	0.1	28

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MIDI Pi48-2	45	4.24	0.85	1.98	3.68	7.36	13	19.8	28.3	45.3	113	26.6
MIDI Pi48-3	45	4.34	0.57	1.7	3.4	7.08	12.7	19.8	28.3	45.3	113	26.6
MIDI Si32-2	87	3.71	0.85	1.98	2.83	5.10	9.34	15	22.7	—	—	22.1
MIDI Si32-3	87	3.71	0.57	1.42	2.83	5.10	9.34	15	22.7	—	—	22.1
MIDI Xi40-2	65	3.88	1.13	2.55	4.81	7.93	12.5	17.8	25.5	36.8	65.1	28
MIDI Xi40-3	65	3.88	0.62	1.76	3.4	6.23	10.5	16.1	23.8	34	62.3	28

Dimensional drawing





Ordering information

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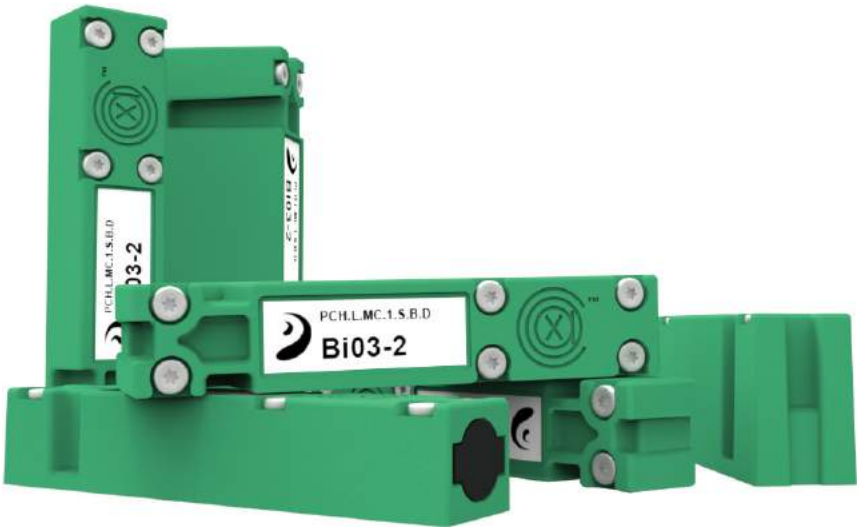
piCHIP10X family



The lightweight piCHIP10X unit is a small vacuum pump which is optimized for integration. It is flexible enough to surface mount quickly on a variety of materials. With its almost silent operation, the piCHIP10X is ideal for clean room operations. Medical and electronic industries are best suited to use this product in their vacuum applications. Because COAX® cartridges are up to twice as fast as other cartridges and provide three times more flow than a conventional ejector with the same air consumption, the piCHIP10X is able to provide a high performance even at low or fluctuating feed pressures (14.5-87 psi).

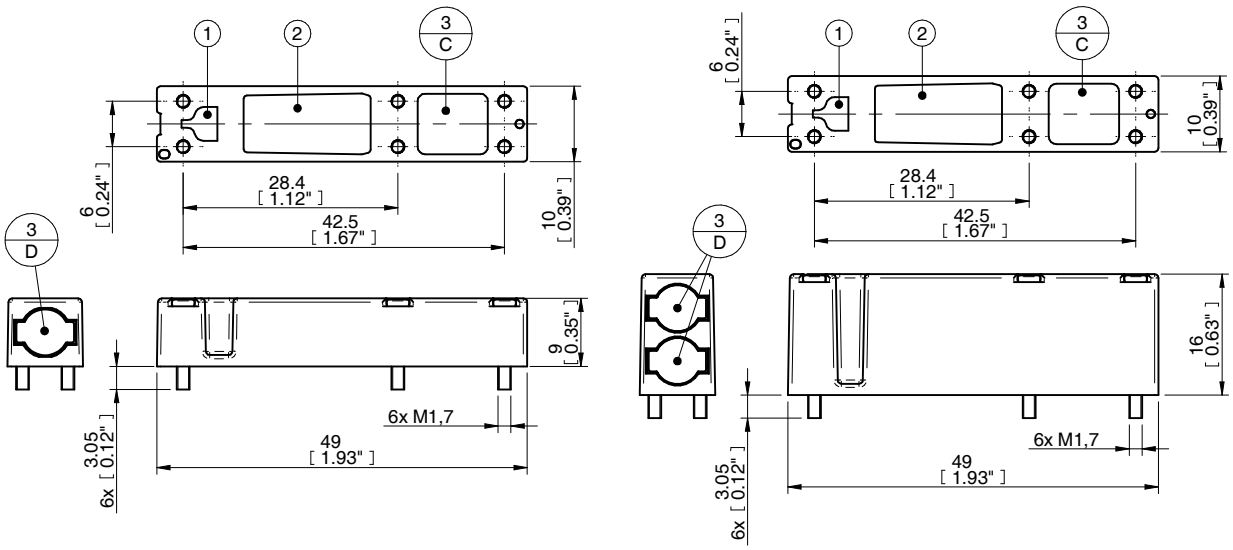
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)									Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	-inHg
MICRO Bi03-2	26	0.30	0.49	0.32	0.13	0.08	0.07	0.05	0.03	0.01	—	24.5
MICRO Si02-2	87	0.25	0.59	0.44	0.25	0.17	0.15	0.13	0.08	0.04	—	22.1
MICRO Ti05-2	58	0.57	0.68	0.59	0.49	0.36	0.21	0.15	0.08	0.04	0.01	24.8
MICRO Xi2.5-2	73	0.28	0.51	0.36	0.21	0.13	0.08	0.06	0.04	0.02	0.02	27.1

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)								Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	-inHg
MICRO Bi03-2	26	0.30	14.2	39.6	110	181	283	453	793	1444	24.5
MICRO Si02-2	87	0.25	11.6	28.6	56.9	93.4	139	195	289	—	22.1
MICRO Ti05-2	58	0.57	9.34	20.7	34.0	56.6	87.8	142	235	470	24.8
MICRO Xi2.5-2	73	0.28	13.9	34.8	70.2	127	207	320	510	793	27.1

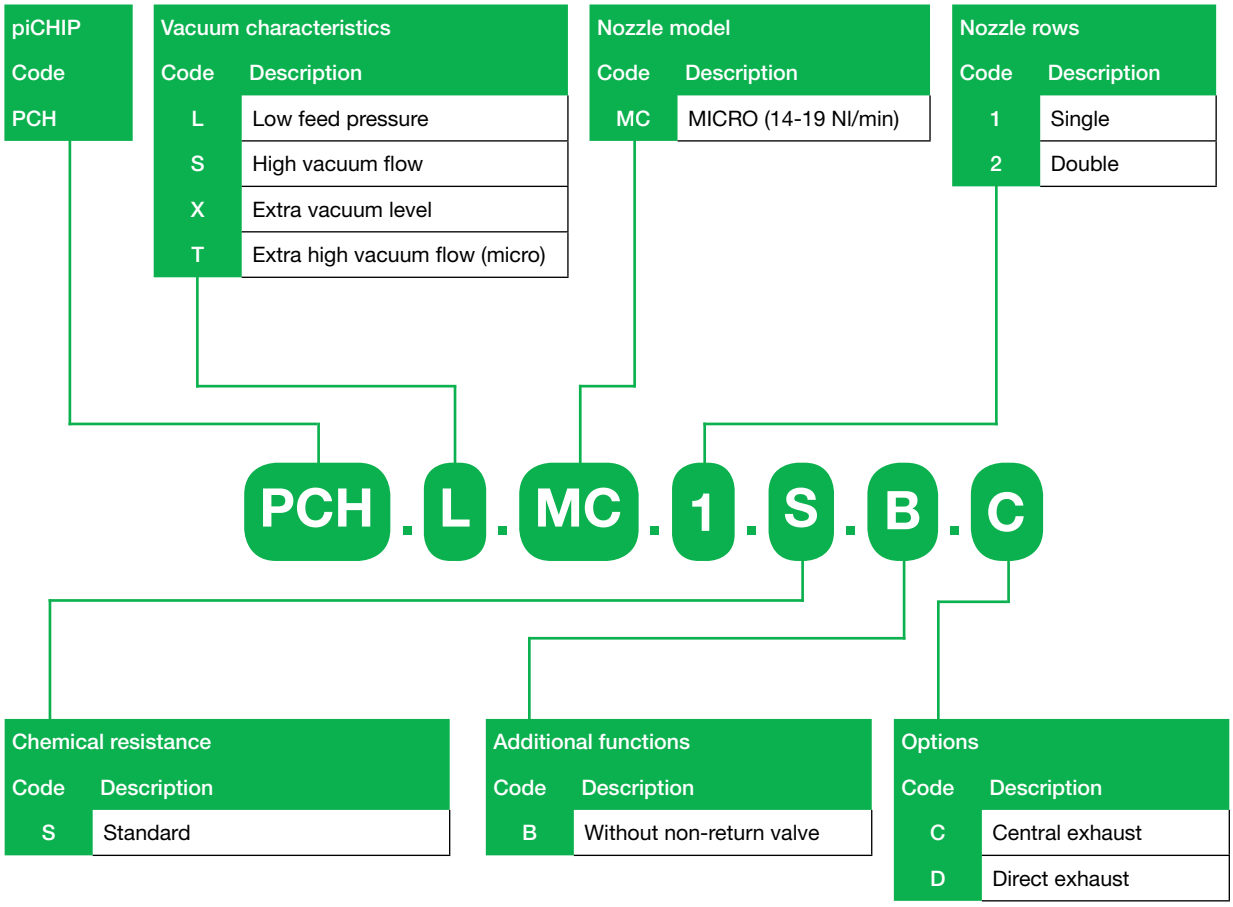
Dimensional drawing



Ordering information

For a complete list of available pumps and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

piCHIP10X – Customer Code



Inline MICRO family

piINLINE® are small lightweight inline ejectors that use the patented COAX® technology inside. They can be mounted directly on a hose close to the suction cup (or point of suction). Piab's piINLINE® ejector program offers much better performance with at least 40-50% lower energy consumption compared to competing Inline single-stage ejectors in corresponding sizes. Inline vacuum generators are especially common in electronic/ semiconductor pick-and-place applications, dedicated packaging equipment, injection-molding automation and unloading/loading metal forming machines (bending, punching and laser-cutting)

The COAX® Cartridge Si/Ti for extra vacuum flow. Bi cartridge for reliability at low feed pressures. And Ti/Xi cartridge when high flow and deep vacuum is needed.

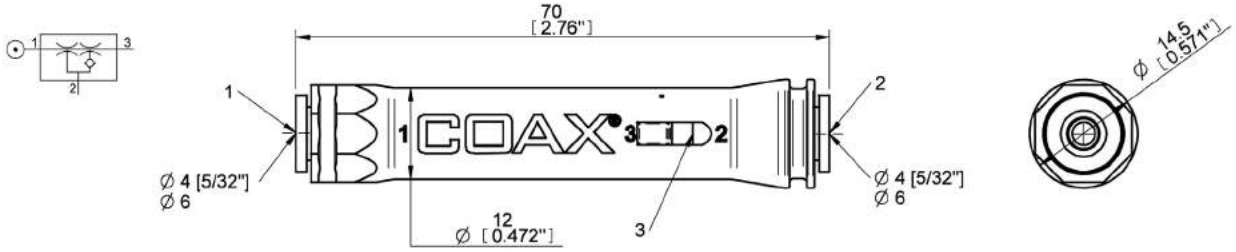
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)									Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	-inHg
MICRO Bi03-2	26	0.30	0.49	0.32	0.13	0.08	0.07	0.05	0.03	0.01	—	24.5
MICRO Si02-2	87	0.25	0.59	0.44	0.25	0.17	0.15	0.13	0.08	0.04	—	22.1
MICRO Ti05-2	58	0.57	0.68	0.59	0.49	0.36	0.21	0.15	0.08	0.04	0.01	24.8
MICRO Ti05-2	87	0.78	0.66	0.57	0.51	0.42	0.32	0.19	0.08	0.02	—	22.1
MICRO Xi2.5-2	73	0.28	0.51	0.36	0.21	0.13	0.08	0.06	0.04	0.02	0.02	27.1

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)								Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	-inHg
MICRO Bi03-2	26	0.30	14.2	39.6	110	181	283	453	793	1444	24.5
MICRO Si02-2	87	0.25	11.6	28.6	56.9	93.4	139	195	289	—	22.1
MICRO Ti05-2	58	0.57	9.34	20.7	34.0	56.6	87.8	142	235	470	24.8
MICRO Ti05-2	87	0.78	8.50	19.8	34.0	51.0	73.6	119	239	—	22.1
MICRO Xi2.5-2	73	0.28	13.9	34.8	70.2	127	207	320	510	793	27.1

Dimensional drawing



Ordering information

For a complete list of available pumps and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings. CAD-drawings and much more. Register and get full access to all resources available.

Inline MINI family

piINLINE® are small lightweight inline ejectors that use the patented COAX® technology inside. They can be mounted directly on a hose close to the suction cup (or point of suction). Piab's piINLINE® ejector program offers much better performance with at least 40-50% lower energy consumption compared to competing inline single-stage ejectors in corresponding sizes. Inline vacuum generators are especially common in electronic/semiconductor pick-and-place applications, dedicated packaging equipment, injection-molding automation and unloading/loading metal forming machines (bending, punching and laser-cutting).

The COAX Cartridge Si cartridge for extra vacuum flow the Pi cartridge for high performance at low feed pressures. And the Xi cartridge when high flow and deep vacuum is needed.

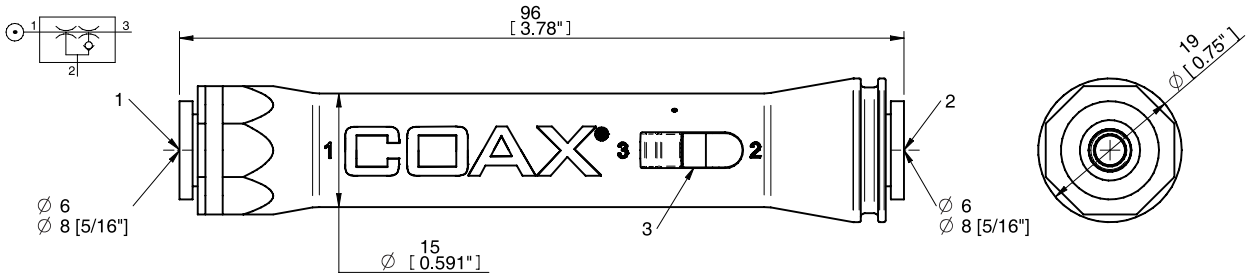
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	10	20	30	40	50	60	70	80	90	-inHg
MINI Si08-2	87	0.93	1.46	1.17	0.89	0.59	0.49	0.34	0.25	0.17	—	—	22.1
MINI Pi12-2	46	0.93	1.21	0.93	0.66	0.49	0.40	0.30	0.21	0.13	0.06	—	26.6
MINI Xi10-2	73	0.97	1.31	1.06	0.78	0.57	0.40	0.32	0.23	0.15	0.095	0.023	27.7

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	10	20	30	40	50	60	70	80	90	-inHg
MINI Si08-2	87	0.93	4.53	10.5	18.7	31.1	39.6	59.5	87.8	—	—	22.1
MINI Pi12-2	46	0.93	5.66	13.0	23.5	31.1	51.0	76.5	113	181	—	26.6
MINI Xi10-2	73	0.97	5.10	11.6	20.4	28.3	45.3	65.1	99.1	150	252	27.7

Dimensional drawing



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Inline MIDI family

piINLINE® are small lightweight inline ejectors that use the patented COAX® technology inside. They can be mounted directly on a hose close to the suction cup (or point of suction). Piab's piINLINE® ejector program offers much better performance with at least 40-50% lower energy consumption compared to competing inline single-stage ejectors in corresponding sizes. Inline vacuum generators are especially common in electronic/ semiconductor pick-and-place applications, dedicated packaging equipment, injection-molding automation and unloading/loading metal forming machines (bending, punching and laser-cutting).

The COAX® Cartridge Si cartridge for extra vacuum flow the Pi cartridge for high performance at low feed pressures. And the Xi cartridge when high flow and deep vacuum is needed.

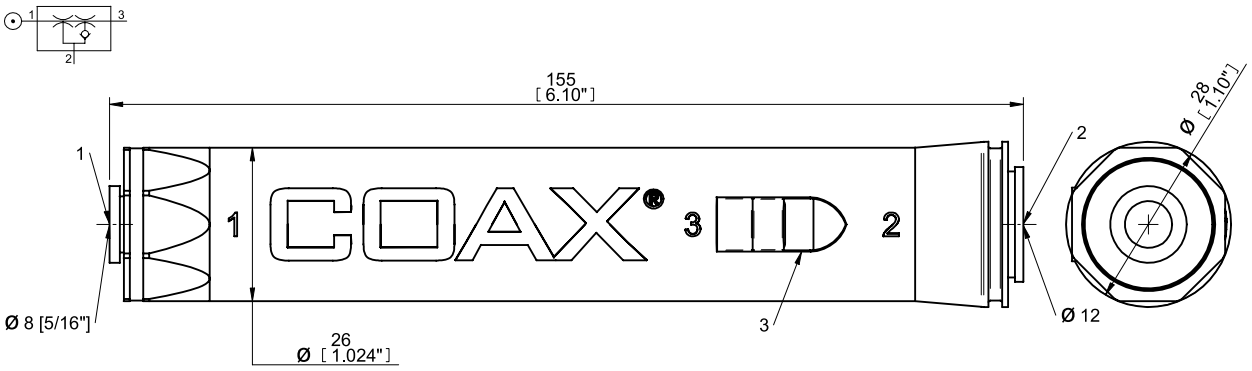
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MIDI Si32-2	87	3.71	6.57	5.3	4.03	2.54	1.48	1.27	1.06	0.74	—	—	22.1
MIDI Pi48-2	45	4.24	5.72	4.66	3.18	1.97	1.38	1.06	0.74	0.53	0.21	—	26.6
MIDI Xi40-2	65	3.88	5.93	4.87	3.39	2.12	1.55	1.23	0.91	0.68	0.38	0.06	28.1

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MIDI Si32-2	87	3.71	1.13	2.27	3.96	7.08	11.3	16.7	23.2	—	—	22.1
MIDI Pi48-2	45	4.24	1.13	2.83	5.1	8.5	13.6	20.1	29.7	52.4	113	26.6
MIDI Xi40-2	65	3.88	1.13	2.55	4.81	7.93	12.5	17.8	25.5	36.8	65.1	28.1

Dimensional drawing



Ordering information

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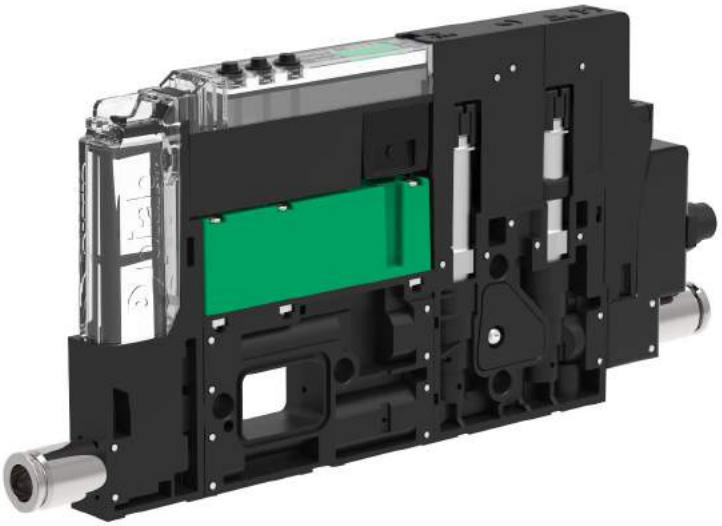
piCOMPACT®10X



piCOMPACT® is an ejector family with integrated controls, so called compact or ”all-in-one” ejector unit. It is a stackable platform with the possibility to mount several units in the same manifold and have common pneumatic and electrical connections. The focus during development has been on the most significant “key criteria” for these types of pumps, reliability and speed, as well as introducing some brand new attractive features/functions. That in combination with our state-of-the-art vacuum engine, COAX®, the product is outstanding. By working at low feed pressure and maximizing the utilization rate of the compressed air, the COAX® ejectors reduce energy consumption for manufacturers while increasing productivity and reliability. Its vacuum response to 15–18 -inHg is typically 30–50% faster compared to single stage technology. The piCOMPACT® is only 10 mm wide with a large 6 mm vacuum connection for maximum performance.

Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)								Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	-inHg
MICRO Bi03-2	31.9/29.0*	0.30	0.44	0.30	0.13	0.04	0.03	0.03	0.01	0.01	24.2
MICRO Si02-2	87.6/87*	0.23	0.55	0.38	0.20	0.11	0.10	0.08	0.06	0.04	22.1
MICRO Ti05-2	62.4/58*	0.49	0.66	0.59	0.47	0.34	0.19	0.13	0.10	0.05	24.8
MICRO Xi2.5-2	74/72.5*	0.28	0.49	0.32	0.17	0.09	0.08	0.06	0.05	0.03	26.9

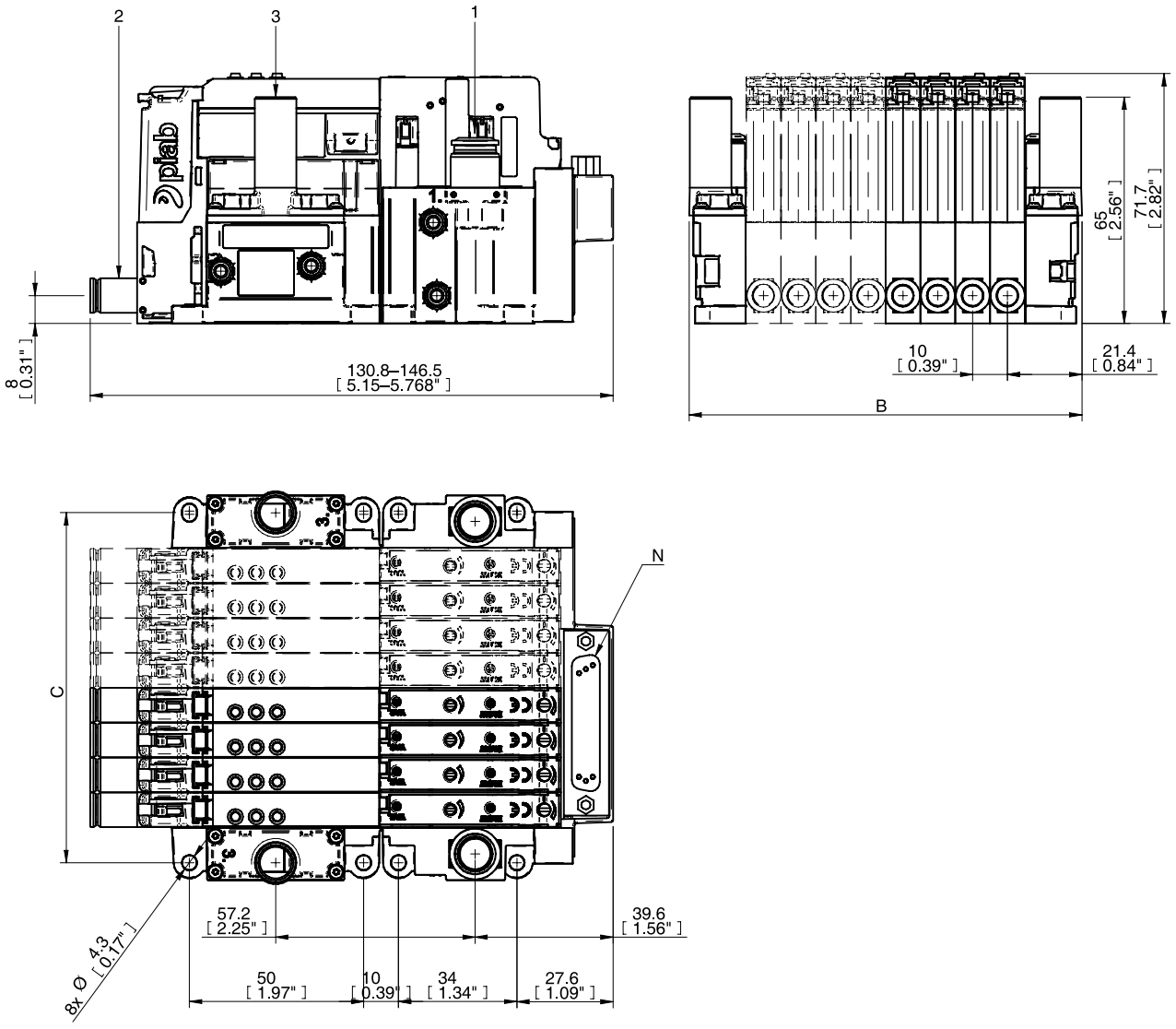
* Pump/nozzle.

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (ms) of 0.30 cu in to reach different vacuum levels (-inHg)											Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	Max	-inHg
MICRO Bi03-2	0.22/0.2*	0.30	5	9.9	20.4	52.8	99.4	153	228	354	552	—	652**	24.2
MICRO Si02-2	87.6/87*	0.23	5	8.90	16.2	30.6	48.3	68.4	95.0	136	—	—	185**	22.1
MICRO Ti05-2	62.4/58*	0.49	5.00	6.70	10.2	14.8	23.0	34.6	50.0	70.2	114	—	159**	24.8
MICRO Xi2.5-2	74/72.5*	0.28	5.10	8.90	16.2	35.0	59.0	86.6	121	169	250	421	464**	26.9

* Pump/nozzle ** Evacuation time (ms) at max vacuum level (-inHg).

