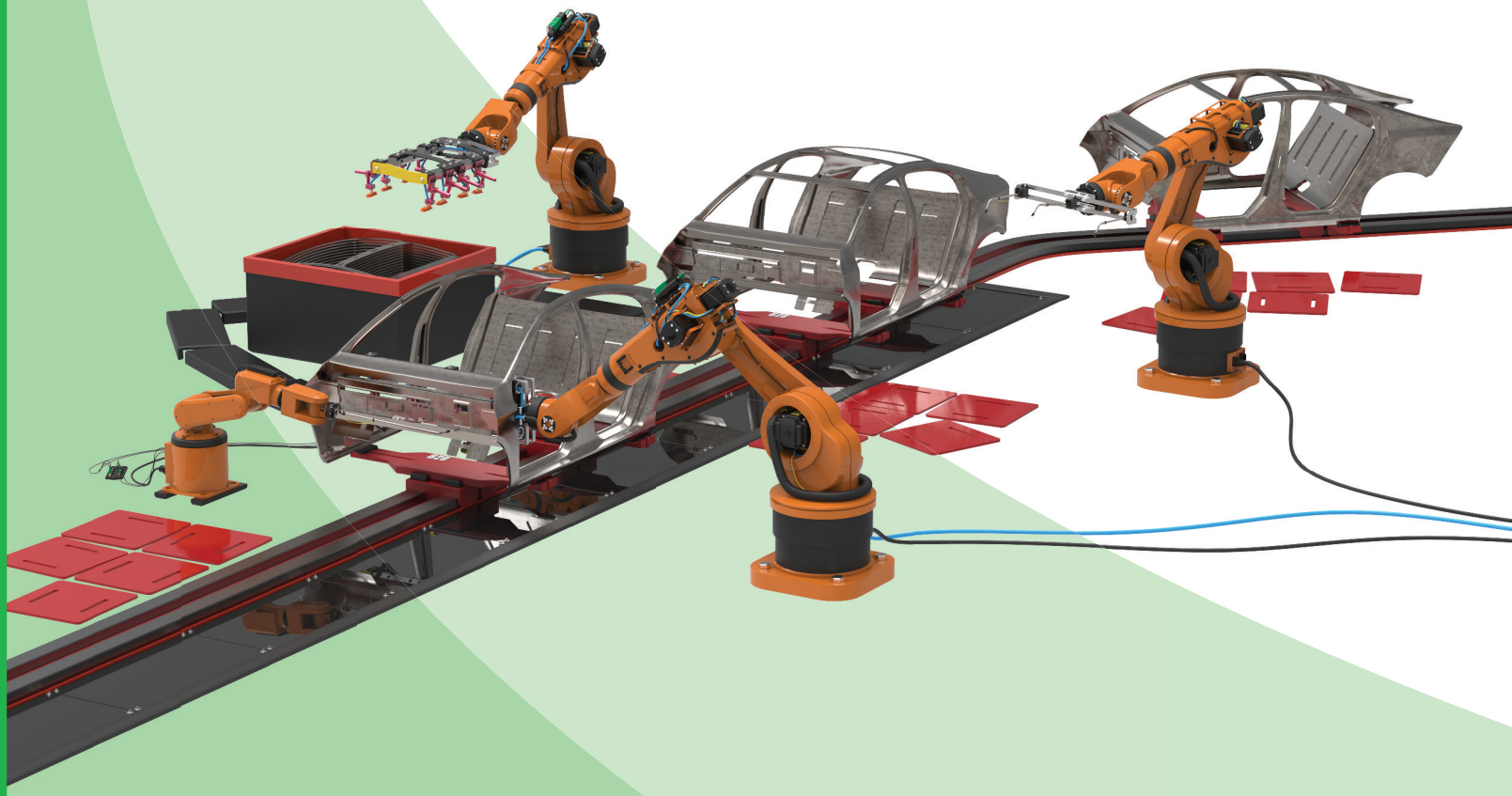
piab

Automotive Industry

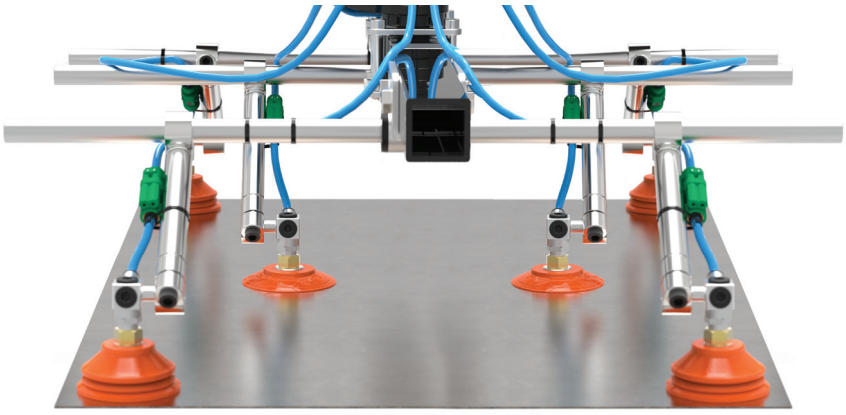
Realize productivity gains with innovative vacuum components for the automotive industry



Your global supplier

What does Piab do for the Automotive industry?

Piab's vacuum components for highly automated production lines in the automotive industry are found in the press shop, body shop and final assembly. Piab also has special products for manual handling devices and for automotive sub-supplier industries, such as tailored-welded blanks, glass, tires and plastic interior/exterior parts.



Over 25 years' experience of selling vacuum components to automotive with excellent track-record

- Efficient vacuum generators for centralized and decentralized vacuum.
- Durable and mark free suction cups for metal sheets, glass, plastics and composites made of high-end materials.
- End-of-arm tools and mounting elements to facilitate positioning of suction cups.
- Vacuum system accessories such as level compensators, vacuum sensors, vacuum check valves and energy optimizers.
- Large Area Foam Grippers.

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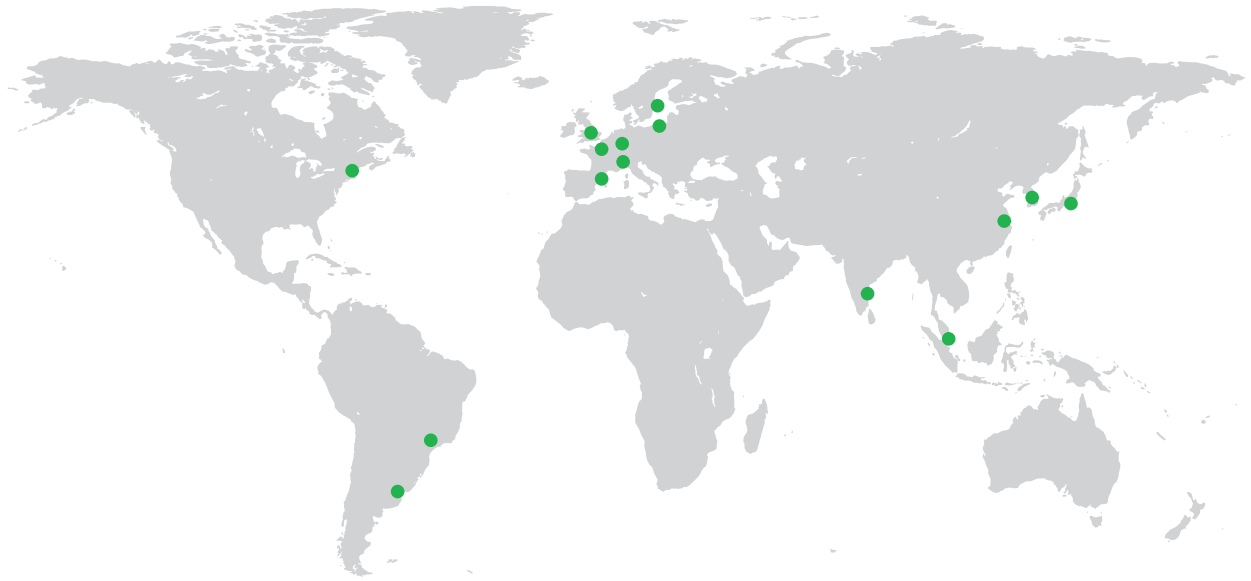
Strong productivity benefits with Piab components for automotive

- Huge selection of products designed in accordance with automotive industry standards that are configurable to meet each and every need.
- High reliability and superior performance leading to better uptime, faster cycles times and longer intervals between maintenance/service.
- Energy savings up to 50%.
- Several specially designed functions to handle E-Stop situations and eliminate risk for damage and wasted energy consumption.
- Condition monitoring and diagnostics functions to maximize system reliability and minimize downtime.
- Advanced communication and remote parameter setting with IO-link technology gives improved operating efficiency. IO-link is fieldbus neutral making it easy to integrate.



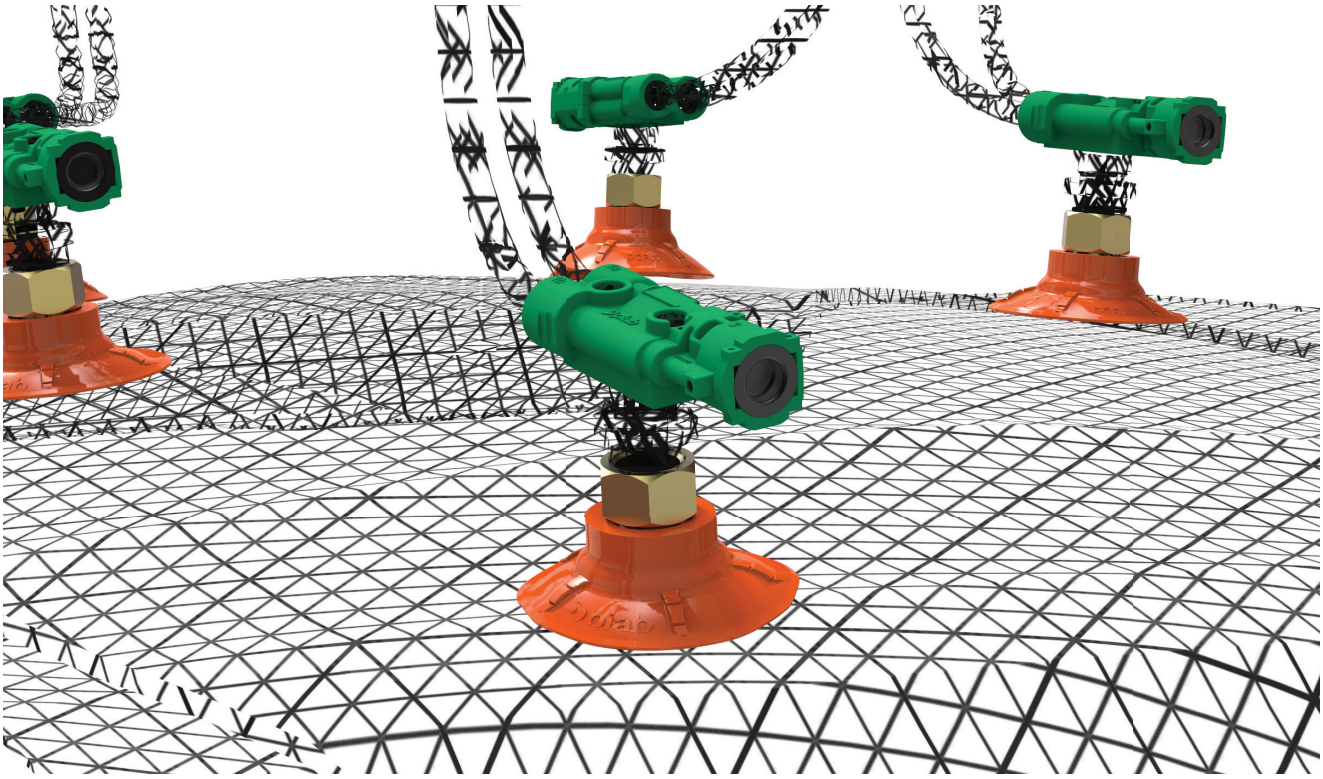
A Global Automotive sales team

- Offers regional and global support/coordination.
- Fast deliveries worldwide thanks to a logistic set-up with regional warehouses.
- Great customer support with product and application expertize.
- Full support to OEMs, line builders and integrators for the best vacuum solution.
- On-site training for operators and engineers.
- Help with documentation and plant/project handbooks.
- Vacuum audits of manufacturing units with focus on energy, speed and uptime improvements.

- Deep “Know-how” in following areas:
  - Tailored blanks
  - Press shop
  - Body shop
  - Final assembly (Glass, and manual handling lifting)

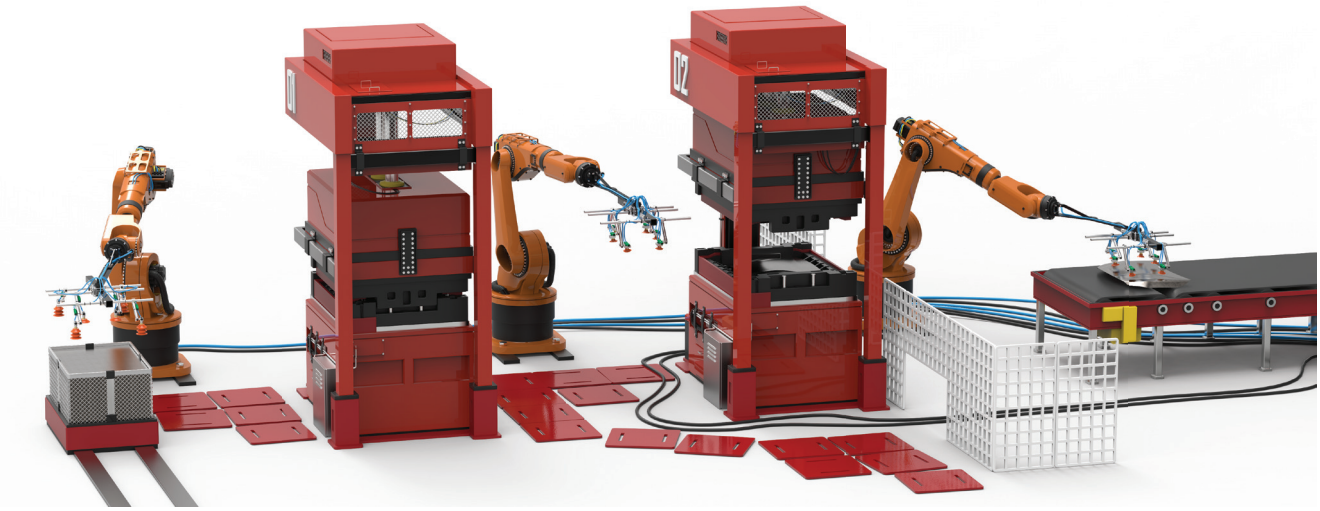
R&D department dedicated to support automotive customers

- Constant flow of new innovative products for automotive applications.
- Customized solutions.
- Best-in-class support on 3D-CAD downloads, compliance certificates and MTBF data.
- Suction cups are available with 3D CAD (step file, etc.) both in normal and vacuum activated states.
- Silicone-free and PWIS-free certificates available.



