Vacuum components

For economic, safe and efficient handling

Catalogue PDE2507TCUK-ab

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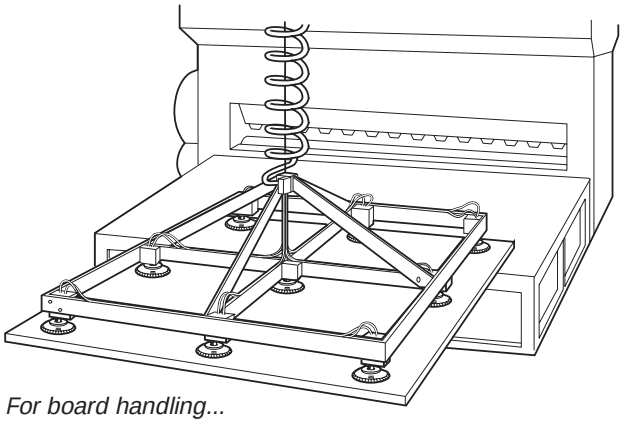
Important!

Before carrying out any work on the vacuum system, ensure that all vacuum and compressed air have been released. Remove the primary air supply hose for positive interruption of possible air supply, and briefly blow compressed air into all holding valves to ensure that all parts are released. Do not remove any components until all this has been done.

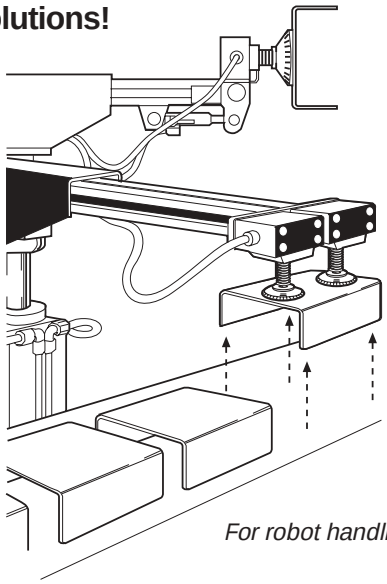
Important!

Holding valves must not be regarded as 'safety' valves, as there will always be a slight inward leakage of air into a vacuum system. This means that, sooner or later, parts held by vacuum will be released.

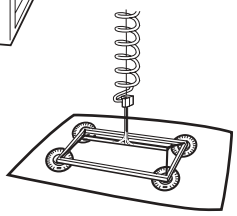
- Think Systems - create technical solutions!



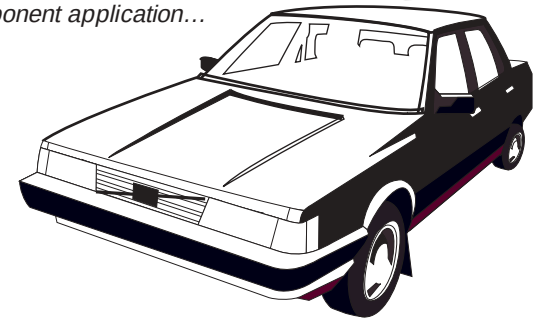
For board handling...



For robot handling...



For component application…



A complete programme of vacuum components

Suction cups

About 100 suction cups of varying material and shapes, with attachments for handling and exposing in varying environments - with lifting forces varying from 0.1 to 2600 N - are always in stock.

For example, bellows cups for level adjustment on components of varying shape and for separation of thin components, oval suction cups for lifting rough and narrow components and flat suction cups for horizontal/vertical lifting of flat or gently curved surfaces.

Accessories, connections and attachments

Our wide range of connections and accessories gives the greatest possible flexibility and simplifies attachment of suction cups.

The range includes sprung anchorages with integrated springs, which damp and compensate for level differences, jointed attachments which counteract problems during acceleration and deceleration.

Flow valves, quick release couplings, vacuum gauges, union nipples, adaptors and filters are other accessories for increased efficiency.

Generators

Our generators are designed to reach a high vacuum level quickly and thus offer better machine cycle times.
The programme includes everything from small generators for direct connection to suction cups, to generators with built-in latching and blow-off functions and Multi-Function units with built in automatic air economizers, which save up to 98% of air consumption.

Evacuation times for 1 litre volume to 75% vacuum vary from 0.25 s to 15 s and air consumption at 4 bar varies between 12 - 720 l/min, depending on the generator chosen.

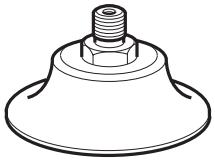
Working units

You can easily build up complete working units to suit your own specific requirements, using the various basic units.
A simple working unit could consist of just the small, easily installed Mini Single or Mini Compact mini-generators and a suction cup or sprung attachment which functions together with a suction cup. In other installations, where the degree of mechanisation is higher and where more advanced solutions are required, a Multi-Function generator could be selected. The built-in solenoids are responsible for both the air supply to the generator and for the blow-off function of the component or workpiece. Everything to give the quickest precise lifting and disconnection possible.

The Multi-Function generator also has a latching function, which gives very high security and offers considerable savings in compressed air. An external vacuum monitor keeps track of the vacuum level and sends signals to the compressed air supply.

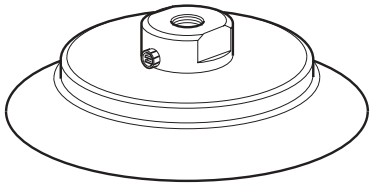
A high-technology version of the Multi-Function generator is also available, with independently adjustable connection (55%) and disconnection (70%) levels and an alarm signal (40%) for the lowest vacuum level needed to avoid dropping objects. Suitable for very high safety requirements, such as press lines in the motor industry.