Dimensional drawing



Ordering information

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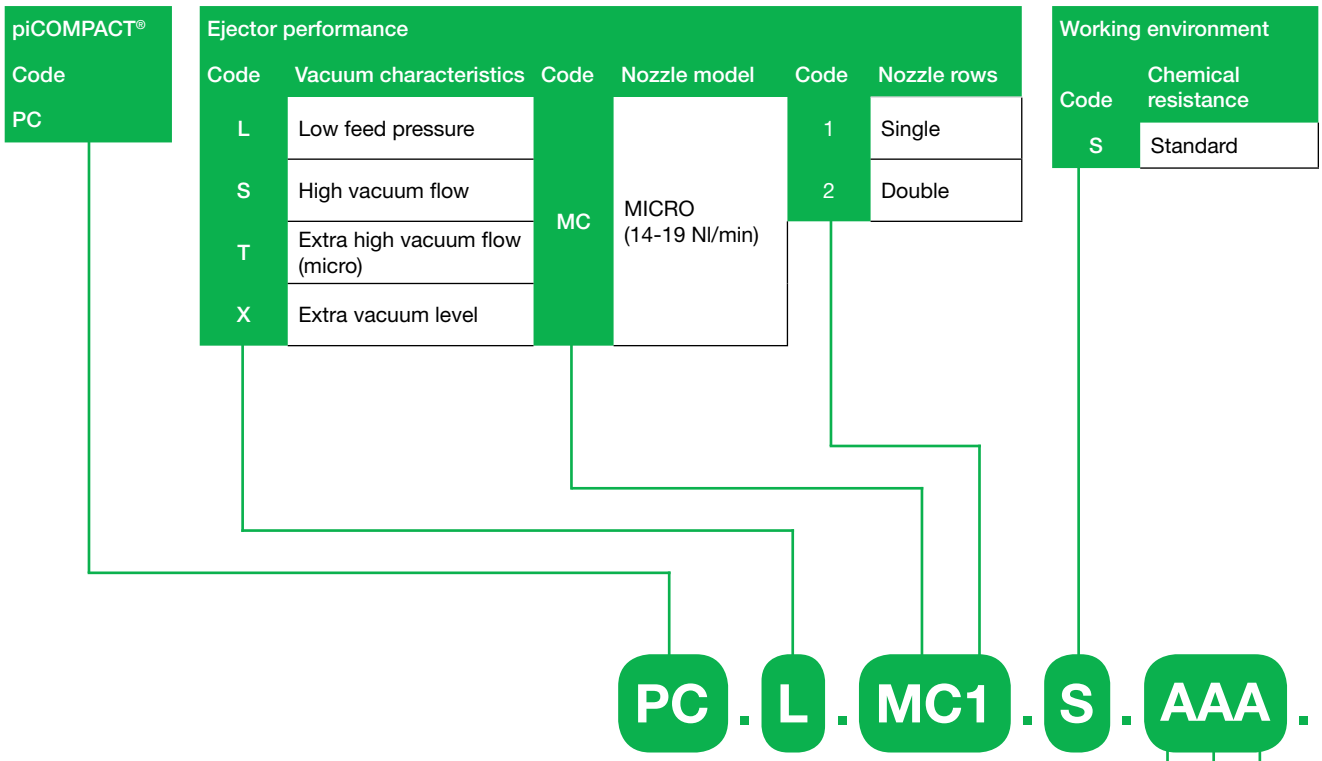
piCOMPACT®10X – Customer Code

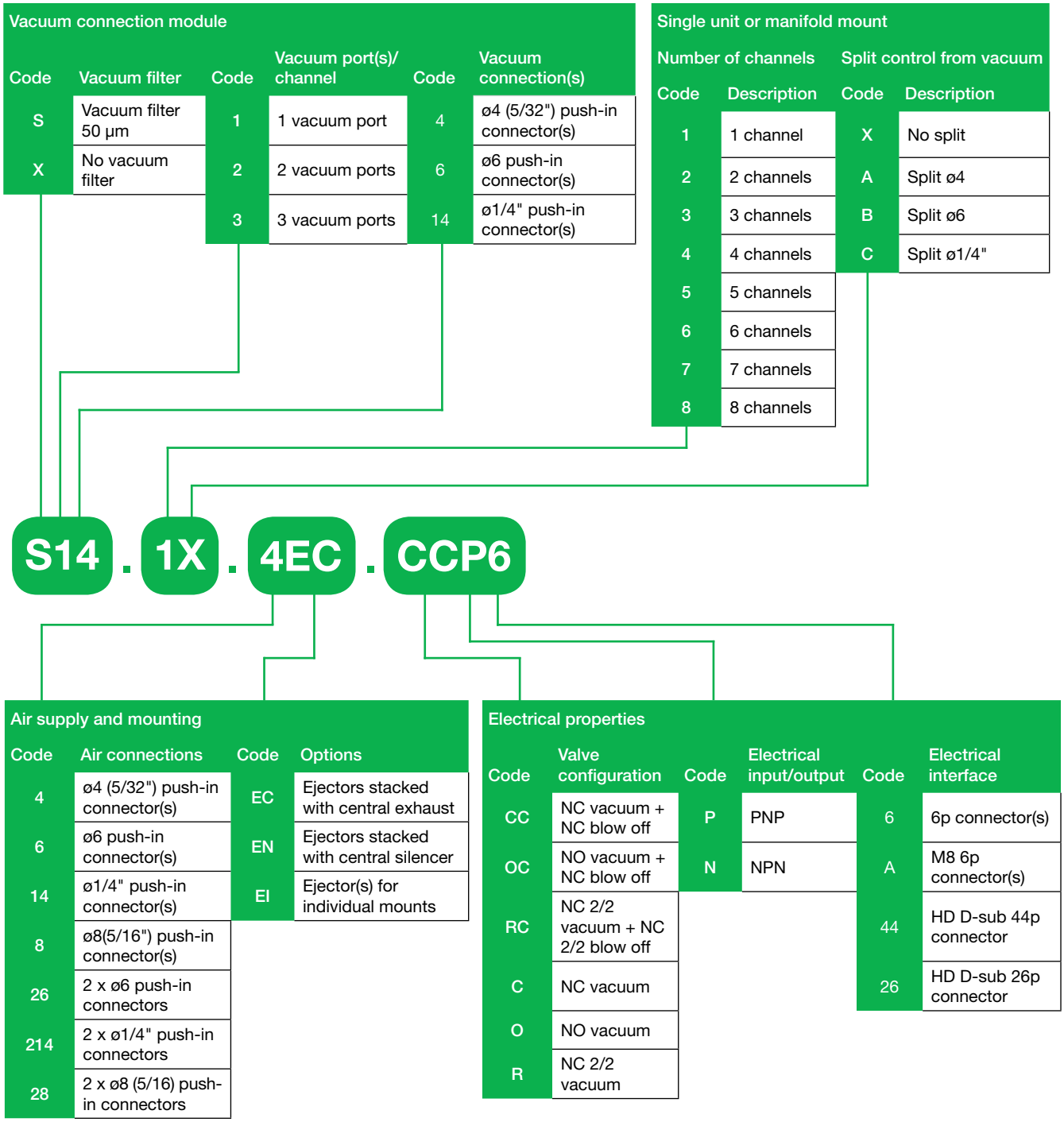


piCOMPACT® Code
PC

Ejector performance					
Code	Vacuum characteristics	Code	Nozzle model	Code	Nozzle rows
L	Low feed pressure	MC	MICRO (14-19 Nl/min)	1	Single
S	High vacuum flow			2	Double
T	Extra high vacuum flow (micro)				
X	Extra vacuum level				

Working environment	
Code	Chemical resistance
S	Standard

Functionality					
Code	Control functions	Code	Non-return valve	Code	Vacuum sensing
A	Electrical ES, vac and blow off	A	With non-return valve	A	Display, analog and digital output
B	Electrical ES, vac and automatic blow off	B	Without non-return valve	X	No vacuum sensing
C	Vac and blow off				
D	Vac and automatic blow off				
E	Vacuum on/off (vac)				


Vacuum connection module
Code
Vacuum filter
S
Vacuum filter 50 µm
X
No vacuum filter
Code
Vacuum port(s)/ channel
1
1 vacuum port
2
2 vacuum ports
3
3 vacuum ports
Code
Vacuum connection(s)
4
ø4 (5/32") push-in connector(s)
6
ø6 push-in connector(s)
14
ø1/4" push-in connector(s)
Single unit or manifold mount
Number of channels
Code
Description
1
1 channel
2
2 channels
3
3 channels
4
4 channels
5
5 channels
6
6 channels
7
7 channels
8
8 channels
Split control from vacuum
Code
Description
X
No split
A
Split ø4
B
Split ø6
C
Split ø1/4"
S14
1X
4EC
CCP6
Air supply and mounting
Code
Air connections
4
ø4 (5/32") push-in connector(s)
6
ø6 push-in connector(s)
14
ø1/4" push-in connector(s)
8
ø8(5/16") push-in connector(s)
26
2 x ø6 push-in connectors
214
2 x ø1/4" push-in connectors
28
2 x ø8 (5/16) push-in connectors
Code
Options
EC
Ejectors stacked with central exhaust
EN
Ejectors stacked with central silencer
EI
Ejector(s) for individual mounts
Electrical properties
Code
Valve configuration
CC
NC vacuum + NC blow off
OC
NO vacuum + NC blow off
RC
NC 2/2 vacuum + NC 2/2 blow off
C
NC vacuum
O
NO vacuum
R
NC 2/2 vacuum
Code
Electrical input/output
P
PNP
N
NPN
Code
Electrical interface
6
6p connector(s)
A
M8 6p connector(s)
44
HD D-sub 44p connector
26
HD D-sub 26p connector

piCOMPACT®23

piCOMPACT® is an ejector family with integrated controls, so called compact or ”all-in-one” ejector unit. It is a stackable platform with the possibility to mount several units in the same manifold and have common pneumatic and electrical connections. The focus during development has been on the most significant “key criteria” for these types of pumps, reliability and speed, as well as introducing some brand new attractive features/functions. That in combination with our state-of-the-art vacuum engine, COAX®, the product is outstanding. By working at low feed pressure and maximizing the utilization rate of the compressed air, the COAX® ejectors reduce energy consumption for manufacturers while increasing productivity and reliability.Its vacuum response to 15–18 -inHg is typically 30–50% faster compared to single stage technology.

Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)									Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	-inHg
SX12	73.2/72.5*	1.53	2.59	2.18	1.65	1.10	0.57	0.44	0.32	0.19	0.06	25
SX42	68.2/62.4*	4.68	7.33	6.40	5.11	3.60	2.16	1.29	1.00	0.59	0.21	26.6

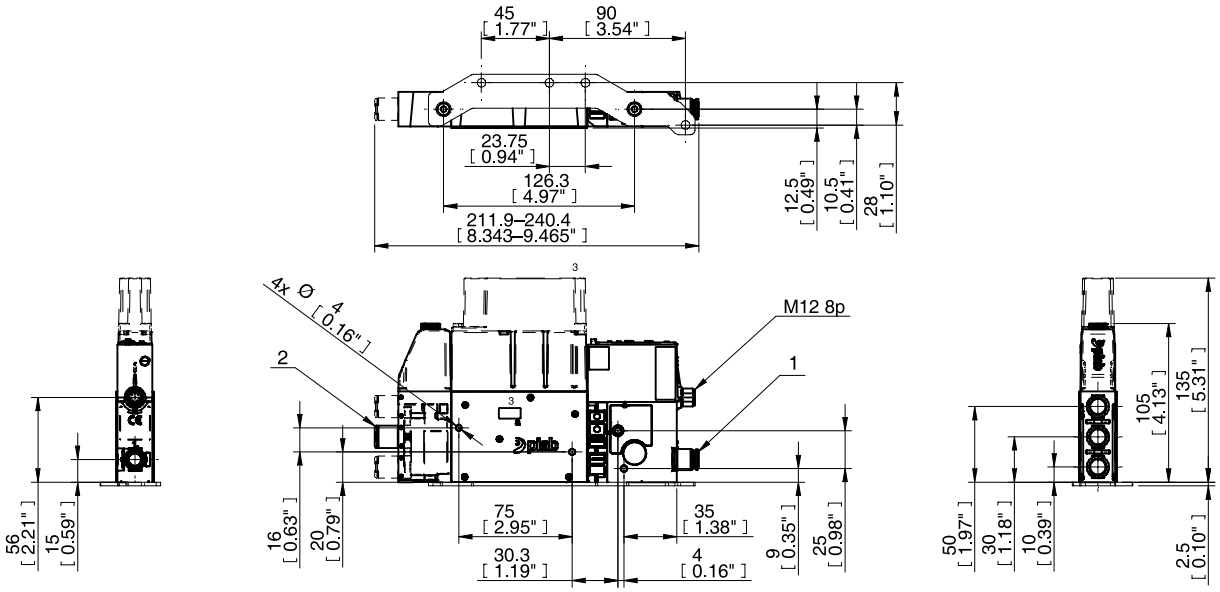
* Pump/nozzle.

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)								Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	-inHg
SX12	73.2/72.5*	1.53	2.32	5.69	10.6	19.1	34.5	54.2	84.4	175	25
SX42	68.2/62.4*	4.68	1.08	2.10	3.48	5.78	10.1	16.3	24.9	48.7	26.6

* Pump/nozzle.

Dimensional drawing



Ordering information

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piCOMPACT®23 – Customer Code

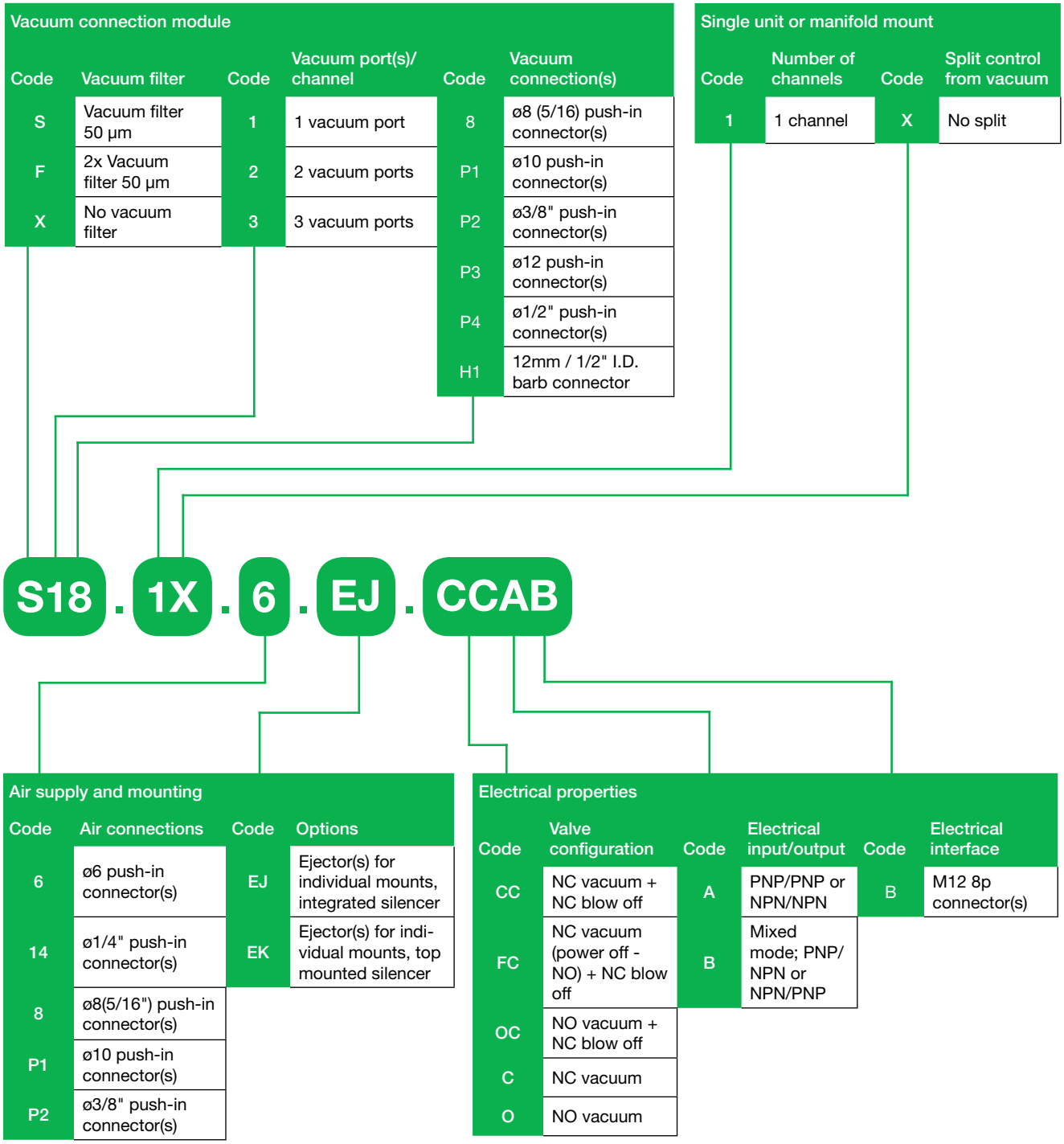
piCOMPACT® Code
PC

Ejector performance					
Code	Vacuum characteristics	Code	Nozzle model	Code	Nozzle rows
F	High vacuum performance	12	SX12 (73-146 Nl/min)	1	Single
				2	Double
		42	SX42 (207-415 Nl/min)		

Working environment	
Code	Chemical resistance
S	Standard

PC . F . 121 . S . AAA .

Functionality					
Code	Control functions	Code	Non-return valve	Code	Vacuum sensing
A	Electrical ES, vac and blow off	A	With non-return valve	A	Display, analog and digital outputs
B	Electrical ES, vac and automatic blow off	B	Without non-return valve	B	Display, 2x digital outputs
C	Vac and blow off			C	Display, leakage warning and digital outputs
D	Vac and automatic blow off			X	No vacuum sensing
E	Vacuum on/off (vac)				



Vacuum connection module

Code	Vacuum filter
S	Vacuum filter 50 µm
F	2x Vacuum filter 50 µm
X	No vacuum filter

Code	Vacuum port(s)/ channel
1	1 vacuum port
2	2 vacuum ports
3	3 vacuum ports

Code	Vacuum connection(s)
8	ø8 (5/16) push-in connector(s)
P1	ø10 push-in connector(s)
P2	ø3/8" push-in connector(s)
P3	ø12 push-in connector(s)
P4	ø1/2" push-in connector(s)
H1	12mm / 1/2" I.D. barb connector

Single unit or manifold mount

Code	Number of channels
1	1 channel

Code	Split control from vacuum
X	No split

Air supply and mounting

Code	Air connections
6	ø6 push-in connector(s)
14	ø1/4" push-in connector(s)
8	ø8(5/16") push-in connector(s)
P1	ø10 push-in connector(s)
P2	ø3/8" push-in connector(s)

Code	Options
EJ	Ejector(s) for individual mounts, integrated silencer
EK	Ejector(s) for individual mounts, top mounted silencer

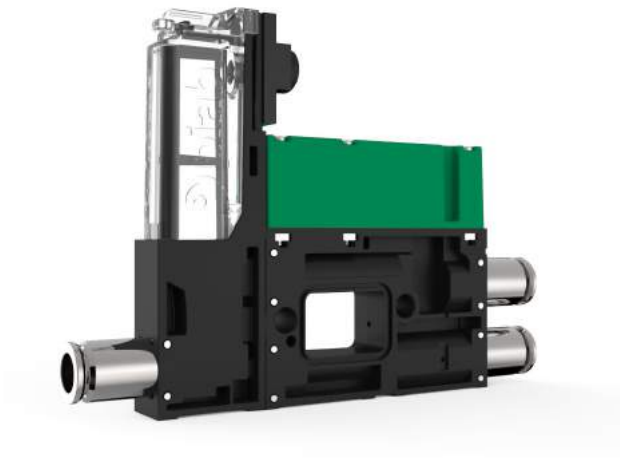
Electrical properties

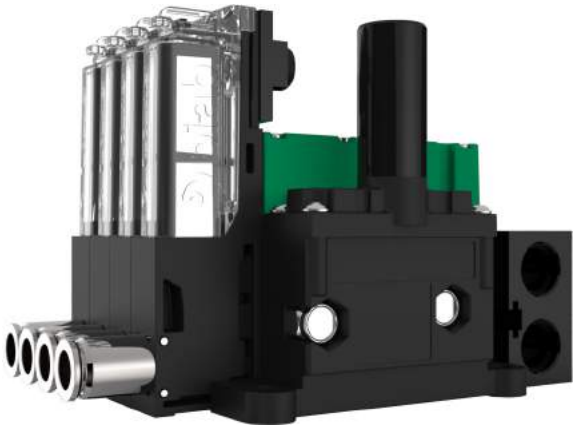
Code	Valve configuration
CC	NC vacuum + NC blow off
FC	NC vacuum (power off - NO) + NC blow off
OC	NO vacuum + NC blow off
C	NC vacuum
O	NO vacuum

Code	Electrical input/output
A	PNP/PNP or NPN/NPN
B	Mixed mode; PNP/ NPN or NPN/PNP

Code	Electrical interface
B	M12 8p connector(s)

piPUMP10X





Compact/stackable vacuum pumps are air-driven multistage ejector families, based on COAX® technology, It provides a high operational reliability, in case of fluctuating or low compressed-air pressure. Excellent performance when a quick response time when deep vacuum is needed. There is also a quick vacuum non-return valve as an option.

Vacuum flow

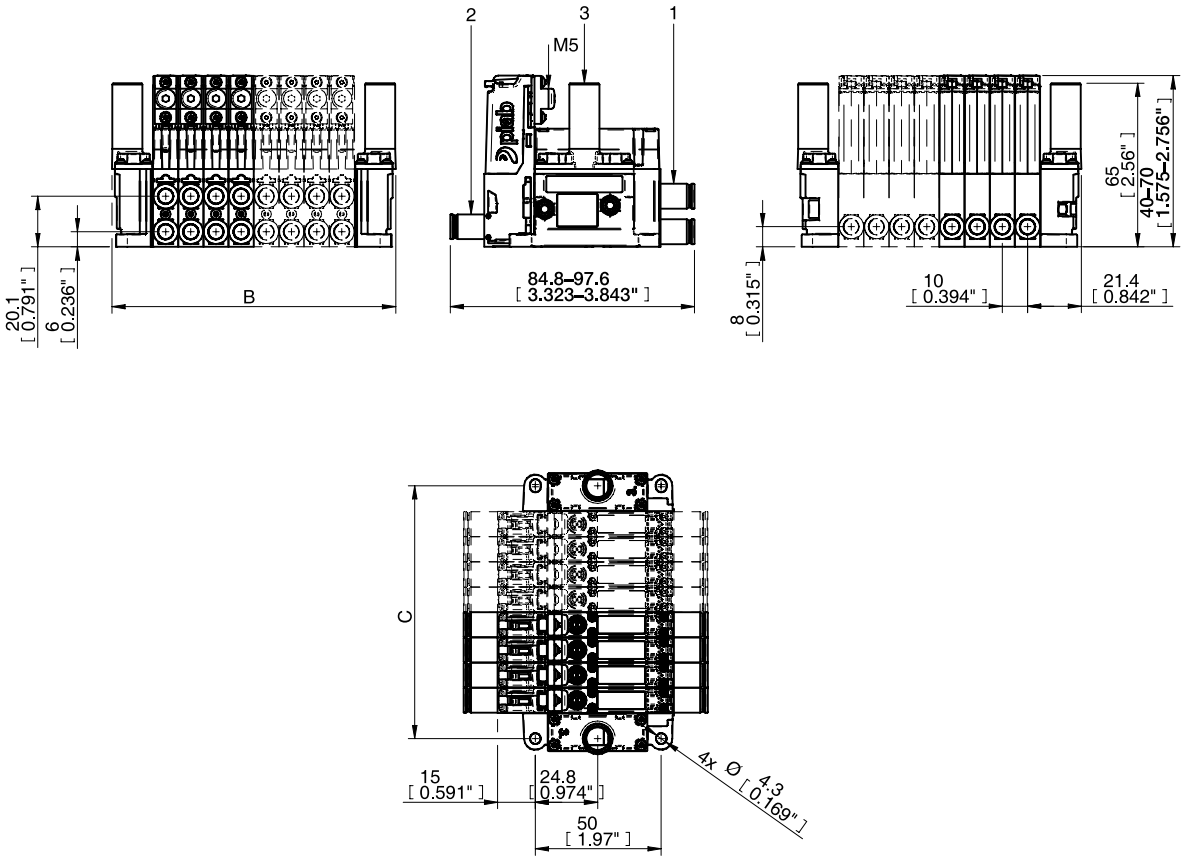
COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)								Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	-inHg
MICRO Bi03-2	29	0.30	0.44	0.30	0.133	0.044	0.034	0.030	0.015	0.008	24.2
MICRO Si02-2	87	0.23	0.55	0.38	0.201	0.112	0.095	0.081	0.057	0.040	22.1
MICRO Ti05-2	58	0.49	0.66	0.59	0.466	0.339	0.186	0.133	0.095	0.049	24.8
MICRO Xi2.5-2	73	0.28	0.49	0.32	0.167	0.093	0.076	0.064	0.049	0.028	26.8

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (ms) of 0.30 cu in to reach different vacuum levels (-inHg)											Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	Max	-inHg
MICRO Bi03-2	29	0.30	5	9.9	20.4	53	99	153	228	354	552	—	652*	24.2
MICRO Si02-2	87	0.23	5	8.9	16.2	31	48	68	95	136	—	—	185*	22.1
MICRO Ti05-2	58	0.49	5	6.7	10.2	14.8	23	35	50	70	114	—	159*	24.8
MICRO Xi2.5-2	73	0.28	5.1	8.9	16.2	35	59	87	121	169	250	421	464*	26.8

*Evacuation time (ms) at max vacuum level (-inHg)

Dimensional drawing



Ordering information

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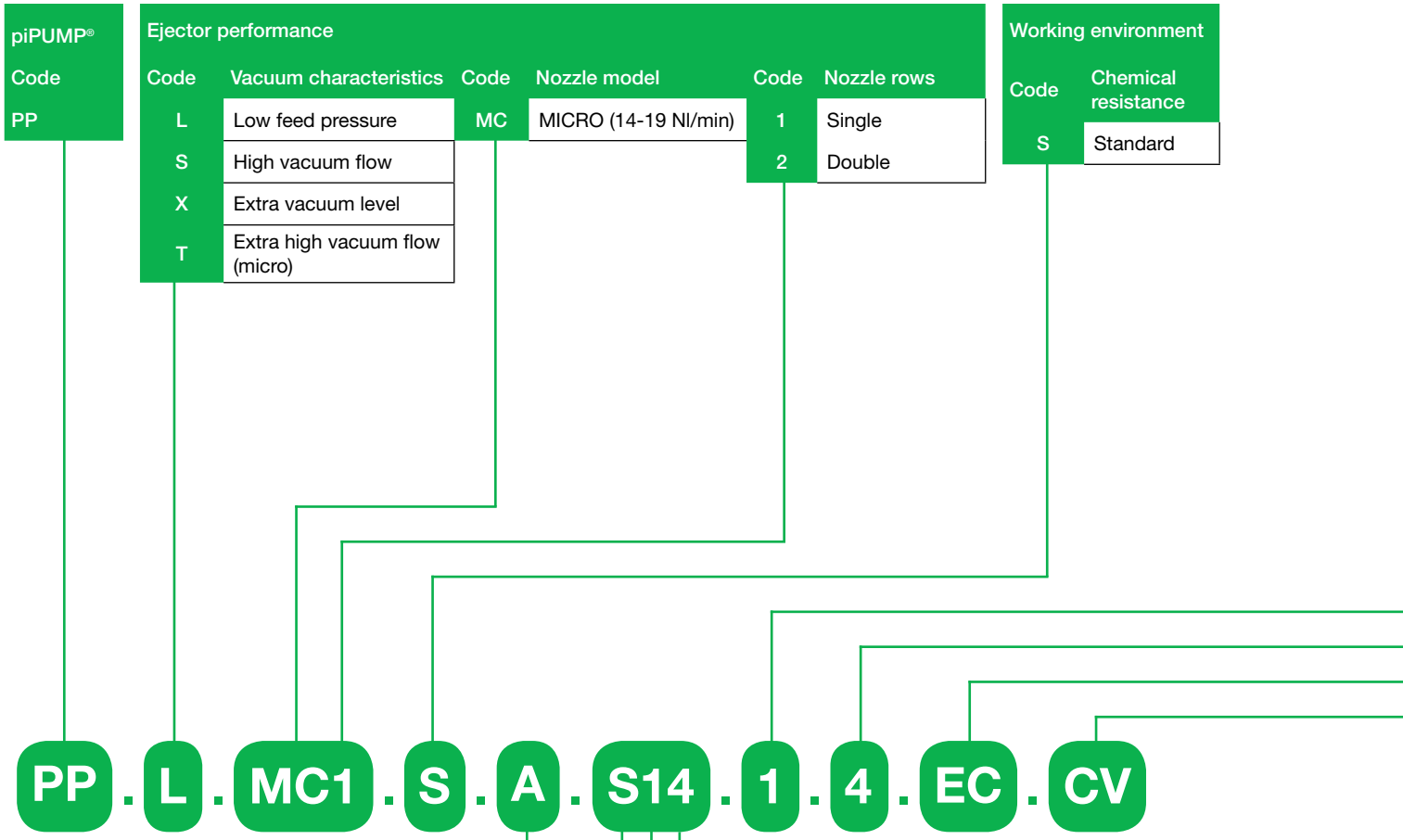
piPUMP10X – Customer Code



Functionality

Additional function

Code	Description
A	With non-return valve
B	Without non-return valve

Vacuum connection module

Vacuum filter		Vacuum port(s)/channel		Vacuum connection(s)	
Code	Description	Code	Description	Code	Description
S	Vacuum filter 50 µm	1	1 vacuum port	4	ø4 (5/32") push-in connector(s)
X	No vacuum filter	2	2 vacuum ports	6	ø6 push-in connector(s)
		3	3 vacuum ports	14	ø1/4" push-in connector(s)

Single unit or manifold mount	
Code	Number of channels
1	1 channel
2	2 channels
3	3 channels
4	4 channels
5	5 channels
6	6 channels
7	7 channels
8	8 channels

Air supply and mounting			
Code	Air connections	Code	Options
4	ø4 (5/32”) push-in connector(s)	EC	Ejectors stacked with central exhaust
6	ø6 push-in connector(s)	EX	Ejectors stacked without central exhaust
14	ø1/4” push-in connector(s)	EN	Ejectors stacked with central silencer
18	1/8” NPSF Common feed	X	No option

Release functions	
Code	Release functions
CV	Blow off check valve

P3010 family

Compact/stackable vacuum pumps are air-driven multistage ejector families, based on COAX® technology, they are equipped with integrated controls and special functions, such as on/off valve, blow-off valve, vacuum switch, energy saving function etc. They are configurable platforms, making it easy to specify the exact control functions needed for the system.