Press shop

In stamping (pressing), sheet metal blanks of steel or aluminum are moved through a series of presses and formed into car parts such as a door panel or a hood/bonnet. Piab's components are used to de-stack, transport and at the end, automatically rack the parts as fast and as reliably as possible by the means of vacuum. Piab's suction cups, suction cup holders and COAX® based vacuum generators (centralized and decentralized) with unique features and functions intended for stamping will help exceed your requirements for vacuum components.



Piab's components…

- Highest reliability for maximum uptime.
- Durable and long lasting.
- Ability to adapt and conform to complex geometries found in the later press stages.
- Lightweight.
- Cups and ejectors contribute to more Strokes Per Minute (SPM).
- Products are easy to use and easy to control.
- Condition monitoring and diagnostics functions.
- Resistant to tough environment (oil, dirt, heavy vibrations).
- Integrated safety functions in case of E-Stop.
- Energy savings with COAX® technology and other integrated functions.

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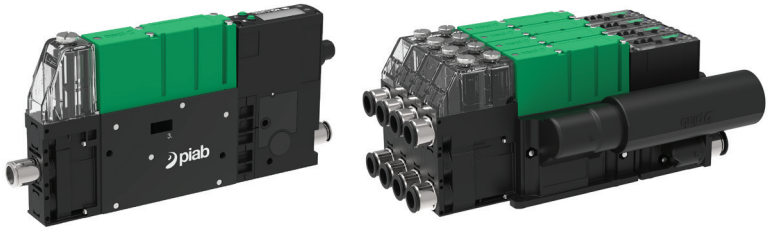
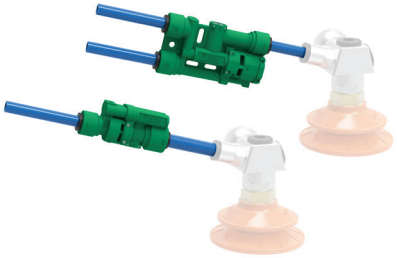


piCOMPACT®23

Centralized “all-in-one ejector” with integrated controls. Available with functions suitable in stamping such as bi-stable on/off valve for safety, ABO (amplified blow-off), high capacity nozzles for faster cycle time, vacuum filter for reliability, energy saving functions, IO-Link communication and much more. Read more on page 20.



piINLINE®plus with AQR & EBR

New patented lightweight decentralized inline ejector with integrated automatic release function (AQR) and exhaust block release function (EBR). Read more on page 17.

piSTAMP with EBR

Decentralized lightweight ejector with generic design and Exhaust Block Release function (EBR). Read more on page 19.

DURAFLEX® Friction cups, DCF series

Handling of convex and concave oily surfaces with maximum shear force grip. Read more on page 41.

DURAFLEX® Friction cups, BFFT Series

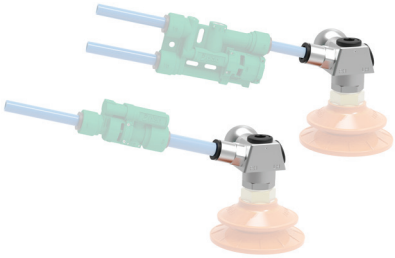
Handling ultra-thin metal sheets without risk for dents. Suitable for thickness ≥0.024 in. Read more on page 39.

DURAFLEX® Friction cups, BXF series

Specially designed for de-stacking and auto-racking applications where large level compensation is needed. Eliminates the need for spring plungers/metal level compensators. **Coming soon.**

DURAFLEX® Friction cups, OCF and OBF series

Small oval friction cups to handle and grip on narrow and curved surfaces on parts at the end of the press line. Read more on page 45 and 47.

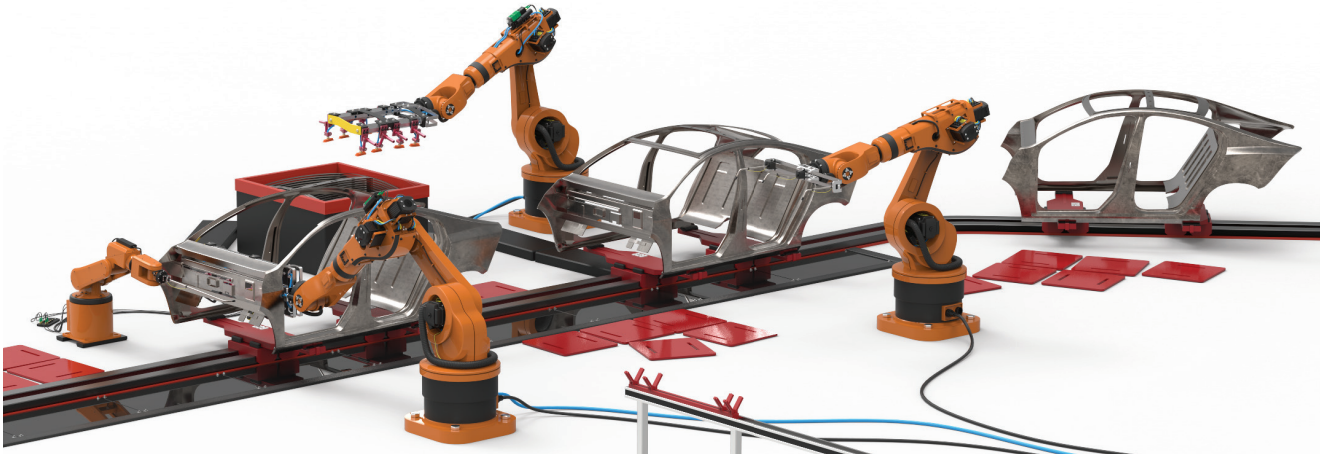


Suction cup holders

New weight-optimized and durable suction cups holders. Made of machined aluminum and available with ball joint and lock pin interfaces for industry standard end-of-arm tools.

Body shop

In the fully automated body shop process, the stamped parts are welded and assembled into a body-in-white car ready for the paint shop. Piab's vacuum components are used on advanced robot gripper systems for handling parts between assembly stations and in vacuum holding fixtures during operations such as welding and hemming of parts together. For quality control and loading stations in the production process, Piab components are used on ergonomic manual handling devices as well. Piab's tailored made components for the body shop have several unique features helping improve productivity and safety.



Piab's components…

- Vacuum safety functions to handle system and power failures as well as E-Stops without risk for damage of parts or harm to personnel.
- Decentralized vacuum solutions with safety functions for highest degree of fail-safe operation.
- Energy saving function with COAX® technology and other integrated functions.
- Highest reliability for maximum uptime.
- Durable in the harsh welding environment where ozone and welding sparks are present.
- Products that are easy to use and easy to control.
- Modular tooling components for quick setup and unlimited positioning of cups.
- Condition monitoring and diagnostics functions.

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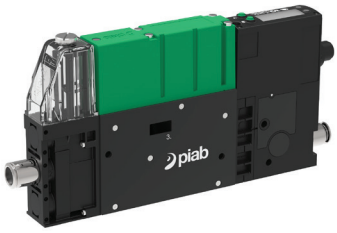
Decentralized ejectors

These decentralized ejectors come with integrated vacuum check valve, release and/or energy saving functions.
PMAT Vacuum Check Valve (24h). Recommended if mechanical safety system is excluded. (Pg. 70)
piSECURE with Vacuum Check Valve. Recommended if mechanical safety system is excluded. (Pg. 24)
VGS™3040. Recommended if a mechanical safety system is included. (Pg. 25)



piCOMPACT®23

Centralized “all-in-one ejector” with integrated controls. Available with functions suitable in the body shop such as bi-stable on/off valve for safety, vacuum filter for reliability, energy saving functions, IO-link communication, Pre Vacuum Hovering (PVH) and Self Adhesion Control (SAC) for manual handling devices and much more. Read more on page 20.

P5010 ES AQR

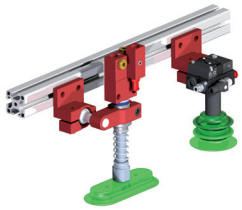
Pneumatic controlled centralized compact ejector with check valve, release and energy saving functions. Read more on page 29.

Vacuum Switch VS4128

Durable Vacuum Switch with M12 connector. Possible to serial wire to save I/Os, suitable for decentralized systems. Read more on page 86.

DURAFLEX® Friction cups

Huge program of cups for handing metal sheets with complex geometries. Read more on pages 37–48.



PMAT (Piab Modular Automation Tooling)

Allows design of vacuum gripper and fixture tools in body shop with minimal design time. Made of hard coated aluminum and easy to assemble onsite, without welding or use of special tools. Full adjustability, flexibility and rigidity. Read more on page 73.

Final Assembly

In the final assembly, the painted car will be made ready on the assembly line. Windshields, tires, plastic exterior parts (bumpers, lights etc), interior parts (dashboards, seats, textiles, etc.) are assembled and the engine and power transmission is merged with the rest. At the end of the assembly line, car liquids, such as brake oil and A/C coolants are filled up. Piab's vacuum products are widely used in most of the final assembly applications, on ergonomic-manual handling assist arms and robots used for windshield assembly or for other pick-and-place. Large, deep vacuum Piab ejector pumps are also found in stations for liquid filling.

Piab's components…

- Vacuum safety functions to handle system and power failures as well as E-Stops without risk.
- To reduce damage of parts or harm to personnel, suitable for manual handling assist arms.
- Decentralized vacuum solutions with safety functions for highest degree of fail-safe operation.
- Tailored made patented functions such as Self Adhesion Control (SAC) and Pre Vacuum Hovering (PVH) to optimize design of ergonomic assist arms and make them user-friendly, efficient and safe for operators.
- Special suction cups for excellent grip on textured plastic surfaces. Good choice for interior parts and back-side of composite parts.
- Mark free suction cups for windshield handling.
- Energy saving function with COAX® technology.
- Foam grippers to pick and kit layers of smaller parts.
- Reliable and maintenance-free deep vacuum ejector pumps for liquid filling applications.

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DURAFLEX® single durometer

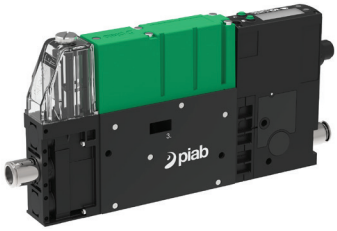
Mark-free grip for windshield handling. Read more on page 49.

DURAFLEX® dual durometer

Excellent grip on textured and rough surfaces. Read more on page 56.

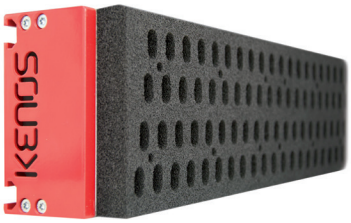
Vacuum check valve & piSECURE

Secures vacuum in cups for hours in case of power failure. Read more on pages 24 and 70 respectively.



piCOMPACT®23 with SAC & PVH

Features SAC (Self Adhesion Control) and PVH (Pre Vacuum Hovering). Patented functions for ergonomic vacuum assist arms used for assembly. The function will make it easier, safer and more efficient for operators. Read more on page 20.



Kenos foam grippers

Flexible solutions for handling several products with different shapes, dimensions and compactness. Read more on page 63.

P6040

Large capacity ejector pumps suitable for liquid filling applications. Maintenance-free operation. Read more on page 32.

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Vacuum technology at automotive sub-suppliers

Piab components are important for successful manufacturing of car parts made by sub suppliers for the automotive industry. Here are some examples where Piab components are present and contribute to efficient production.

Tailor welded blanks

The process prior to stamping the metal sheets in order to optimize the car weight as well as for crash-safety. Blanks (metal sheets) of different thickness are laser welded together before entering the press shop. Piab DURAFLEX® cups have proven to last long and stay flexible in the laser welding environment.

Interior parts

Design and appearance requirements on car interiors often results in materials with textured surfaces that are more difficult to grip without damage. Piab has developed a line of polyurethane cups with flexible lips and stable bodies that will give an excellent grip on these materials.

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Windshields

In the production of windshields, mark free handling, abrasion resistance and sometimes high temperature resistance are the important requirements. Piab's program of silicone free DURAFLEX® cups has proven particularly suitable in the glass industry. piSECURE is an ejector product line developed for the highest degree of safety when handling and lifting glass.

Tires

Vacuum is used to handle rubber slabs during the molding process of car tires. Piab has developed a program of small DURAFLEX® cups with excellent grip and longer life when handling rubber slabs as compared to conventional suction cups. For the molding process, Piab's large (deep vacuum) ejector pumps are used to secure the quality of the tires. They contribute with reliability, easy installation, easy operation and low cost of service compared to rotary vane pumps.

General Motors utilizes 80% more efficient decentralized vacuum system

Background

General Motors (GM) needed a vacuum system that would function in harsh environments and provide a high level of performance and safety. The major automotive manufacturer saw a number of advantages in choosing a decentralized vacuum system over a centralized one.

Solution

With a decentralized system, performance can be enhanced as it offers a great amount of flexibility. As additional product styles are included in a line at GM, a valve and the necessary cups to accommodate the new product are easily added. Strong, continuous vacuum flow is another goal to consider when choosing a system. With vacuum being produced at each suction cup, a decentralized system will still retain a strong hold if some of the cups are damaged or line losses occur.

Result

GM has recognized that the decentralized vacuum system from Piab is about 80% more efficient than a centralized vacuum setup. This means that huge potential savings in air can be realized when using that system. GM has also recognized gains through improved setup and simple maintenance, as the setup for the decentralized system is very simplistic.

Product overview

	Tailored blank	Press shop	Body shop	Final assembly	Other
Generators/ejectors					
piINLINE®plus	●●	●●●	●●	●●	–
piSTAMP	●●	●●●	●●	●●	–
piCOMPACT®23	●●●	●●●	●●●	●●●	–
piSECURE	●●	●●	●●●	●●●	–
VGS™3040	●●	●●	●●●	●●●	–
P5010	●	●	●●●	●	●
P6040	–	–	–	●●●	–
Suction cups					
Friction cups	●●●	●●●	●●●	●●	–
DURAFLEX® single durometer	●●●	●	●●	●●●	●●●
DURAFLEX® dual durometer	●●	●	●●●	●●●	●●●
XLF 150	●●●	●	●●	●●●	–
Kenos Vacuum Gripping Systems	●	●	●	●●	●●●
PMAT					
PMAT configurable products	●●	●●	●●●	●●●	–
Accessories					
Mounting elements (ME)	●●●	●●	●●	●●●	–
Level Compensators	●●●	●●●	●●●	●●●	–
Blow-off check valves	●●●	●●●	●●●	●●●	–
AQR	●●●	●●●	●●●	●●●	–
piSAVE release	●●●	●●●	●●●	●●●	–
Optimizers					
piSAVE sense 02/03	●●●	●●	●●	●●●	–
Vacustat	●●●	●●●	●●●	●●●	–
piSAVE optimize	●●●	●●●	●●●	●●●	–
Vacuum switch VS4128	●●	●●	●●●	●●●	–
T-connector M12 male	●●	●●	●●●	●●●	–

●●● Recommended, ●● Functional but not recommended, ● Not recommended.