Flat - Simple



PFG/PFTM/PFTF

Flat - Ribbed



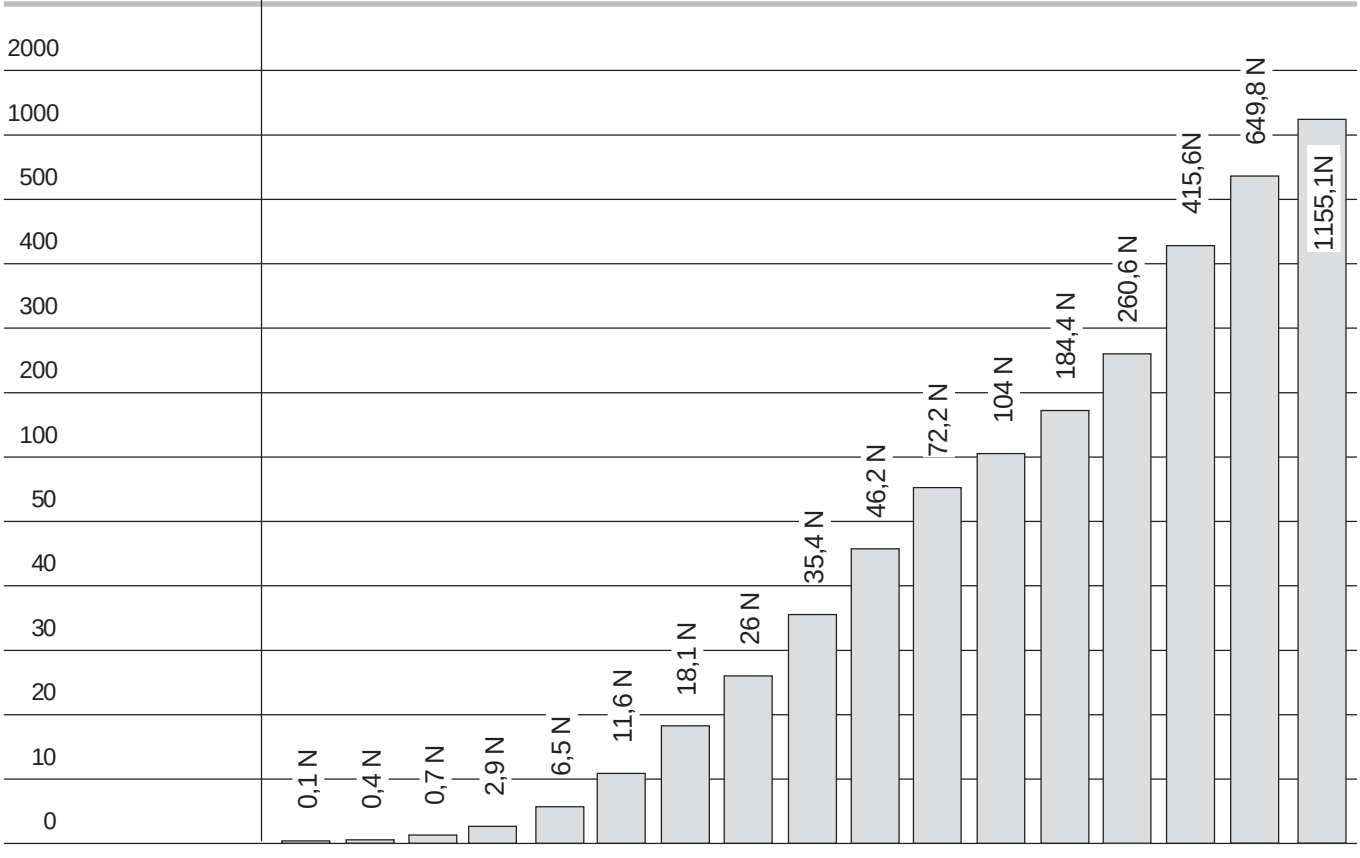
PFG/PFTM/PFTF

Diameter Ø mm		2	3,5	5	10	15	20	25	30	35	40	50	60	80	95	120	150	200
Port size, (Fitting)	Male	M5	M5	M5	M5	G1/8	G1/8	G1/8	G1/8	G1/8	G1/8	G1/8	G1/4	G1/4	G1/4	-	-	-
	Female	-	-	-	-	G1/8	G1/8	G1/8	G1/8	G1/8	G1/8	G1/8	G1/4	G1/4	G1/4	G1/2	G1/2	G1/2
	Male	-	-	-	-	-	-	G1/4	G1/4	G1/4	G1/4	G1/4	-	-	-	-	-	-
	Female	-	-	-	-	-	-	G1/4	G1/4	G1/4	G1/4	G1/4	-	-	-	-	-	-
Standard material:																		
Nitrile, NBR		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Silicone, SI		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Urethane, U																		
Special material		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Lifting force in N

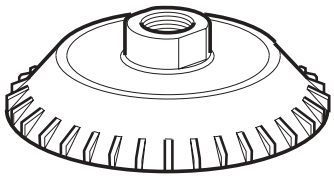
Lifting force = Pressure x Area / Safety factor
75% vacuum on a dry surface, safety factor = 2

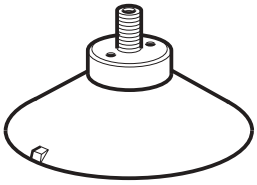
Please see page 20 for detailed information

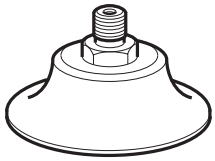


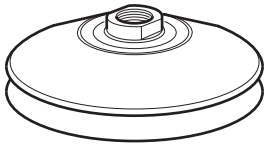
Refer to page	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21