It is available with three-stage COAX® cartridge MINI. Choose an Si cartridge for extra vacuum flow, a Pi cartridge for high performance at low feed pressure or an Xi cartridge when high flow and deep vacuum is needed. The P3010 includes a flow-through silencer and a built-in vacuum filter for harsh environments. It is suitable for fast and reliable evacuation in sealed systems

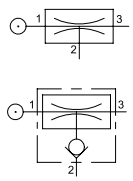
Vacuum flow

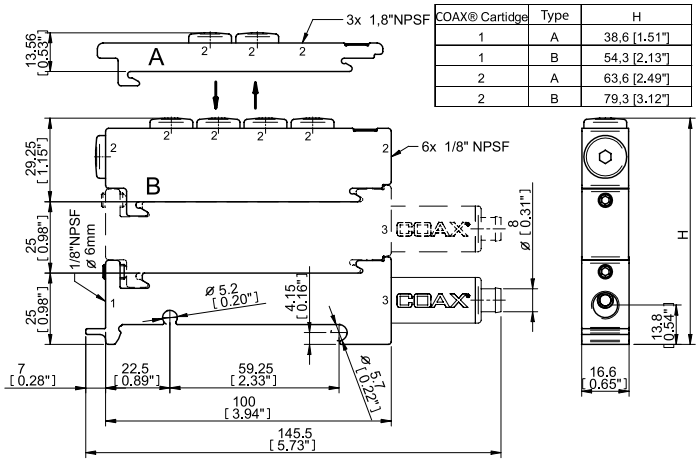
COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MINI Pi12-3	46	0.93	2.97	1.27	0.93	0.57	0.40	0.30	0.21	0.13	0.06	—	26.6
MINI Si08-3	87	0.93	2.84	1.55	1.17	0.74	0.49	0.36	0.28	0.17	—	—	22.1
MINI Xi10-3	73	0.97	3.03	1.48	1.06	0.70	0.40	0.32	0.23	0.15	0.095	0.023	27.7

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MINI Pi12-3	46	0.93	2.27	6.51	13.9	28.3	48.1	73.6	110	178	—	26.6
MINI Si08-3	87	0.93	2.83	7.08	13.6	22.7	36.8	65.1	130	—	—	22.1
MINI Xi10-3	73	0.97	2.55	7.36	14.2	25.5	42.5	62.3	96.3	147	249	27.7

Dimensional drawing





COAX® Cartidge	Type	H
1	A	38,6 [1.51"]
1	B	54,3 [2,13"]
2	A	63,6 [2,49"]
2	B	79,3 [3.12"]

Ordering information

For a complete list of available pumps and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

Accessory descriptions

P3010 Quick release

The quick release function has a volume of 0.18–3.67 in^3. Quick release is done by accumulating and utilizing the feed-air pressure as a boost. The ON/OFF is activated simultaneously with the P3010

P3010 ES

The P3010 has an integrated air-saving function (piSAVE onoff) that minimizes the air consumption by controlling the incoming air flow to the pump. Large hysteresis is recommended for sealed vacuum handling applications such as metal sheet, glass or plastic handling. And small hysteresis is recommended if a very accurate vacuum level has to be maintained in the process. It has an adjustable ES switch level and is a pneumatic function.

Solenoid Valve

The solenoid valve is an electric 3/2 valve with a possibility for manual override. As it has push in connections it is quick and easy to mount. The body has three M5 ports. It is suitable for compressed air with a filtration of 40 µm.

Vacuum switch

A vacuum switch can be used for many different applications. It converts a vacuum signal into a electric or pneumatic signal. Vacuum switches are available in many different versions, from very small electro-mechanicals with pre-set settings to pneumatics or programmable fully electronics. Some switches are design to fit directly into the P3010 with an Ø 6 mm push-in.

AVM™2

The AVM™2 unit has built-in control and monitoring functions. The integrated energy saving function (ES) minimizes the air consumption in sealed systems. It has valves for vacuum on/off and blow-off with electrical power failsafe function. The AVM has digital outputs, 16 pre-set combinations of vacuum levels, digital vacuum level display and a mechanical valve for blow-off flow adjustment.

CU

The CU has electric valves for vacuum on/off and blow-off and a mechanical valve for blow-off flow adjustment. It also has a special M12 4-pin cable assembly with LED for status of valve signal.

P3010 – Customer Code

P3010
Code
P3010

Code	Connection interface
00	Housing connection Ø6 mm
01	Housing connection 1/8”

Code	COAX® Cartridge module
AA	COAX® Cartridge module Si08-3 FS x1
AB	COAX® Cartridge module Si08-3 AFS x1
AC	COAX® Cartridge module Si08-3 FS x2
AD	COAX® Cartridge module Si08-3 AFS x2
AE	COAX® Cartridge module Pi12-3 FS x1
AF	COAX® Cartridge module Pi12-3 AFS x1
AG	COAX® Cartridge module Pi12-3 FS x2
AH	COAX® Cartridge module Pi12-3 AFS x2
AI	COAX® Cartridge module Xi10-3 FS x1
AJ	COAX® Cartridge module Xi10-3 AFS x1
AK	COAX® Cartridge module Xi10-3 FS x2
AL	COAX® Cartridge module X10-3 AFS x2

P3010 . 00 . AA . 01 . AA . 00

Code	Connection modules / function
01	Connection module high 6x1/8”
02	Connection module low 3x1/8”
04	Function Quick-release module 10/6 - 3
05	Function Quick-release module 8/6 - 30
06	Function Quick-release module 8/6 - 60
07	Function Quick-release module 10/6 - 30
08	Function Quick-release module 10/6 - 60
09	Function Quick-release module 1/4”/6 - 3 (NPSF)
10	Function Quick-release module 1/4”/6-30 (NPSF)
11	Function Quick-release module 1/4”/6-60 (NPSF)
12	Function Quick-release module 8/6-3
27	Function AVM™2 NO
28	Function AVM™2 NC (power off - NO)
29	Function CU NC
30	Function AVM™2 NO auto blow-off (1 sec)
31	Function AVM™2 NC auto blow-off (1 sec)
32	Function AVM™2 NC 2 (power off - NC)
33	Function CU NO

Code	Energy saving
AA	No energy saving (included in AVM2)
AB	Solenoid valve DS23
AC	piSAVE onoff 2/2 NO large hysteres
AD	piSAVE onoff 2/2 NO small hysteres

Code	Vacuum sensing
00	No vacuum sensing (included in AVM2)
01	Vacuum switch PNP NO MM8
02	Vacuum switch NPN NO MM8
05	Vacuum switch PNP NO LM8
09	Vacuum switch PNP NO DM8
10	Vacuum switch NPN NO DM8
11	Vacuum switch Inductive, adj. Knob
18	Vacuum switch VS4015 9 -inHg
19	Vacuum switch VS4015 15 -inHg
20	Vacuum switch VS4015 21 -inHg
21	Vacuum switch VS4016 9 -inHg
22	Vacuum switch VS4016 15 -inHg
23	Vacuum switch VS4016 21 -inHg

P5010 family

Compact/stackable vacuum pumps are air-driven multistage ejector families. based on COAX® technology. they are equipped with integrated controls and special functions. such as on/off valve. blow-off valve. vacuum switch. energy saving function etc. They are configurable platforms. making it easy to specify the exact control functions needed for the system.

It has a patented COAX® push-in technology that allows insertion and removal of the cartridge without tools. It is available two or three-stage COAX® cartridge MIDI. Choose an Si cartridge for extra vacuum flow. a Pi cartridge for high performance at low feed pressure or an Xi cartridge when high flow and deep vacuum is needed. The P5010 has an integrated flow-through silencer that is unaffected by dust and dirt. It provides substantially lower air-consumption as compared to conventional ejectors of similar sizes.

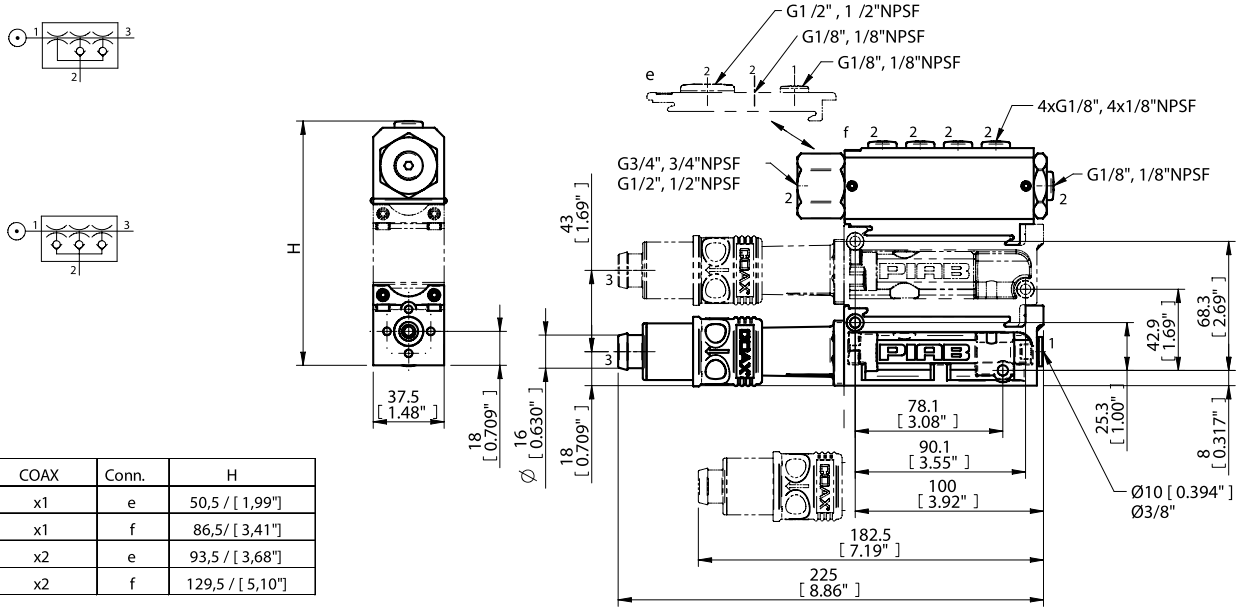
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	10	20	30	40	50	60	70	80	90	-inHg
Pi48-2	45	4.24	5.9	5.3	3.8	2.3	1.4	1.1	0.7	0.5	0.2	—	26.6
Pi48-3	45	4.34	11.9	5.3	3.8	2.3	1.4	1.1	0.7	0.5	0.2	—	26.6
Si32-2	87	3.71	7.0	6.4	5.5	3.6	1.9	1.3	1.1	0.7	—	—	22.1
Si32-3	87	3.71	12.7	7.4	5.5	3.6	1.9	1.3	1.1	0.7	—	—	22.1
Xi40-2	65	3.88	5.9	4.9	3.4	2.1	1.5	1.2	0.9	0.7	0.4	0.1	28.0
Xi40-3	65	3.88	12.5	6.4	4.2	2.8	1.5	1.2	0.9	0.7	0.4	0.1	28.0

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	10	20	30	40	50	60	70	80	90	-inHg
Pi48-2	45	4.24	0.85	1.98	3.68	7.36	13.0	19.8	28.3	45.3	113	26.6
Pi48-3	45	4.34	0.57	1.70	3.40	7.08	12.7	19.8	28.3	45.3	113	26.6
Si32-2	87	3.71	0.85	1.98	2.83	5.10	9.34	15.0	22.7	—	—	22.1
Si32-3	87	3.71	0.57	1.42	2.83	5.10	9.34	15.0	22.7	—	—	22.1
Xi40-2	65	3.88	1.13	2.55	4.81	7.93	12.5	17.8	25.5	36.8	65.1	28.0
Xi40-3	65	3.88	0.62	1.76	3.40	6.23	10.5	16.1	23.8	34.0	62.3	28.0

Dimensional drawing



COAX	Conn.	H
x1	e	50,5 / [1,99"]
x1	f	86,5/ [3,41"]
x2	e	93,5 / [3,68"]
x2	f	129,5 / [5,10"]

Ordering information

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Accessory descriptions

AVM™2

The AVM™2 unit has built-in control and monitoring functions. The integrated energy saving function (ES) minimizes the air consumption in sealed systems. It has valves for vacuum on/off and blow-off with electrical power failsafe function. The AVM has digital outputs, 16 pre-set combinations of vacuum levels, digital vacuum level display and a mechanical valve for blow-off flow adjustment.

CU

The CU has electric valves for vacuum on/off and blow-off and a mechanical valve for blow-off flow adjustment. It also has a special M12 4-pin cable assembly with LED for status of valve signal.

P5010 ES

The P5010 has an integrated air-saving function (piSAVE onoff) that minimizes the air consumption by controlling the incoming air flow to the pump. Large hysteresis is recommended for sealed vacuum handling applications such as metal sheet, glass or plastic handling. And small hysteresis is recommended if a very accurate vacuum level has to be maintained in the process. It has an adjustable ES switch level and is a pneumatic function.

P5010 – Customer Code

P5010
Code
P5010

Connection interface	
Code	Description
00	Housing, connection Ø 10 mm
01	Housing, connection Ø 3/8"

P5010 . 00 . AA . 01

COAX® Push-in	
Code	Description
AA	COAX® push-in module Si32-2X1
AB	COAX® push-in module Si32-3X1
AC	COAX® push-in module Si32-2X1, non-return valve
AD	COAX® push-in module Si32-3X1, non-return valve
AE	COAX® push-in module Si32-2X2
AF	COAX® push-in module Si32-3X2
AG	COAX® push-in module Si32-2X2, non-return valve
AH	COAX® push-in module Si32-3X2, non-return valve
AI	COAX® push-in module Pi48-2X1
AJ	COAX® push-in module Pi48-3X1
AK	COAX® push-in module Pi48-2X1, non-return valve
AL	COAX® push-in module Pi48-3X1, non-return valve
AM	COAX® push-in module Pi48-2X2
AN	COAX® push-in module Pi48-3X2
AO	COAX® push-in module Pi48-2X2, non-return valve
AP	COAX® push-in module Pi48-3X2, non-return valve
AQ	COAX® push-in module Xi40-2X1
AR	COAX® push-in module Xi40-3X1
AS	COAX® push-in module Xi40-2X1, non-return valve
AT	COAX® push-in module Xi40-3X1, non-return valve
AU	COAX® push-in module Xi40-2X2
AV	COAX® push-in module Xi40-3X2
AW	COAX® push-in module Xi40-2X2, non-return valve
AX	COAX® push-in module Xi40-3X2, non-return valve

Connection modules/function	
Code	Description
01	Connection module low, G connection
02	Connection module high, G connection
03	Connection module low, NPSF connection
04	Connection module high, NPSF connection
05	Function AVM™2 NO, G connection
06	Function AVM™2 NC (power off - NO), G connection
07	Function AVM™2 NO, NPSF connection
08	Function AVM™2 NC (power off - NO), NPSF connection
09	Function CU NC, G connection
10	Function CU NC, NPSF connection
11	Function ES Vacustat 2/2 NO large hysteres
12	Function ES Vacustat 2/2 NO small hysteres
13	Function AVM™2 NO, automatic blow-off (1 sec), G connection
14	Function AVM™2 NC, automatic blow-off (1 sec), G connection
15	Function AVM™2 NC 2 (power off - NC), G connection
16	Function AVM™2 NO, automatic blow-off (1 sec), NPSF connection
17	Function AVM™2 NC, automatic blow-off (1 sec), NPSF connection
18	Function AVM™2 NC 2 (power off - NC), NPSF connection

VGS™2010 family

Piab VGS™ – A product design where different suction cups are integrated with vacuum cartridges based on the patented COAX® technology. The “vacuum gripper” makes selection, sizing and installation of a vacuum system easier. With a VGS™ you will enjoy the benefits of a more cost-efficient and reliable decentralized vacuum system. It has a low weight at 0.88–1.38 oz..

It is available with a two-stage COAX® cartridge MICRO. Choose Bi for low feed pressure, Si for high vacuum flow, Xi for extra vacuum and Ti at 0.4/0.6 MPa for extra capacity/dirt tolerance. This VGS™ is compatible with any suction cup with G1/8” male fitting.

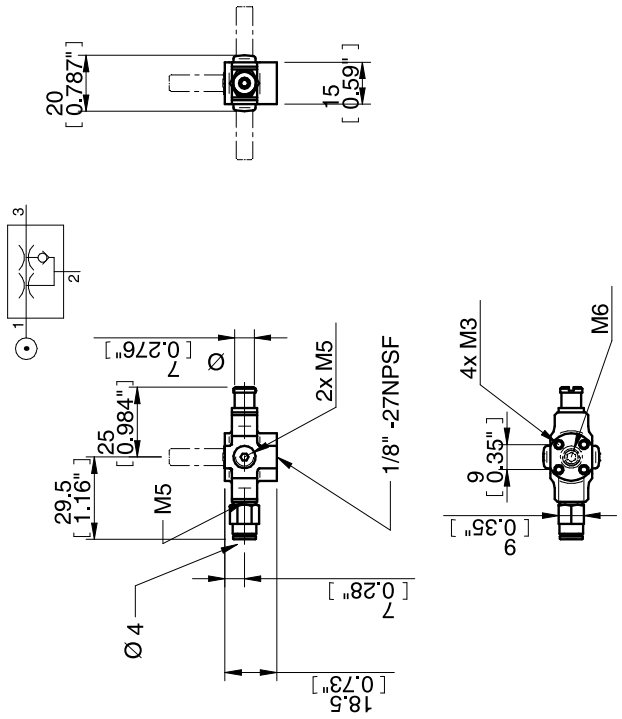
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)								Max vacuum
	psi	scfm	0	10	20	30	40	50	60	70	-inHg
MICRO Bi03-2	58	0.19	0.53	0.32	0.17	0.15	0.11	0.06	—	—	17.7
MICRO Si02-2	73	0.21	0.57	0.40	0.19	0.17	0.15	0.11	0.04	—	20.7
MICRO Ti05-2	58	0.19	0.53	0.32	0.17	0.15	0.11	0.06	—	—	17.7
MICRO Ti05-2	73	0.21	0.57	0.40	0.19	0.17	0.15	0.11	0.04	—	20.7
MICRO Xi2.5-2	87	0.25	0.59	0.44	0.25	0.17	0.15	0.13	0.08	0.04	22.1

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)								Max vacuum
	psi	scfm	10	20	30	40	50	60	70	80	-inHg
MICRO Bi03-2	58	0.19	7.08	4.25	2.27	1.98	1.42	0.85	—	—	17.7
MICRO Si02-2	73	0.21	7.65	5.38	2.55	2.27	1.98	1.42	0.57	—	20.7
MICRO Ti05-2	58	0.19	7.08	4.25	2.27	1.98	1.42	0.85	—	—	17.7
MICRO Ti05-2	73	0.21	7.65	5.38	2.55	2.27	1.98	1.42	0.57	—	20.7
MICRO Xi2.5-2	87	0.25	7.93	5.95	3.40	2.27	1.98	1.70	1.13	0.57	22.1

Dimensional drawing



Ordering information

For a complete list of available pumps and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

VGS™2010 – Customer Code

Code	Housing
VGS2010	Housing

Code	COAX®
AA	No COAX® cartridge (slave unit)
AB	COAX® cartridge MICRO Bi03-2
AF	COAX® cartridge MICRO Si02-2
AJ	COAX® cartridge MICRO Xi2.5-2
AN	COAX® cartridge MICRO Ti05-2

VGS2010 . AB . 01 . BA

Code	Mounting orientation
00	4x M3 top, flush mount
01	M6 19 mm top, profile kit
02	M6 19 mm right, profile kit
03	M6 19 mm left, profile kit

Code	Suction cup
BA	No suction cup
DA	BX25P 30°/60° Shore A
DB	BX25P 60° Shore A
DC	FC20P 50° Shore A
DD	F25CP 50° Shore A
DE	OB20x60P 60° Shore A
DF	OF10x30P 50° Shore A
DG	OF15x45P 50° Shore A

VGS™3010 family

Piab VGS™ – A product design where different suction cups are integrated with vacuum cartridges based on the patented COAX® technology. The “vacuum gripper” makes selection, sizing and installation of a vacuum system easier. With a VGS™ you will enjoy the benefits of a more cost-efficient and reliable decentralized vacuum system. It has a low weight at 3.91–12.0 oz..

It is available with two- or three-stage COAX® cartridge MINI. Choose a Di cartridge, for very harsh environments, combining high dust and high humidity levels, an Si cartridge for extra vacuum flow, a Pi cartridge for high performance at low feed pressure or an Xi cartridge when high flow and deep vacuum is needed. The three-stage cartridge will give extra high initial vacuum flow, which is suitable in high speed applications. The VGS™ is compatible with any suction cup with G3/8” male fitting.

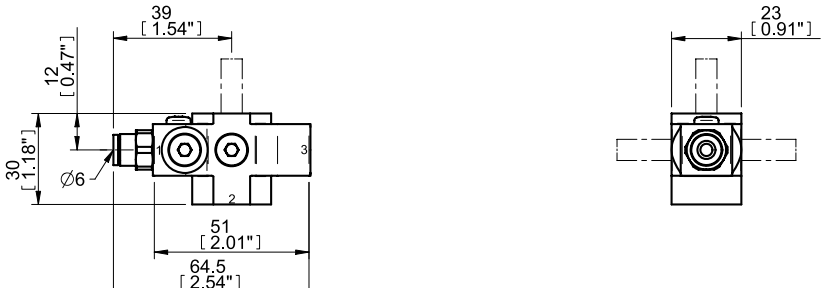
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MINI Pi12-2	46	0.93	1.44	1.27	0.93	0.57	0.40	0.30	0.21	0.13	0.06	—	26.6
MINI Pi12-3	46	0.93	2.97	1.27	0.93	0.57	0.40	0.30	0.21	0.13	0.06	—	26.6
MINI Si08-2	87	0.93	1.63	1.42	1.08	0.70	0.49	0.34	0.25	0.17	—	—	22.1
MINI Si08-3	87	0.93	2.84	1.55	1.17	0.74	0.49	0.36	0.28	0.17	—	—	22.1
MINI Xi10-2	73	0.97	1.59	1.33	1.04	0.70	0.40	0.32	0.23	0.15	0.08	0.023	27.7
MINI Xi10-3	73	0.97	3.03	1.48	1.06	0.70	0.40	0.32	0.23	0.15	0.08	0.023	27.7
MINI Di16-2	87	1.59	1.36	1.21	1.04	0.87	0.74	0.61	0.38	0.08	—	—	21.5

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MINI Pi12-2	46	0.93	4.81	9.06	16.4	31.1	51.0	76.5	113	181	—	26.6
MINI Pi12-3	46	0.93	2.27	6.51	13.9	28.3	48.1	73.6	110	178	—	26.6
MINI Si08-2	87	0.93	3.96	8.78	15.6	25.5	39.6	59.5	87.8	—	—	22.1
MINI Si08-3	87	0.93	2.83	7.08	13.6	22.7	36.8	56.6	82.1	—	—	22.1
MINI Xi10-2	73	0.97	3.96	8.50	17.0	28.3	45.3	65.1	99.1	150	252	27.7
MINI Xi10-3	73	0.97	2.55	7.36	14.2	25.5	42.5	62.3	96.3	147	249	27.7
MINI Di16-2	87	1.59	4.81	9.91	16.4	23.8	32.6	44.7	70.5	—	—	21.5

Dimensional drawing



Ordering information

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VGS™3010 – Customer Code

Code	Housing
VGS3010	Housing

Code	COAX®
AA	No COAX® cartridge (slave unit)
AB	MINI Pi12-2
AC	MINI Pi12-3
AD	MINI Pi12-2, non-return valve
AE	MINI Pi12-3, non-return valve
AF	MINI Si08-2
AG	MINI Si08-3
AH	MINI Si08-2, non-return valve
AI	MINI Si08-3, non-return valve
AJ	MINI Xi10-2
AK	MINI Xi10-3
AL	MINI Xi10-2, non-return valve
AM	MINI Xi10-3, non-return valve
AN	MINI Di16-2

Code	Mounting orientation
00	4x M4 top, flush mount
01	M8 16 mm top
02	M8 16 mm right
03	M8 16 mm left
04	M8 27 mm top, profile kit
05	M8 27 mm right, profile kit
06	M8 27 mm left, profile kit
07	M6 22 mm top, profile kit
08	M6 22 mm right, profile kit
09	M6 22 mm left, profile kit
11	Ball joint VGS™3010 right
12	Ball joint VGS™3010 left
13	Lock-pin VGS™3010 right
14	Lock-pin VGS™3010 left
15	Level compensator LC30

VGS3010 . AB . 01 . BA

Suction cup
Visit piab.com for the full range of suction cups available for VGS™3010

VGS™3040 family

This is a product design where different suction cups can be integrated with vacuum cartridges based on the patented COAX® technology. The “vacuum gripper” makes selection, sizing and installation of a vacuum system easier. With a VGS™ you will enjoy the benefits of a more cost-efficient and reliable decentralized vacuum system. The VGS™ is compatible with any suction cup with G3/8” male fitting. It has a low weight at 7.20–12.0 oz..

It is available with two- or three-stage COAX® cartridge MINI. Choose a Di cartridge, for very harsh environments, combining high dust and high humidity levels, an Si cartridge for extra vacuum flow, a Pi cartridge for high performance at low feed pressure or an Xi cartridge when high flow and deep vacuum is needed. The three-stage cartridge will give extra high initial vacuum flow, which is suitable in high speed applications.

It is available in lockpin 16, 19 or balljoint mountings, industry standard as well as level compensator to compensate for differences in level of object. It can also be fitted with different functions as energy saving, release or blow off.