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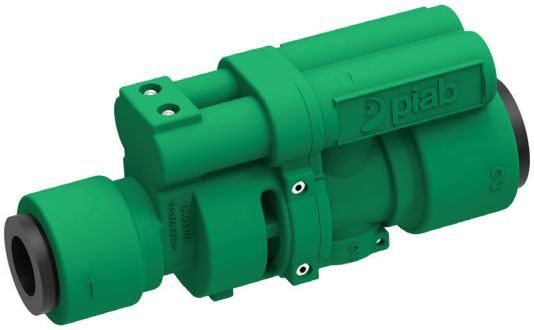
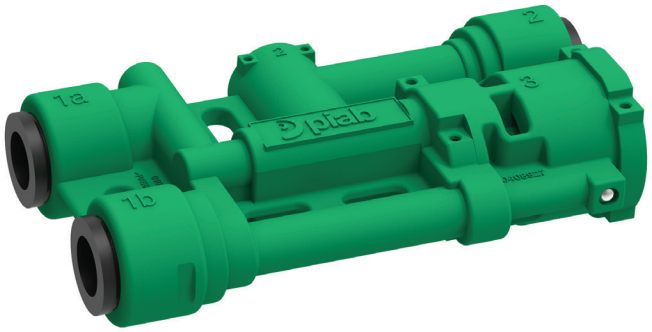
Generators/ejectors

piINLINE®plus





The ultra-lightweight vacuum ejectors feature a unique and integrated automatic release mechanism, and come in compact, minimized packages. Tailor-made for automotive press-shop automation, piINLINE®plus generators utilize the COAX® technology, ensuring low air consumption (typically 25 percent lower than competing technology), excellent suction capacity, and fast evacuation. Generators can be configured with either one or two MICRO COAX® cartridges; two cartridges for larger suction cups in high speed applications, or one cartridge for smaller suction cups or for reduced air consumption when high speed is not essential.

The integrated release function is available in two optional designs – the easily controllable Atmospheric Quick Release (AQR), which requires no extra compressed air hose, and the very fast performing Exhaust Block Release (EBR).

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 Ti05-2	72.5	1.36	1.3	1.2	1	0.8	0.56	0.3	0.12	0.04	0	23.9

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 Ti05-2	72.5	1.36	4.8	10.2	17	25.5	39.7	68	139	375	23.9

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.

piINLINE®plus – Customer Code

piINLINE®plus Code
PIL

Code	Model
A	AQR
B	EBR

Code	Nozzle
T	Ti05-2 Extra high vacuum flow

Code	Nozzle rows
1	Single
2	Double

Code	Air connection:
6	ø6 push-in connector(s)
14	ø1/4" push-in connector(s)
8	ø8 push-in connector(s)

Code	EBR-Pilot air connection
6	ø6 push-in connector(s)
14	ø1/4" push-in connector(s)
8	ø8 push-in connector(s)
X	No pilot air connection

PIL . A . T . 2 . 8X . 10 . X . XXX

Code	Vacuum connection
6	ø6 push-in connector(s)
14	ø1/4" push-in connector(s)
8	ø8 (5/18 (5/16)) push-in connector(s)
10	ø1/4" push-in connector(s)
38	ø3/8” push-in connector(s)

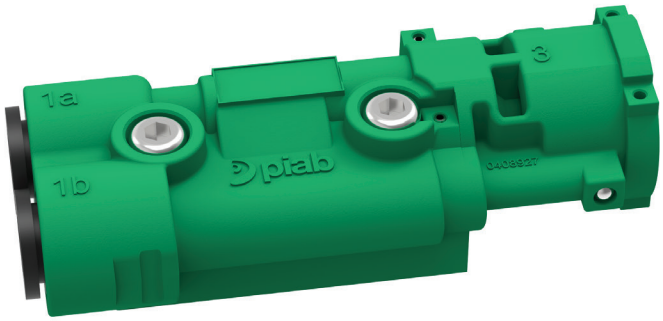
Code	Sensing port connection
X	No
6	Yes 6mm
14	Yes 1/4” mm

Code	Suction cup holder
X	No holder
I	Ball-Joint
C	Lock-pin

Code	Holder mounting direction
X	No holder
LH	Left handed
RH	Right handed
U	Up

Code	Holder thread
X	No holder
G38F	G3/8” female
G38M	G3/8” male
NT38M	3/8” NPT male

piSTAMP



piSTAMP offers easy retrofitting in the automotive press shop tooling. The ultra-lightweight vacuum generator features a unique and integrated release mechanism, and comes in a compact, minimized package. A fully decentralized design with compressed air ports at the side and vacuum port underneath, piSTAMP will fit perfectly in generic suction cup holders found in standard press shop tooling systems. piSTAMP utilizes COAX® technology, typically 25 percent lower than competing technology, excellent suction capacity, and fast evacuation. The generator is normally supplied with two MICRO COAX® cartridges, supporting large suction cups in high speed applications. A one cartridge option is available for additional air consumption saving when used with smaller cups or at slower cycle speeds.

The integrated release function, the very fast acting Exhaust Block Release (EBR), is based on a durable polyurethane membrane which is not sensitive to dust. This ensures highly reliable production systems with improved uptime.

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 Ti05-2	73	1.36	1.31	1.19	1.02	0.81	0.55	0.3	0.13	0.04	0.01	23.9

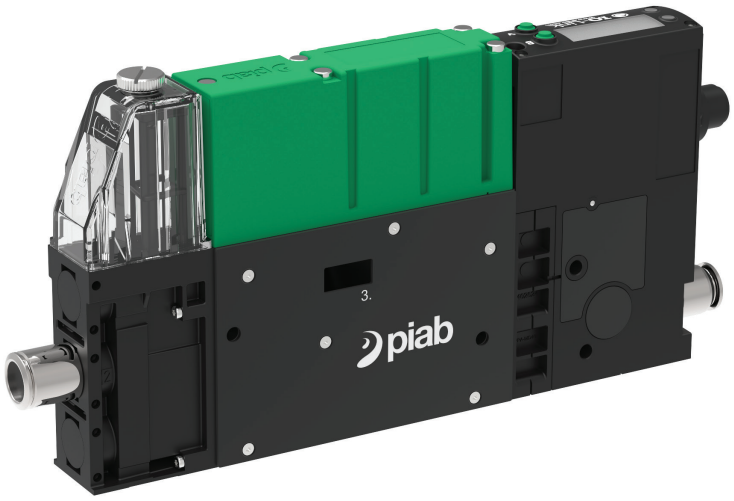
Evacuation times

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 Ti05-2	73	1.36	4.81	10.2	17	25.5	39.6	68	139	377	23.9

Ordering information

Name	Part No.
piSTAMP 8-8 mm	02.07.770
piSTAMP 6-6 mm	02.07.771
piSTAMP 1/4"-1/4"	02.07.772

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 maximising the utilisation 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.

Unbeaten performance, high reliability and new special features on piCOMPACT®23 will exceed the tough requirements of the automotive industry. The amplified blow-off (ABO) gives an efficient and super-strong, yet air-saving blow-off even in vacuum systems for very large car parts. The bi-stable (latching) on/off valve in combination with a check valve secures safety and air-savings in case of an emergency-stop. Integrated diagnostics, such as leakage warnings, and automatic functions to minimize energy consumption as well as high level communication (IO-link) are available options appreciated by automotive customers.

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	-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	10	20	30	40	50	60	70	80	-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.

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Pneumatic technical information

Description	Unit	COAX®			
		SX12 ×1	SX12 ×2	SX42 ×1	SX42 ×2
Optimum feed pressure, pump	psi	73.2	74.7	68.2	78.3
Optimum feed pressure, nozzle	psi	72.5	72.5	62.4	62.4
Max. vacuum at optimum pressure	-inHg	25	25	26.6	26.6
Air consumption at optimum pressure	scfm	1.52	3.05	4.68	9.36
Max. vacuum flow at optimum pressure	scfm	2.58	5.16	7.33	14.7
Flow, blow off at 87 psi	scfm	0–11.7			

General electric characteristics

Description	
Supply voltage	24 ±10% V
Current consumption	100/63 mA (Valve pull/hold at $24V_{sys}$)

Technical data, IO-Link

Description	Unit	
Min. cycle time	ms	2.5
Transfer type	Baud rate	230k (COM3)
IO-Link revision		1.1

Valve module

Description	
Function on/off	Normally closed (NC*) or normally open (NO)
Function blow-off	Normally closed (NC)
Air consumption blow-off/release	0–11.7 scfm at 87 psi
Manual override	Yes, non-locking push style

* NC failsafe version is available (power off - NO). In running mode the valve behaves like a NC valve but if power is cut the valve goes into NO-mode leaving compressed air for continuous vacuum.

Other data

Description	
Temperature range	14–122°F
Materials	PA, NBR, SS, POM, TPE, PVC, Brass, Al

For full specifications 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.

piCOMPACT®23 – customer code

piCOMPACT®
Code
PC

Functionality	
Code	Vacuum characteristics
F	High vacuum performance

Functionality	
Code	Nozzle model
12	SX12 (2.59–5.18 scfm)
42	SX42 (7.33–14.6 scfm)
Code	**Nozzle rows**
1	Single
2	Double

Working enviroment	
Code	Chemical resistance
S	Standard

Functionality	
Code	Control functions
A	Electrical ES, vac and blow-off
B	Electrical ES, vac and automatic timer based blow-off (ATBO)
F	Electrical ES, vac, intelligent blow-off (IBO)
C	Vac and blow-off
D	Vac, automatic timer based blow-off (ATBO)
G	Vac and intelligent blow off (IBO)
E	Vacuum on/off (vac)
H	IO-Link pre-configured

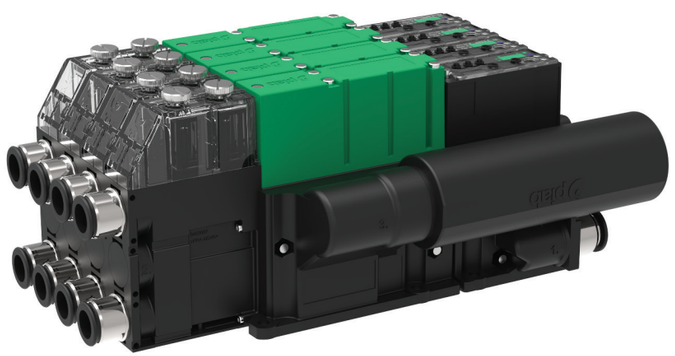
Vacuum connect module	
Code	Vacuum filter
S	Vacuum filter 50 µm
F	2× Vacuum filter 50 µm
X	No vacuum filter
Z	No vacuum filter including sensing port
Code	**Vacuum ports(s) / channel**
1	1 vacuum port
2	2 vacuum ports
3	3 vacuum ports
Code	**Vacuum connection(s)**
8	Ø8(5/16) push-in connector(s)
P1	Ø10 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
2	2 channels
3	3 channels
4	4 channels
Code	**Split control from vacuum**
X	No split
B	Split Ø6
C	Split Ø1/4"
D	Split Ø8
E	Split Ø10
F	Split Ø3/8"

Additional vacuum functions	
Code	
	No extra vacuum control
Z	Self adhesion control (SAC)

Internal check valves	
Code	
B	Without non-return valve
A	With non-return valve
C	Amplified blow-off, without vacuum non-return valve (ABO)
D	Amplified blow-off, with vacuum non-return valve (ABO)
E	Pre-vacuum hovering, without vacuum non-return valve (PVH)
F	Pre-vacuum hovering, with vacuum non-return valve (PVH)
Code	**Vacuum sensing**
A	Display, analog and digital output
B	Display, 2× digital outputs
C	Display, leakage warning and digital output
D	IO-Link display
X	No vacuum sensing

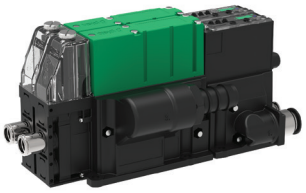
IO-Link Energy saving type	
Code	
1	ES pre-set on 22.1 -inHg
2	ES Automatic level determination (ALD)
3	ES pre-set on 22.1 -inHg with ALD backup
0	No ES
Code	**IO-Link Blow-off type**
1	Automatic timer based blow-off (ATBO)
2	Intelligent blow off (IBO)
0	External control
Code	**IO-Link Additional functions**
1	Self adhesion control (SAC)
0	No IO-Link additional functions



PC . F . 422 . S . AAA . F18 . 4X . 2P1 . EN . CCAB

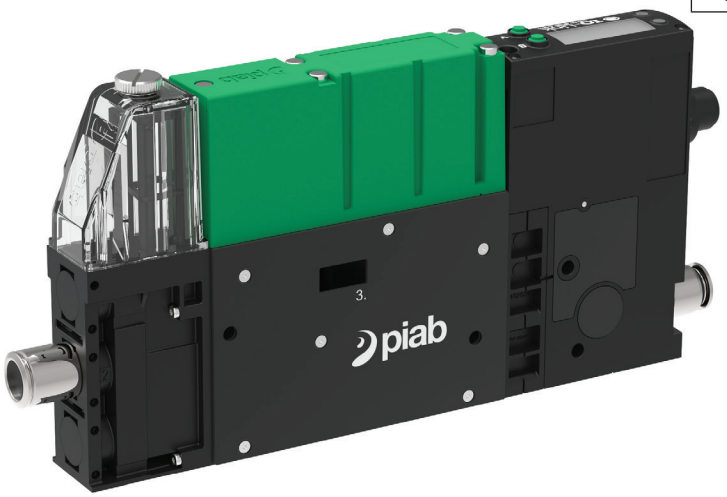
PC . F . 122 . S . H111AD . S1P1 . 1X . 8 . EJ . CCCC

Air supply	
Code	Air connections
6	Ø6 push-in connector
14	Ø1/4" push-in connector
8	Ø8(5/16") push-in connector
P1	Ø10 push-in connector
P2	Ø3/8" push-in connector
P3	Ø12 push-in connector(s)
P4	Ø1/2" push-in connector(s)
2P1	2× Ø10 push-in connector(s)
2P2	2× Ø3/8" push-in connector(s)
2P3	2× Ø12 push-in connector(s)
2P4	2× Ø1/2" push-in connector(s)



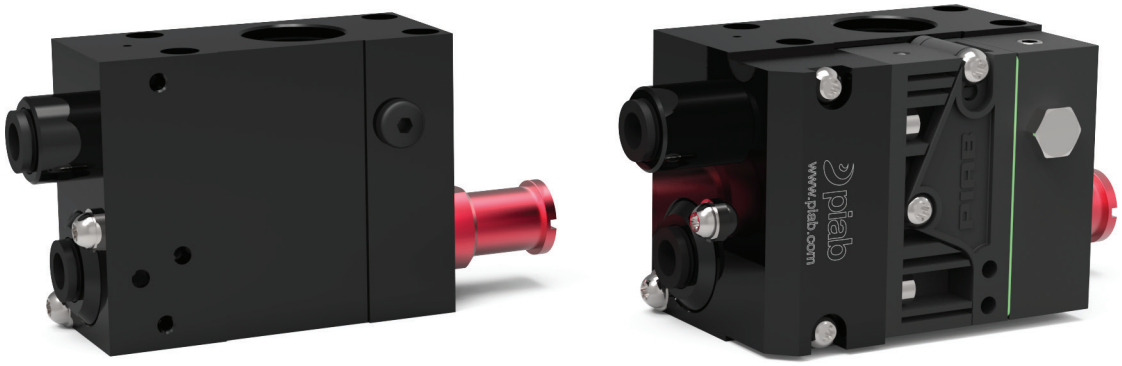
Mounting	
Code	Ejector options
EC	Ejectors stacked with central exhaust
EN	Ejectors stacked with central silencer
EJ	Ejector(s) for individual mounts, integrated silencer
EK	Ejector(s) for individual mounts, top mounted silencer
EL	Ejector(s) for individual mounts, central exhaust
EM	Ejector(s) for individual mounts, central 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
AC	Bi-stable vacuum valve + NC blow off
Code	**Electrical input/output**
A	PNP/PNP or NPN/NPN
B	Mixed mode
C	IO-Link, PNP/PNP
Code	**Electrical interface**
B	M12 8p connector(s)
C	M12 4p connector(s)



PC . F . 122 . S . H111AD . S1P1 . 1X . 8 . EJ . CCCC

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

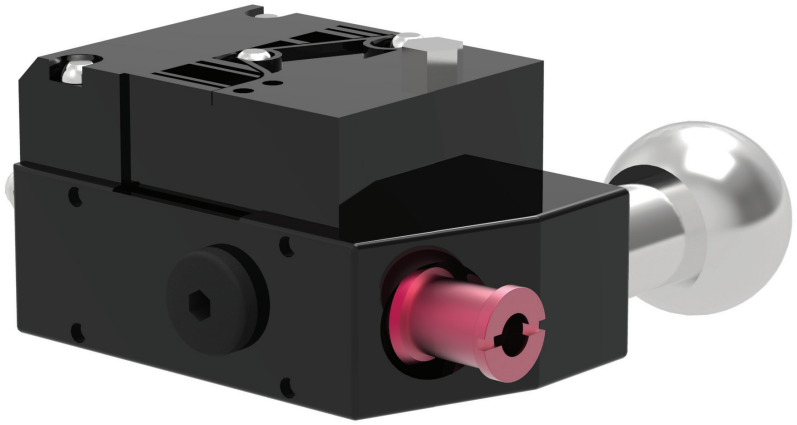
Evacuation times

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

Ordering information

Name	Part No.
piSECURE COAX® X10-2 ES	02.00.984
piSECURE COAX® X10-2	02.00.986

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 8.5–12.0 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.