Flat - Strong	Flat - Profiled	Flat - Anti-Slip	Bellows - Anti-Slip

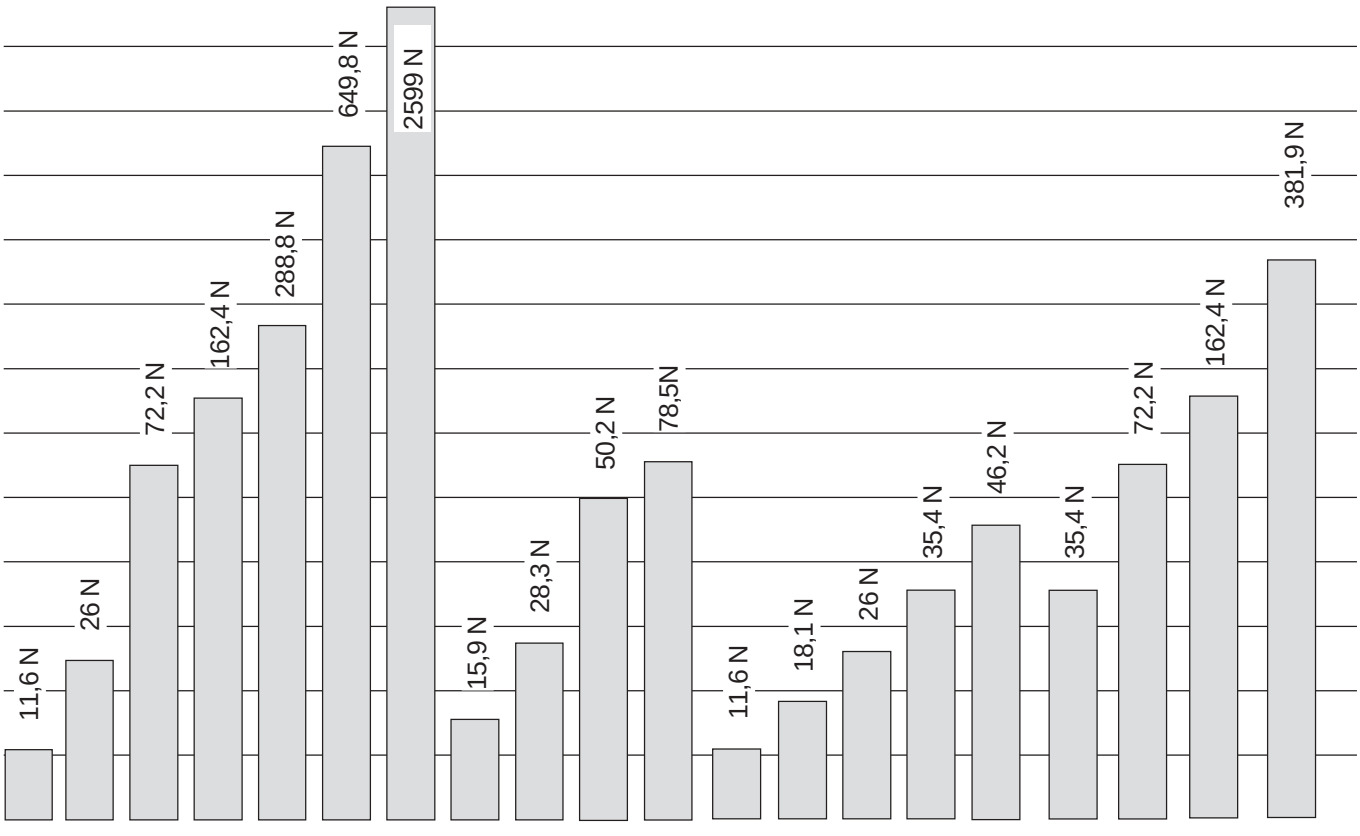




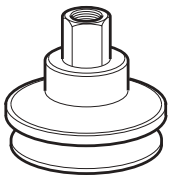




P5V-CFS							P5V-CFA				PFOG/PFOTM/ PFOTF					PBOG			
20	30	50	75	100	150	300	45	60	80	100	20	25	30	35	40	35	50	75	110
-	-	-	-	-	-	-	M10	M10	M10	M10	G1/8	G1/8	G1/8	G1/8	G1/8	-	-	-	-
M5	M5	G1/8	G1/4	G3/8	G1/2	G1/2	-	-	-	-	G1/8	G1/8	G1/8	G1/8	G1/8	G1/8	G1/8	G1/4	G3/8
-	-	-	-	-	-	-	G1/4	G1/4	G1/4	G1/4	-	G1/4	G1/4	G1/4	G1/4	-	-	-	-
-	-	-	-	-	-	G1	-	-	-	-	-	G1/4	G1/4	G1/4	G1/4	-	-	-	-
●	●	●	●	●	●	●					●	●	●	●	●	●	●	●	●
											●	●	●	●	●	●	●	●	●
							●	●	●	●									