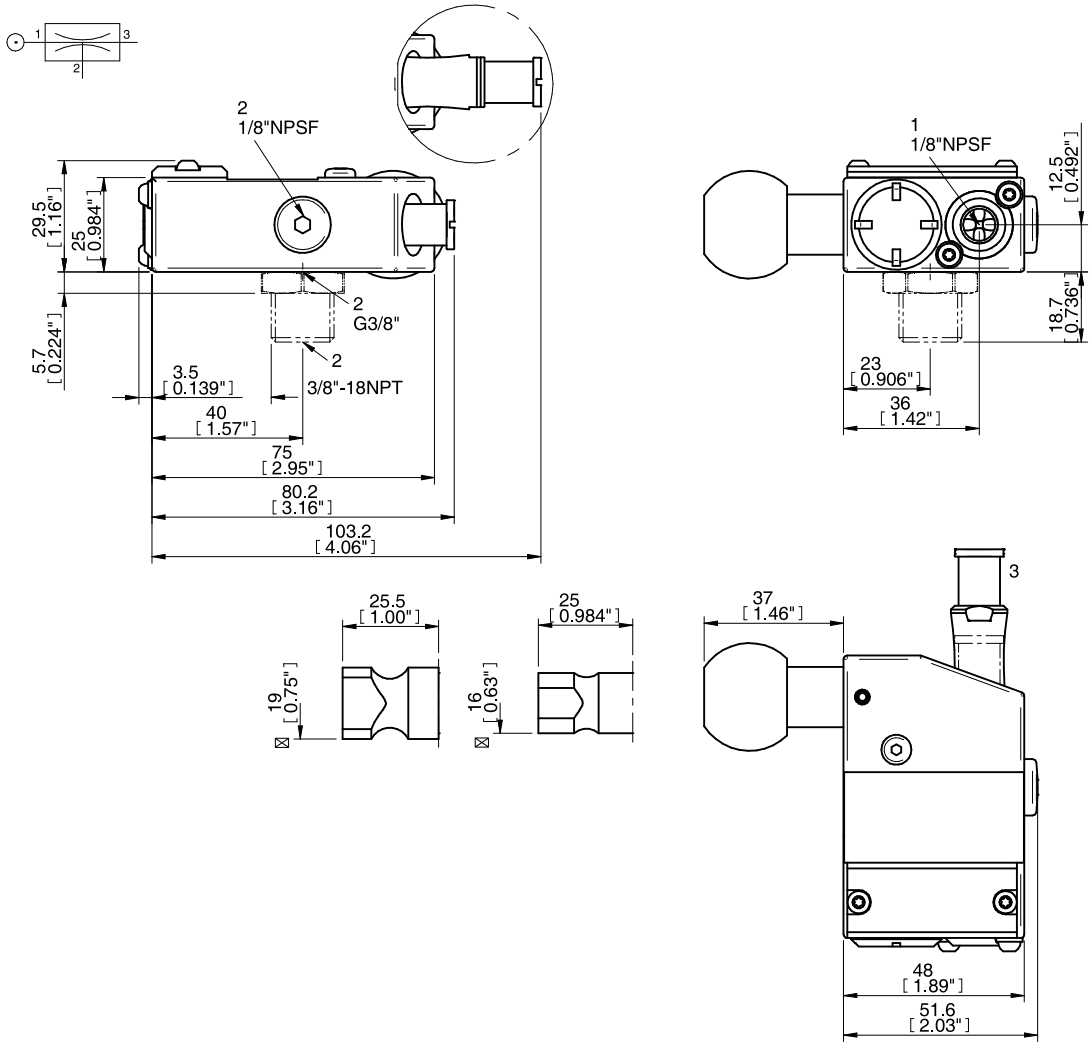
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MINI Si08-2	87	0.93	1.63	1.42	1.08	0.70	0.49	0.34	0.25	0.17	—	—	22.1
MINI Si08-3	87	0.93	2.84	1.55	1.17	0.74	0.49	0.36	0.28	0.17	—	—	22.1
MINI Xi10-2	73	0.97	1.59	1.33	1.04	0.70	0.40	0.32	0.23	0.15	0.095	0.023	27.7
MINI Xi10-3	73	0.97	3.03	1.48	1.06	0.70	0.40	0.32	0.23	0.15	0.095	0.023	27.7
MINI Pi12-2	46	0.93	1.44	1.27	0.93	0.57	0.40	0.30	0.21	0.13	0.03	—	26.6
MINI Pi12-3	46	0.93	2.97	1.27	0.93	0.57	0.40	0.30	0.21	0.13	0.03	—	26.6

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MINI Si08-2	87	0.93	3.96	8.78	15.6	25.5	39.6	59.5	87.8	—	—	22.1
MINI Si08-3	87	0.93	2.83	7.08	13.6	22.7	36.8	56.6	82.1	—	—	22.1
MINI Xi10-2	73	0.97	3.96	8.50	17.0	28.3	45.3	65.1	99.1	150	252	27.7
MINI Xi10-3	73	0.97	2.55	7.36	14.2	25.5	42.5	62.3	96.3	147	249	27.7
MINI Pi12-2	46	0.93	4.81	9.06	16.4	31.1	51.0	76.5	113	181	—	26.6
MINI Pi12-3	46	0.93	2.27	6.51	13.9	28.3	48.1	73.6	110	178	—	26.6

Dimensional drawing



Ordering information

For a complete list of available pumps and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

Accessory descriptions

VGS™3040 with profile mount

It makes the attachment easy to a standard extrusion and profile systems with an adjustable position. This will give a quick setup and changeover.

VGS™3040 with level compensator

It is available with level compensator to compensate for differences in level of object.

VGS™3040 with piSAVE onoff

It has an integrated energy-saving device, piSAVE onoff, results in very low air consumption in sealed applications. The built-in blow off check valve will provide a fast release of the object It has an adjustable vacuum controlled 2/2 NO valve and is available with large hysteresis for object handling and small hysteresis for process applications.

VGS™3040 with piSAVE release

It has a built-in quick release for fast release of object. It works with an internal or separate feed of air. It equalises pressure in the suction cups to provide fast release of the product. The piSAVE release will provide an extra fast release by accumulating and utilizing the feed-air pressure as a boost. It has an ON/OFF activated simultaneously with the ejector and no additional controls required — use a single 3/2 control valve for the ejector and piSAVE release.

VGS™3040 with blow off

It has a built-in blow off check valve for fast release of object. Prevents vacuum from being pulled through the blow-off lines, which means faster response time and completely independent vacuum units.

VGS™3040 – Customer Code

Code	Housing
VGS3040	Housing

Code	COAX® cartridge
AB	COAX® cartridge MINI Pi12-2
AC	COAX® cartridge MINI Pi12-3
AD	COAX® cartridge MINI Pi12-2, non-return valve
AE	COAX® cartridge MINI Pi12-3, non-return valve
AF	COAX® cartridge MINI Si08-2
AG	COAX® cartridge MINI Si08-3
AH	COAX® cartridge MINI Si08-2, non-return valve
AI	COAX® cartridge MINI Si08-3, non-return valve
AJ	COAX® cartridge MINI Xi10-2
AK	COAX® cartridge MINI Xi10-3
AL	COAX® cartridge MINI Xi10-2, non-return valve
AM	COAX® cartridge MINI Xi10-3, non-return valve

Code	Mounting style
00	No mounting style
01	Mounting Lock pin 16 mm
02	Mounting Lock pin 19 mm
03	Mounting Ball joint
04	Mounting Lock pin 16 mm level compensator
05	Mounting Lock pin 19 mm level compensator
06	Mounting Ball joint level compensator
07	Mounting Extrusion mount level compensator
08	Mounting Profile mount
09	Mounting Profile mount

VGS3040 . AB . 01 . AA . 01 . AA

Code	Energy saving
AA	No energy saving
AB	piSAVE onoff 19.5 -inHg
AC	piSAVE onoff, Adjustable (factory set at 13.5 -inHg)

Code	Release function
01	Release Blow-off
02	piSAVE release internal
03	piSAVE release external

Code	Vacuum connection
AA	G3/8" female
AB	G3/8" male - 3/8" NPT male adapter

VGS™5010 family

Piab VGS™ – A product design where different suction cups are integrated with vacuum cartridges based on the patented COAX® technology. The “vacuum gripper” makes selection, sizing and installation of a vacuum system easier. With a VGS™ you will enjoy the benefits of a more cost-efficient and reliable decentralized vacuum system. It has a low weight at 14.6–24.0 oz..

The VGS™5010 is specially designed for handling larger parts, such as car body sheets as it is compatible with any suction cup with G1/2” male fitting. It is also available with a two or three-stage COAX® cartridge MIDI. Choose an Si cartridge for extra vacuum flow, a Pi cartridge for high performance at low feed pressure or an Xi cartridge when high flow and deep vacuum is needed. The three-stage cartridge will give extra high initial vacuum flow, suitable in high speed applications.

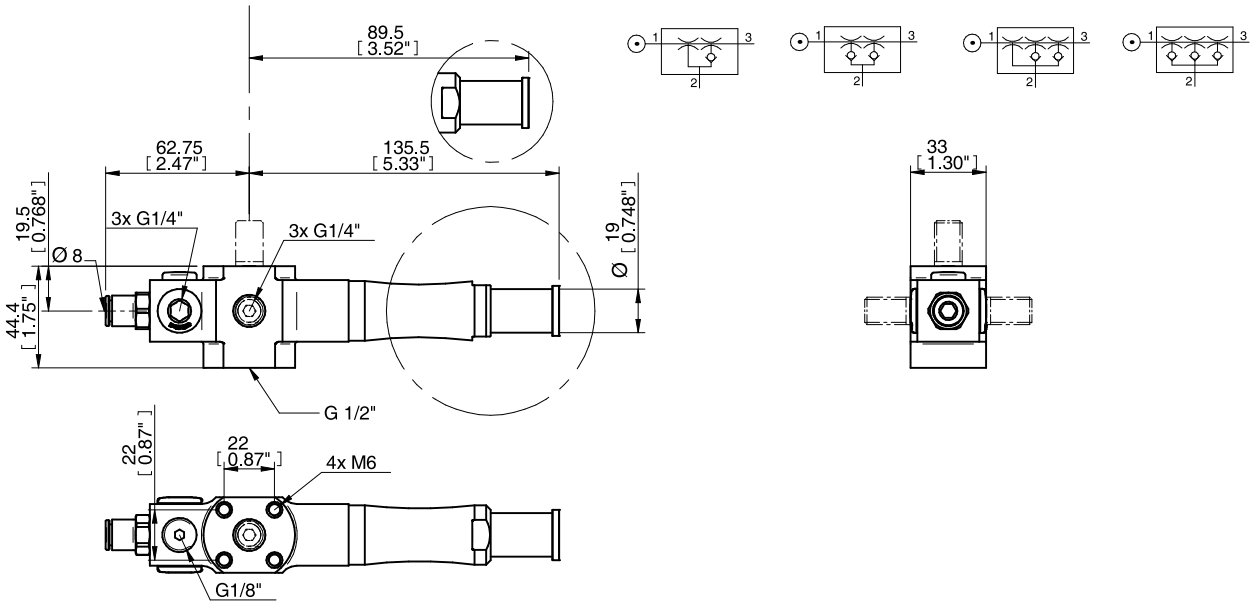
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MIDI Pi48-2	45	4.24	5.93	5.30	3.81	2.33	1.38	1.06	0.74	0.53	0.21	—	26.6
MIDI Pi48-3	45	4.34	11.9	5.30	3.81	2.33	1.38	1.06	0.74	0.53	0.21	—	26.6
MIDI Si32-2	87	3.71	6.99	6.36	5.51	3.60	1.91	1.27	1.06	0.74	—	—	22.1
MIDI Si32-3	87	3.71	12.7	7.42	5.51	3.60	1.91	1.27	1.06	0.74	—	—	22.1
MIDI Xi40-2	65	3.88	5.93	4.87	3.39	2.12	1.55	1.23	0.91	0.68	0.38	0.06	28
MIDI Xi40-3	65	3.88	12.5	6.36	4.24	2.75	1.55	1.23	0.91	0.68	0.38	0.06	28

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MIDI Pi48-2	45	4.24	0.03	0.07	0.13	0.26	13.0	19.8	28.3	45.3	113	26.6
MIDI Pi48-3	45	4.34	0.02	0.06	0.12	0.25	12.7	19.8	28.3	45.3	113	26.6
MIDI Si32-2	87	3.71	0.03	0.07	0.1	0.18	9.34	15.0	22.7	—	—	22.1
MIDI Si32-3	87	3.71	0.02	0.05	0.1	0.18	9.34	15.0	22.7	—	—	22.1
MIDI Xi40-2	65	3.88	0.04	0.09	0.17	0.28	12.5	17.8	25.5	36.8	65.1	28
MIDI Xi40-3	65	3.88	0.022	0.062	0.12	0.22	10.5	16.1	23.8	34.0	62.3	28

Dimensional drawing



Ordering information

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VGS™5010 – Customer Code

Code	Housing
VGS5010	Housing

Code	COAX® cartridge
AA	No COAX® cartridge (slave unit)
AB	COAX® cartridge MIDI Pi48-2
AC	COAX® cartridge MIDI Pi48-3
AD	COAX® cartridge MIDI Pi48-2, non-return valve
AE	COAX® cartridge MIDI Pi48-3, non-return valve
AF	COAX® cartridge MIDI Si32-2
AG	COAX® cartridge MIDI Si32-3
AH	COAX® cartridge MIDI Si32-2, non-return valve
AI	COAX® cartridge MIDI Si32-3, non-return valve
AJ	COAX® cartridge MIDI Xi40-2
AK	COAX® cartridge MIDI Xi40-3
AL	COAX® cartridge MIDI Xi40-2, non-return valve
AM	COAX® cartridge MIDI Xi40-3, non-return valve

Code	Mounting style
00	4x M6 top, flush mount
01	4x M6 top, angle bracket
02	M12 20 mm top
03	M12 20 mm right
04	M12 20 mm left
05	M12 20 mm top, angle bracket
06	M12 20 mm right, angle bracket
07	M12 20 mm left, angle bracket

VGS5010 . AB . 00 . BA

Code	Suction cup
BA	No suction cup
CO	BF110P 30°/60° Shore A
CP	BF110P 60° Shore A
CQ	BX110P 30°/60° Shore A
CR	BX110P 60° Shore A
CS	F110P 30°/60° Shore A
CT	F110P 60° Shore A
CU	OB65x170P 30°/60° Shore A
CV	OB65x170P 60° Shore A
CX	BL50-3P 30°/70° Shore A
CY	BX75P 30°/60° Shore A
CZ	BX75P 60° Shore A

COAX® in piGRIP®

This is a fully decentralized vacuum unit based on patented COAX® technology. It provides the quickest response time and very high energy efficiency. The COAX® in piGRIP® is available with a variation of two stage COAX® MICRO cartridges. The COAX in piGRIP is compatible with any suction cup with G1/8" male fitting.

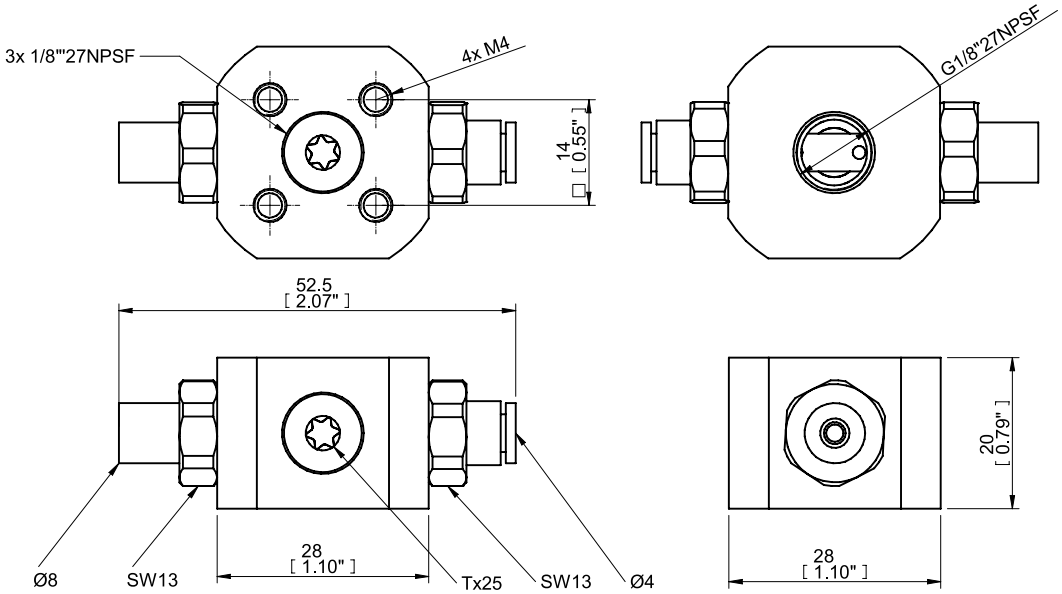
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)									Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	-inHg
MICRO Bi03-2	26	0.30	0.49	0.32	0.13	0.08	0.074	0.049	0.028	0.013	–	24.5
MICRO Si02-2	87	0.25	0.59	0.44	0.25	0.17	0.15	0.13	0.08	0.04	–	22.1
MICRO Ti05-2	58	0.57	0.68	0.59	0.49	0.36	0.21	0.15	0.08	0.04	0.008	24.8
MICRO Xi2.5-2	73	0.28	0.51	0.36	0.21	0.13	0.08	0.06	0.04	0.02	0.02	27.1

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)								Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	-inHg
MICRO Bi03-2	26	0.30	14.2	39.6	110	181	283	453	793	1444	24.5
MICRO Si02-2	87	0.25	11.6	28.6	56.9	93.4	139	195	289	–	22.1
MICRO Ti05-2	58	0.57	9.34	20.7	34.0	56.6	87.8	142	235	470	24.8
MICRO Xi2.5-2	73	0.28	13.9	34.8	70.2	127	207	320	510	793	27.1

Dimensional drawing



Ordering information

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piCLASSIC

It is available with a three-stage COAX® cartridge MIDI. Choose an Si cartridge for extra vacuum flow, a Pi cartridge for high performance at low feed pressure or an Xi cartridge when high flow and deep vacuum is needed. This pump has a substantially lower air consumption compare to competition, it is compact with no moving parts. It can be configured with 1–6 cartridges. This pump can easily be upgraded with more capacity if needed. And it is also easy to disassemble for maintenance.

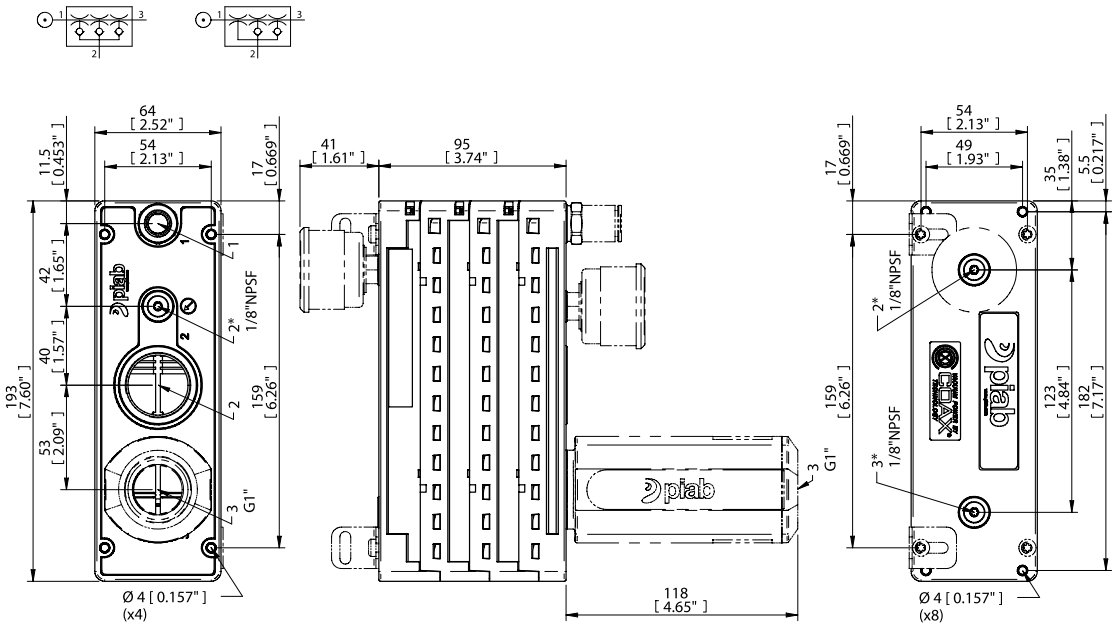
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MIDI Si32-3 x1	87	3.71	12.7	7.42	5.51	3.60	1.91	1.27	1.06	0.74	—	—	22.1
MIDI Si32-3 x2	87	7.42	25.4	14.8	11.0	7.20	3.81	2.54	2.12	1.48	—	—	22.1
MIDI Si32-3 x3	87	11.12	38.1	22.2	16.5	10.8	5.72	3.81	3.18	2.33	—	—	22.1
MIDI Si32-3 x4	87	14.83	50.9	29.7	22.0	14.4	7.63	5.09	4.24	2.97	—	—	22.1
MIDI Si32-3 x5	87	18.54	54.0	33.5	26.3	18.0	9.54	6.36	5.30	4.45	—	—	22.1
MIDI Si32-3 x6	87	22.25	61.0	37.9	31.4	21.6	11.4	7.63	6.36	4.66	—	—	22.1
MIDI Pi48-3 x1	45	4.34	11.9	5.30	3.81	2.33	1.38	1.06	0.74	0.53	0.21	—	26.6
MIDI Pi48-3 x2	45	8.48	23.7	10.6	7.63	4.66	2.75	2.12	1.48	1.06	0.42	—	26.6
MIDI Pi48-3 x3	45	12.71	35.6	15.9	11.4	6.99	4.13	3.18	2.22	1.59	0.64	—	26.6
MIDI Pi48-3 x4	45	16.95	47.5	21.2	15.3	9.32	5.51	4.24	2.97	2.12	0.85	—	26.6
MIDI Pi48-3 x5	45	21.19	50.4	23.9	18.2	11.7	6.89	5.30	3.71	2.65	1.06	—	26.6
MIDI Pi48-3 x6	45	25.43	57.0	27.1	21.8	14.0	8.26	6.36	4.45	3.18	1.27	—	26.6
MIDI Xi40-3 x1	65	3.88	12.5	6.36	4.24	2.75	1.55	1.23	0.91	0.68	0.38	0.06	28
MIDI Xi40-3 x2	65	7.76	25.0	12.7	8.48	5.51	3.09	2.46	1.82	1.36	0.76	0.13	28
MIDI Xi40-3 x3	65	11.63	37.5	19.1	12.7	8.26	4.64	3.69	2.73	2.03	1.14	0.19	28
MIDI Xi40-3 x4	65	15.51	50.0	25.4	17.0	11.0	6.19	4.92	3.64	2.71	1.53	0.25	28
MIDI Xi40-3 x5	65	19.39	53.2	28.6	20.1	13.8	7.73	6.14	4.56	3.39	1.91	0.32	28
MIDI Xi40-3 x6	65	23.31	60.0	32.4	24.2	16.5	9.28	7.29	5.47	4.07	2.29	0.38	28

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MIDI Si32-3 x1	87	3.71	0.57	1.42	2.83	5.10	9.34	15.0	22.7	—	—	22.1
MIDI Si32-3 x2	87	7.42	0.28	0.71	1.42	2.55	4.81	7.65	11.3	—	—	22.1
MIDI Si32-3 x3	87	11.12	0.20	0.48	0.93	1.70	3.11	5.10	7.65	—	—	22.1
MIDI Si32-3 x4	87	14.83	0.14	0.37	0.71	1.27	2.35	3.68	5.66	—	—	22.1
MIDI Si32-3 x5	87	18.54	0.14	0.34	0.62	1.02	1.87	3.11	4.53	—	—	22.1
MIDI Si32-3 x6	87	22.25	0.11	0.28	0.51	0.85	1.56	2.55	3.68	—	—	22.1
MIDI Pi48-3 x1	45	4.34	0.57	1.70	3.40	7.08	12.7	19.8	28.3	45.3	113	26.6
MIDI Pi48-3 x2	45	8.48	0.28	0.85	1.70	3.68	6.51	9.91	14.2	22.7	56.6	26.6
MIDI Pi48-3 x3	45	12.71	0.20	0.57	1.13	2.27	4.25	6.51	9.34	15.0	37.7	26.6
MIDI Pi48-3 x4	45	16.95	0.14	0.42	0.85	1.70	3.11	5.10	7.08	11.3	28.3	26.6
MIDI Pi48-3 x5	45	21.19	0.14	0.40	0.79	1.42	2.55	3.96	5.66	9.1	22.7	26.6
MIDI Pi48-3 x6	45	25.43	0.11	0.37	0.71	1.13	2.27	3.40	4.81	7.6	19.0	26.6
MIDI Xi40-3 x1	65	3.88	0.62	1.76	3.40	6.23	10.5	16.1	23.8	34.0	62.3	28
MIDI Xi40-3 x2	65	7.76	0.31	0.88	1.70	3.11	5.38	8.21	11.9	17.0	31.1	28
MIDI Xi40-3 x3	65	11.63	0.20	0.59	1.13	1.98	3.40	5.38	7.93	11.3	20.7	28
MIDI Xi40-3 x4	65	15.51	0.17	0.45	0.85	1.56	2.55	3.96	5.95	8.5	15.6	28
MIDI Xi40-3 x5	65	19.39	0.14	0.40	0.74	1.25	1.98	3.11	4.81	6.8	12.5	28
MIDI Xi40-3 x6	65	23.31	0.14	0.34	0.62	1.13	1.70	2.83	3.96	5.7	10.5	28

Dimensional drawing



*) Sensing port

PCL.XXXX.S. AB

	1	2
AB	G1/4"	G1"
12B	Ø12	G1"

Ordering information

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Accessory descriptions

piCLASSIC Energy saving

piCLASSIC has an integrated air-saving function (piSAVE onoff) that minimizes the air consumption by controlling the incoming air flow to the pump. Large hysteresis is recommended for sealed vacuum handling applications such as metal sheet, glass or plastic handling. And small hysteresis is recommended if a very accurate vacuum level has to be maintained in the process. It has an adjustable ES switch level and is a pneumatic function.

piCLASSIC piSAVE optimize

The piSAVE optimize is a vacuum controlled proportional pressure regulator, a fully pneumatic device suitable for air-driven ejectors/pumps. The feed pressure to the vacuum pump/ejector is automatically regulated and controlled to maintain the set vacuum level. Air/energy usage is kept to a minimum for the application (optimized). It is recommended for leaking and sealed applications to save energy and secure the right vacuum level.

piCLASSIC – Customer Code

piCLASSIC Code
PCL

Code	COAX® Cartridge module
S	COAX® cartridge Si32-3, high vacuum flow
X	COAX® cartridge Xi40-3, extra vacuum level
P	COAX® cartridge Pi48-3, low feed pressure

Code	Number of COAX®
1	x1
2	x2
3	x3
4	x4
5	x5
6	x6

Code	COAX® valve configuration
B	Standard
A	Non-return valve

Code	Sealing material
N	Nitrile
V	Viton

PCL . X2BN . S . AD . SV

Code	Function
S	No function
F	Energy saving system (ES)
O	piSAVE optimize

Code	Compressed air connection
A	G1/4" female
E	1/4" NPT female
D	1/8" NPSF (G) female
08	Push-in Ø 8 mm [5/16"]
10	Push-in Ø 10 mm
12	Push-in Ø 12 mm

Code	Vacuum connection
D	G3/4" female
E	3/4" NPT female
B	G1" female

Code	COAX® valve configuration
S	Silencer G1" male
SV	Silencer G1" male & vacuum gauge
V	Vacuum gauge
X	No accessory

P6010

As with the majority of our pumps, it is available with the patented COAX® technology and with a three-stage COAX® cartridge MIDI. Choose an Si cartridge for extra vacuum flow, a Pi cartridge for high performance at low feed pressure or an Xi cartridge when high flow and deep vacuum is needed. The P6010 consumes substantially less air compared to conventional ejectors. It also has quicker evacuation times and a low noise level. It is available with multiple connection alternatives. It can be configured with 1–4 cartridges.

Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
Pi48-3 x1	45	4.24	11.9	5.30	3.81	2.33	1.38	1.06	0.74	0.53	0.21	—	26.6
Si32-3 x1	87	3.71	12.7	7.42	5.51	3.60	1.91	1.27	1.06	0.74	—	—	22.1/15.3*
Xi40-3 x1	65	3.88	12.5	6.36	4.24	2.75	1.55	1.23	0.91	0.68	0.38	0.06	28/15*
Pi48-3 x2	45	8.48	23.7	10.6	7.63	4.66	2.75	2.12	1.48	1.06	0.42	—	26.6
Si32-3 x2	87	7.42	25.4	14.8	11.0	7.20	3.81	2.54	2.12	1.48	—	—	22.1/15.3*
Xi40-3 x2	65	7.76	25.0	12.7	8.48	5.51	3.09	2.46	1.82	1.36	0.76	0.13	28/15*
Pi48-3 x3	45	12.71	35.6	15.9	11.4	6.99	4.13	3.18	2.22	1.59	0.64	—	26.6
Si32-3 x3	87	11.12	38.1	22.2	16.5	10.8	5.72	3.81	3.18	2.22	—	—	22.1/15.3*
Xi40-3 x3	65	11.63	37.5	19.1	12.7	8.26	4.64	3.69	2.73	2.03	1.14	0.19	28/15*
Pi48-3 x4	45	16.95	47.5	21.2	15.3	9.32	5.51	4.24	2.97	2.12	0.85	—	26.6
Si32-3 x4	87	14.83	50.9	29.7	22.0	14.4	7.63	5.09	4.24	2.97	—	—	22.1/15.3*
Xi40-3 x4	65	15.51	50.0	25.4	17.0	11.0	6.19	4.92	3.64	2.71	1.53	0.25	28/15*

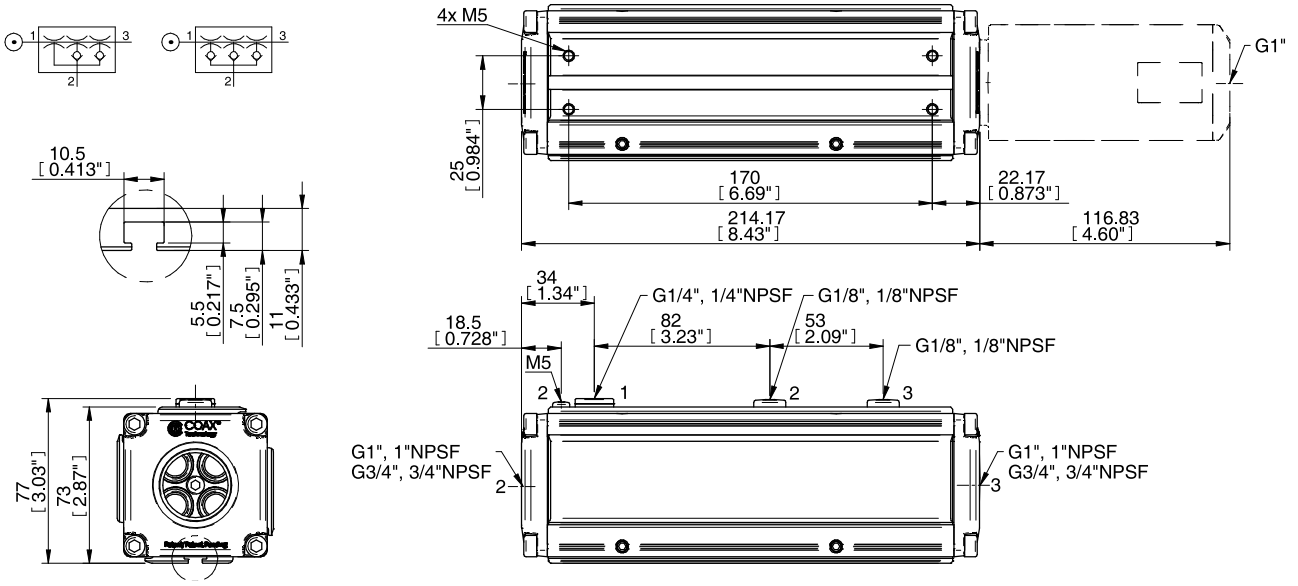
*without/with 1x flap valve

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
Pi48-3 x1	45	4.24	0.57	1.70	3.40	7.08	12.7	19.8	28.3	45.3	113	26.6
Si32-3 x1	87	3.71	0.57	1.42	2.83	5.10	9.34	15.0	22.7	—	—	22.1/15.3*
Xi40-3 x1	65	3.88	0.62	1.76	3.40	6.23	10.5	16.1	23.8	34.0	62.3	28/15*
Pi48-3 x2	45	8.48	0.28	0.85	1.70	3.54	6.51	9.91	14.2	22.7	56.6	26.6
Si32-3 x2	87	7.42	0.28	0.71	1.42	2.55	4.81	7.65	11.3	—	—	22.1/15.3*
Xi40-3 x2	65	7.76	0.31	0.88	1.70	3.11	5.38	8.21	11.9	17.0	31.1	28/15*
Pi48-3 x3	45	12.71	0.19	0.57	1.13	2.35	4.25	6.51	9.34	15.0	37.7	26.6
Si32-3 x3	87	11.12	0.19	0.48	0.93	1.70	3.11	4.81	7.65	—	—	22.1/15.3*
Xi40-3 x3	65	11.63	0.21	0.59	1.13	2.07	3.40	5.38	7.93	11.3	20.7	28/15*
Pi48-3 x4	45	16.95	0.14	0.42	0.85	1.78	3.11	4.96	7.08	11.3	28.3	26.6
Si32-3 x4	87	14.83	0.14	0.35	0.71	1.27	2.35	3.68	5.66	—	—	22.1/15.3*
Xi40-3 x4	65	15.51	0.16	0.44	0.85	1.56	2.63	3.96	5.95	8.50	15.6	28/15*

*without/with 1x flap valve

Dimensional drawing



Ordering information

For a complete list of available pumps and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

Accessory descriptions

P6010 Classic

Very similar to the P6010 with the patented COAX® technology. The connections can be made on the long side of the ejector and is retro-compatible with Piab's Classic model in regard to mounting.

P6010 AVM™2

The AVM™2 unit has built-in control and monitoring functions. The integrated energy saving function (ES) minimizes the air consumption in sealed systems. It has valves for vacuum on/off and blow-off with electrical power failsafe function. The AVM has digital outputs, 16 pre-set combinations of vacuum levels, digital vacuum level display and a mechanical valve for blow-off flow adjustment.

P6010 CU

The CU has electric valves for vacuum on/off and blow-off and a mechanical valve for blow-off flow adjustment. It also has a with special M12 4-pin cable assembly with LED for status of valve signal.

P6010 PCC

Different vacuum pumps need different feed pressure for optimum performance. The PCC is programmable for constant vacuum level, as the input signal regulates the feed pressure to maintain a constant vacuum level. It has an integrated analog vacuum sensor.

P6010 – Customer Code

P6010 Code P6010	Code	COAX® Cartridge module
	AA	COAX® Cartridge module Blind x 4
	AB	COAX® Cartridge module Si32-3x1
	AC	COAX® Cartridge module Si32-3x2
	AD	COAX® Cartridge module Si32-3x3
	AE	COAX® Cartridge module Si32-3x4
	AF	COAX® Cartridge module Si32-3x1, non-return valve
	AG	COAX® Cartridge module Si32-3x2, non-return valve
	AH	COAX® Cartridge module Si32-3x3, non-return valve
	AI	COAX® Cartridge module Si32-3x4, non-return valve
	AJ	COAX® Cartridge module Pi48-3x1
	AK	COAX® Cartridge module Pi48-3x2
	AL	COAX® Cartridge module Pi48-3x3
	AM	COAX® Cartridge module Pi48-3x4
	AN	COAX® Cartridge module Pi48-3x1, non-return valve
	AO	COAX® Cartridge module Pi48-3x2, non-return valve
	AP	COAX® Cartridge module Pi48-3x3, non-return valve
	AQ	COAX® Cartridge module Pi48-3x4, non-return valve
	AR	COAX® Cartridge module Xi40-3x1
	AS	COAX® Cartridge module Xi40-3x2
	AT	COAX® Cartridge module Xi40-3x3
	AU	COAX® Cartridge module Xi40-3x4
	AV	COAX® Cartridge module Xi40-3x1, non-return valve
	AW	COAX® Cartridge module Xi40-3x2, non-return valve
	AX	COAX® Cartridge module Xi40-3x3, non-return valve
	AY	COAX® Cartridge module Xi40-3x4, non-return valve
	BB	COAX® Cartridge module Si32-3x1, 1x flap valve
	BC	COAX® Cartridge module Si32-3x2, 1x flap valve
	BD	COAX® Cartridge module Si32-3x3, 1x flap valve
	BE	COAX® Cartridge module Si32-3x4, 1x flap valve
	BJ	COAX® Cartridge module Xi40-3x1, 1x flap valve
	BK	COAX® Cartridge module Xi40-3x2, 1x flap valve
	BL	COAX® Cartridge module Xi40-3x3, 1x flap valve
	BM	COAX® Cartridge module Xi40-3x4, 1x flap valve

Code	Mounting
01	Mounting T-slot, Cover plate PIAB label

P6010 . AA . 01 . LA . 51

piab

Code	Cover/Function plates
LA	Cover plate G thread connections, Cover plate plain
LB	Function PCC Vacuum, Cover plate G thread connections
LI	Cover plate Classic G thread connections, Cover plate plain
LJ	Cover plate NPSF thread connections, Cover plate plain
LK	Cover plate Classic NPSF thread connections, Cover plate plain
LT	Function PCC Vacuum, Cover plate NPSF thread connections
LU	Function AVM 2 NO, Cover plate G thread connections
LV	Function AVM 2 NC, Cover plate G thread connections
LW	Function AVM 2 NO, Cover plate NPSF thread connections
LX	Function AVM 2 NC, Cover plate NPSF thread connections
LY	Function CU NC, Cover plate G thread connections
LZ	Function CU NC, Cover plate NPSF thread connections
MA	Function AVM2 NO, Cover plate G thread connections SB
MB	Function AVM2 NC, Cover plate G thread connections SB
MC	Function AVM2 N0, Cover plate NPSF thread connections SB
MD	Function AVM2 NC, Cover plate NPSF thread connections SB
ME	Function CU NC, Cover plate G thread connections SB
MF	Function CU NC, Cover plate NPSF thread connections SB

Code	Cover/Function plates
51	Connections 2x G1"
52	Connections 2x G1", silencer 1"
53	Connections 2x G3/4"
54	Connections 2x G3/4", silencer 3/4"
55	Connections 2x 1" NPSF
56	Connections 2x 1" NPSF, silencer 1"
57	Connections 2x 3/4" NPSF
58	Connections 2x 3/4" NPSF, silencer 3/4"

P6040

The P6040 comes with the patented COAX® technology. It is available with a three-stage COAX® cartridge MIDI. Choose an Si cartridge for extra vacuum flow, a Pi cartridge for high performance at low feed pressure or an Xi cartridge when high flow and deep vacuum is needed. This pump has a substantially lower air consumption compare to competition, it is compact with no moving parts. It can be configured with 5–16 cartridges.

Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MIDI Pi48-3 x5	44	21.19	59.3	26.5	19.1	11.7	6.89	5.30	3.71	2.65	1.06	—	26.6
MIDI Pi48-3 x6	44	25.43	71.2	31.8	22.9	14.0	8.26	6.36	4.45	3.18	1.27	—	26.6
MIDI Pi48-3 x7	44	29.66	83.1	37.1	26.7	16.3	9.64	7.42	5.19	3.71	1.48	—	26.6
MIDI Pi48-3 x8	44	33.90	94.9	42.4	30.5	18.6	11.0	8.48	5.93	4.24	1.70	—	26.6
MIDI Pi48-3 x9	44	38.14	107	47.7	34.3	21.0	12.4	9.54	6.67	4.77	1.91	—	26.6
MIDI Pi48-3 x10	44	42.38	119	53.0	38.1	23.3	13.8	10.6	7.42	5.30	2.12	—	26.6
MIDI Pi48-3 x11	44	46.62	131	58.3	42.0	25.6	15.2	11.7	8.16	5.83	2.33	—	26.6
MIDI Pi48-3 x12	44	50.85	142	63.6	45.8	28.0	16.5	12.7	8.90	6.36	2.54	—	26.6
MIDI Pi48-3 x13	44	55.09	154	68.9	49.6	30.3	17.9	13.8	9.64	6.89	2.75	—	26.6
MIDI Pi48-3 x14	44	59.33	166	74.2	53.4	32.6	19.3	14.8	10.4	7.42	2.97	—	26.6
MIDI Pi48-3 x15	44	63.57	178	79.5	57.2	35.0	20.7	15.9	11.1	7.95	3.18	—	26.6
MIDI Pi48-3 x16	44	67.80	190	84.8	61.0	37.3	22.0	17.0	11.9	8.48	3.39	—	26.6
MIDI Si32-3 x5	87	18.54	63.6	37.1	27.5	18.0	9.54	6.36	5.30	3.71	—	—	22.1/15.3*
MIDI Si32-3 x6	87	22.25	76.3	44.5	33.1	21.6	11.4	7.63	6.36	4.45	—	—	22.1/15.3*
MIDI Si32-3 x7	87	25.96	89.0	51.9	38.6	25.2	13.3	8.90	7.42	5.19	—	—	22.1/15.3*
MIDI Si32-3 x8	87	29.66	102	59.3	44.1	28.8	15.3	10.2	8.48	5.93	—	—	22.1/15.3*
MIDI Si32-3 x9	87	33.37	114	66.7	49.6	32.4	17.2	11.4	9.54	6.67	—	—	22.1/15.3*
MIDI Si32-3 x10	87	37.08	127	74.2	55.1	36.0	19.1	12.7	10.6	7.42	—	—	22.1/15.3*
MIDI Si32-3 x11	87	40.79	140	81.6	60.6	39.6	21.0	14.0	11.7	8.16	—	—	22.1/15.3*
MIDI Si32-3 x12	87	44.50	153	89.0	66.1	43.2	22.9	15.3	12.7	8.90	—	—	22.1/15.3*
MIDI Si32-3 x13	87	48.20	165	96.4	71.6	46.8	24.8	16.5	13.8	9.64	—	—	22.1/15.3*

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MIDI Si32-3 x14	87	51.91	178	104	77.1	50.4	26.7	17.8	14.8	10.4	—	—	22.1/15.3*
MIDI Si32-3 x15	87	55.62	191	111	82.6	54.0	28.6	19.1	15.9	11.1	—	—	22.1/15.3*
MIDI Si32-3 x16	87	59.33	203	119	88.1	57.6	30.5	20.3	17.0	11.9	—	—	22.1/15.3*
MIDI Xi40-3 x5	65	19.39	62.5	31.8	21.2	13.8	7.73	6.14	4.56	3.39	1.91	0.32	28/15*
MIDI Xi40-3 x6	65	23.27	75.0	38.1	25.4	16.5	9.28	7.37	5.47	4.07	2.29	0.38	28/15*
MIDI Xi40-3 x7	65	27.14	87.5	44.5	29.7	19.3	10.8	8.60	6.38	4.75	2.67	0.44	28/15*
MIDI Xi40-3 x8	65	31.02	100	50.9	33.9	22.0	12.4	9.83	7.29	5.42	3.05	0.51	28/15*
MIDI Xi40-3 x9	65	34.90	113	57.2	38.1	24.8	13.9	11.1	8.20	6.10	3.43	0.57	28/15*
MIDI Xi40-3 x10	65	38.78	125	63.6	42.4	27.5	15.5	12.3	9.11	6.78	3.81	0.64	28/15*
MIDI Xi40-3 x11	65	42.65	138	69.9	46.6	30.3	17.0	13.5	10.0	7.46	4.20	0.70	28/15*
MIDI Xi40-3 x12	65	46.53	150	76.3	50.9	33.1	18.6	14.7	10.9	8.14	4.58	0.76	28/15*
MIDI Xi40-3 x13	65	50.41	163	82.6	55.1	35.8	20.1	16.0	11.8	8.81	4.96	0.83	28/15*
MIDI Xi40-3 x14	65	54.29	175	89.0	59.3	38.6	21.7	17.2	12.8	9.49	5.34	0.89	28/15*
MIDI Xi40-3 x15	65	58.16	188	95.4	63.6	41.3	23.2	18.4	13.7	10.2	5.72	0.95	28/15*
MIDI Xi40-3 x16	65	62.04	200	102	67.8	44.1	24.7	19.7	14.6	10.8	6.10	1.02	28/15*

*without/with 1x flap valve

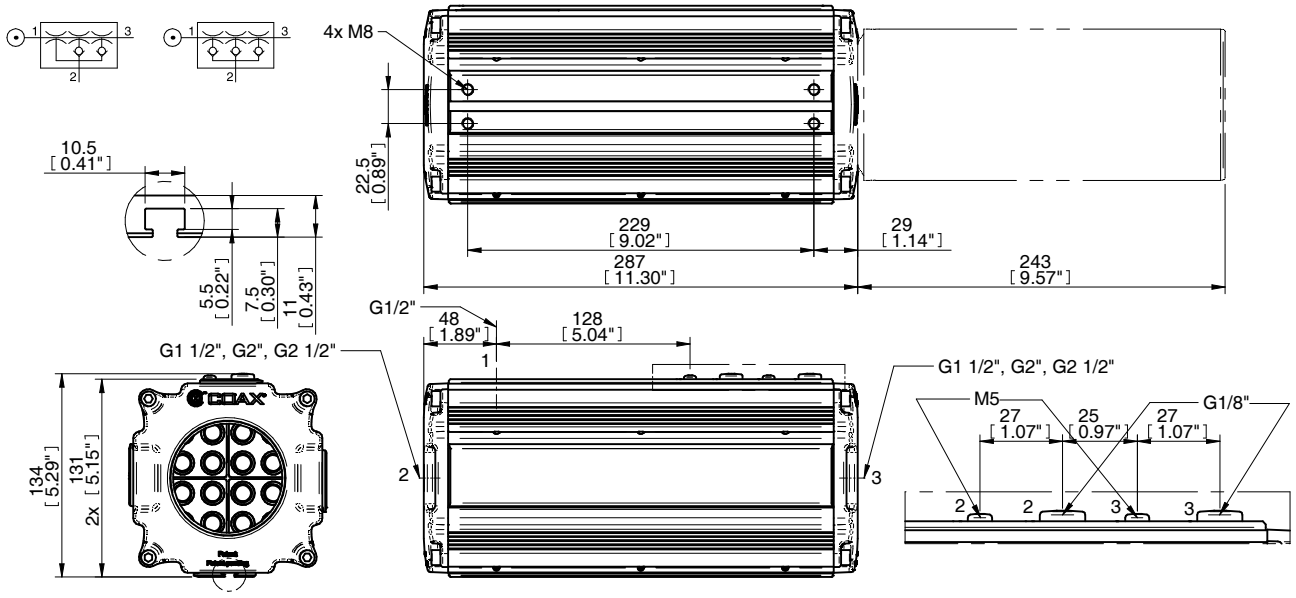
Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MIDI Pi48-3 x5	44	21.19	0.11	0.34	0.68	1.42	2.55	3.96	5.66	9.06	22.7	26.6
MIDI Pi48-3 x6	44	25.43	0.09	0.28	0.57	1.19	2.12	3.40	4.81	7.65	19.0	26.6
MIDI Pi48-3 x7	44	29.66	0.08	0.24	0.48	1.02	1.81	2.83	3.96	6.51	16.1	26.6
MIDI Pi48-3 x8	44	33.90	0.07	0.21	0.42	0.88	1.59	2.49	3.68	5.66	14.2	26.6
MIDI Pi48-3 x9	44	38.14	0.06	0.19	0.37	0.79	1.42	2.21	3.11	5.10	12.5	26.6
MIDI Pi48-3 x10	44	42.38	0.06	0.17	0.34	0.71	1.27	1.98	2.83	4.53	11.3	26.6
MIDI Pi48-3 x11	44	46.62	0.05	0.16	0.31	0.65	1.16	1.81	2.58	4.25	10.2	26.6
MIDI Pi48-3 x12	44	50.85	0.05	0.14	0.28	0.59	1.08	1.64	2.35	3.68	9.34	26.6
MIDI Pi48-3 x13	44	55.09	0.04	0.13	0.26	0.54	0.99	1.53	2.18	3.40	8.78	26.6
MIDI Pi48-3 x14	44	59.33	0.04	0.12	0.24	0.51	0.91	1.42	2.01	3.11	8.21	26.6
MIDI Pi48-3 x15	44	63.57	0.04	0.11	0.23	0.48	0.85	1.33	1.90	3.11	7.65	26.6
MIDI Pi48-3 x16	44	67.80	0.04	0.11	0.21	0.45	0.82	1.25	1.78	2.83	7.08	26.6
MIDI Si32-3 x5	87	18.54	0.11	0.28	0.57	1.02	1.87	3.11	4.53	—	—	22.1/15.3*
MIDI Si32-3 x6	87	22.25	0.09	0.24	0.48	0.85	1.56	2.49	3.68	—	—	22.1/15.3*
MIDI Si32-3 x7	87	25.96	0.08	0.20	0.40	0.74	1.33	2.15	3.11	—	—	22.1/15.3*
MIDI Si32-3 x8	87	29.66	0.07	0.18	0.37	0.65	1.16	1.87	2.83	—	—	22.1/15.3*
MIDI Si32-3 x9	87	33.37	0.06	0.16	0.31	0.57	1.05	1.67	2.52	—	—	22.1/15.3*
MIDI Si32-3 x10	87	37.08	0.06	0.14	0.28	0.51	0.93	1.50	2.27	—	—	22.1/15.3*
MIDI Si32-3 x11	87	40.79	0.05	0.13	0.26	0.45	0.85	1.36	2.07	—	—	22.1/15.3*
MIDI Si32-3 x12	87	44.50	0.05	0.12	0.24	0.42	0.79	1.25	1.90	—	—	22.1/15.3*
MIDI Si32-3 x13	87	48.20	0.04	0.11	0.22	0.40	0.71	1.16	1.76	—	—	22.1/15.3*

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MIDI Si32-3 x14	87	51.91	0.04	0.10	0.20	0.37	0.68	1.08	1.61	—	—	22.1/15.3*
MIDI Si32-3 x15	87	55.62	0.04	0.09	0.19	0.34	0.62	0.99	1.50	—	—	22.1/15.3*
MIDI Si32-3 x16	87	59.33	0.04	0.09	0.18	0.31	0.59	0.93	1.42	—	—	22.1/15.3*
MIDI Xi40-3 x5	65	19.39	0.12	0.34	0.68	1.25	2.10	3.11	4.81	6.80	12.5	28/15*
MIDI Xi40-3 x6	65	23.27	0.10	0.28	0.57	1.05	1.76	2.69	3.96	5.66	10.5	28/15*
MIDI Xi40-3 x7	65	27.14	0.09	0.25	0.48	0.88	1.50	2.29	3.40	4.81	8.78	28/15*
MIDI Xi40-3 x8	65	31.02	0.08	0.22	0.42	0.79	1.30	2.01	3.11	4.25	7.93	28/15*
MIDI Xi40-3 x9	65	34.90	0.07	0.20	0.37	0.68	1.16	1.78	2.63	3.68	6.80	28/15*
MIDI Xi40-3 x10	65	38.78	0.06	0.18	0.34	0.62	1.05	1.61	2.38	3.40	6.23	28/15*
MIDI Xi40-3 x11	65	42.65	0.06	0.16	0.31	0.57	0.96	1.47	2.15	3.11	5.66	28/15*
MIDI Xi40-3 x12	65	46.53	0.05	0.15	0.28	0.51	0.88	1.36	1.98	2.83	5.10	28/15*
MIDI Xi40-3 x13	65	50.41	0.05	0.14	0.26	0.48	0.82	1.25	1.84	2.61	4.81	28/15*
MIDI Xi40-3 x14	65	54.29	0.05	0.12	0.24	0.45	0.76	1.16	1.70	2.44	4.53	28/15*
MIDI Xi40-3 x15	65	58.16	0.04	0.12	0.23	0.42	0.71	1.08	1.59	2.27	4.25	28/15*
MIDI Xi40-3 x16	65	62.04	0.04	0.11	0.21	0.40	0.65	1.02	1.50	2.12	3.96	28/15*

*without/with 1x flap valve

Dimensional drawing



Ordering information

For a complete list of available pumps and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

Accessory descriptions

P6040 V30

Piab P6040 multi stage ejector with Si, Pi or Xi COAX® technology. Modular design for flexible performance. Compact and durable with no moving parts. Electric 3/2 valve for on/off. Manometer for feed pressure control

P6040 ES Vacuum

Piab P6040 multi stage ejector with Si, Pi or Xi COAX® technology. Modular design for flexible performance. Compact and durable with no moving parts. Electrically operated air-saving device. Adjustable vacuum controlled 2/2 NO valve. Manometer for feed pressure control. Recommended for non-leaking system.

P6040 – Customer Code

P6040
Code
P6040

Code	Application type
V	Vacuum
B	Blow

Code	Mounting
00	Mounting T-slot

Code	Cover/Function plates
AA	Connection G1/2"
AB	Connection 4x G1/2"
AC	Function Valve v30
AD	Function ES-Vacuum
AE	Function ES-Blow

P6040 . V . AA . 00 . AA . 00

Code	Connections for vacuum and exhaust
00	Connections G 1 1/2"
01	Connections G 2"
02	Connections G 2 1/2"
03	Connection G 1 1/2", silencer
04	Connection G 2", silencer
05	Connection G 2 1/2", silencer
06	Connection G 1 1/2", inlet silencer
07	Connection G 2", inlet silencer
08	Connection G 2 1/2", inlet silencer

Code												COAX® Cartridge module
×5	×6	×7	×8	×9	×10	×11	×12	×13	×14	×15	×16	
AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	COAX® Cartridge module Pi48-3
AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	COAX® Cartridge module Pi48-3, non-return valve
AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	COAX® Cartridge module Pi48-3, 1x flap valve
BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	COAX® Cartridge module Si32-3
BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	COAX® Cartridge module Si32-3, non-return valve
CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	COAX® Cartridge module Si32-3, 1x flap valve
CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	COAX® Cartridge module Xi40-3
DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	COAX® Cartridge module Xi40-3, non-return valve
DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	COAX® Cartridge module Xi40-3, 1x flap valve

Round pump

This round pump is available with the energy efficient COAX® cartridges. It designed for high vacuum flow with 6x COAX® Si MIDI cartridges. Still it is small, compact and lightweight (3.52 lb.). Easy to mount and install with integrated hose connectors.

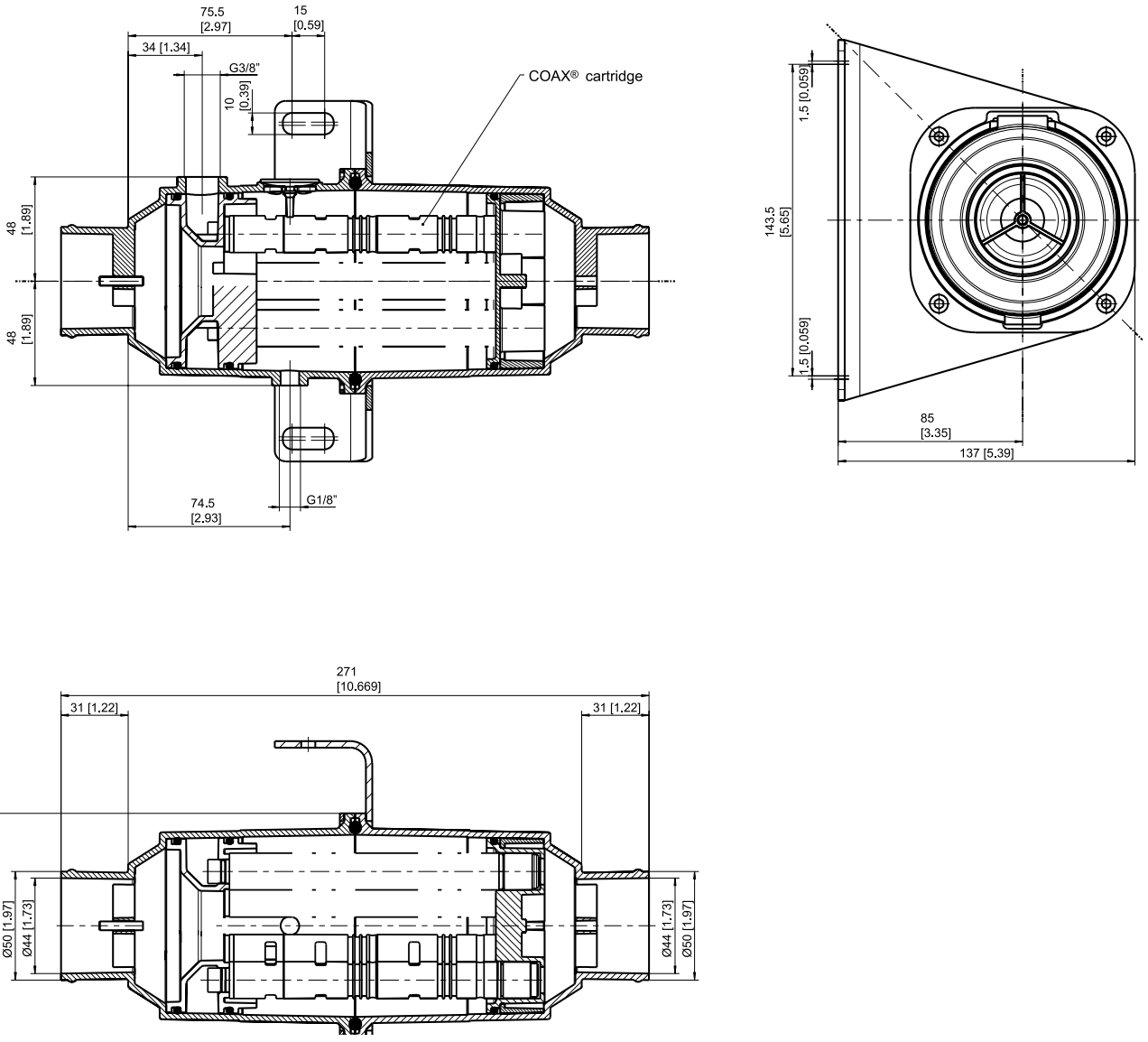
Vacuum flow

COAX® Cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)								Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	-inHg
MIDI Si32-3 x6	58	15.89	63.6	36.9	24.2	15.3	10.2	5.09	1.27	—	17.7
MIDI Si32-3 x6	73	19.07	72.5	42.0	28.0	17.8	10.8	7.88	4.45	2.29	20.7
MIDI Si32-3 x6	87	22.25	76.3	44.5	33.1	21.6	11.4	7.63	6.36	4.45	22.1

Evacuation times

COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)							Max vacuum
	psi	scfm	3	6	9	12	15	18	21	-inHg
MIDI Si32-3 x6	58	15.89	0.14	0.34	0.65	1.13	1.98	4.73	—	17.7
MIDI Si32-3 x6	73	19.07	0.08	0.28	0.51	0.99	1.64	2.83	4.73	20.7
MIDI Si32-3 x6	87	22.25	0.08	0.23	0.48	0.85	1.56	2.49	3.77	22.1

Dimensional drawing



Ordering information

For a complete list of available pumps and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

MINI L pumps family

This family of pumps provides a large vacuum flow even though they are very small in size and lightweight. Vacuum level to 22.1 -inHg. Some pumps in this family are available with connection plate in aluminium or composite PA. These are recommended to use when the handled product is made of porous material such as cardboard, wood or paper.