For automotive customers, VGS™3040 with piSAVE on/off, that 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. Also, VGS™3040 with blow off, it has a built-in blow off check valve for fast release of the handled object. Prevents vacuum from being pulled through the blow-off lines, which means faster response time and completely independent vacuum units.

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

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™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

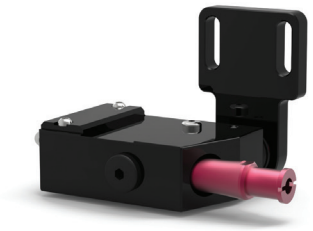
VGS3040 . AB . 01 . AA . 01 . AA

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

Configuration examples

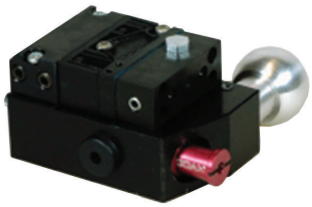


VGS™3040 with profile mount

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

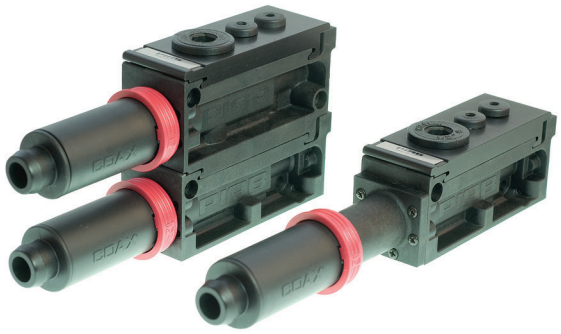
It has a built-in quick release for fast release of object. It works with an internal or separate feed of air. It equalizes pressure in the suction cups to provide fast release of the product. The piSAVE release will provide an extra fast release by accumulating and utilising the feed-air pressure as 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.

••• Recommended

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 vac-uum
	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

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

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

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

P5010 . 00 . AA . 01

Code	COAX® Push-in
AA	COAX® push-in module Si32-2×1
AB	COAX® push-in module Si32-3×1
AC	COAX® push-in module Si32-2×1, non-return valve
AD	COAX® push-in module Si32-3×1, non-return valve
AE	COAX® push-in module Si32-2×2
AF	COAX® push-in module Si32-3×2
AG	COAX® push-in module Si32-2×2, non-return valve
AH	COAX® push-in module Si32-3×2, non-return valve
AI	COAX® push-in module Pi48-2×1
AJ	COAX® push-in module Pi48-3×1
AK	COAX® push-in module Pi48-2×1, non-return valve
AL	COAX® push-in module Pi48-3×1, non-return valve
AM	COAX® push-in module Pi48-2×2
AN	COAX® push-in module Pi48-3×2
AO	COAX® push-in module Pi48-2×2, non-return valve
AP	COAX® push-in module Pi48-3×2, non-return valve
AQ	COAX® push-in module Xi40-2×1
AR	COAX® push-in module Xi40-3×1
AS	COAX® push-in module Xi40-2×1, non-return valve
AT	COAX® push-in module Xi40-3×1, non-return valve
AU	COAX® push-in module Xi40-2×2
AV	COAX® push-in module Xi40-3×2
AW	COAX® push-in module Xi40-2×2, non-return valve
AX	COAX® push-in module Xi40-3×2, non-return valve

Code	Connection modules/function
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

P6040 family

Large capacity ejector pumps suitable for liquid filling applications. 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*
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*

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 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*
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*

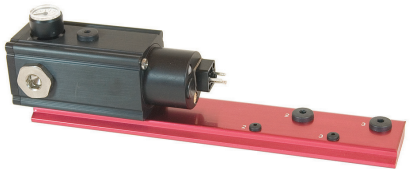
COAX® Cartridge	Feed pressure	Air consumption	Evacuation time (s/cf) to reach different vacuum levels (-inHg)									Max vacuum
	psi	scfm	3	6	9	12	15	18	21	24	27	-inHg
MIDI Xi40-3 x6	65	23.27	0.10	0.28	0.57	1.05	1.76	2.69	3.96	5.66	10.5	28/15*
MIDI Xi40-3 x7	65	27.14	0.09	0.25	0.48	0.88	1.50	2.29	3.40	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.

Ordering information

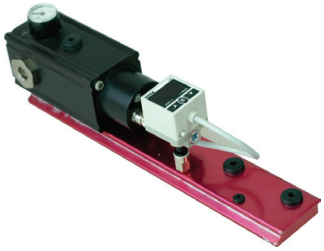
For a complete list of available pumps and combinations with further information visit **piab.com**. On our webpage you will also be able to find dimensional drawings, CAD-drawings and much more. Register and get full access to all resources available.

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 4×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, 1× 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, 1× 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, 1× flap valve

Suction cups

Material

Name	Color	Hardness, Shore A°	Temperature, °F
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

Material resistance

Name	Wear resistance	Oil	Weather and ozone	Hydrolysis	Gasoline	Concentrated acids	Alcohol	Oxidation
Nitrile-PVC (NPV)	●●●●	●●●●	●●●	●●●	●●●●	●●	●●●	●●●
Polyurethane (PU)	●●●●	●●●●	●●●●	●●	●●	●●	●●/●*	●

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

piab

Bellows flat friction family (BFF)

- Special designed friction cups for oily surfaces, such as sheets in metal forming processes.
- Normal wear on friction cup will not affect the long term shear force performance.
- Best choice if > 0.1g/m^2 press oil is used on the sheet.
- Thanks to the strong grip on oily surfaces, the suction cups can withstand high shear forces, typically 2–4 times more than corresponding conventional suction cups.
- The “BFF” design is suitable for uneven/curved surfaces or if level compensation is needed, for example in de-stacking applications.
- The flat inner support gives stability during movement in any orientation.
- DURAFLEX® suction cups manufactured in a specially developed material that features the elasticity of rubber and wear resistance of polyurethane. The material does not leave any marks on the objects handled.

Lifting forces

Name	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallell to the surface, lbf, at vacuum level	
	18 -inHg	27 -inHg	18 -inHg	27 -inHg
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*

* Dry metal sheet/Oily metal sheet.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
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

* Height range includes fittings.

Available materials

Name	PU55°/PU60°
BFF30P	●
BFF40P	●
BFF60P	●
BFF80P	●
BFF110P	●

Ordering information

G threads

Name	G1/4” female	G3/8” female				G3/8” male with mesh filter	G3/8” male / 1/8” NPSF fem.
			plastic thread	plastic	17 mm thread		
BFF30P	BFF30P.4R.G75W	BFF30P.4R.G71W	–	BFF30P.4R.G73WC	–	–	BFF30P.4R.G68W
BFF40P	BFF40P.4R.G75W	BFF40P.4R.04UA	–	–	BFF40P.4R.G63W	BFF40P.4R.04UF	–
BFF60P	BFF60P.4R.G75W	BFF60P.4R.06UA	BFF60P.5RC.G56WC	–	BFF60P.4R.G64W	BFF60P.4R.06UF	–
BFF80P	BFF80P.5R.G75W	BFF80P.5R.G45W	BFF80P.5RC.G56WC	–	BFF80P.5R.G65W	BFF80P.5R.G45M	–
BFF110P	BFF110P.5R.G75W	BFF110P.5R.G45W	BFF110P.5RC.G57WC	–	BFF110P.5R.G65W	BFF110P.5R.G45M	–

M, NPT and T-slot threads

Name	M10×1.5 male	3/8” NPT female	T-slot	
				with mesh filter
BFF30P	–	BFF30P.4R.N50W	BFF30P.4R.T1W	–
BFF40P	BFF40P.4R.M10M	BFF40P.4R.04UN	–	BFF40P.4R.T1M
BFF60P	BFF60P.4R.M10M	BFF60P.4R.06UN	–	BFF60P.4R.T1M
BFF80P	BFF80P.5R.M10M	BFF80P.5R.N47W	–	BFF80P.4R.T1M
BFF110P	BFF110P.5R.M10M	BFF110P.5R.N47W	–	BFF110P.4R.T1M

Bellows flat friction, Thin sheets family (BFFT)

- Special designed friction cups for thin (0.6–0.8 mm) oily metal sheets, such as outer body car parts in a press-to press forming process.
- Long lasting material, normal wear on friction cup will not affect the long term grip performance.
- Refined internal friction pattern provides additional grip performance, the suction cups can withstand high shear forces, typically 3–5 times more than corresponding conventional suction cups.
- Best choice if > 0.1g/m^2 press oil is used on the sheet but also a great choice for dry metal sheets.
- The “BFFT” design is suitable for thin flat or uneven/curved surfaces and if level compensation is needed, for example in de-stacking applications.
- The flat inner support, made of dual hardness, gives stability and good grip during movement in any orientation.
- DURAFLEX® suction cups manufactured in a specially developed material that features the elasticity of rubber and wear resistance of polyurethane. The material does not leave any marks on the objects handled and has a fantastic elastic memory, even after hundreds of thousands of cycles.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallell to the surface, lbf, at vacuum level	
	18 -inHg	27 -inHg	18 -inHg	27 -inHg
BFFT50P	23.4/23.6*	13.7/27.4*	32.6/32.8*	19.1/34.8*
BFFT70P	37.1/38.7*	24.7/39.6*	47.4/49.5*	33.3/55.1*
BFFT90P	41.4/41.4*	38.4/61.4*	51.7/51.3*	52.2/81.8*

* Dry metal sheet/Oily metal sheet.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
BFFT50P	2.09	1.58	3.35	0.43	0.90
BFFT70P	2.87	1.76	3.74	0.55	2.22
BFFT90P	3.66	2.13	5.12	0.83	5.10

Available materials

Name	PU60°/PU60°/PU30°
BFFT50P	●
BFFT70P	●
BFFT90P	●

Ordering information

Name	G1/4" female	G3/8" female		G3/8" male / 1/8" NPSF female	3/8" NPT female	T-slot
	with mesh filter	with mesh filter	plastic	with mesh filter	with mesh filter	with mesh filter
BFFT50P	BFFT50P.5S.G75MR	BFFT50P.5S.G70MR	BFFT50P.5S.G68WC	BFFT50P.5S.G69MR	BFFT50P.5S.N49MR	BFFT50P.5S.T2W
BFFT70P	BFFT70P.5S.G75MR	BFFT70P.5S.G70MR	BFFT70P.5S.G68WC	BFFT70P.5S.G69MR	BFFT70P.5S.N49MR	BFFT70P.5S.T2W
BFFT90P	BFFT90P.5S.G75MR	BFFT90P.5S.G70MR	BFFT90P.5S.G68WC	BFFT90P.5S.G69MR	BFFT90P.5S.N49MR	BFFT90P.5S.T2W

Deep concave friction family (DCF)

- Special designed friction cups for domed or flat oily surfaces, such as sheets in metal forming processes.
- Long lasting material, normal wear on friction cup will not affect the long term shear force performance.
- Best choice if > 0.1g/m^2 press oil is used on the sheet but also a great choice for dry metal sheets.
- Refined internal friction pattern provides additional grip performance, the suction cups can withstand high shear forces, typically 3–5 times more than corresponding conventional suction cups.
- Thin design that easily will follow convex or concave surfaces. The thin and pliable design in combination with a special inner friction pattern will maximize grip performance.
- DURAFLEX® suction cups manufactured in a specially developed material that features the elasticity of rubber and wear resistance of polyurethane. The material does not leave any marks on the objects handled and has a fantastic elastic memory, even after hundreds of thousands of cycles.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallell to the surface, lbf, at vacuum level	
	18 -inHg	27 -inHg	18 -inHg	27 -inHg
DCF65P	31.7/32.1*	22.5/32.8*	42.9/43.4*	30.1/44.1*
DCF90P	49.9/57.3*	41.1/57.6*	69.7/69.9*	55.8/80.5*
DCF110P	70.4/70.8*	64.3/84.8*	97.3/98*	80.5/129*

* Dry metal sheet/Oily metal sheet.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
DCF65P	2.66	1.62	3.74	0.35	1.46
DCF90P	3.64	1.78	5.12	0.51	3.51
DCF110P	4.43	2.11	6.02	0.63	6.72

Available materials

Name	PU60°/PU60°/PU30°
DCF65P	●
DCF90P	●
DCF110P	●

Ordering information

Name	3/8" NPT female	G3/8" male / 1/8" NPSF female	G3/8" female		G1/4" female	T-slot
	with mesh filter	with mesh filter	with mesh filter	plastic	with mesh filter	with mesh filter
DCF65P	DCF65P.4S.N49MR	DCF65P.4S.G69MR	DCF65P.4S.G70MR	DCF65P.4S.G68WC	DCF65P.4S.G75MR	DCF65P.4S.T2W
DCF90P	DCF90P.4S.N49MR	DCF90P.4S.G69MR	DCF90P.4S.G70MR	DCF90P.4S.G68WC	DCF90P.4S.G75MR	DCF90P.4S.T2W
DCF110P	DCF110P.4S.N49MR	DCF110P.4S.G69MR	DCF110P.4S.G70MR	DCF110P.4S.G68WC	DCF110P.4S.G75MR	DCF110P.4S.T2W