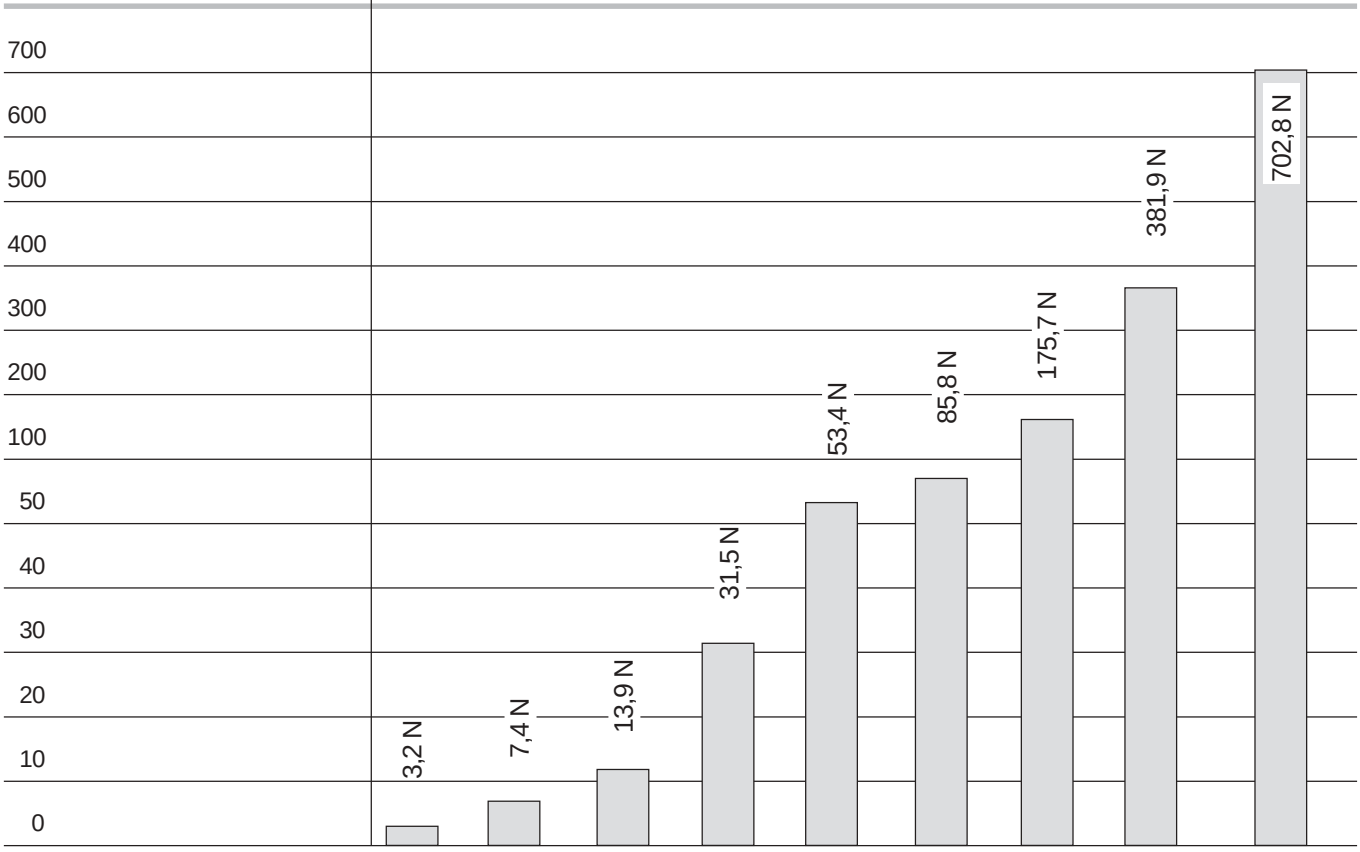


Bellows - Short



PBTM/PBTF

Diameter Ø mm		10	15	20	30	40	50	75	110	150
Port size, (Fitting)	Male	M5	M5	G1/8	G1/8	G1/8	G1/8	G1/4	-	-
	Female	-	-	G1/8	G1/8	G1/8	G1/8	-	G1/2	G1/2
	male	-	-	-	G1/4	G1/4	G1/4	-	-	-
	Female	-	-	-	G1/4	G1/4	G1/4	-	-	-
Standard material:										
Nitrile, NBR		●	●	●	●	●	●	●	●	●
Silicone, SI		●	●	●	●	●	●	●	●	●
Special material		●	●	●	●	●	●	●	●	●
Lifting force in N		Lifting force = Pressure x Area / Safety factor 75% vacuum on a dry surface, safety factor = 2						Please see page 20 for detailed information		



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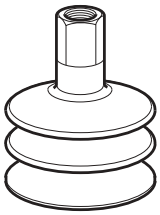
Bellows - Long

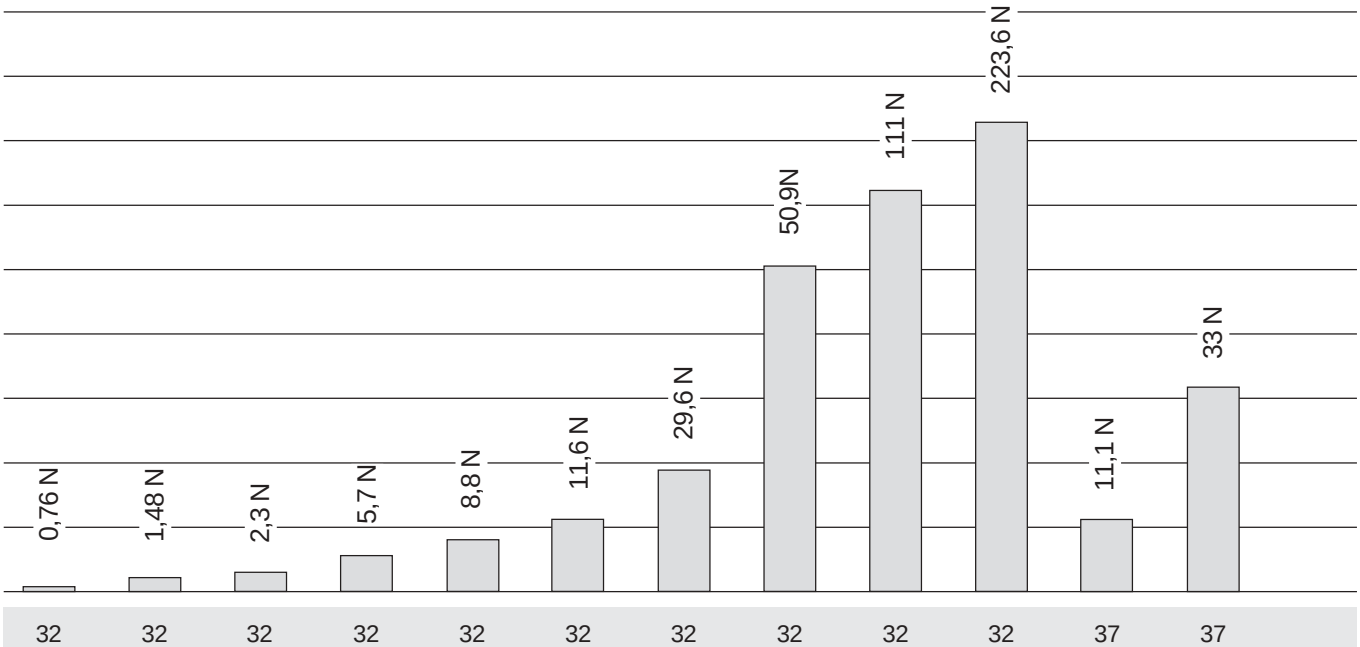
Oval - Space Saver



PCG/PCTM/PCTF

P5V-CVS

5	7	9	14	18	20	32	42	62	88	60x20	100x32
G1/8	G1/8	M5	M5	M5	M5	G1/8	G1/8	G1/8	G1/4	-	-
-	-	M6 (male)	M6 (male)	M6 (male)	M6 (male)	G1/8	G1/8	G1/8	-	G1/8	G1/4
-	-	G1/8	G1/8	G1/8	G1/8	G1/4	G1/4	G1/4	-	-	-
-	-	G1/8	G1/8	G1/8	G1/8	G1/4	G1/4	G1/4	-	-	-
●	●	●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●		