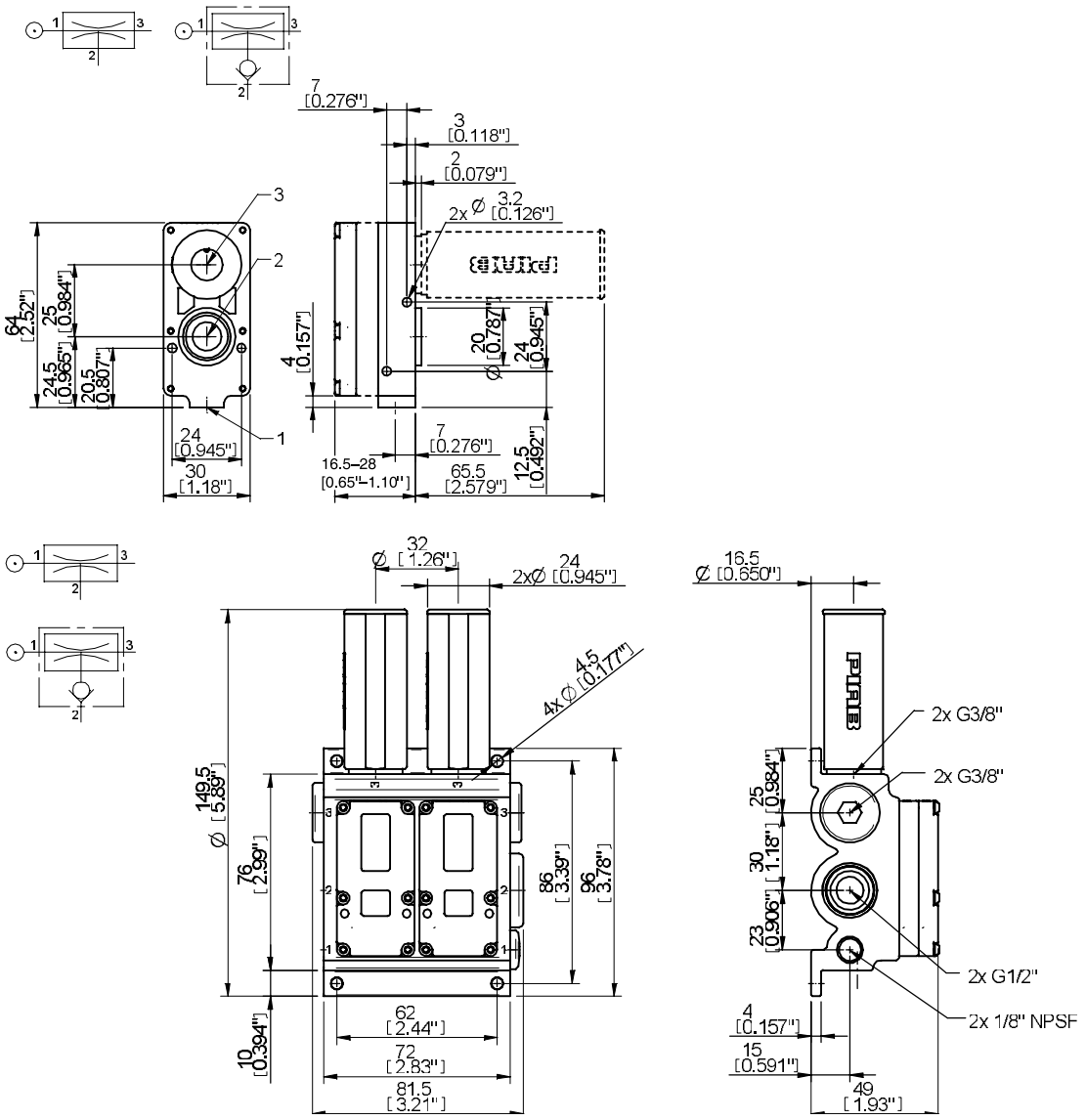
Vacuum flow

Pump name	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)								Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	-inHg
L7	87	1.04	1.53	1.04	0.61	0.53	0.42	0.34	0.21	0.14	22.1
L14	87	2.08	3.18	2.12	1.21	0.95	0.83	0.68	0.51	0.28	22.1
L28	87	4.24	5.51	3.60	2.33	1.89	1.57	1.17	0.76	0.36	22.1
L56	87	8.48	10.8	7.42	4.24	3.60	2.97	2.33	1.72	0.91	22.1

Evacuation times

Pump name	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)							Max vacuum
	psi	scfm	3	6	9	12	15	18	21	-inHg
L7	87	1.04	2.63	8.78	20.4	34.0	51.0	73.6	108	22.1
L14	87	2.08	1.81	4.81	10.2	16.7	24.9	36.8	51.0	22.1
L28	87	4.24	1.33	3.11	5.66	9.06	13.0	19.5	31.1	22.1
L56	87	8.48	0.65	1.50	2.83	4.53	6.51	9.34	14.2	22.1

Dimensional drawing



Ordering information

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MINI M-L pumps family

This pump family with its very small size and low weight provide extra vacuum level to 24.1 -inHg. Some models are available with the connection plate in aluminium or composite PA. These are recommended to use when the handled product is made of a sealed material or a non-porous material such as plastic, metal or glass.

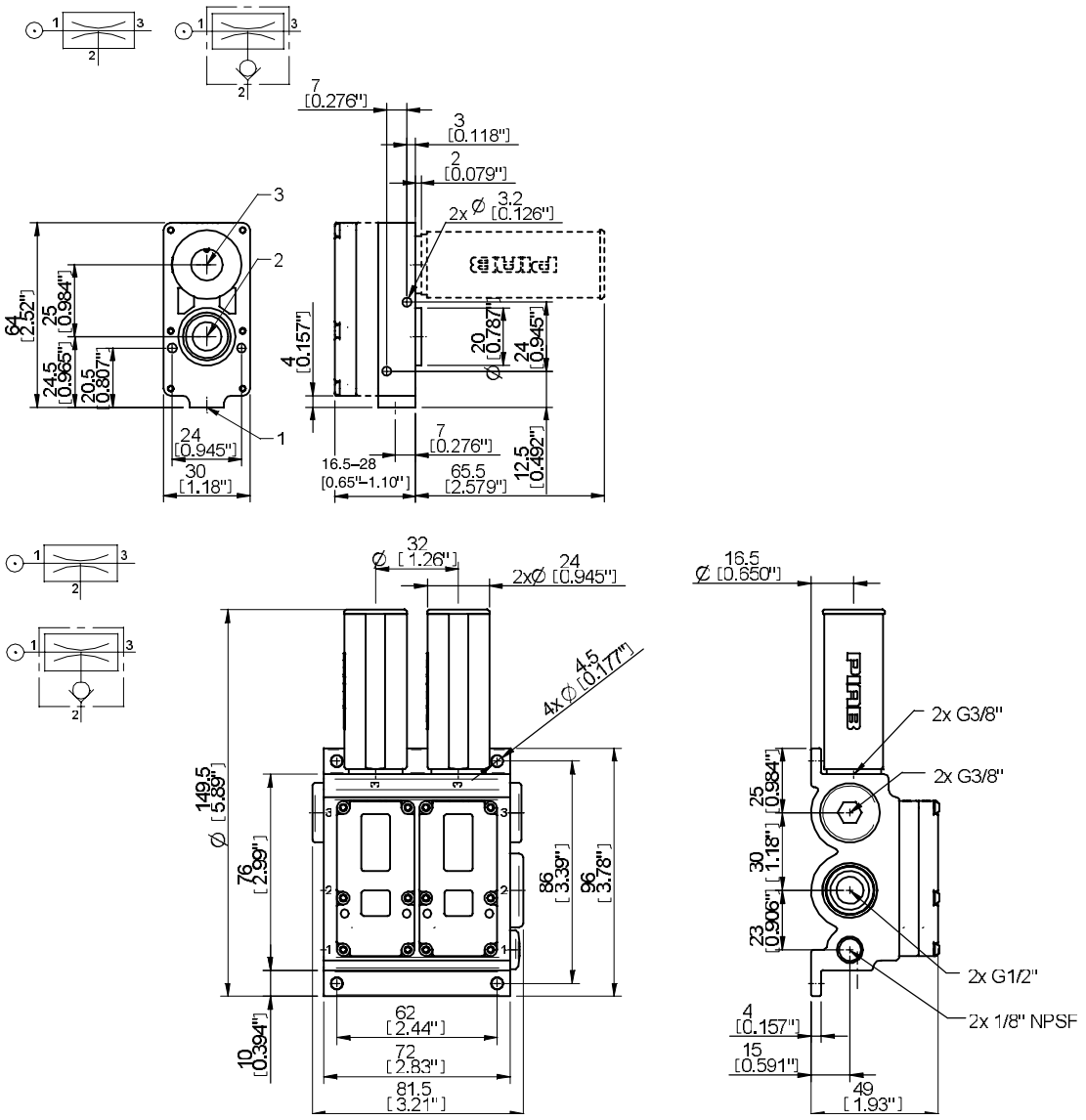
Vacuum flow

Pump name	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)									Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	-inHg
M5L	55	0.81	1.23	0.64	0.47	0.38	0.30	0.21	0.17	0.08	0.02	23.9
M5L	87	1.17	1.55	1.06	0.55	0.30	0.25	0.21	0.17	0.11	0.04	24.8
M10L	55	1.61	2.33	1.21	0.83	0.74	0.64	0.44	0.25	0.13	0.04	23.9
M10L	87	2.33	2.75	1.93	1.02	0.61	0.55	0.44	0.28	0.19	0.06	24.8
M20L	55	3.18	4.24	2.54	1.61	1.42	1.12	0.87	0.70	0.40	0.04	23.9
M20L	87	4.66	5.09	3.60	2.01	1.21	1.02	0.81	0.61	0.40	0.13	24.8
M40L	55	6.36	8.48	4.66	2.97	2.54	2.12	1.50	0.91	0.40	0.11	23.9
M40L	87	9.32	10.2	6.57	3.60	2.33	1.97	1.57	1.21	0.76	0.23	24.8

Evacuation times

Pump name	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)								Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	-inHg
M5L	55	0.81	5.66	17.3	34.0	51.0	73.6	108	167	314	23.9
M5L	87	1.17	3.68	10.2	28.3	51.0	79.3	113	161	266	24.8
M10L	55	1.61	3.68	8.78	16.1	25.5	36.8	56.6	90.6	201	23.9
M10L	87	2.33	2.24	5.66	14.2	26.1	39.6	59.5	85.0	142	24.8
M20L	55	3.18	1.47	3.96	7.36	11.9	18.1	28.3	48.1	105	23.9
M20L	87	4.66	1.08	2.83	6.80	12.2	19.3	28.3	42.5	70.8	24.8
M40L	55	6.36	0.85	2.10	3.68	5.95	9.06	14.2	26.9	45.3	23.9
M40L	87	9.32	0.88	1.81	3.68	6.23	9.63	14.2	19.8	36.8	24.8

Dimensional drawing



Ordering information

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MINI X-L pumps family

This pump family with its very small size and low weight provide extra vacuum level to 27.9-inHg. Some models are available with the connection plate in aluminium or composite PA. These are recommended to use when the handled product is made of a sealed material or a non-porous material such as plastic. metal or glass.

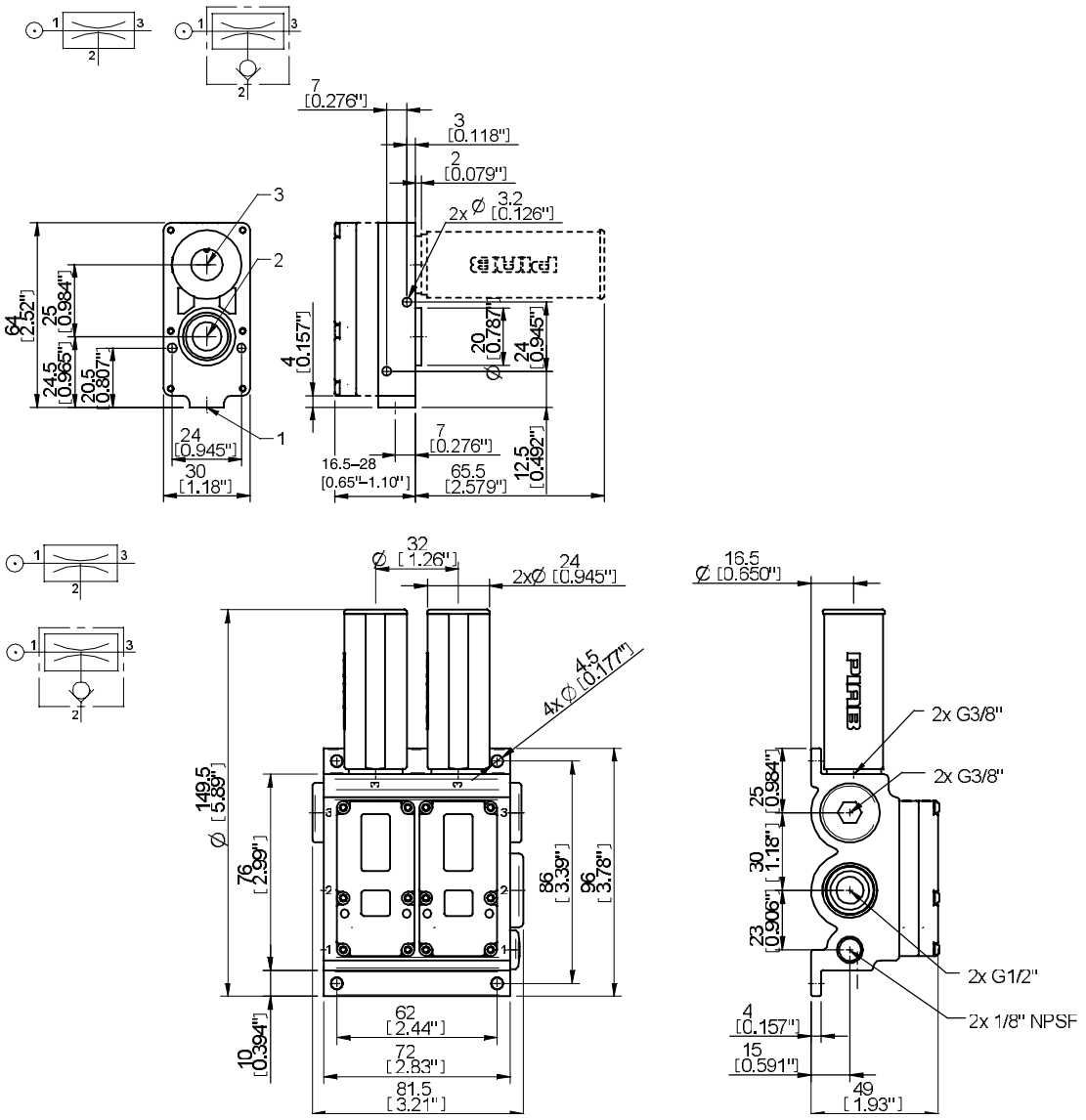
Vacuum flow

Pump name	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
X5L	58	0.83	1.02	0.51	0.25	0.23	0.21	0.18	0.15	0.121	0.064	0.013	27.4
X10L	58	1.67	1.61	0.74	0.51	0.44	0.34	0.28	0.21	0.15	0.085	0.021	27.4
X20L	58	3.39	4.03	2.12	1.06	0.93	0.81	0.64	0.53	0.36	0.21	0.042	27.4
X40L	58	6.57	6.78	3.18	2.12	1.91	1.48	1.27	1.06	0.85	0.36	0.081	27.4

Evacuation times

Pump name	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
X5L	58	0.83	4.81	23.2	48.1	76.5	110	153	210	300	637	27.4
X10L	58	1.67	3.11	13.3	26.6	42.5	62.3	87.8	122	187	396	27.4
X20L	58	3.39	1.56	5.66	11.3	18.4	27.5	39.6	53.8	76.5	144	27.4
X40L	58	6.57	1.08	3.40	6.23	9.34	13.6	19.3	34.0	62.3	90.6	27.4

Dimensional drawing



Ordering information

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MAXI MLL pumps family

MLL 200/400

MLL800

MLL1200

This is probably the largest compressed-air driven pump in the market. Some of the models have an optional energy saving feature.

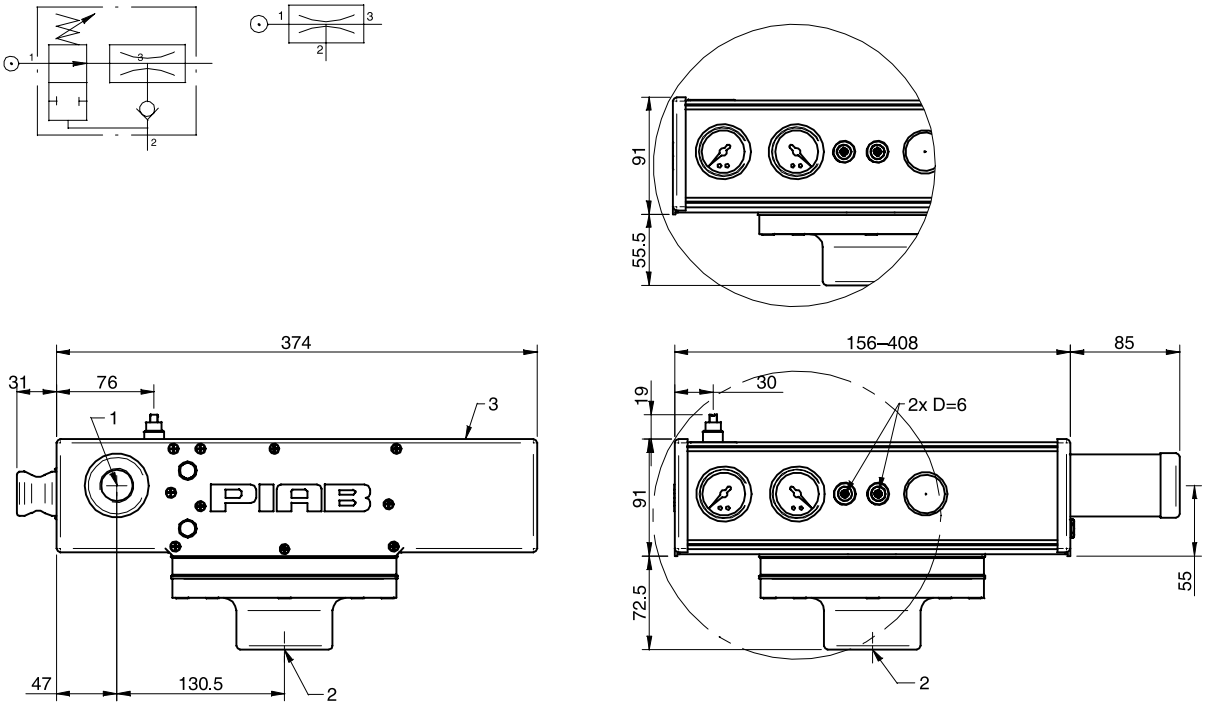
Vacuum flow

Pump name	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MLL200	87	29.7	102	57.2	38.4	20.1	10.2	6.99	5.09	2.33	1.02	0.02	26.8
MLL400	87	59.3	195	110	74.2	39.0	19.5	13.6	9.75	4.66	1.95	0.04	26.8
MLL800	87	119	373	210	142	74.2	37.3	26.1	18.6	8.90	3.81	0.08	26.8
MLL1200	87	178	540	303	206	108	55.1	37.9	27.1	12.9	5.51	0.11	26.8

Evacuation times

Pump name	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MLL200	87	29.7	0.085	0.227	0.396	0.850	1.70	2.83	4.53	8.21	23.2	26.8
MLL400	87	59.3	0.042	0.113	0.198	0.425	0.850	1.42	2.27	4.25	11.6	26.8
MLL800	87	119	0.023	0.051	0.099	0.227	0.396	0.680	1.13	2.04	5.66	26.8
MLL1200	87	178	0.014	0.034	0.065	0.147	0.255	0.453	0.765	1.36	3.96	26.8

Dimensional drawing



Ordering information

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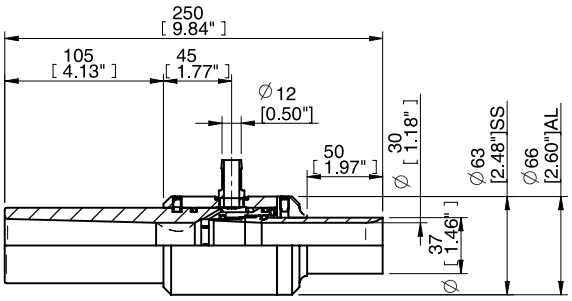
Ejector 300

This is a compact ejector pump which is normally used when a large flow with low vacuum is desired. The air consumption and capacity can be adjusted. Small amounts of material and contaminants can be conveyed. This product is available in stainless steel or aluminium. When it is fitted with an insert, the ejector changes characteristics providing higher vacuum at lower flow. It is delivered with a 3/8” hose nipple for the compressed air connection.

Vacuum flow

Feed pressure	Air consumption	Vacuum flow (scfm) at 0 -inHg		Max vacuum (-inHg)	
psi	scfm	Ejector 300	With insert	Ejector 300	With insert
15	17.6	117	1.03	67.8	1.48
29	28.2	180	1.77	99.6	3.25
44	38.8	233	2.36	125	4.72
58	49.4	267	3.1	136	5.91
73	60.0	299	3.54	136	6.35
87	70.6	322	3.69	125	6.44

Dimensional drawing



Ordering information

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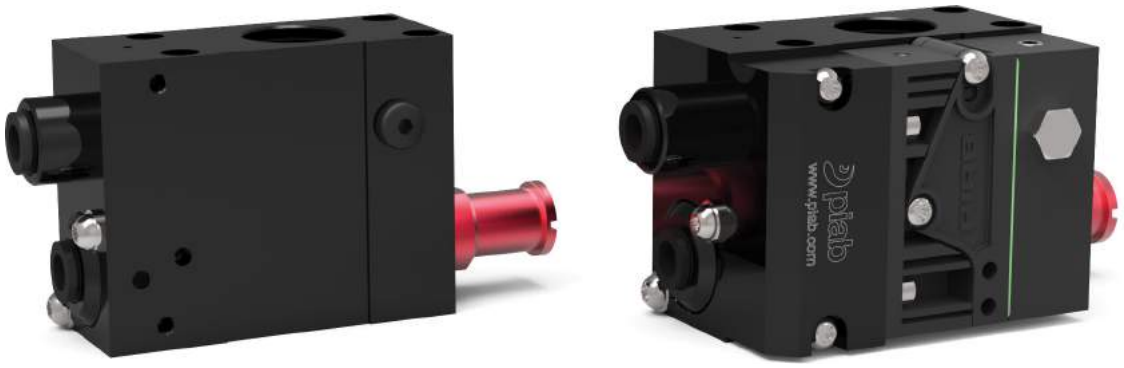
piSECURE



This vacuum pump combines high security and the most energy-efficient solution for sealed material, COAX® technology with automatic air-saving function. It has a check valve that traps vacuum in sealed applications and an integrated energy saving device that results in virtually no energy consumption. It is an excellent product when working with vacuum handling devices that have to comply and fulfil legislated lifting norms for handling devices, for example (DIN/SS) – EN 13155, ASME Standard B30.20, etc.

As the piSECURE uses the two stage COAX® MINI Xi10-2 ejector it will provide a fast evacuation to 27.8 -inHg. It is suitable to use as decentralized (one per cup) for maximum safety. It also has an integrated blow-off release valve for fast and reliable release of object. The optional air saving function (piSECURE ES) can save up to 99% of consumption.

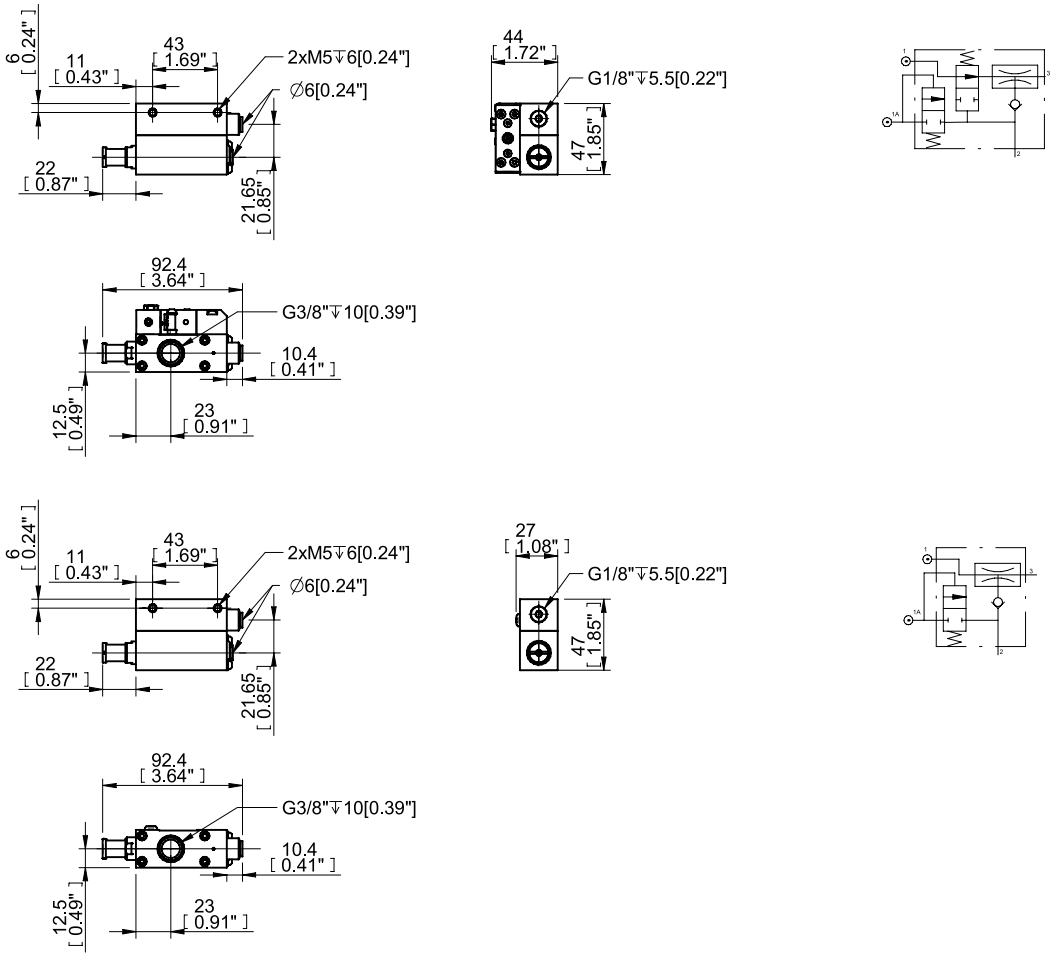
Vacuum flow

COAX® cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)										Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	27	-inHg
MINI Xi10-2	65	0.89	1.59	1.29	0.95	0.59	0.40	0.32	0.23	0.15	0.091	0.006	27.1
MINI Xi10-2	73	0.97	1.59	1.33	1.04	0.70	0.40	0.32	0.23	0.15	0.095	0.023	27.7
MINI Xi10-2	87	1.14	1.57	1.33	1.12	0.89	0.64	0.34	0.23	0.17	0.087	0.021	27.4

Evacuation times

COAX® cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MINI Xi10-2	65	0.89	4.25	8.50	17.0	31.1	45.3	65.1	99.1	150	272	27.1
MINI Xi10-2	73	0.97	3.96	8.50	17.0	28.3	45.3	65.1	99.1	150	252	27.7
MINI Xi10-2	87	1.14	4.25	8.50	14.2	22.7	36.8	56.6	87.8	136	246	27.4

Dimensional drawing



Ordering information

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Vacuum Check Valve VT-1H with COAX®

This vacuum pump combines high security and the most energy-efficient solution for sealed material, COAX® technology with automatic air-saving function. It has a check valve that traps vacuum in sealed applications and an integrated energy saving device that results in virtually no energy consumption. It is an excellent product when working with vacuum handling devices that have to comply and fulfil legislated lifting norms for handling devices, for example (DIN/SS) – EN 13155, ASME Standard B30.20, etc.