Flat concave friction family (FCF)

- Special designed friction cups for oily surfaces, such as sheets in metal forming processes.
- Normal wear on friction cup will not affect the long term shear force performance.
- Best choice if > 0.1g/m² press oil is used on the sheet.
- Thanks to the strong grip on oily surfaces, the suction cups can withstand high shear forces, typically 2–4 times more than corresponding conventional suction cups.
- The “FCF” design is suitable for 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.
- DURAFLEX® suction cups manufactured in a specially developed material that features the elasticity of rubber and wear resistance of polyurethane. The material does not leave any marks on the objects handled.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallell to the surface, lbf, at vacuum level	
	18 -inHg	27 -inHg	18 -inHg	27 -inHg
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*

* Dry metal sheet/Oily metal sheet.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
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

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
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

Name	PU55°/PU60°
FCF25P	●
FCF35P	●
FCF50P	●
FCF75P	●
FCF100P	●
FCF125P	●

Ordering information

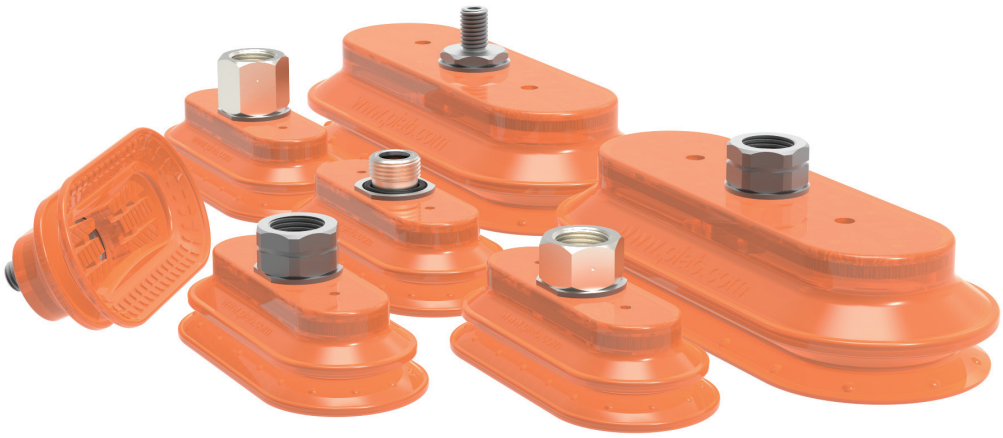
G threads

Name	G1/4" female	G3/8" male with mesh filter	G3/8" male / 1/8" NPSF female	G3/8" female			
					plastic	plastic thread	17 mm thread
FCF25P	FCF25P.4R.G75W	–	FCF25P.4R.G68W	FCF25P.4R.G71W	FCF25P.4R.G76WC	–	–
FCF35P	FCF35P.4R.G75W	FCF-35P.4R.04UF	–	FCF-35P.4R.04UA	FCF35P.4R.G76WC	–	FCF35P.4R.G67W
FCF50P	FCF50P.4R.G75W	FCF-50P.4R.05UF	–	FCF-50P.4R.05UA	FCF50P.4R.G74WC	–	FCF50P.4R.G66W
FCF75P	FCF75P.5R.G75W	FCF75P.5R.G45M	–	FCF75P.5R.G45W	–	FCF75P.5RC.G56WC	FCF75P.5R.G65W
FCF100P	FCF100P.5R.G75W	FCF100P.5R.G40M	–	FCF100P.5R.G46W	–	FCF100P.5RC.G56WC	FCF100P.5R.G62W
FCF125P	FCF125P.5R.G75W	FCF125P.5R.G40M	–	FCF125P.5R.G46W	–	FCF125P.5RC.G56WC	FCF125P.5R.G62W

M, NPT and T-slot threads

Name	M10x1.5 male	3/8" NPT female	T-slot	
				with mesh filter
FCF25P	–	FCF25P.4R.N51W	FCF25P.4R.T1W	–
FCF35P	FCF35P.4R.M10M	FCF35P.4R.04UN	–	FCF35P.4R.T1M
FCF50P	FCF50P.4R.M10M	FCF50P.4R.05UN	–	FCF50P.4R.T1M
FCF75P	FCF75P.5R.M10M	FCF75P.5R.N47W	–	FCF75P.4R.T1M
FCF100P	FCF100P.5R.M10M	FCF100P.5R.N48W	–	FCF100P.4R.T1M
FCF125P	FCF125P.5R.M10M	FCF125P.5R.N48W	–	FCF125P.4R.T1M

Oval bellows friction family (OBF)



- Special designed friction cups for oily surfaces, such as sheets in metal forming processes.
- Normal wear on friction cup will not affect the long term shear force performance.
- Best choice if > 0.1g/m^2 press oil is used on the sheet.
- Thanks to the strong grip on oily surfaces, the suction cups can withstand high shear forces, typically 2–4 times more than corresponding conventional suction cups.
- The ”OBF” design is suitable for oblong objects with domed and flat surfaces, such as those encountered with body parts in the automotive industry.
- Can handle objects with height differences.
- Fitting option, male G3/8”, with a swivel function prior to the locking operation, for easy positioning of the oval cup.
- DURAFLEX® suction cups manufactured in a specially developed material that features the elasticity of rubber and wear resistance of polyurethane. The material does not leave any marks on the objects handled.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallell to the surface, lbf, at vacuum level	
	18 -inHg	27 -inHg	18 -inHg	27 -inHg
OBF35×90P	31.5/24.3*	44.5/35.3*	28.1/23.6*	40.2/33.9*
OBF50×140P	73.1/55.3*	98.5/83.6*	73.7/60.9*	93.3/78.0*
OBF65×170P	89.2/90.6*	128.1/112.9*	98.2/120.9*	139.2/149.5

* Dry metal sheet/Oily metal sheet.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
OBF35×90P	4.13×1.97	1.54–1.89*	1.18	0.43	2.20
OBF50×140P	6.18×2.64	1.85–2.20*	1.97	0.51	5.80
OBF65×170P	7.36×3.23	2.13–2.47*	1.97	0.59	12.2

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

Available materials

	PU55°/PU60°
OBF35×90P	●
OBF50×140P	●
OBF65×170P	●

Ordering information

Name	G3/8" male	G3/8" female		M10x1.5 male	3/8" NPT female
	with mesh filter		17mm thread		
OBF35×90P	OBF35X90P.5R.G40M	OBF35X90P.5R.G46W	OBF35x90P.5R.G62W	OBF35X90P.5R.M10M	OBF35X90P.5R.N48W
OBF50×140P	OBF50X140P.5R.G40M	OBF50X140P.5R.G46W	–	OBF50X140P.5R.M10M	OBF50X140P.5R.N48W
OBF65×170P	OBF65X170P.5R.G40M	OBF65X170P.5R.G46W	–	OBF65X170P.5R.M10M	OBF65X170P.5R.N48W

Oval concave friction family (OCF)

- Special designed friction cups for oily surfaces, such as sheets in metal forming processes.
- Normal wear on friction cup will not affect the long term shear force performance.
- Best choice if > 0.1g/m² press oil is used on the sheet.
- Thanks to the strong grip on oily surfaces, the suction cups can withstand high shear forces, typically 2–4 times more than corresponding conventional suction cups.
- The ”OCF” design is suitable for oblong objects with slightly curved or flat surfaces, such as those encountered with body parts in the automotive industry.
- Fitting option, male G3/8”, with a swivel function prior to the locking operation, for easy positioning of the oval cup.
- DURAFLEX® suction cups manufactured in a specially developed material that features the elasticity of rubber and wear resistance of polyurethane. The material does not leave any marks on the objects handled.

Lifting forces

	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallell to the surface, lbf, at vacuum level	
	18 -inHg	27 -inHg	18 -inHg	27 -inHg
OCF20×80P	16.9/18.4*	25.0/20.2*	17.5/7.87*	25.2/10.8*
OCF30×90P	25.0/25.9*	35.3/35.7*	24.1/11.5*	36.0/16.6*
OCF40×110P	40.0/41.6*	55.1/55.3*	37.5/12.1*	52.2/17.5*

* Dry metal sheet/Oily metal sheet.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
OCF20×80P	3.31×0.94	1.06–1.69*	0.79	0.12	0.92
OCF30×90P	3.64×1.28	1.16	0.98	0.16	1.04
OCF40×110P	4.45×1.69	1.28–1.40*	1.65	0.20	2.07

* Height range includes fittings.

Available materials

	PU55°/PU60°
OCF20×80P	●
OCF30×90P	●
OCF40×110P	●

Ordering information

Name	G3/8"		3/8" NPT female
	male	female	
OCF20×80P	OCF20X80P.5R.G41M	OCF20X80P.5R.G45W	OCF20X80P.5R.N47W
OCF30×90P	OCF30X90P.5R.G41M	OCF30X90P.5R.G45W	OCF30X90P.5R.N47W
OCF40×110P	OCF40X110P.5R.G40M	OCF40X110P.5R.G46W	OCF40X110P.5R.N48W

DURAFLEX® single durometer

- Long lasting.
- Stable with high load bearing capability.
- Mark-free.
- The best option in most applications for sheet metal, glass or plastic handling.

B / B-XP BX F FC OB

B / B-XP – 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.
BX – This family is designed for height differences, slightly curved planes and uneven surfaces
F – 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.
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.
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 especially suitable for irregular surfaces and when level compensation is desired. This program of oval suction cups has characteristics that are especially 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	
	18 -inHg	27 -inHg	18 -inHg	27 -inHg
B75P PU60	1.03	1.24	0.56	0.67
B10XP PU60	2.02	2.70	1.12	2.02
B15XP PU60	4.43	5.17	2.47	3.37
B20XP PU60	6.07	6.74	2.92	4.05

	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallell to the surface, lbf, at vacuum level	
	18 -inHg	27 -inHg	18 -inHg	27 -inHg
B25XP PU60	10.8	14.8	7.42	11.2
B52XP PU60	24.5	33.7	15.7	20.2
B75XP PU60	49.9	69.0	45.0	51.7
B110XP PU60	98.9	112.4	85.4	103.4
BF80P PU60	50.6	66.1	28.6	37.3
BF110P PU60	75.1	65.9	51.9	68.6
BX10P PU60	0.52	0.83	—	—
BX15P PU60	1.35	1.35	—	—
BX20P PU60	1.57	2.47	—	—
BX25P PU60	3.15	4.05	2.47	3.37
BX35P PU60	5.62	6.74	6.74	8.09
BX52P PU60	13.3	18.0	11.0	12.6
BX75P PU60	27.0	37.3	25.6	33.7
BX110P PU60	95.8	95.3	54.9	65.9
F75P PU60	51.9	74.2	25.4	38.0
F110P PU60	112.0	158.5	117.6	149.3
FC20P PU60	2.70	3.60	2.02	2.70
FC25P PU60	4.50	6.07	2.70	4.05
FC35P PU50	8.09	11.5	11.5	13.9
FC35P PU60	7.64	11	9.22	11.5
FC50P PU40	22.7	30.4	24.2	29.5
FC50P PU60	22.7	30.7	27.4	32.7
FC75P PU40	46.3	63.4	59	67.9
FC75P PU60	49.6	66.4	66.4	75.2
FC100P PU40	83.8	111.2	93.8	123.9
FC100P PU60	96.8	131.6	77.9	112.7
FC150P PU40	190.9	272	225.7	266.1
FC150P PU60	211.2	274.9	167.6	254.6
OB20×60P	10	16.8	10.9	14.2
OB35×90P PU60	34.5	54.6	25.1	32.7
OB50×140P PU60	68.1	108.6	86.1	116.8
OB65×170P PU60	91.5	157.2	129.8	177

General specifications

Name	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
B75P PU60	3.11	1.47	3.54	0.79	6.71
B10XP PU60	0.43	0.55	0.24	0.12	0.01
B15XP PU60	0.63	0.58	0.39	0.13	0.02
B20XP PU60	0.83	0.41	0.35	0.18	0.06
B25XP PU60	1.02	0.53	0.43	0.22	0.1
B52XP PU60	2.09	1.06	1.14	0.44	0.81

Name	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in³
B75XP PU60	3.05	1.68–1.74	2.36	0.63	2.61
B110XP PU60	4.48	1.91	3.54	0.92	7.51
BF80P PU60	3.31	1.73–1.83	1.97	0.59	2.44
BF110P PU60	4.53	2.09–2.6	2.76	0.94	6.71
BX10P PU60	0.43	0.65	0.24	0.18	0.03
BX15P PU60	0.63	0.73	0.24	0.22	0.06
BX20P PU60	0.83	0.6	0.33	0.3	0.07
BX25P PU60	1.02	0.75	0.31	0.33	0.18
BX35P PU60	1.46	1.06	0.39	0.55	0.61
BX52P PU60	2.09	1.54	1.26	0.75	1.83
BX75P PU60	3.05	2.04–2.55	0.91	1.02	4.88
BX110P PU60	4.48	2.91–3.43	2.17	1.54	14.03
F75P PU60	3.03	0.51	5.91	0.08	1.16
F110P PU60	4.53	0.79	9.84	0.16	3.66
FC20P PU50	0.86	0.37	0.98	0.07	0.06
FC25P PU50	1.12	0.67–0.91	1.77	0.16	0.18
FC35P PU50/PU60	1.38	0.59	1.26	0.22	0.31
FC50P PU40/PU60	1.97	1.32	2.09	0.2	0.61
FC75P PU40/60	2.95	0.94–1.46	3.07	0.26	1.83
FC100P PU40/PU60	3.94	1.06	4.33	0.4	4.88
FC150P PU40/PU60	5.91	1.59	6.5	0.56	15.26
OB20×60P	2.44	0.93	0.28	0.18	1.46
OB35×90P PU60	3.76	1.07	1.18	0.41	2.32
OB50×140P PU60	5.75	1.36	1.02	0.44	5.8
OB65×170P PU60	6.97	1.63	1.5	0.63	10.68

* Height range includes fittings.