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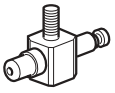
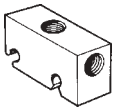
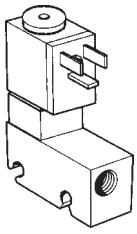
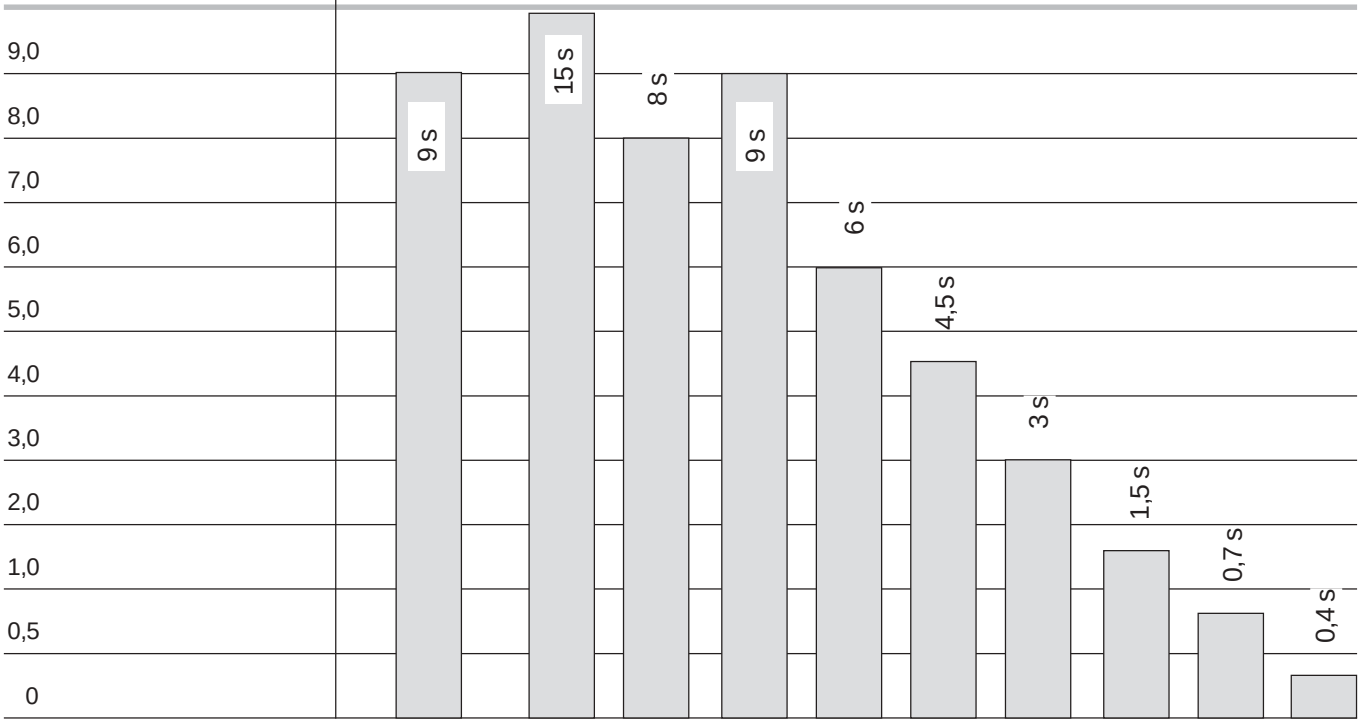
	Mini Single	Mini Compact	Compact - Profiled						
									
	P5V-GS	P5V-GC	P5V-GP						
Air consumption at 4 bar in Nl/min	20	12	20	20	30	40	60	120	240	420
Vacuum port size Male	G1/8	-	-	-	-	-	-	-	-	-
Vacuum port size Female	G1/8	G1/8	G1/4	G1/8	G1/4	G1/4	G1/4	G3/8	G1/2	G1/2
Vacuum port size Male	G1/4	-	-	-	-	-	-	-	-	-
Vacuum port size Female	-	-	-	-	-	-	G3/8	-	-	-
Air pressure supply, bar	4	4	4	4	4	4	4	4	4	4
Max vacuum level, %	90	80	80	90	90	90	90	90	90	90
Rapid release (R)				●	●	●	●	●	●	●
Solenoid					●		●			
Solenoid + R					●					
Holding valve										
Time to evacuate 1litre to 75% vacuum, s										



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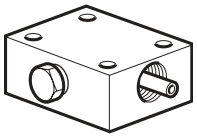
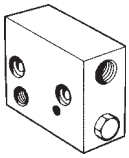
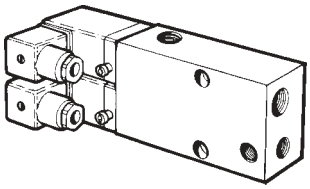
Compact - Solid	Compact - AirSaver	Multi-Function