It has the two-stage COAX® cartridge MINI Pi12-2 integrated and is available in lock pin 16, 19 or ball joint mountings, industry standard. It is also available with level compensator to compensate for differences in level of object.

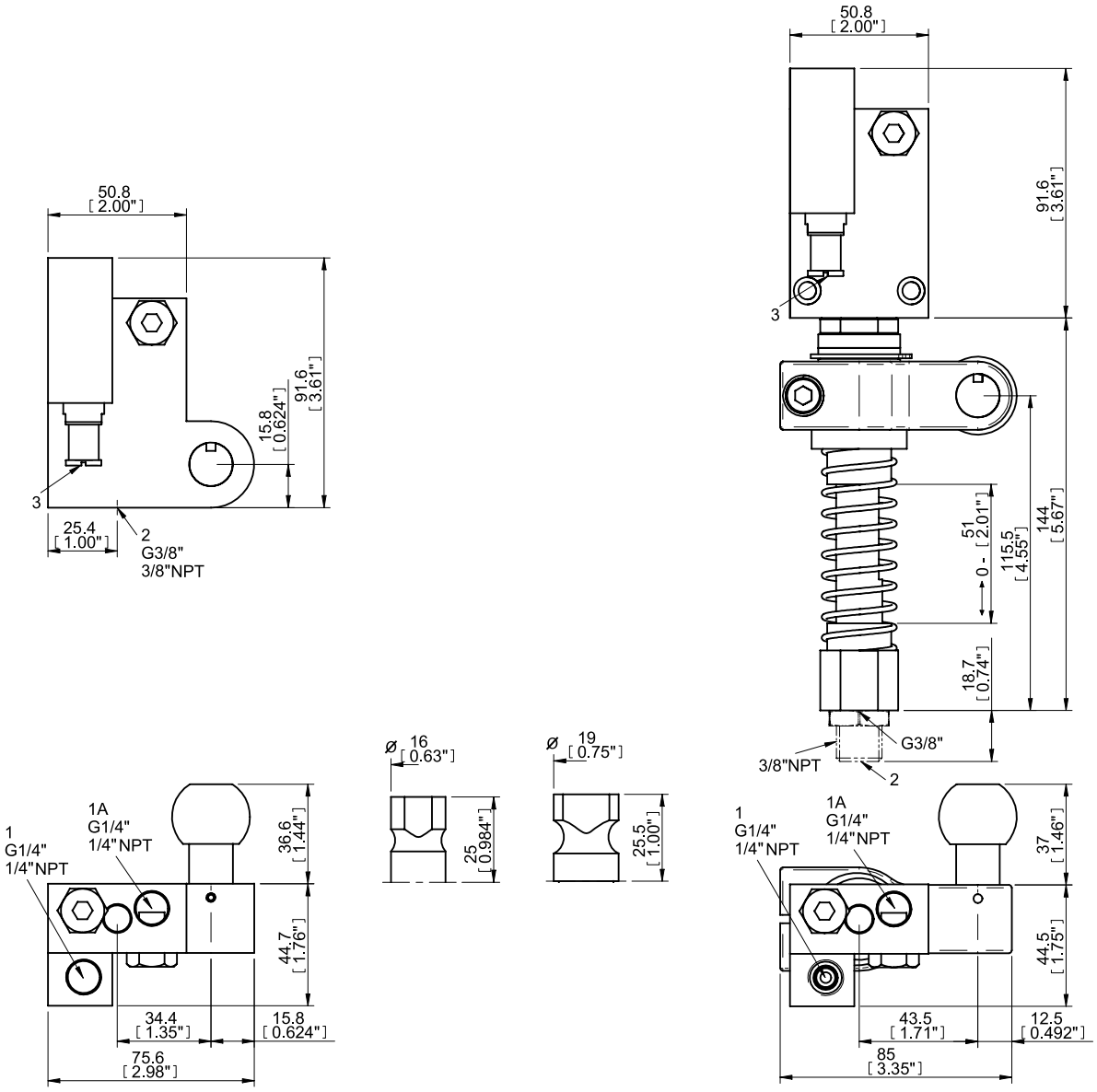
Vacuum flow

COAX® cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)									Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	-inHg
MINI Pi12-2	46	0.93	1.44	1.27	0.93	0.57	0.4	0.3	0.21	0.13	0.06	26.6

Evacuation times

COAX® cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)								Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	-inHg
MINI Pi12-2	46	0.93	4.81	9.06	16.4	31.1	51	76.5	113	181	26.6

Dimensional drawing



Ordering information

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Vacuum Check Valve VT-1H Vacustat with COAX®

This vacuum pump combines high security and the most energy-efficient solution for sealed material, COAX® technology with automatic air-saving function. It has a check valve that traps vacuum in sealed applications and an integrated energy saving device that results in virtually no energy consumption. It is an excellent product when working with vacuum handling devices that have to comply and fulfil legislated lifting norms for handling devices, for example (DIN/SS) – EN 13155, ASME Standard B30.20, etc.

It has the two-stage COAX® cartridge MINI Pi12-2 integrated and is available in lock pin 16, 19 or ball joint mountings, industry standard. It is also available with level compensator to compensate for differences in level of object. This pump has an integrated energy-saving device, Vacustat that results in virtually no air consumption in sealed applications.

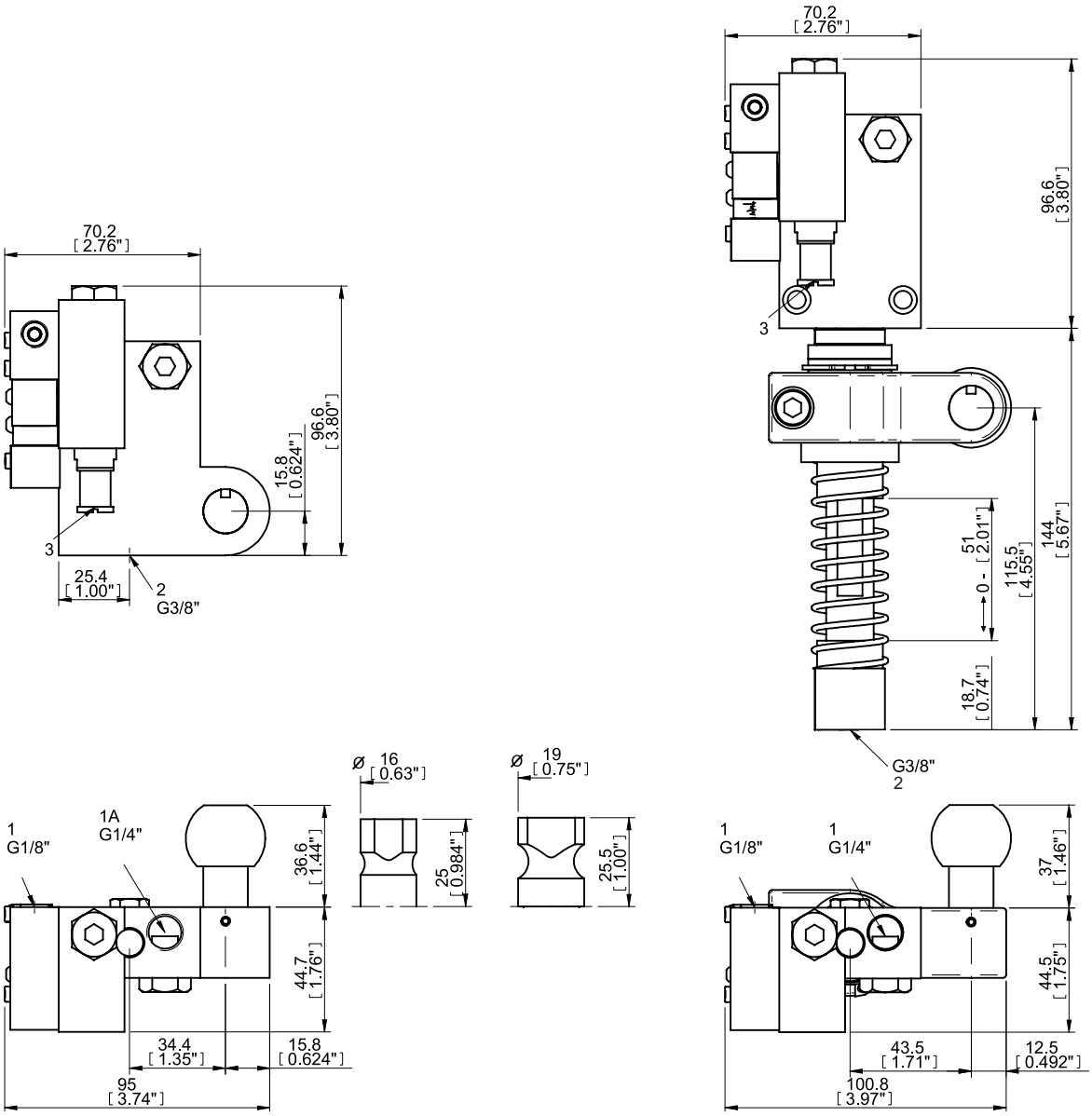
Vacuum flow

COAX® cartridge	Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)									Max vacuum
	psi	scfm	0	3	6	9	12	15	18	21	24	-inHg
MINI Pi12-2	46	0.93	1.44	1.27	0.93	0.57	0.4	0.3	0.21	0.13	0.06	26.6

Evacuation times

COAX® cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)								Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	-inHg
MINI Pi12-2	46	0.93	4.81	9.06	16.4	31.1	51	76.5	113	181	26.6

Dimensional drawing



Ordering information

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Classic H40

A traditional Piab vacuum pump developed to be used within the chemical industry or in chemically aggressive environments. It can achieve higher vacuum levels, even down to 29.5 -inHg. It is available with connection plate in composite PPS. We recommend it to be used with practically zero leakage present and in nonporous applications.

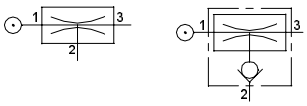
Vacuum flow

Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)												Max vacuum
psi	scfm	0	3	6	9	12	15	18	21	24	27	28	29	-inHg
87	5.51	5.93	4.45	3.18	1.91	0.85	0.64	0.42	0.3	0.21	0.2	0.04	0.01	29.5

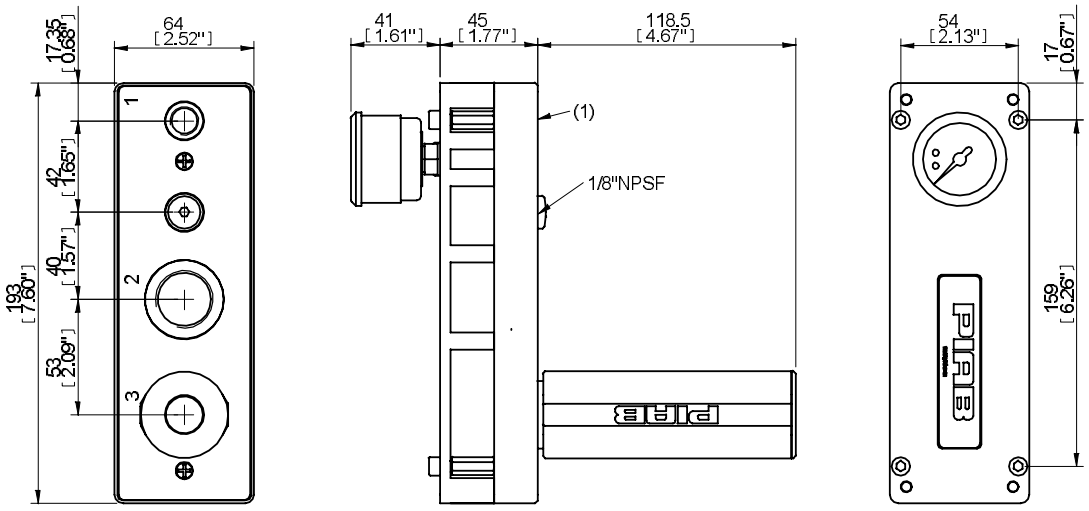
Evacuation times

Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)												Max vacuum
psi	scfm	3	6	9	12	15	18	21	24	27	28	29	29.4	-inHg
87	5.51	0.91	2.12	4.25	9.06	18.1	31.1	48.1	73.6	110	156	278	340	29.5

Dimensional drawing



	1	2	3
E	1/4"NPT	3/4"NPT	3/4"NPT



Ordering information

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Classic H120

A traditional Piab vacuum pump developed to be used within the chemical industry or in chemically aggressive environments. It can achieve higher vacuum levels, even down to 29.85 -inHg. It is available with connection plate in composite PPS or aluminium. We recommend it to be used with practically zero leakage present and in nonporous applications.

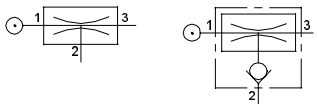
Vacuum flow

Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)												Max vacuum
psi	scfm	0	3	6	9	12	15	18	21	24	27	28	29	-inHg
87	16.1	17.8	14	9.96	5.72	3.18	2.54	1.82	1.31	0.91	0.21	0.11	0.02	29.8

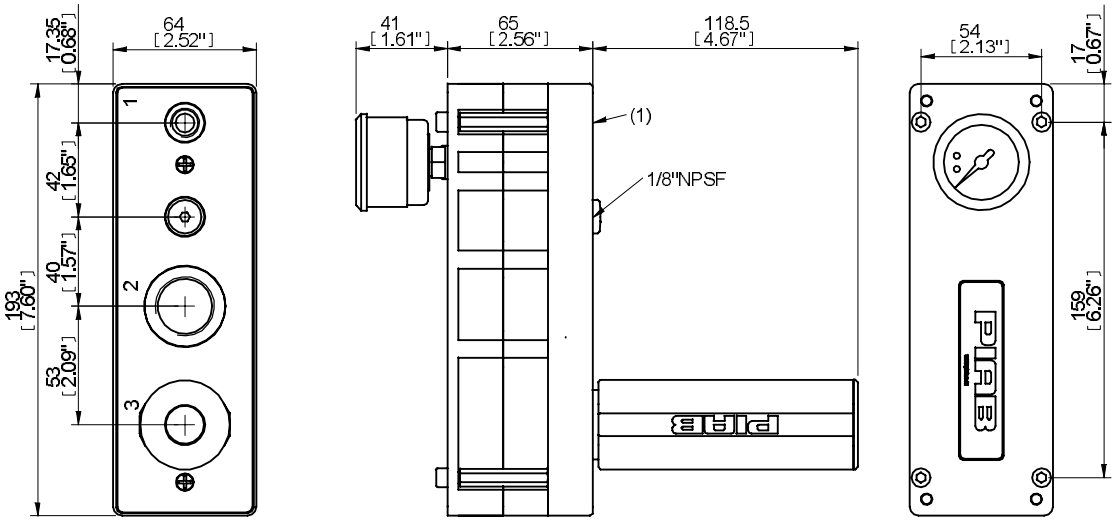
Evacuation times

Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)												Max vacuum
psi	scfm	3	6	9	12	15	18	21	24	27	28	29	29.4	29.6	-inHg
87	16.1	0.51	0.93	1.7	3.11	5.1	7.65	11.9	17.6	36.8	59.5	119	153	235	29.8

Dimensional drawing



	1	2	3
E	1/4"NPT	3/4"NPT	3/4"NPT



Ordering information

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Lab Vac LVH40

This vacuum pump is tailor-made for laboratory applications, such as degassing, vacuum filtering, gel drying and rotation evaporation. It can achieve high vacuum levels to 20 mbar abs. with a maximum vacuum flow of 5.3 scfm. There is no risk for “back draft” which can cause damaged test samples. Its low noise level, easy installation and maintenance is widely appreciated.

It has a high chemical resistance, with an option to have with Kalrez sealing material which normally makes the chemical resistance unsurpassed.

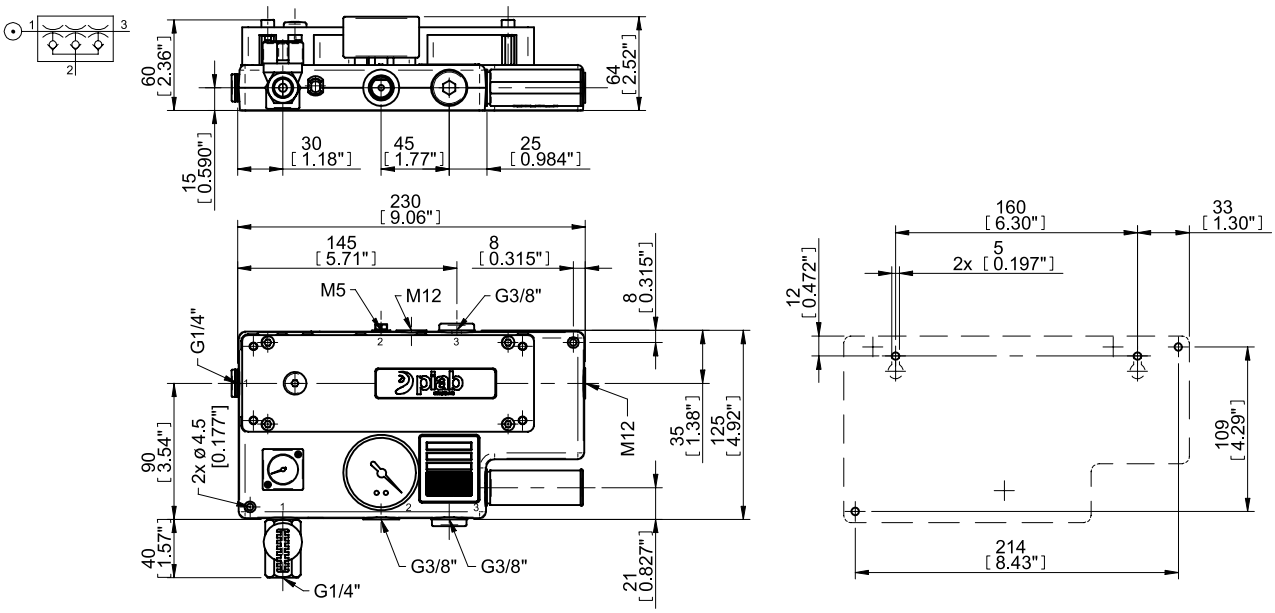
Vacuum flow

Feed pressure	Air consumption	Vacuum flow (scfm) at different vacuum levels (-inHg)											Max vacuum
psi	scfm	0	3	6	9	12	15	18	21	24	27	28	-inHg
87	5.51	5.3	3.81	2.75	1.48	1.12	0.74	0.51	0.34	0.25	0.13	0.04	28.9

Evacuation times

Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)										Max vacuum
psi	scfm	3	6	9	12	15	18	21	24	27	28	-inHg
87	5.51	1.13	2.55	5.1	11.6	20.1	30.9	46.7	70.2	111	170	28.9

Dimensional drawing



Ordering information

For a complete list of available pumps and combinations with further information visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

Pump accessories

	Vacuum pump accessories		Features and benefits
1		Vacuum switches	Our line includes inductive universal, electro-mechanical and pneumatic vacuum switches that are pre-set or adjustable.
2		Valves	Choose between solenoid, electrically or vacuum-controlled valves. The vacuum controlled valve (Vacustat) shuts off the flow of compressed air to the pump when the pre-set level is reached, and consequently the consumption of compressed air is minimized.
3		Regulators	Different vacuum pumps need different feed pressure for optimum performance. A filter regulator can easily be manually set to a desired pressure level, and be used to eliminate particles from the compressed air. A pilot regulator can be used to automatically set the feed pressure according to your needs.
4		Silencers	Reduce noise from exhaust with a flow-through design.
5		Vacuum filters	To filter dust and other small particles from the vacuum flow. Reduces the risk of operation breakdown or stoppage in the pump.
6		Other	Body for COAX® cartridges, vacuum gauge, manometer etc.

Vacuum Pump Accessories

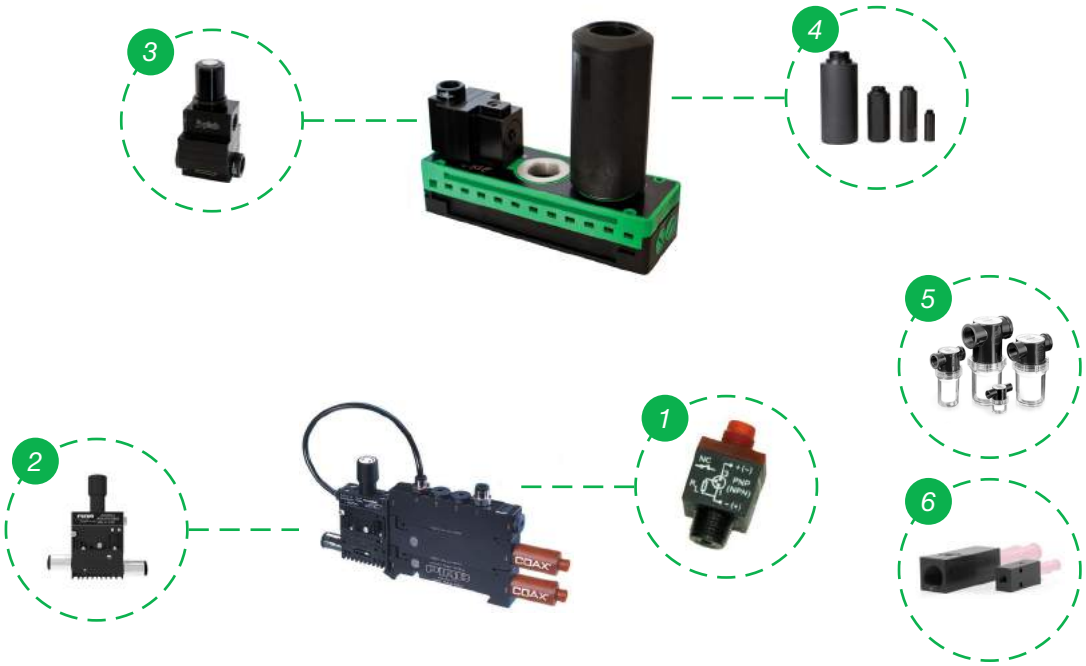


Image only to serve as an example.

1. *Vacuum switches*
2. *Valves*
3. *Regulators*
4. *Silencers*
5. *Vacuum filters*
6. *Other*

Vacuum switches

Vacuum switches, pneumatic

- Converts a vacuum level to a pneumatic signal.
- Vacuum-actuated membrane linked to a pneumatic switch.
- Available preset or with adjustable vacuum level.

Vacuum switches, electromechanical

- Converts a vacuum level to an electric signal, VAC or VDC.
- Vacuum-actuated membrane linked to an electro-mechanical switch.
- Integrated cable with open ends included.
- Available preset or with adjustable vacuum level.

Vacuum switches, inductive universal

- Converts a vacuum level to a digital signal, 24 VDC.
- Vacuum-actuated membrane linked to a proximity-inductive universal switch.
- Integrated cable with open ends included.
- PNP NO/NC or NPN NO/NC output functions.
- The switch must be connected in series with the load.

Technical Data

Description	Hysteresis	Signal range
Vacuum switch, pneumatic, adjustable with screw and knob (NO)	0.90 -inHg	3.00–28.0 -inHg
Vacuum switch, pneumatic, adjustable with screw and knob (NC)	3.50 -inHg	4.50–28.0 -inHg
Vacuum switch, pneumatic, preset (NO 7.5 -inHg)	0.90 -inHg	6.30–8.70 -inHg
Vacuum switch, pneumatic, preset (NO 19.0 -inHg)	0.90 -inHg	16.6–21.4 -inHg
Vacuum switch, pneumatic, preset (NC 9.0 -inHg)	3.50 -inHg	7.50–10.5 -inHg
Vacuum switch, pneumatic, preset (NC 21.0 -inHg)	3.50 -inHg	18.0–24.0 -inHg
Vacuum switch, electro-mechanical, adjustable with screw & knob	3.00 -inHg	4.00–28.0 -inHg
Vacuum switch, electro-mechanical, preset (Signal range 7.5 -inHg)	3.00 -inHg	6.00–9.00 -inHg
Vacuum switch, inductive universal, adjustable with knob Ø6	0.60 -inHg	3.00–28.0 -inHg
Vacuum switch, inductive universal, adjustable with knob	0.60 -inHg	3.00–28.0 -inHg
Vacuum switch, inductive universal, preset (Signal range 3.0 -inHg)	0.60 -inHg	2.70–3.30 -inHg
Vacuum switch, inductive universal, preset (Signal range 9.0 -inHg)	0.60 -inHg	8.10–9.90 -inHg

Ordering information

For a complete list of available vacuum switches visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Mini vacuum switch, AI, pre-set VS4118/VS4128

- Pre-set vacuum switch with digital output.
- Durable and compact design with G1/8” 90° angle swivel connection for easy installation.
- VS4118 hardwired enables PNP NO/NC or NPN NO/NC functionality.
- VS4128 suitable for plug in I/Os. Available in PNP NO or NPN NO models.
- Possible to connect several units serially with T-connectors to provide a common output (VS4128 PNP).

Mini vacuum switch, pre-set VS4015/VS4016

- Pre-set vacuum switch with digital output.
- Very low weight and small format, push-in or thread connections.
- PNP NO/NC or NPN NO/NC output functions.

Technical Data

Description	Hysteresis	Signal range
Vacuum Switch VS4128 9.0 -inHg, M12 PNP NO	2.36 -inHg	8.10–10.5 -inHg
Vacuum Switch VS4128 15.0 -inHg, M12 PNP NO	2.36 -inHg	14.1–16.5 -inHg
Vacuum Switch VS4118 9.0 -inHg, M8 PNP/NPN NO/NC	2.36 -inHg	20.9–22.5 -inHg
Vacuum Switch VS4118 15.0 -inHg, M8 PNP/NPN NO/NC	2.36 -inHg	8.10–10.5 -inHg
Vacuum Switch VS4118 21.0 -inHg, M8 PNP/NPN NO/NC	2.36 -inHg	14.1–16.5 -inHg
Vacuum Switch VS4128 15.0 -inHg, M12 NPN NO	2.36 -inHg	20.9–22.5 -inHg
Vacuum switch VS4015, Ø6, 9.0 -inHg	1.58–2.08 -inHg	7.80–10.2 -inHg
Vacuum switch VS4015, Ø6, 15.0 -inHg	1.58–2.08 -inHg	13.8–16.2 -inHg
Vacuum switch VS4015, Ø6, 21.0 -inHg	1.58–2.08 -inHg	19.8–22.2 -inHg
Vacuum switch VS4016, G1/8” male, 9.0 -inHg	1.58–2.08 -inHg	7.80–10.2 -inHg
Vacuum switch VS4016, G1/8” male, 15.0 -inHg	1.58–2.08 -inHg	13.8–16.2 -inHg
Vacuum switch VS4016, G1/8” male, 21.0 -inHg	1.58–2.08 -inHg	19.8–22.2 -inHg

Ordering information

For a complete list of available vacuum switches visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Vacuum switches

Vacuum switch 3-color digital display M8

- 2 PNP outputs, NO or NC. Independently selectable for each output.
- 3-color LCD display, easy readout.
- 7 programmable vacuum units, for example kPa, inHg, mmHg, etc.
- Dual display allows actual and set value to be displayed at the same time.
- Selectable ”Key-Lock mode” with display indicator to avoid unauthorized changes.
- Selectable ”Power-Save mode” with display indicator.
- Mounting brackets included.