Available materials

Name	PU40°	PU50°	PU60°
B75P			●
B10XP			●
B15XP			●
B20XP			●
B25XP			●
B52XP			●
B75XP			●
B110XP			●
BF80P			●
BF110P			●
BX10P			●
BX15P			●
BX20P			●
BX25P			●

Name	PU40°	PU50°	PU60°
BX35P			●
BX52P			●
BX75P			●
BX110P			●
F75P			●
F110P			●
FC20P		●	
FC25P		●	
FC35P		●	●
FC50P	●		●
FC75P	●		●
FC100P	●		●
FC150P	●		●
OB20×60P			●
OB35×90P			●
OB50×140P			●
OB65×170P			●

Ordering information

No fitting & NPT threads

Name	No fitting	1/8” NPT male with mesh filter	1/4” NPT male with mesh filter	3/8” NPT male with mesh filter
B75P PU60	B75P.4E	–	–	–
B10XP PU60	B10XP.4E	–	–	–
B15XP PU60	B15XP.4E	–	–	–
B20XP PU60	B20XP.4E	B20XP.4E.02AC	–	–
B25XP PU60	B25XP.4E	B25XP.4E.02AC	–	–
B35XP PU60	B35XP.4E	–	B35XP.4E.04AC	–
B52XP PU60	B52XP.4E	–	B52XP.4E.05AC	B52XP.4E.05AE
B110XP PU60	B110XP.5E	–	–	–
BX10P PU60	BX10P.4E	–	–	–
BX15P PU60	BX15P.4E	–	–	–
BX20P PU60	BX20P.4E	BX20P.4E.02AC	–	–
BX25P PU60	BX25P.4E	–	–	–
BX25P PU60 with filter	BX25P.4E.F	BX25P.4E.02AC.F	–	–
BX35P PU60	BX35P.4E	–	–	–
BX35P PU60 with filter	BX35P.4E.F	–	BX35P.4E.04AC.F	BX35P.4E.04AE.F
BX52P PU60	BX52P.4E	–	–	–
BX52P PU60 with filter	BX52P.4E.F	–	BX52P.4E.05AC.F	BX52P.4E.05AE.F
BX110P PU60 with filter	BX110P.5E.F	–	–	–
F75P PU60	F75P.4E	–	–	–
F110P PU60	F110P.4E	–	–	–
FC20P PU50	FC20P.4D	FC20P.4D.02AC	–	–

Name	No fitting	1/8” NPT male with mesh filter	1/4” NPT male with mesh filter	3/8” NPT male with mesh filter
FC25P PU50	FC25P.4D	FC25P.4D.02AC	–	–
FC35P PU50	FC35P.4D	–	FC35P.4D.04AC	–
FC35P PU60	FC35P.4E	–	FC35P.4E.04AC	FC35P.4E.04AE
FC100P PU40	FC100P.4C	–	–	–
FC100P PU 60	FC100P.4E	–	–	–
FC150P PU40	FC150P.4C	–	–	–
FC150P PU60	FC150P.4E	–	–	–
OB35×90P PU60	OB35X90P.5E	–	–	–
OB50×140P PU60	OB50X140P.5E	–	–	–
OB65×170P PU60	OB65X170P.5E	–	–	–

M threads

Name	M5 male	M5 female	5xM5 female
B10XP PU60	B10XP.4E.01AC	–	–
B15XP PU60	B15XP.4E.01AC	–	–
B20XP PU60	–	B20XP.4E.02AA	B20XP.4E.02AE
B25XP PU60	–	B25XP.4E.02AA	B25XP.4E.02AE
BX10P PU60	BX10P.4E.01AC	–	–
BX15P PU60	BX15P.4E.01AC	–	–
BX20P PU60	–	BX20P.4E.02AA	BX20P.4E.02AE
BX25P PU60 with filter	BX25P.4E.02AA.F	–	BX25P.4E.02AE.F
FC20P PU 50	–	FC20P.4D.02AA	FC20P.4D.02AE
FC25P PU 50	–	FC25P.4D.02AA	FC25P.4D.02AE

NPSF threads

Name	1/8” NPSF female		3/8” NPSF female		5x1/8” NPSF female
		with mesh filter		with mesh filter	
B75P PU60	–	B75P.4E.07NA	B75P.5E.N40W	B75P.4E.07NE	–
B35XP PU60	–	B35XP.4E.04AG	–	–	–
B52XP PU60	–	B52XP.4E.05AG	–	–	B52XP.4E.05AF
B75XP PU60	–	–	–	B75XP.5E.N40W	–
B110XP PU60	–	–	–	B110XP.5E.N40W	–
BF80P PU60	–	–	BF80P.4E.08UB	–	–
BF110P PU60	–	–	BF110P.5E.N40W	–	–
BX35P PU60 with filter	BX35P.4E.04AA.F	–	–	–	–
BX52P PU60 with filter	BX52P.4E.05AA.F	BX52P.4E.05AG.F	–	–	BX52P.4E.05AF.F
BX110P PU60 with filter	–	–	BX110P.5E.N40W.F	–	–
F75P PU60	–	F75P.4E.07NA	F75P.5E.N40W	F75P.4E.07NE	–
F110P PU60	–	–	F110P.5E.N40W	–	–
FC35P PU50	FC35P.4D.04AA	FC35P.4D.04AG	–	–	–

Name	1/8” NPSF female		3/8” NPSF female		5x1/8” NPSF female
		with mesh filter		with mesh filter	
FC35P PU60	FC35P.4E.04AA	FC35P.4E.04AG	–	–	FC35P.4E.04AF
FC75P PU40	–	–	FC75P.5E.N40W	–	–
FC75P PU 60	–	FC100P.4C.07NA	FC100P.5C.N40W	FC100P.4C.07NE	–
FC100P PU 40	–	FC100P.4E.07NA	FC100P.5E.N40W	FC100P.4E.07NE	–
FC100P PU 60	–	–	–	F110P.4E.11NB	–
F110P PU 60	–	–	–	FC150P.4C.11NB	–
FC150P PU 40	–	–	–	FC150P.4E.11NB	–
FC150P PU 60	–	–	OB35X90P.5E. N40W	–	–
OB35×90P PU60	–	–	OB50X140P.5E. N40W	–	–
OB50×140P PU60	–	–	OB65X170P.5E. N40W	–	–
OB65×170P PU60	–	–	0108676	–	–

Threaded insert & O-ring

Name	for thread insert	thread insert G1/8” male	thread insert G1/4” male	thread insert G3/8” male		with O-ring
					with mesh filter	
B75P PU60	B75P.5E	–	–	–	B75P.5E.G40M	–
B75XP PU60	B75XP.5E	B75XP.5E.G60	B75XP.5E.G59	B75XP.5E.G40W	–	–
B110XP PU60	–	–	–	B110XP.5E.G40W	–	–
BF110P PU60	–	–	–	–	BF110P.5E.G40M	BF110P.5E
BX75P PU60 with filter	BX75P.5E.F	BX75P.5E.G60.F	BX75P.5E.G59.F	BX75P.5E.G40W.F	–	–
BX110P PU60 with filter	–	–	–	BX110P.5E.G40W.F	–	–
F75P PU60	F75P.5E	–	–	–	F75P.5E.G40M	–
F110P PU60	F110P.5E	–	–	–	F110P.5E.G40M	–
FC75P PU40	FC75P.5C	–	–	–	FC75P.5C.G40M	–
FC75P PU 60	FC75P.5E	–	–	–	FC75P.5E.G40M	–
FC100P PU 40	FC100P.5C	–	–	–	FC100P.5C.G40M	–
FC100P PU 60	FC100P.5E	–	–	–	FC100P.5E.G40M	–
OB35×90P PU60	–	–	–	–	OB35X90P.5E.G40M	–
OB50×140P PU60	–	–	–	–	OB50X140P.5E.G40M	–
OB65×170P PU60	–	–	–	–	OB65X170P.5E.G40M	–

G1/8”–G1/4” threads

Name	G1/8” male			G1/8” male / M5 female	G1/4” male
		M5 female	with mesh filter	with mesh filter	with mesh filter
B75P PU60	–	–	–	–	–
B20XP PU60	–	–	B20XP.4E.02AB	B20XP.4E.02AF	–

Name	G1/8" male			G1/8" male / M5 female	G1/4" male
		M5 female	with mesh filter	with mesh filter	with mesh filter
B25XP PU60	–	–	B25XP.4E.02AB	B25XP.4E.02AF	–
B35XP PU60	–	–	B35XP.4E.04AI	–	–
B52XP PU60	–	–	B52XP.4E.05AI	–	B52XP.4E.05AB
BF80P PU60	–	–	–	–	–
BX20P PU60	BX20P.4E.02AB	BX20P.4E.02AF	–	–	–
BX25P PU60 with filter	BX25P.4E.02AB.F	BX25P.4E.02AD.F	–	BX25P.4E.02AF.F	–
BX35P PU60 with filter	–	–	BX35P.4E.04AI.F	–	BX35P.4E.04AB.F
BX52P PU60 with filter	–	–	BX52P.4E.05AI.F	–	BX52P.4E.05AB.F
F75P PU60	–	–	–	–	–
F110P PU60	–	–	–	–	–
FC20P PU 50	–	FC20P.4D.02AD	FC20P.4D.02AB	FC20P.4D.02AF	–
FC25P PU 50	–	FC25P.4D.02AD	FC25P.4D.02AB	FC25P.4D.02AF	–
FC35P PU 50	–	–	–	–	FC35P.4D.04AB
FC35P PU60	–	–	–	–	FC35P.4E.04AB
OB20×60P PU60	OB20X60P.5E.G31M	–	–	–	–

G3/8"–G1/2" threads

Name	G3/8" female		G3/8" male			G1/2" female
		with mesh filter		with mesh filter	1/8" NPSF female	with mesh filter
B75P PU60	–	B75P.4E.07ND	–	–	–	B75P.4E.07NF
B25XP PU60	–	–	–	B35XP.4E.04AD	–	–
B35XP PU60	–	–	–	B52XP.4E.05AD	–	–
B75XP PU60	–	–	BF80P.4E.08UD	BF80P.4E.08UG	B75XP.4E.07UF	–
BF80P PU60	BF80P.4E.08UA	–	–	–	–	–
BX25P PU60 with filter	–	–	–	BX-35P.4E.04AD.F	–	
BX35P PU60 with filter	–	–	–	BX-52P.4E.05AD.F	–	
F75P PU60	–	F75P.4E.07ND	–	–	–	F75P.4E.07NF
F110P PU60	–	F110P.4E.11NA	–	FC35P.4E.04AD	–	F110P.4E.11NC
FC35P PU 50	–	–	–	FC35P.4D.04AD	–	–
FC50P PU40	–	–	–	–	FC50P.4C.05UB	–
FC50P PU60	–	–	–	–	FC50P.4E.05UB	–
FC75P PU40	–	–	–	–	FC75P.4C.07UF	–
FC75P PU60	–	–	–	–	FC75P.4E.07UF	–
FC100P PU40	–	FC100P.4C.07ND	–	–	–	FC100P.4C.07NF
FC100P PU 60	–	FC100P.4E.07ND	–	–	–	FC100P.4E.07NF
FC150P PU 40	–	FC150P.4C.11NA	–	–	–	FC150P.4C.11NC
FC150P PU 60	–	FC150P.4E.11NA	–	–	–	FC150P.4E.11NC

DURAFLEX® dual durometer

- Extremely flexible lip and stiff body.
- Conforms well to unevenness and roughness.
- Mark-free.
- Good for auto-racking, plastic parts with rough surfaces or texture, edges, joints, seams, height transitions.

B / B-XP BX F OB

B / B-XP – 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.
BX – This family is designed for height differences, slightly curved planes and uneven surfaces
F – 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.
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 especially suitable for irregular surfaces and when level compensation is desired. This program of oval suction cups has characteristics that are especially suited for handling of metal sheet material.

Lifting forces

Name	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallell to the surface, lbf, at vacuum level	
	18 -inHg	27 -inHg	18 -inHg	27 -inHg
B10XP PU 30/60	1.1	1.3	0.6	0.7
B15XP PU 30/60	2.7	3.2	1.5	2.4
B20XP PU 30/60	4.4	5.9	2.1	3
B25XP PU 30/60	5.6	6.5	3.5	4.4
B35XP PU 30/60	11.5	14.8	8.9	11.8
B52XP PU 30/60	24.8	30.1	17.7	25.1
B75P PU 30/60	44	59.6	28.3	33.6
B75XP PU 30/60	51.9	67.3	44.3	53.1
B110XP PU 30/60	112.1	138.7	103.3	126.9

Name	Lifting force vertical to the surface, lbf, at vacuum level		Lifting force parallell to the surface, lbf, at vacuum level	
	18 -inHg	27 -inHg	18 -inHg	27 -inHg
BF80P PU 30/50	46.3	57.8	26	34.5
BF110P PU 30/60	67.6	66.4	62	72.6
BX10P PU 30/60	0.7	1.1	–	–
BX15P PU 30/60	1.2	1.3	–	–
BX20P PU 30/60	2.1	2.8	–	–
BX25P PU 30/60	3.8	5	3	3.5
BX35P PU 30/60	5.9	8.3	5.6	7.7
BX52P PU 30/60	16.5	22.1	13	15.9
BX75P PU 30/60	32.5	41.6	24.5	34.2
BX110P PU 30/60	90.3	102.1	67.9	76.7
F75P PU 30/60	56.9	80.5	51.9	90.9
F110P PU 30/60	127.4	174.3	130.1	182
OB35×90P PU 30/60	35.1	51.3	21.5	29.5
OB50×140P PU 30/60	69.3	108	76.7	103
OB65×170P PU 30/60	98.8	159.6	111.8	156.9

General specifications

Name	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
B10XP PU 30/60	0.43	0.55–0.88	0.16	0.12	0.01
B15XP PU 30/60	0.63	0.58	0.22	0.13	0.02
B20XP PU 30/60	0.83	0.41	0.22	0.18	0.06
B25XP PU 30/60	1.02	0.53	0.35	0.22	0.1
B35XP PU 30/60	1.46	0.73	0.63	0.37	0.27
B52XP PU 30/60	2.09	1.06	0.98	0.44	0.81
B75P PU 30/60	3.11	1.47	3.54	0.79	6.71
B75XP PU 30/60	3.05	1.68–1.86	1.97	0.63	2.61
B110XP PU 30/60	4.48	1.91	3.15	0.92	7.51
BF80P PU 30/50	3.31	1.73–1.83	1.97	0.59	2.44
BF110P PU 30/60	4.53	2.09–2.6	2.17	0.94	6.71
BX10P PU 30/60	0.43	0.65	0.16	0.18	0.03
BX15P PU 30/60	0.63	0.73	0.22	0.22	0.06
BX20P PU 30/60	0.83	0.6	0.39	0.3	0.07
BX25P PU 30/60	1.02	0.75	0.24	0.33	0.18
BX35P PU 30/60	1.46	1.06	0.39	0.55	0.61
BX52P PU 30/60	2.09	1.54	1.26	0.75	1.83
BX75P PU 30/60	3.05	2.04–2.55	0.91	1.02	4.88
BX110P PU 30/60	4.48	2.91	2.17	1.54	14.03
F75P PU 30/60	3.03	0.51	5.91	0.08	1.16
F110P PU 30/60	4.53	0.79	9.84	0.16	3.66
OB35×90P PU 30/60	3.76	1.07	1.18	0.41	2.32
OB50×140P PU 30/60	5.75	1.36	0.91	0.44	5.8

Name	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
OB65×170P PU 30/60	6.97	1.63	1.5	0.63	10.68

* Height range includes fittings.