P5V-GA

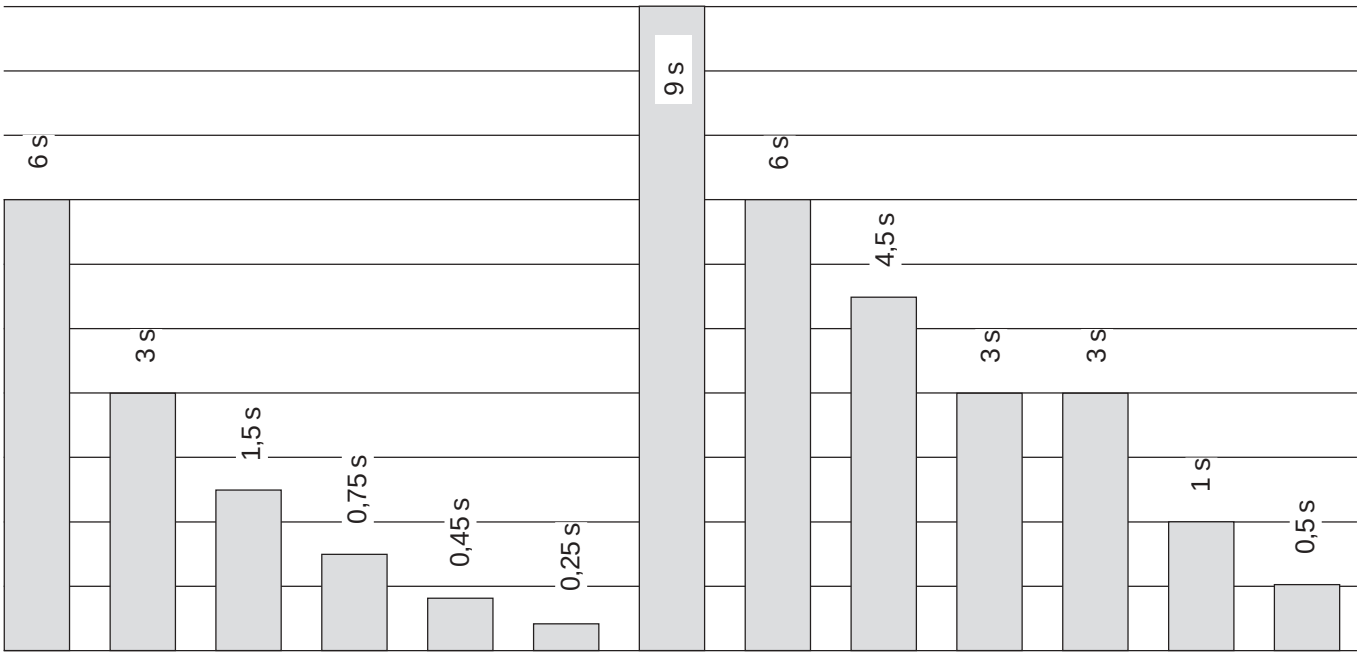


P5V-GW



P5V-GM

30	60	120	240	420	720	20	30	40	60	60	180	360
- G1/4 - -	- G1/2 - -	- G1/2 - -	- G1/2 - -	- G3/4 - -	- G1/2 - -	- G1/2 - -	- G1/2 - -	- G1/2 - -	- G1/2 - -	- G1/2 - -	- G1/2 - -	- G1/2 - -
4	4	4	4	4	4	4	4	4	4	4,2	4,8	5,5
92	92	92	92	92	92	90	90	90	90	90	90	90
●	●	●	●	●		●	●	●	●	●	●	●
										●	●	●
										●	●	●
	●	●	●	●		●	●	●	●	●	●	●



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Index of Vacuum Component Symbols

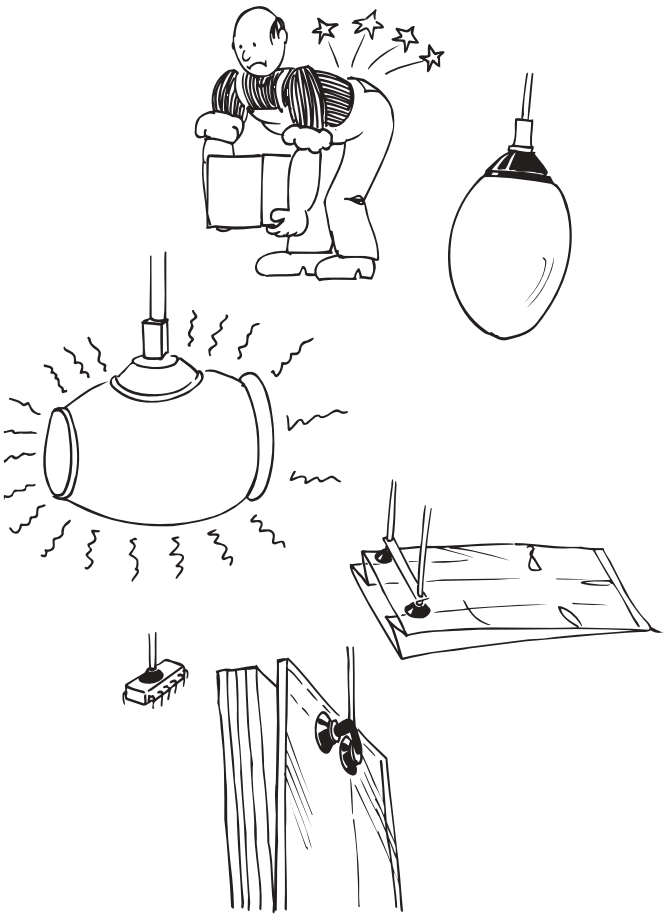
Symbol	Description
Suction cup icons	
	**Flat surface thin section**
	**Flat surface any section**
	**Soft porous material thin section**
	**Soft porous material any section**
	**Slightly bowed surface thin section**
	**Slightly bowed surface any section**
	**Bowed surface thin surface**
	**Bowed surface any surface**
	**Soft material**
	**Metal sheet handling**
	**Corrugated sheet handling**

Symbol	Description
Suction cup icons	
	**Differences in heights and levels**
	**Vertical lift**
	**Not for vertical lift**
	**Rough and/or abrasive surfaces**
	**Thin or narrow item handling**
	**Oil resistant**
	**Weather resistant i.e. uv, ozone, ...**
	**High lifting force**
	**Lifting force vertical**
	**Lifting force horizontal**

Vacuum applications

Probably the greatest number of vacuum applications is to be found in industry, where they are limited only by cost and imagination.

Typical applications are for holding items to be lifted or worked on: a number of such applications are shown below.



- *Heavy lifting - saves backs*
- *Careful lifting - saves eggs*
- *Hot lifts - using silicone suction cups*
- *Clean lifts - opening bags*
- *Small lifts - electronic components and other small items*
- *Perfect lifts - sheets of glass*

When designing vacuum systems, it is important to define the required system performance and features correctly and to select the correct basic concept for the installation.