Vacuum switch, adjustable with analog output

- Converts vacuum to an analog output signal and an adjusted vacuum level to a digital output.
- Adjustable hysteresis.
- Separate cable with open ends included.

Vacuum switch, adjustable with LED-display

- Converts adjusted vacuum levels to 2 separate digital outputs.
- Digital vacuum level display.
- Integrated cable with M8 connector included.

Technical Data

Description	Hysteresis	Signal range
Vacuum switch 3-color digital display M8	Adjustable, 0.30–2.40 -inHg	0–29.9 -inHg
Vacuum switch, MM8	1–5 % F.S.	0–29.9 -inHg
Vacuum switch, DM8	2 % F.S.	0–29.9 -inHg

Ordering information

For a complete list of available vacuum switches visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Vacuum switch, LM8

- Converts an adjusted vacuum level to a digital output.
- Very low weight and small format with push-in connection.
- Integrated cable with M8 connector included.

Vacuum switch, adjustable for P2010

- Converts an adjusted vacuum level to a digital output signal for pressure or vacuum.
- NC in vacuum range 0–29.9 -inHg. NO in pressure range 0–87 psi.
- Very low weight and small format with M5 90° angle swivel connection.
- Integrated cable with open ends included.

Vacuum Switches, Electric EVS

- EVS 54 with Calibrated Adjustment Dial.
- EVS 100 NEMA 4X.
- SPDT Switch, wired NO or NC.
- Electrical Rating: 15 amps 125/250 VAC resistive.

Technical Data

Description	Hysteresis	Signal range
Vacuum switch, LM8	2 % F.S.	0–29.9 -inHg
Vacuum switch, M5	2 % F.S.	0–29.9 -inHg to 87 psi
Vacuum switch, EVS 54 electric	1.5–3.5 -inHg	0–29.9 -inHg
Vacuum switch, EVS 100 electric	1.0–2.0 -inHg	0–29.9 -inHg

Ordering information

For a complete list of available vacuum switches visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Valves

piSAVE release

- Equalizes pressure in the suction cups to provide fast release of the product.
- Extra fast release by accumulating and utilising the feed-air pressure as a boost.
- ON/OFF activated simultaneously with the ejector.
- No additional controls required — use a single 3/2 control valve for the ejector and piSAVE release.

AQR

- Equalizes pressure in vacuum gripper systems to provide fast release of product.
- Consumes no additional compressed air.
- ON/OFF activated simultaneously with the ejector.
- No additional controls required — use a single 3/2 control valve for the pump and AQR.

QR

- For vacuum pump P3010.
- Quick release by accumulating and utilising the feed-air pressure as a boost.
- ON/OFF activated simultaneously with the P3010
- Three sizes for optimizing release volume with system volume.

Technical Data

Description	Flow, atmospheric	Volume (Quick-Release)
piSAVE release G1/8"	8.16 scfm	–
piSAVE release G1/4"	16.6 scfm	–
Atmospheric quick-release valve – AQR	6.99 scfm	–
Quick-Release module P3010	–	0.18 in^3
Quick-Release tank module P3010	–	1.83 in^3
Quick-Release tank module P3010	–	3.66 in^3

Ordering information

For a complete list of available valves visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

piSAVE sense

- Vacuum check valves which allows a few suction cups to miss the object(s) and still maintain enough vacuum level in the system with quick response and release times.
- The vacuum check valves shall be used in a centralized vacuum system, one for each suction cup.
- Designing with vacuum check valves will require a smaller vacuum pump and save energy.
- Suitable for handling different size or different number of leaking or sealed objects such as MDF boards, corrugated cardboards or metal sheets with a flexible handling device.
- Also suitable for objects with surface leakage around the lip of the suction cup.
- The smallest sizes are mainly suitable for sealed and smooth materials, such as metal and glass (02/06 for small cups and 03/60 for large cups).
- The valves are supplied separately for integration or mounted in an Al-fitting with female and male threaded connections to facilitate installation.

piSAVE restrict

- Vacuum flow restrictors which allows a few suction cups to miss the object(s) and still maintain enough vacuum level in the system.
- Suitable for handling different size sealed sheets/ objects with the same flexible lifting device.
- The vacuum flow restrictors shall be used in a centralized vacuum system, one for each suction cup.
- Designing with flow restrictors will require a smaller vacuum pump and save energy.
- Available in three sizes with different flow performance/characteristics to suit different size suction cups.
- The restrictors are integrated in an Al-fittng with female and male threaded connections to faciliate installation.

Technical Data

Description	Pump flow/cup min.	Pump flow/cup to close valve	Leakage flow, max.
piSAVE sense 02/60 (yellow)	0.002 (@ 13.3 -inHg) scfm	0.44 (@ 0.9 -inHg) scfm	–
piSAVE sense 03/60 (green)	0.13 (@ 13.3 -inHg) scfm	0.78 (@ 0.9 -inHg) scfm	–
piSAVE sense 04/60 (blue)	0.32 (@ 13.3 -inHg) scfm	1.17 (@ 2.1 -inHg) scfm	–
piSAVE sense 05/60 (red)	0.53 (@ 13.3 -inHg) scfm	1.53 (@ 3.3 -inHg) scfm	–
piSAVE restrict multiple port fitting 0.7	–	–	0.17 scfm
piSAVE restrict multiple port fitting 1.0	–	–	0.34 scfm
piSAVE restrict multiple port fitting 1.3	–	–	0.57 scfm

Ordering information

For a complete list of available valves visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Valves

piSAVE onoff

- Independent pneumatic air-saving device for vacuum pumps.
- Adjustable vacuum controlled 2/2 NO valve.
- Available with large hysteresis for object handling and small hysteresis for process applications.
- The Vacustat is recommended for vacuum pumps in non-leaking systems.
- The vacuum pump must be fitted with a non-return valve.

Blow-off Check valve G1/8”

- Prevents vacuum from being pulled through the blow-off lines, which means faster response time and completely independent vacuum units.
- Reliable quick-release function even in larger systems with several units, due to the very low feed pressure required to break away for blow-off.
- Suitable in applications where cleaning of the suction cup filters or cooling of the object to be picked is important.

Technical Data

Description	Flow	Flow rate
piSAVE onoff	15.5 scfm	–
Blow-off Check valve G1/8”	–	3.18–5.93 scfm (@ 44-101.5 psi)

Ordering information

For a complete list of available suction cup valves visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Valves – Vacuum check valves

Vacuum Check Valve VT-1H

- Check valve that traps vacuum in sealed applications for safe operation.
- Built-in blow off check valve for fast release of object.
- Available in lock pin 16, 19 or ball joint mountings, industry standard.
- Available with level compensator to compensate for differences in level of object.

Vacuum Check Valve VT-1H with COAX®

- Two-stage COAX® cartridge MINI Pi12-2 integrated.
- Check valve that traps vacuum in sealed applications for safe operation.
- Built-in blow off check valve for fast release of object.
- Available in lock pin 16, 19 or ball joint mountings, industry standard.
- Available with level compensator to compensate for differences in level of object.

Vacuum Check Valve VT-1H Vacustat with COAX®

- Two-stage COAX® cartridge MINI Pi12-2 integrated.
- Check valve that traps vacuum in sealed applications for safe operation.
- Built-in blow off check valve for fast release of object.
- Integrated energy-saving device, Vacustat results in virtually no air consumption in sealed applications.
- Available in lock pin 16, 19 or ball joint mountings, industry standard.
- Available with level compensator to compensate for differences in level of object.

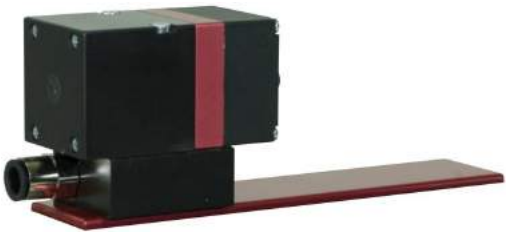
Technical Data

Description	Vacuum flow, max.
Vacuum Check Valve VT-1H	1.44 scfm
Vacuum Check Valve VT-1H with COAX®	1.44 scfm
Vacuum Check Valve VT-1H Vacustat with COAX®	1.44 scfm

Ordering information

For a complete list of available vacuum check valves visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Regulators



piSAVE optimize

- Vacuum controlled proportional pressure regulator, a fully pneumatic device suitable for air-driven ejectors/pumps.
- The feed pressure to the vacuum pump/ejector is automatically regulated and controlled to maintain the set vacuum level. Air/energy usage is kept to a minimum for the application (optimized).
- Recommended for leaking and sealed applications to save energy and secure the right vacuum level.
- Extra port for Vacuum gauge.
- Air ventilation port with filter.
- Swivel compressed air connections.
- piSAVE optimize gives maximum feed pressure/ flow to vacuum pump/ejector until vacuum level starts to build up.
- Separate mounting bracket kit.
- Upgrade kit - available as an integrated module for piCLASSIC and Classic vacuum pumps.

PCC (Piab Cruise Control)

- For vacuum pump P6010.
- Programmable for constant vacuum level.
- The signal input regulates the feed pressure to maintain a constant vacuum level.
- Integrated analog vacuum sensor.

Technical Data

Description	Vacuum flow
piSAVE optimize	3.54–31.78 scfm (@ recommended ejector/pump feed pressure)
PCC (Piab Cruise Control)	0–38.8 scfm

Ordering information

For a complete list of available regulators visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Pilot regulator

- Pilot-operated pressure regulator with secondary pressure relief and flow compensation.
- Suitable for remote control.

Regulator

- Regulator for optimizing feed pressure to vacuum pumps or smaller vacuum systems.
- Manometer for feed pressure control.

Technical Data

Description	Flow
Pressure regulator, pilot operated, G1/4”	19.1 scfm
Regulator 1/4”, manometer	19.1 scfm

Ordering information

For a complete list of available regulators visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Silencers

Silencer MINI/MIDI

- Reduces noise from exhaust on MINI/MIDI piINLINE®.

Silencers

- Reduce noise from exhaust.
- Flow-through design.

Silencer COAX®

- Reduces noise from the exhaust.
- Compatible with aluminium holders for MINI and MIDI COAX® cartridges.
- Simple snap locking when mounting.
- Through-flow design that eliminates the risk of impaired performance due to clogging of the silencer.

Technical Data

Description	Noise level, reduction
Silencer piINLINE® MINI	10 dBA
Silencer piINLINE® MIDI	15 dBA
Silencer	10 dBA
Silencer COAX®	> 10 dBA

Ordering information

For a complete list of available silencers visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Vacuum Filters

Vacuum filters – plastic

- To filter dust and other small particles from the vacuum flow.
- Reduces the risk of operation breakdown or stoppage in the pump.
- Replaceable filter element.
- Available with special filter element with increased filter area.

Vacuum filters – metal

- To filter dust and other small particles from the vacuum flow.
- Reduces the risk of operation breakdown or stoppage in the pump.

Inline filters

- Translucent, inert polypropylene housing allows for visual inspection.
- These miniature filters can be used on compressed air lines or vacuum lines to protect vacuum pumps, vacuum switches and valves from contamination.
- Filter is constructed of chemically inert porous polyethylene and has a recommended working pressure up to 65 psi.

Technical Data

Description	Pressure	Removal efficiency	Flow, nominal
Vacuum filter G1/2” (5 µm) & G3/4” (5 µm)	-14.5–0 psi	5 µm	12.3 scfm
Vacuum filter G1½” (5 µm)	-14.5–0 psi	5 µm	19.1 scfm
Vacuum filter G1/8”, 1/8” NPT & 1/4” NPT	-14.5–0 psi	10 µm	2.97 scfm
Vacuum filter G3/8” & 3/8” NPT	-14.5–0 psi	10 µm	5.30 scfm
Vacuum filter G1/2”, G3/4”, 1/2” NPT & 3/4” NPT	-14.5–0 psi	10 µm	31.8 scfm
Vacuum filter G1”, G1½”, 1” NPT & 1 1/2” NPT	-14.5–0 psi	10 µm	89.0 scfm
Vacuum filter, 3/8” NPT steel, 3/4” NPT steel	-14.5–0 psi	5 µm	13.8 scfm
Vacuum filter, 1/2” NPT steel	-14.5–0 psi	5 µm	21.0 scfm
Vacuum filter, 1” NPT steel	-14.5–0 psi	5 µm	35.0 scfm
Vacuum filter, 1 1/2” NPT steel	-14.5–0 psi	5 µm	79.9 scfm
Vacuum filter, 2” NPT steel	-14.5–0 psi	5 µm	175 scfm
Vacuum filter, 2 1/2” NPT steel	-14.5–0 psi	5 µm	212 scfm
Inline filter	-14.69–65 psi	10 µm	0.42 scfm
Inline filter	-14.69–65 psi	25 µm	1.06 scfm

Ordering information

For a complete list of available vacuum filters visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

Other

Body for COAX® cartridge

- Aluminium bodies for COAX® MINI and MIDI cartridges.
- All 2-stage and 3-stage cartridges, equipped with a red aluminium holder, will fit.
- The mini body has a stackable design with extra port for sensing or blow-off.
- The midi body has a special vacuum-exhaust inline design, which minimizes the influence of dust on the cartridge.
- Cartridge has to be ordered separately.

Vacuum gauge and manometers

- Analog indicator, springjoint – lever system.
- The instruments include nut for installation on a panel.
- Vacuum gauge to 30 -inHg, Manometers to 36.25 and 150 psi.

POREX™ mufflers

- The POREX™ muffler is designed to specifically reduce air blast noise created at exhaust ports of pneumatic valves.
- The porous plastic body is made of high density porous polyethylene.
- The muffler is available in three (3) air flows: fine flow (FF-red base-35 micron), standard flow (black base-70 micron) and coarse flow (CF-green base-250 micron).

Technical Data

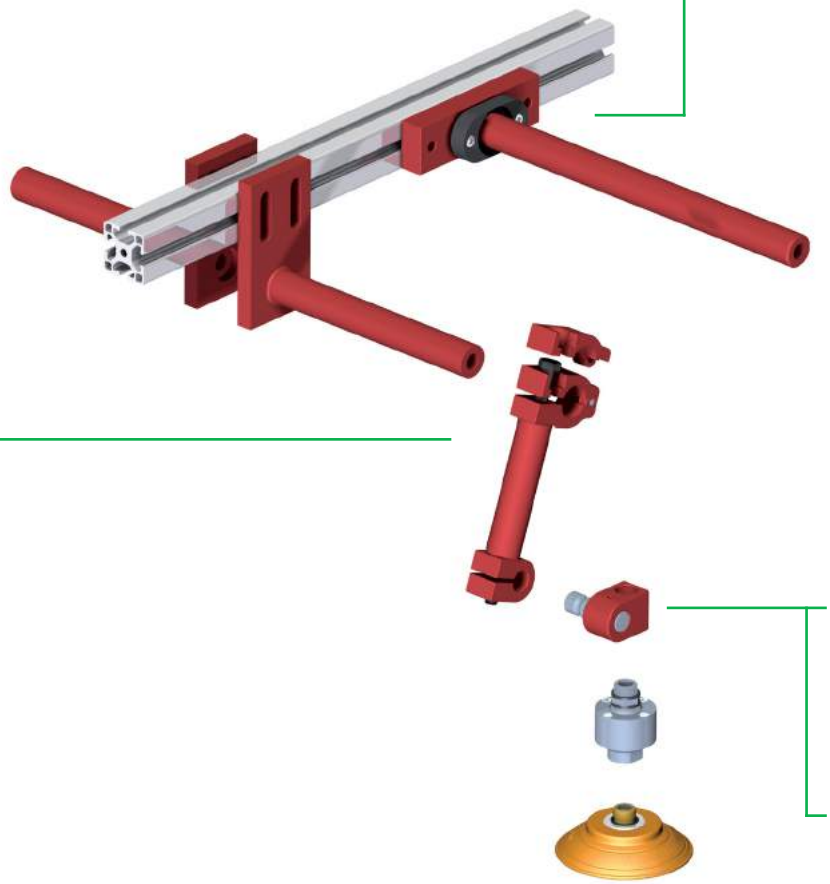
Description	Noise level, reduction
POREX™ Muffler 1/8”	8–13 dBA
POREX™ Muffler 1/4”	4–16 dBA
POREX™ Muffler 3/8”	4–10 dBA
POREX™ Muffler 1/2”	10–20 dBA
POREX™ Muffler 3/4”	8–16 dBA
POREX™ Muffler 1”	14–18 dBA

Ordering information

For a complete list of available accessories visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register to receive full access to all resources available.

PMAT – Piab Modular Automation Tooling

PMAT – Piab Modular Automation Tooling



Connections to main frame/structure of the end-effector

Durable mounting bars, clamp blocks with tubes and special parts that will all fit to any type of welded frames or extrusions.

They form the structure of the PMAT end-effector and interfaces nicely with the swivel arms and in some cases directly with a function attachment.

Centralized vacuum connection

Connect your PMAT system to a centralized vacuum pump.

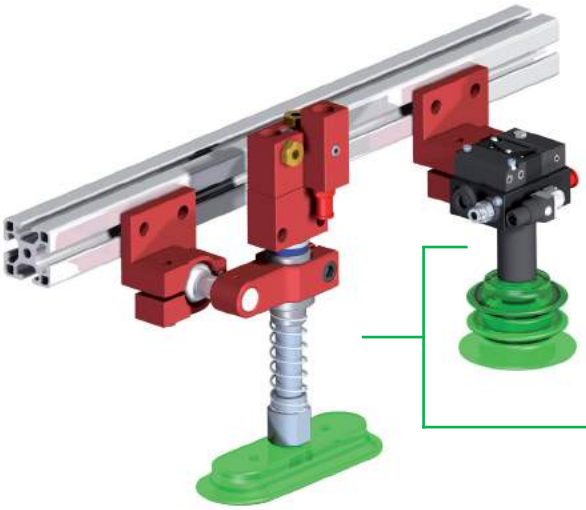
Ball joint

Swivel arms

The swivel arm is the part which allows for unlimited positioning of the suction cup. A single-bolt on the swivel arm will tighten the entire assembly of arm, function attachment and cup in the right position. Swivel arms are available in different lengths for increased flexibility and they can be mounted to a rod/bar by a slide-on function or be clamped to the rod/bar.

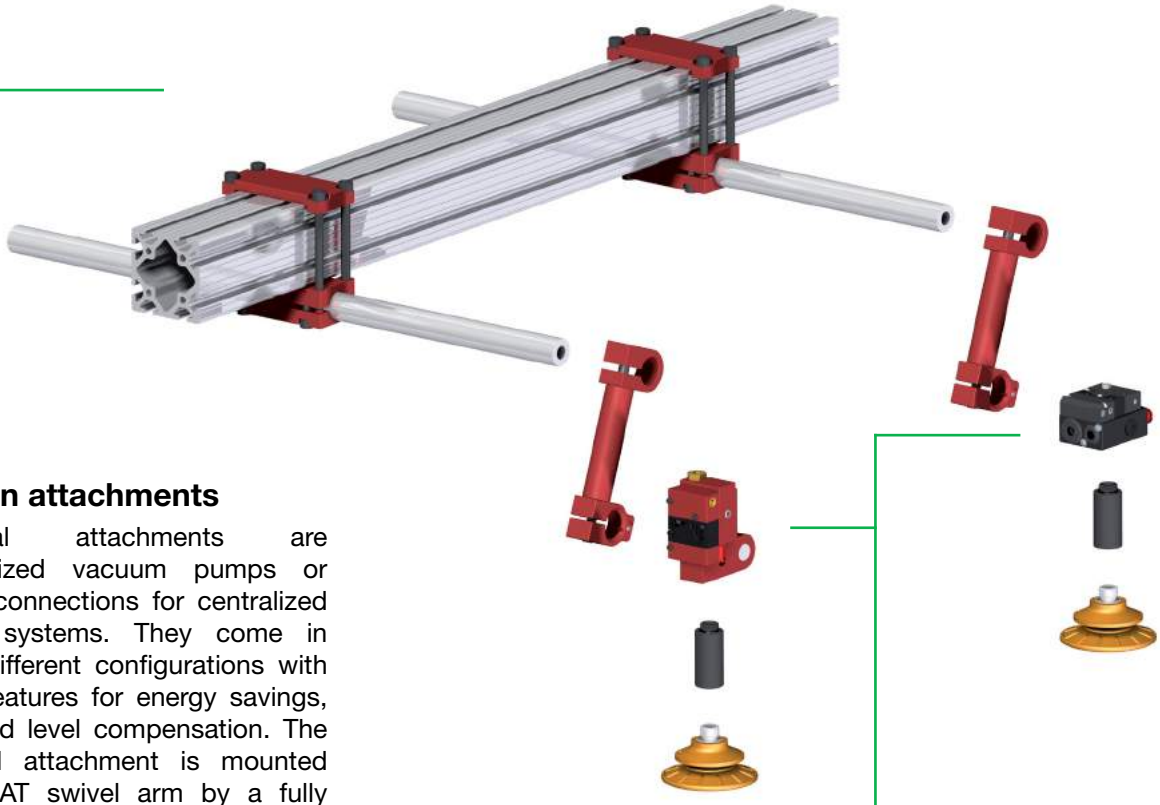
Piab suction cups

Piab suction cups are available in a variety of sizes and materials to efficiently handle your application. To prevent damage to the surface of metal sheets common in automotive and large appliance applications, Piab's DURAFLEX® cups feature a dual-hardness design and soft cup body. Lower vacuum force is needed to seal the cups to part surfaces for gentler handling. The soft lip of Piab's DURAFLEX® cups also molds easily to curved surfaces for less vacuum leakage and stronger grip.



Accessories for suction cups

The PMAT offers a wide range of suction cup accessories to optimize and facilitate the installation. For instance, the accessories can help to avoid bending stress on the suction cup when lifting heavy objects, extend the cup to reach areas in cramped spaces or simply height adjust the cup to the right level.



Function attachments

Functional attachments are decentralized vacuum pumps or vacuum connections for centralized vacuum systems. They come in several different configurations with special features for energy savings, safety and level compensation. The functional attachment is mounted to a PMAT swivel arm by a fully flexible ball joint or a more rigid and rotating lock-pin. The suction cup or the suction cup accessory have a matching interface for the function attachment.

Connections to main frame of the end-effector

Mounting bar – welded

- Rigid mounting with low deflection.
- Slotted mounting for adjustability.
- 100–600 mm (4”-24”) lengths.

Profile mount ball clamp

- Fits on standard size extrusion.
- Used with any Ball joint style function attachment.

Technical Data

Description	Torsional twist	Load, vertical, max.	Load, torque, max.
Mounting bar welded L=100	1 °	–	–
Mounting bar welded L=150	1.2 °	–	–
Mounting bar welded L=200	1.6 °	–	–
Mounting bar welded L=300	2.5 °	–	–
Mounting bar welded L=600	4.6 °	–	–
Profile mount ball clamp, left hand	–	180 lbf	29.5 lb ft
Profile mount ball clamp, right hand	–	180 lbf	29.5 lb ft

Ordering information

For a complete list of available PMAT products visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

Swivel arms

Swivel arm – clamp on

- Standard mounting to 25 mm and 1” bars, easily removable connection.
- Easy single screw adjustment.
- Available in lock pin 16, 19 or ball joint mountings, industry standard.

Swivel arm – slide on

- Standard mounting to 25 mm or 1” bars.
- Easy single screw adjustment.
- Available in lock pin 16, 19 or ball joint mountings, industry standard.

Technical Data

Description	Load, vertical, max.	Load, torque, max.
Swivel arm – clamp on	89.9 lbf	29.5 lb ft
Swivel arm – slide on	89.9 lbf	29.5 lb ft

Ordering information

For a complete list of available PMAT products visit piab.com. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

Function attachments

Centralized vacuum connection

- Connects centralized vacuum to suction cup.
- Available in lock pin 16, 19 or ball joint mountings, industry standard.
- Available with level compensator to compensate for differences in level of object.

Vacuum Check Valve VT-1H

- Check valve that traps vacuum in sealed applications for safe operation.
- Built-in blow off check valve for fast release of object.
- Available in lock pin 16, 19 or ball joint mountings, industry standard.
- Available with level compensator to compensate for differences in level of object.

Ordering information

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Vacuum Check Valve VT-1H with COAX®

- Two-stage COAX® cartridge MINI Pi12-2 integrated.
- Check valve that traps vacuum in sealed applications for safe operation.
- Built-in blow off check valve for fast release of object.
- Available in lock pin 16, 19 or ball joint mountings, industry standard.
- Available with level compensator to compensate for differences in level of object.

Vacuum Check Valve VT-1H Vacustat with COAX®

- Two-stage COAX® cartridge MINI Pi12-2 integrated.
- Check valve that traps vacuum in sealed applications for safe operation.
- Built-in blow off check valve for fast release of object.
- Integrated energy-saving device, Vacustat results in virtually no air consumption in sealed applications.
- Available in lock pin 16, 19 or ball joint mountings, industry standard.
- Available with level compensator to compensate for differences in level of object.

Technical Data

Description	Vacuum flow, max.
Vacuum Check Valve VT-1H	1.44 scfm
Vacuum Check Valve VT-1H with COAX®	1.44 scfm
Vacuum Check Valve VT-1H Vacustat with COAX®	1.44 scfm

Ordering information

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Accessories

Cross connector

- Connects 25 mm bars at any angle.
- Can be used with a Suction cup extension.

Level compensator – profile mount

- Compensates for differences in height.
- Provides certain degree of shock absorption.
- Fits on standard size extrusion.

Proximity mounting bracket

- For mounting of sensors or visions systems.
- Multiple interfaces.

Technical Data

Description	Load, vertical, max.	Load, torque, max.	Load, horizontal, max.
Cross connector 25-25/65	89.9 lbf	88.5 lb ft	–
Level compensator – profile mount	157 lbf	–	157 lbf

Ordering information

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PMAT Configurable Products

Facilitate the selection of our great assortment of function attachments and swivel arm options by using the combined swivel arm and function attachment code configurator. Note that all function attachments are not presented in the code.

Select rod extension	PMAT code
Rod extension 50	AA
Rod extension 100	AB
Rod extension 150	AC

Bar mounting style	PMAT code
Bar clamp, clamp-on 25	00
Bar clamp, slide-on 25	01
Bar clamp, slide-on 1”, pin 16	02
Bar clamp, slide-on 1”, pin 19	14
Bar clamp, slide-on 1”, ball joint	04

Swivel style	PMAT code
Swivel style pin 16	P
Swivel style pin 19	C
Swivel style ball joint	I

Function attachment	PMAT code			
No attachment	00			
	Left hand		Right hand	
		LCS *		LCS *
Centralized vacuum connection, G	XX1	XX2	XX1RH	XX2RH
Centralized vacuum connection, NPT	X1	X2	X1RH	X2RH
Vacuum Check Valve VT-1H, G	XAB	XAM	XABRH	XAMRH
Vacuum Check Valve VT-1H, NPT	AB	AM	ABRH	AMRH
Vacuum Check Valve VT-1H COAX® cartridge MINI Pi12-2, G	XAA	XAL	XAARH	XALRH
Vacuum Check Valve VT-1H COAX® cartridge MINI Pi12-2, NPT	AA	AL	AARH	ALRH
Vacuum Check Valve VT-1H Vacustat COAX® cartridge MINI Pi12-2, G	XEA	XBTF	XEARH	XBTFRH
Vacuum Check Valve VT-1H Vacustat COAX® cartridge MINI Pi12-2, NPT	EA	BTF	EARH	BTFRH

* With level compensator, LCS.

Warranties

Piab offers a warranty to distributors, integrators and users of Piab products worldwide as per the following definitions:

- A five-year warranty is valid for vacuum pumps excluding accessories and controls.
- A one-year warranty is valid for other products if the failure has occurred within specified lifetime in terms of duty cycles.

General warranty principles:

- Piab guarantees against defects in the manufacture and materials by normal use in proper environment, when following the instructions for care, maintenance and control described in the appropriate Piab manual.
- Piab replaces or repairs, free of charge, faulty products provided that these are returned to Piab, and found to be covered by the warranty.
- It is at Piab's discretion whether a faulty product should be sent back to Piab for replacement or if the repair shall be made locally at Piab's expense.
- This warranty does not include wear parts such as suction cups, filter elements, sealings, hoses, etc.
- This warranty does not include subsequent damages caused by defective products.

Notes

Notes

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No need to compromise

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