Available materials

Name	PU 30°/50°	PU 30°/60°
B10XP		●
B15XP		●
B20XP		●
B25XP		●
B35XP		●
B52XP		●
B75P		●
B75XP		●
B110XP		●
BF80P	●	●
BF110P		●
BX10P		●
BX15P		●
BX20P		●
BX25P		●
BX35P		●
BX52P		●
BX75P		●
BX110P		●
F75P		●
F110P		●
OB35×90P		●
OB50×140P		●
OB65×170P		●

Ordering information

No fitting & NPT threads

Name	No fitting	1/8" NPT male with mesh filter	1/4" NPT male with mesh filter	3/8" NPT male with mesh filter	1/2" NPT male
B75P 30/60	B75P.4K	–	–	–	–
B10XP 30/60	B10XP.4K	–	–	–	–
B15XP 30/60	B15XP.4K	–	–	–	–
B20XP 30/60	B20XP.4K	B20XP.4K.02AC	–	–	–
B25XP 30/60	B25XP.4K	B25XP.4K.02AC	–	–	–
B35XP 30/60	B35XP.4K	–	B35XP.4K.04AC	B35XP.4K.04AE	–
B52XP 30/60	B52XP.4K	–	B52XP.4K.05AC	B52XP.4K.05AE	–

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Name	No fitting	1/8” NPT male with mesh filter	1/4” NPT male with mesh filter	3/8” NPT male with mesh filter	1/2” NPT male
B110XP 30/60	B110XP.5K	–	–	–	–
BX10P 30/60	BX10P.4K	–	–	–	–
BX15P 30/60	BX15P.4K	–	–	–	–
BX20P 30/60	BX20P.4K	BX20P.4K.02AC	–	–	–
BX25P 30/60	BX25P.4K	–	–	–	–
BX25P 30/60 with filter	BX25P.4K.F	BX25P.4K.02AC.F	–	–	–
BX35P 30/60 with filter	BX35P.4K.F	–	BX35P.4K.04AC.F	BX35P.4K.04AE.F	–
BX35P 30/60	BX35P.4K	–	–	–	–
BX52P 30/60	BX52P.4K	–	–	–	–
BX52P 30/60 with filter	BX52P.4K.F	–	BX52P.4K.05AC.F	BX52P.4K.05AE.F	–
BX110P 30/60	BX110P.5K	–	–	–	–
BX110P 30/60 with filter	BX110P.5K.F	–	–	–	–
F75P 30/60	F75P.4K	–	–	–	–
F110P 30/60	F110P.4K	–	–	–	–
OB35×90P 30/60	OB35X90P.5K	–	–	–	–
OB50×140P 30/60	OB50X140P.5K	–	–	–	–
OB65×170P 30/60	OB65X170P.5K	–	–	–	–

NPSF threads

Name	1/8” NPSF female		5x1/8” NPSF female	3/8” NPSF female	
		with mesh filter			with mesh filter
B75P 30/60	–	B75P.4K.07NA	–	B75P.5K.N40W	B75P.4K.07NE
B35XP 30/60	–	B35XP.4K.04AG	–	–	–
B52XP 30/60	–	B52XP.4K.05AG	B52XP.4K.05AF	–	–
B75XP 30/60	–	–	–	–	B75XP.5K.N40W
B110XP 30/60	–	–	–	–	B110XP.5K.N40W
BF80P 30/50	–	–	–	BF80P.4H.08UB	–
BF110P 30/60	–	–	–	BF110P.5K.N40W	–
BX35P 30/60 with filter	BX35P.4K.04AA.F	BX35P.4K.04AG.F	–	–	–
BX35P 60 with filter	–	BX35P.4E.04AG.F	–	–	–
BX52P 30/60 with filter	BX52P.4K.05AA.F	BX52P.4K.05AG.F	BX52P.4K.05AF.F	–	–
BX75P 30/60 with filter	–	–	–	BX75P.5K.N40W.F	–
BX75P 60 with filter	–	–	–	BX75P.5E.N40W.F	–
BX110P 30/60 with filter	–	–	–	BX110P.5K.N40W.F	–
F75P 30/60	–	F75P.4K.07NA	–	F75P.5K.N40W	F75P.4K.07NE
F110P 30/60	–	–	–	F110P.5K.N40W	F110P.4K.11NB
OB35×90P 30/60	–	–	–	OB35X90P.5K.N40W	–
OB50×140P 30/60	–	–	–	OB50X140P.5K.N40W	–
OB65×170P 30/60	–	–	–	OB65X170P.5K.N40W	–

Threaded insert & O-ring

Name	for thread insert	G1/4" male thread insert	G1/8" male thread insert	G3/8" male thread insert	G3/8" male thread insert with mesh filter	with O-ring
B75P 30/60	B75P.5K	–	–	–	B75P.5K.G40M	–
B75XP 30/60	B75XP.5K	B75XP.5K.G59	B75XP.5K.G60	B75XP.5K.G40W	–	–
B110XP 30/60	–	–	–	B110XP.5K.G40W	–	–
BF110P 30/60	–	–	–	–	BF110P.5K.G40M	BF110P.5K
BX75P 30/60 with filter	BX75P.5K.F	BX75P.5K.G59.F	BX75P.5K.G60.F	BX75P.5K.G40W.F	–	–
BX110P 30/60 with filter	–	–	–	BX110P.5K.G40W.F	–	–
F75P 30/60	F75P.5K	–	–	–	F75P.5K.G40M	–
F110P 30/60	F110P.5K	–	–	–	F110P.5K.G40M	–
OB35x90P 30/60	–	–	–	–	OB35X90P.5K.G40M	–
OB50x140P 30/60	–	–	–	–	OB50X140P.5K.G40M	–
OB50x170P 30/60	–	–	–	–	OB65X170P.5K.G40M	–

M threads

Name	M5 male	M5 female	5×M5 female
B10XP 30/60	B10XP.4K.01AC	–	–
B15XP 30/60	B15XP.4K.01AC	–	–
B20XP 30/60	–	B20XP.4K.02AA	B20XP.4K.02AE
B25XP 30/60	–	B25XP.4K.02AA	B25XP.4K.02AE
BX10P 30/60	BX10P.4K.01AC	–	–
BX15P 30/60	BX15P.4K.01AC	–	–
BX20P 30/60	–	BX20P.4K.02AA	BX20P.4K.02AE
BX25P 30/60 with filter	–	BX25P.4K.02AA.F	BX25P.4K.02AE.F

G1/8"–G1/4" threads

Name	G1/8" male	G1/8" male with mesh filter	G1/8" male / M5 female	G1/8" male / M5 female with mesh filter	G1/4" male with mesh filter
B20XP 30/60	–	B20XP.4K.02AB	–	B20XP.4K.02AF	–
B25XP 30/60	–	B25XP.4K.02AB	–	B25XP.4K.02AF	–
B35XP 30/60	–	B35XP.4K.04AI	–	–	B35XP.4K.04AB
B52XP 30/60	–	B52XP.4K.05AI	–	–	B52XP.4K.05AB
BX20P 30/60	BX20P.4K.02AB	–	BX20P.4K.02AF	–	–
BX25P 30/60 with filter	–	BX25P.4K.02AB.F	BX25P.4K.02AD.F	BX25P.4K.02AF.F	–
BX35P 30/60 with filter	–	BX35P.4K.04AI.F	–	–	BX35P.4K.04AB.F
BX52P 30/60 with filter	–	BX52P.4K.05AI.F	–	–	BX52P.4K.05AB.F

G3/8”–G1/2” threads

Name	G3/8” female		G3/8” male		G3/8” male / 1/8” NPSF female	G1/2” female
		with mesh filter	standard	with mesh filter		with mesh filter
B75P 30/60	–	B75P.4K.07ND	–	–	–	B75P.4K.07NF
B35XP 30/60	–	–	–	B35XP.4K.04AD	–	–
B52XP 30/60	–	–	–	B52XP.4K.05AD	–	–
B75XP 30/60	–	–	–	–	B75XP.4K.07UF	–
BF80P 30/50	BF80P.4H.08UA	–	BF80P.4H.08UD	BF80P.4H.08UG	–	–
BX35P 30/60 with filter	–	–	–	BX35P.4K. 04AD.F	–	–
BX52P 30/60 with filter	–	–	–	BX52P.4K. 05AD.F	–	–
BX75P 30/60 with filter	–	–	–	–	BX75P.4K. 07UF.F	–
BX75P 30/60	–	–	–	–	BX75P.4K.07UF	–
F75P 30/60	–	F75P.4K.07ND	–	–	–	F75P.4K.07NF
F110P 30/60	–	F110P.4K.11NA	–	–	–	F110P.4K.11NC

XLF 150

- Suitable for handling large and heavy sheets, such as glass and metal, with a flat or slightly concave surface.
- Friction pattern increases safety and capabillity to handle tilted or standing glass/metal sheets.
- Double lip design increases safety against over-load or tear on the outer lip.
- Durable and abrasive resistant material reduces the risk for marks.
- Flat mounting plate facilitates customized mounting interfaces.
- Auxiliary port, suitable for vacuum sensing or efficient blow-off/release.

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
XLF150	74.2/117*	112/173*	175/254*	63.2	95.5	149

*Inner/Outer lip.

General specifications

	Outer diameter, in	Height, in	Min. curve radius, in	Max. vertical movement, in	Volume, in^3
XLF150	6.02	1.06	19.7	0.31	8.85

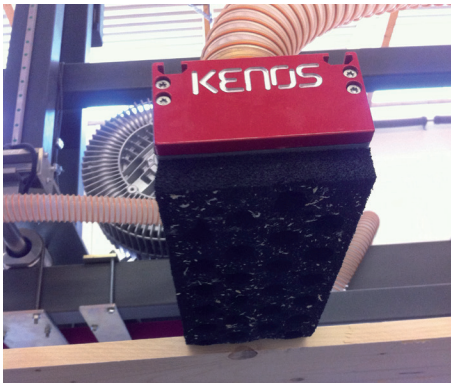
Available materials

	Nitrile-PVC, NPV
XLF150	●

Ordering information

Name	Part No.
XLF150 Extra Large Flat cup, G1/2” female	01.27.131

Kenos Vacuum Gripping Systems



KVG

Kenos Vacuum Gripper – KVG

KVG series represents a flexible solution for the handling manipulation of several products with different shapes, dimensions and porosity due to the double technology available (check valve or flow restrictions).

- Check valves or flow reducers can fulfill the needs.
- The KVG gripping system can be equipped with integrated vacuum generation or suitable for separated vacuum generation.
- The integrated vacuum generator is a modular multi-stage COAX® ejector of easy maintenance.
- The material of the KVG gripping system is made of a technical foam, with different pitch holes and thickness or suction cups.
- Typical applications within the automotive industry are handling of engine covers and inner carpets.

KVGL-S

Kenos Vacuum Gripper Layer – KVGL-S

KVGL-S product series, Kenos Vacuum Gripper Layer - Standard, looks at the wide world of automotive such as end of line automation and other applications.

- Our adjustable check valve technology and the technical foam allows for superior gripping on different kind of boxes, wrap around packaging and primary ones.
- The large availability of standard dimensioning and the modularity make this series highly effective.

KVGL-CJ

Kenos Vacuum Layer – Cans Jars – KVGL-CJ

KVGL-CJ series, Kenos Vacuum Layer – Cans Jars, born for the need to handle the complete layer of cans, jars that can be open or covered on the gripping area.

- In the automotive industry it can be applied for engine and transmission parts.

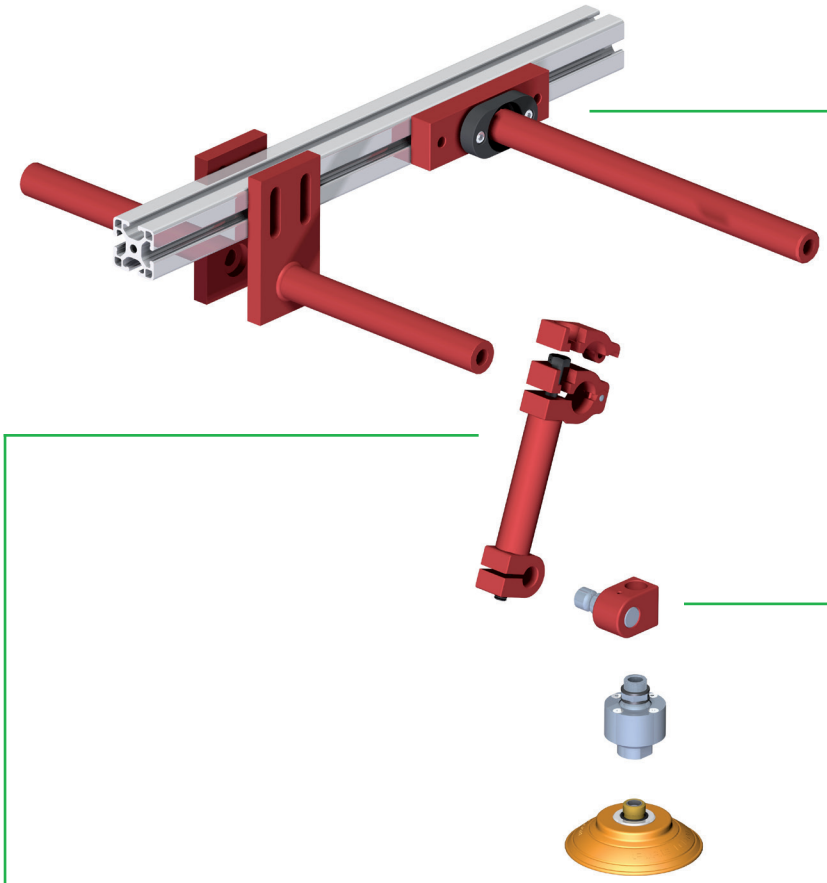
Ordering information

For a complete list of available Kenos Vacuum Grippers visit piab.com. Register to receive full access to all resources available.

PMAT – Piab Modular Automation Tooling

piab

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.

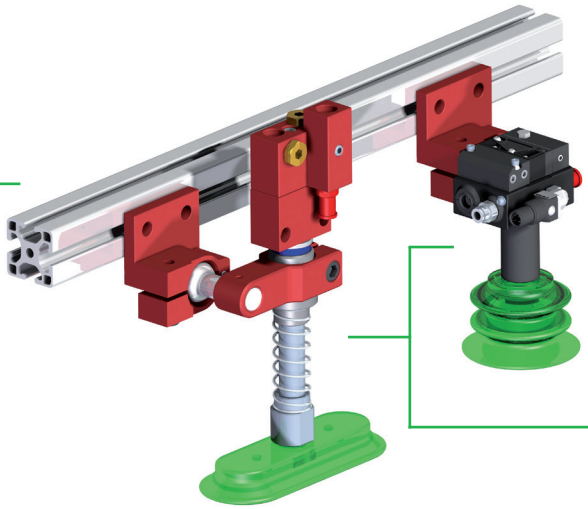
Ball joint

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.