Consider the following factors when deciding on the necessary system features and requirements:
- The effect of the operating environment on the components
- The effect of the components on their environment
- Necessary lifting forces
- Response times
- Permeability of the materials to be lifted
- How the materials are to be gripped
- Distance between components
- Costs

When selecting components for a vacuum installation, it is generally simplest to proceed in the following order:
- Selection of suction cups
- Selection of generators
- Selection of main control valves
- Selection of hoses
- Selection of valves and fittings
- Selection of lifting yokes, mounting devices etc. and ancillary components

Suction cups

Two main methods are used when holding parts:

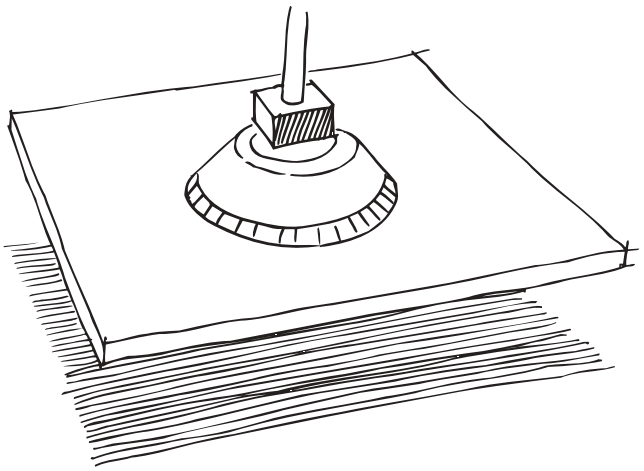
- a mechanical grip, e.g. with a mechanical wedge grip
- securing the part by means of vacuum in a vacuum cup

Advantages of mechanical gripping include simple determination of the necessary and available gripping force, and the fact that the area that is gripped in relatively small.
Drawbacks include the fact that the part being held can be damaged if the gripper is not correctly sized, if the dimensions of the part vary or if it is made of a fragile material. A further drawback of mechanical gripping devices is that they are often expensive to buy, install and maintain.

A major advantage of suction cups as gripping devices is that they do not damage the part. Other advantages that can be mentioned include low purchase price, low service requirements and quick attachment and release.

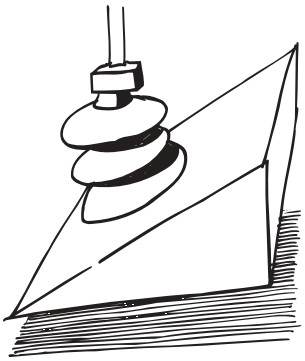
Disadvantages include the fact that, as it is the pressure of the surrounding atmosphere that provides the lifting force, we cannot hold the part with a greater force than that provided by the atmosphere, which means that larger gripping areas are required when using suction cups than when using mechanical gripping devices. In addition, operating costs are often higher than those of mechanical gripping devices, as suction cups in industrial applications are generally powered by vacuum generators. However, this cost can be reduced by using generators with automatic air conservation features.

Suction cups can be constructed in many variants, depending on their applications. However, as far as their general design is concerned, they can be divided into three main types.



Standard suction cup. The commonest type, for use with flat or slightly curved surfaces.

Standard suction cups can be produced in a wide range of types, depending on their potential applications. Examples of the parameters that can be varied include size, materials, double sealing lips, friction grooves, reinforcing springs etc.

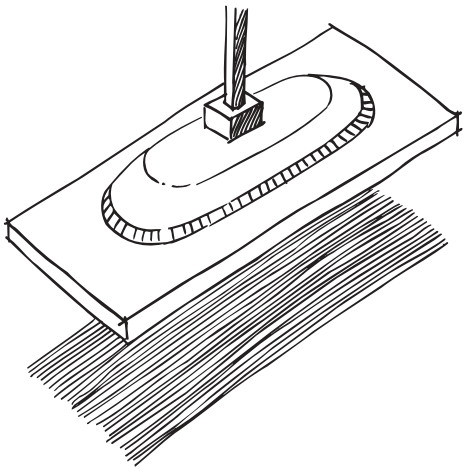


Bellows suction cup. This type of suction cup is intended primarily for applications requiring adjustment to different heights/ levels.

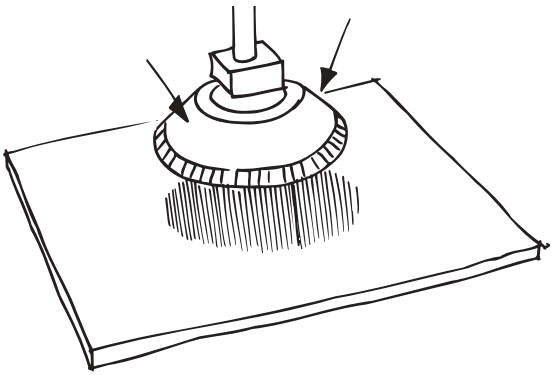
Several bellows suction cups can be fitted to a lifting yoke for handling items with a number of planes and varying shapes, e.g. corrugated sheet. Bellows suction cups also provide a certain degree of flexibility in lifting, which can be utilised to separate thin parts. Bellows cups are produced either as single or double bellows.

Bellows suction cups can also be used in applications where there is a risk of compressing the part to be lifted, as the cup can be positioned so that it does not press against the base and yet can sto lift the part. This can also be done with standard suction cups, but tolerances in positioning them are much tighter.

The design of the bellows suction cup means that it is not suitable for applications involving lifting vertical surfaces.

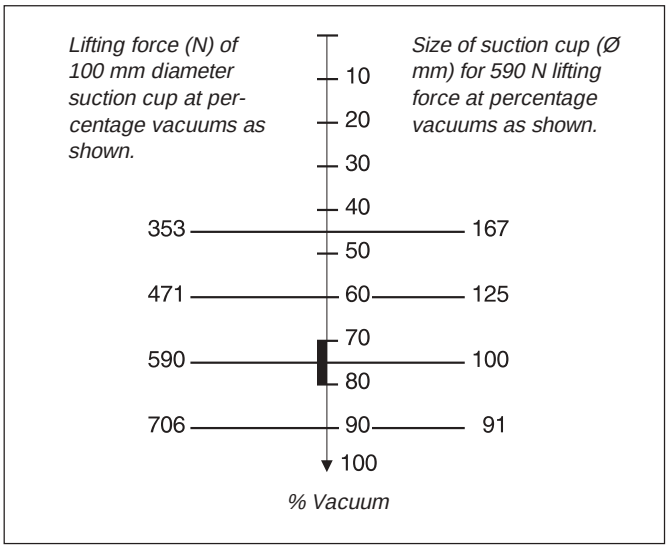


A suction box. This type of suction cup can be oval, square or rectangular, depending on the shape of the part to be lifted.



It is air pressure that presses the suction cup against the surface.

As mentioned previously, it is the air pressure that presses the suction cup against the material. This means that, in order to keep the suction area as small as possible, it is important to use as high a vacuum as possible.