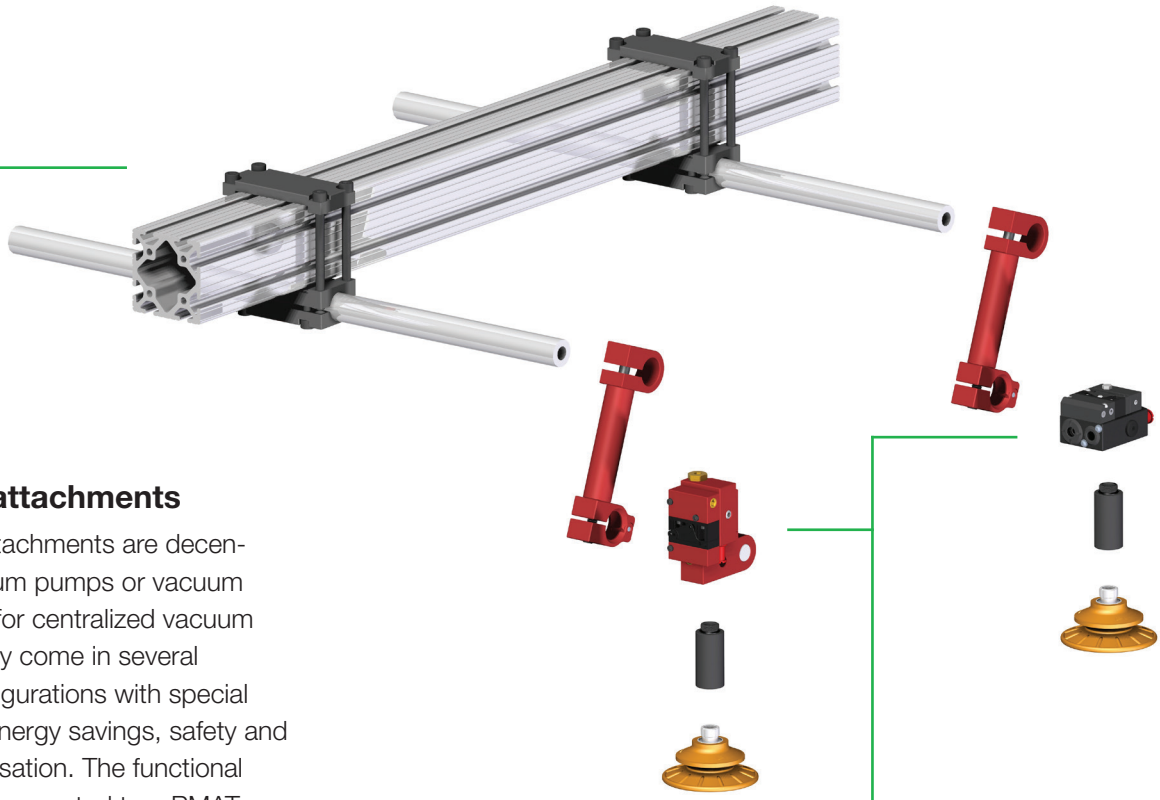
Piab suction cups

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

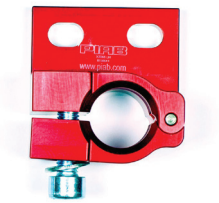
The PMAT offers a wide range of suction cup accessories to optimize and facilitate the installation. For instance, the accessories can help to avoid bending stress on the suction cup when lifting heavy objects, extend the cup to reach areas in cramped spaces or simply height adjust the cup to the right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

Name	Part No.
Mounting bar welded L=100	01.19.784
Mounting bar welded L=150	01.19.785
Mounting bar welded L=200	01.19.786
Mounting bar welded L=300	01.19.787
Mounting bar welded L=600	01.19.788
Profile mount ball clamp, left hand	X2066
Profile mount ball clamp, right hand	X2066RH

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.
- Available in 50, 100, 150 mm lengths.

Swivel arm – slide on

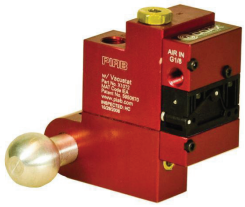
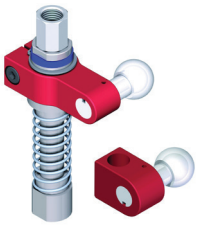
- Standard mounting to 25 mm or 1” bars.
- Easy single screw adjustment.
- Available in lock pin 16, 19 or ball joint mountings, industry standard.
- Available in 50, 100, 150 mm lengths.

Technical Data

Description	Load, vertical, max.	Load, torque, max.
Swivel arm – clamp on	90 lbf	29.5 lb ft
Swivel arm – slide on	90 lbf	29.5 lb ft

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.
- Two-stage COAX® cartridge MINI Pi12-2 integrated (VT-1H with COAX® / VT-1H Vacustat with COAX®).
- Integrated energy-saving device, Vacustat results in virtually no air consumption in sealed applications.

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

Only ordering information for the vacuum check valve VT-1H with ball joint is presented in the table beneath. For ordering information for the vacuum check valve VT-1H with lock pin 16 connection and lock pin 19 connection or without a connection please visit piab.com.

Name	Part No.
Vacuum Check Valve VT-1H with level compensator, G threads, Ball joint, Left hand connection	X6023F
Vacuum Check Valve VT-1H with level compensator, G threads, Ball joint, Right hand connection	X6023
Vacuum Check Valve VT-1H, G threads, Ball joint, Left hand connection	X1020
Vacuum Check Valve VT-1H, G threads, Ball joint, Right hand connection	X1020RH
Vacuum Check Valve VT-1H, NPT threads, Ball joint, Left hand connection	1020RH
Vacuum Check Valve VT-1H, NPT threads, Ball joint, Right hand connection	1020
Vacuum Check Valve VT-1H with level compensator, NPT threads, Ball joint, Left hand connection	6023
Vacuum Check Valve VT-1H with level compensator, NPT threads, Ball joint, Right hand connection	6023RH
Vacuum Check Valve VT-1H COAX®, G threads, Ball joint, Left hand connection	X1045
Vacuum Check Valve VT-1H COAX®, G threads, Ball joint, Right hand connection	X1045RH
Vacuum Check Valve VT-1H COAX® with level compensator, G threads, Ball joint, Left hand connection	X6019F
Vacuum Check Valve VT-1H COAX® with level compensator, G threads, Ball joint, Right hand connection	X6019RHF
Vacuum Check Valve VT-1H COAX®, NPT threads, Ball joint, Left hand connection	1045
Vacuum Check Valve VT-1H COAX®, NPT threads, Ball joint, Right hand connection	1045RH
Vacuum Check Valve VT-1H COAX® with level compensator, NPT threads, Ball joint, Left hand connection	6019

Name	Part No.
Vacuum Check Valve VT-1H COAX® with level compensator, NPT threads, Ball joint, Right hand connection	6019RH
Vacuum Check Valve VT-1H Vacustat with COAX®, G threads, Ball joint, Left hand connection	X1072
Vacuum Check Valve VT-1H Vacustat with COAX® with level compensator, G threads, Ball joint, Left hand connection	X6046F
Vacuum Check Valve VT-1H Vacustat with COAX® with level compensator, G threads, Ball joint, Right hand connection	X6046RHF
Vacuum Check Valve VT-1H Vacustat with COAX®, NPT threads, Ball joint, Left hand connection	1072
Vacuum Check Valve VT-1H Vacustat with COAX®, NPT threads, Ball joint, Right hand connection	1072RH
Vacuum Check Valve VT-1H Vacustat with COAX®, G threads, Ball joint, Right hand connection	X1072RH

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

Name	Part No.
Cross connector 25-25/65	01.21.170
LCS 200 profile mounted level compensator G3/8" female x G3/8" female	01.21.220
LCS 200 profile mounted level compensator 3/8" NPT female x 3/8" NPT male	01.21.219
Proximity mounting bracket	X5082

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.

Accessories

Mounting elements (ME)

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 lbf	5.16 lbf	–	–
Mounting bracket MB12L, MB16L, MB20L	45 lbf	5.16 lbf	–	–
Mounting bracket MB25S, MB25L	67.4 lbf	11.1 lbf	–	–
Height adjuster HA12	9.9 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 × G3/8” female	157 lbf	–	89.9 lbf	–
Suction cup extension SE12	9.9 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

Name	Part No.
Mounting bracket MB12S	02.00.449
Mounting bracket MB16S	02.00.450
Mounting bracket MB20S	02.00.451
Mounting bracket MB25S	02.00.452
Mounting bracket MB16L	02.00.454

Name	Part No.
Mounting bracket MB12L	02.00.455
Mounting bracket MB20L	02.00.456
Mounting bracket MB25L	02.00.457
Height adjuster HA12	02.00.461
Height adjuster HA16	02.00.462
Height adjuster HA20	02.00.463
Height adjuster HA25	01.21.122
Suction cup extension 50, G3/8" male x G3/8" female	X7046
Suction cup extension SE12	02.00.458
Suction cup extension SE16	02.00.459
Suction cup extension SE20	02.00.460

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 G1/2” with stiffer spring is identical to standard level compensator G1/2” except for thicker spring material. Suits e.g. robot vision systems in applications such as auto-racking.

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 absorption.

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	20.23–33.72 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”	55.08 lbf	0.67–2.11 lbf	0.79 in	G1/8”
Level compensator G1/2”	110.16 lbf	5.4–8.32 lbf	0.59 in	G1/2”
Level compensator LC30	157.37 lbf	1.12–9.44 lbf	1.18 in	G3/8”

Ordering information

Name	Part No.
Level compensator LC12-F0510	01.27.103
Level compensator LC12-M0510	01.27.104
Level compensator LC12-F0525	01.27.105
Level compensator LC12-M0525	01.27.106
Level compensator LC16-F1820	01.24.951
Level compensator LC16-M1820	01.24.952
Level compensator LC16-F1835	01.24.953
Level compensator LC16-M1835	01.24.954
Level compensator LC20-F1425	01.24.955
Level compensator LC20-M1425	01.24.956
Level compensator LC20-F1450	01.24.957
Level compensator LC20-M1450	01.24.958
Level compensator LC25-F3840	01.24.959
Level compensator LC25-M3840	01.24.960
Level compensator LC25-F3880	01.24.961
Level compensator LC25-M3880	01.24.962
Level compensator G1/2” with stiffer spring	01.14.291
Level compensator M5	33.50.068
Level compensator G1/8”	33.50.069
Level compensator G1/2”	33.50.071
Level compensator LC30	01.11.552

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.
- Developed for use with decentralized vacuum pump/ generator units such as VGS™3010 and VGS™3040 or a centralized vacuum pump/ generator.
- 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.

Level compensator KSPH

- Compensates for differences in height.
- Provides certain degree of shock absorption.
- Fits on standard size extrusion.
- Level compensators feature a generic design.
- Non-rotational for use with, for example, oval suction cups. Can easily be made rotational.

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
Kenos level compensator – KSPH-M20-XX-25 (XX: Male or female thread connection)	–	0.98 in	1/8”, 1/4”, 3/8”
Kenos level compensator – KSPH-M20-XX-50 (XX: Male or female thread connection)	–	1.97 in	1/8”, 1/4”, 3/8”
Kenos level compensator – KSPH-M20-XX-75 (XX: Male or female thread connection)	–	2.95 in	1/8”, 1/4”, 3/8”

Ordering information

Name	Part No.
Level compensator LC30 w ball joint LH	01.24.213
Level compensator LC30 w lock pin 19 LH	01.24.214
Level compensator LC30 w lock pin 16 LH	01.24.215
LCS 200 profile mounted level compensator G3/8” female x G3/8” female	01.21.220
LCS 200 profile mounted level compensator 3/8” NPT female x 3/8” NPT male	01.21.219
KSPH-M20-1M-25, 1/8”	K-25-00630
KSPH-M20-1M-50, 1/8”	K-25-00642
KSPH-M20-1M-75, 1/8”	K-25-00652
KSPH-M20-1F-25, 1/8”	K-25-00631
KSPH-M20-1F-50, 1/8”	K-25-00643
KSPH-M20-1F-75, 1/8”	K-25-00653
KSPH-M20-2M-25, 1/4”	K-25-00632
KSPH-M20-2M-50, 1/4”	K-25-00644
KSPH-M20-2M-75, 1/4”	K-25-00654
KSPH-M20-2F-25, 1/4”	K-25-00633
KSPH-M20-2F-50, 1/4”	K-25-00645
KSPH-M20-2F-75, 1/4”	K-25-00655
KSPH-M20-3M-25, 3/8”	K-25-00634
KSPH-M20-3M-50, 3/8”	K-25-00646
KSPH-M20-3M-75, 3/8”	K-25-00656
KSPH-M20-3F-25, 3/8”	K-25-00635
KSPH-M20-3F-50, 3/8”	K-25-00647
KSPH-M20-3F-75, 3/8”	K-25-00657

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 (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

Name	Part No.
piSAVE release G1/4"	01.19.720
piSAVE release G1/8"	01.19.721
Atmospheric quick-release valve – AQR	01.11.236
Blow-off Check valve 1/8" NPSF female	01.15.314

Optimizers

piSAVE sense 02/03

- 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 metal sheets with a flexible handling device.
- Also suitable for objects with surface leakage around the lip of the suction cup.
- Available in four sizes with different flow performance/characteristics to suit different degree of leakage on handled material and different size of cups.
- 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.

Technical Data

Description	Pump flow/cup min.	Pump flow/cup to close valve
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

Ordering information

Name	Part No.
piSAVE sense Multiple port fitting 02/60 (yellow)	02.02.396
piSAVE sense 02/60 (yellow),10p, incl. Assembly tool	02.02.394
piSAVE sense 02/60 (yellow), 100p, incl. Assembly tool	02.02.395
piSAVE sense Multiple port fitting 03/60 (green)	01.28.719
piSAVE sense 03/60 (green), 10p, incl. Assembly tool	02.02.424
piSAVE sense 03/60 (green), 100p, incl. Assembly tool	02.02.427

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.

Technical Data

Description	Flow	Flow rate
piSAVE onoff	15.5 scfm (@ P1=6 bar & Δp=0.5 bar)	–
Blow-off Check valve	–	3.18 – 5.93 scfm (@ 44-101.5 psi)

Ordering information

Name	Part No.
piSAVE onoff with small hysteresis	01.18.100
piSAVE onoff with large hysteresis	01.18.200

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.

Technical Data

Description	Vacuum flow
piSAVE optimize	3.54–31.78 scfm

Ordering information

Name	Part No.
piSAVE optimize stand-alone 25–70 -inHg G3/8"	01.28.999
piSAVE optimize standalone 25–70 -inHg 3/8" NPT	01.29.000
piSAVE optimize upgrade kit piCLASSIC/Classic	01.29.002

Vacuum switch VS4128

- Pre-set vacuum switch with digital output.
- Durable and compact design with G1/8” 90° angle swivel connection for easy installation.
- 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).

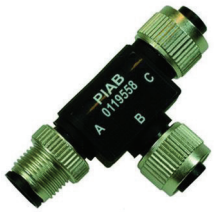
Technical Data

Description	Hysteresis	Signal range
Vacuum Switch VS4128 9 -inHg, M12 PNP NO	1.16 psi	7.68–10.04 -inHg
Vacuum Switch VS4128 15 -inHg, M12 PNP NO	1.16 psi	13.58–15.95 -inHg
Vacuum Switch VS4128 15 -inHg, M12 NPN NO	1.16 psi	13.58–15.95 -inHg

Ordering information

Name	Part No.
Vacuum Switch VS4128 9 -inHg, M12 PNP NO	01.10.630
Vacuum Switch VS4128 15 -inHg, M12 PNP NO	01.10.631
Vacuum Switch VS4128 15 -inHg, M12 NPN NO	01.24.450

T-connector M12 male



- Serially connects two or several vacuum switches, VS4128, into one common output to the PLC or BUS-I/0.
- Quick and simple installation with standard male to female M12 eurofast cable assemblies.
- Suitable if the PLC or BUS-I/O is limited to one or two input signals from a vacuum system with several vacuum switches.

Technical Data

Description	Current, max.	Safety classification	Voltage, max.
T-connector M12 male	4000 mA	IP65	60 VDC

Ordering information

Name	Part No.
T-connector M12 male, 2×M12 female	01.19.558

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No need to compromise

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