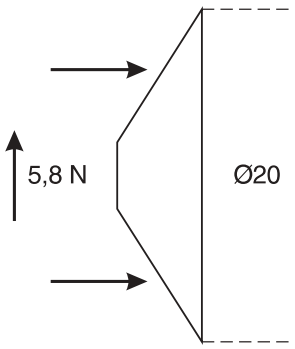


This diagram illustrates why as high a vacuum as 75 % should be employed.

A high vacuum has the following advantages:

– High lifting force for a given area
– Reduced diameter for the same lifting force

The choice of vacuum level can then be determined by consideration of the material of the part and its air permeability.



In the case of vertical load surfaces, it is only the friction force that can be regarded as holding the item.

In tables of holding forces exerted by suction cups, it can be seen that holding forces when lifting vertical surfaces are very much lower than those quoted when lifting horizontal surfaces. As an example, a 20 mm diameter suction cup has a holding force of 11.6 N when lifting a horizontal surface, but only 5.8 N when lifting a vertical surface. The reason for this is of course that the holding force when lifting a vertical surface is converted to a frictional force, and it is only the frictional force that can be employed for lifting the material. For the same reason, a suction cup having internal friction grooves is best suited for applications lifting vertical surfaces.

The values of vertical surface lifts are calculated for dry steel sheet. As a result, the actual holding force for lifting vertical surfaces will vary, depending on the surface friction of the materials to be gripped.

See the section on suction cups for further details.

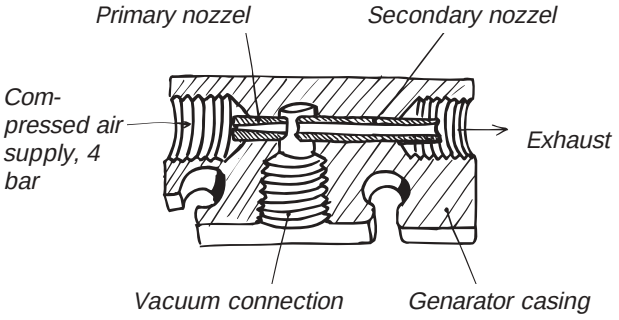
Diameter in mm	Area in cm^2	Lifting force Horizontal in N	Lifting force Vertikal in N	Volume in cm^3
5,0	0,20	0,7	0,4	0,005
10,0	0,79	2,9	1,4	0,07
15,0	1,77	6,5	3,3	0,2
20,0	3,14	11,6	5,8	0,5
25,0	4,91	18,1	9,0	1,1
30,0	7,07	26,0	13,0	1,1
35,0	7,07	35,4	17,7	2,3
40,0	12,56	46,2	23,1	3,0
50,0	19,63	72,2	36,1	7,3
60,0	28,26	104,0	52,0	12,7
80,0	50,24	184,8	92,4	27,3
95,0	70,85	260,6	130,3	39,3
120,0	113,04	415,6	207,9	77,3
150,0	176,63	649,8	324,9	197,0
200,0	314,00	1155,1	577,6	387,0

Capacity table for lifting horizontal and vertical surface with flat suction cups, and 75 % vacuum and safety factor of 2. Values shown in the table are calculated values, determined from the following formula:
Lifting force = (pressure x area x coefficient of friction)/safety factor at 75 % vacuum on a dry surface layer. Safety factor = 2 and coefficient of friction = 0.5.

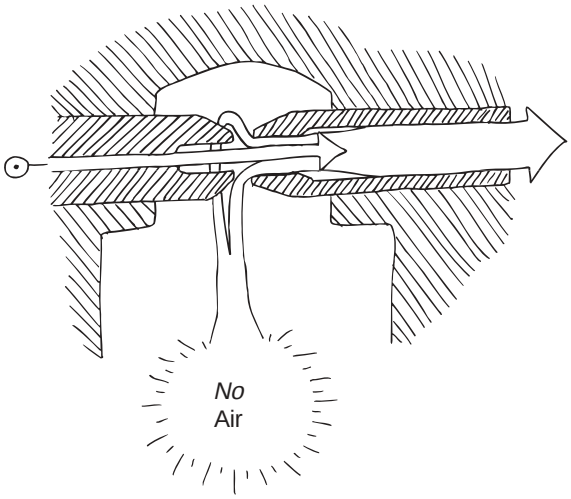
Vacuum generators

There are several ways of producing a vacuum: comparison of three different types are shown in the table below. However, in this brochure, we shall restrict ourselves to consideration only of generators.

Generator pumps operate on the venturi principle, and are powered by compressed gas, usually compressed air.



Generator pump, 0 - 90 % vacuum.



The venturi principle.

The venturi principle involves connecting a compressed air supply to the generator, in which it expands through one or more nozzles. Expansion converts the stored energy in the air, in the form of air pressure, to kinetic energy, in the form of movement of the air. The velocity of the jet increases, and pressure and temperature drop, creating a negative pressure on the suction side.

The advantages of generator pumps include compact dimensions, no moving parts, low maintenance costs and rapid response.

Drawbacks generally include their low flow capacity (e.g. in comparison with that of fans), relatively high compressed air consumption and high noise level of the discharged air.

Generator pumps can be designed either as high-vacuum or as low-vacuum generators.

– High-vacuum generators can produce a high vacuum, but at low suction flow rates.
– Low-vacuum generators produce a low vacuum, but at high suction flow rates.

Glass, metal sheets etc. do not allow air to pass through them, and so high-vacuum generators are recommended for such handling applications.

Low-vacuum generators are recommended for applications dealing with materials such as paper etc., having high air permeabilities.

Generator	Fan	Positive displacement pump
+ Very low purchase price. Rapid response to high vacuum level. Low weight and modest dimensions make it easy to install wherever required. Mounting an generator on, or close to suction cups reduces the air volume to be evacuated, resulting in relatively low energy consumption.	+ Low purchase price Can evacuate large quantities of air (important when working with materials with high air permeability).	+ Low running costs. Low noise level.
– High exhaust noise. Relatively high running costs if used for continuous operation.	– High noise level. Low vacuum level.	– High purchase price. High service costs. Central installations mean that high system volumes must be evacuated, with the result that hoses, suction cups and valves etc. all affect performance of the system.

Comparisons of generators, fans and positive displacement pumps

Selection of Generators

Theoretically, even the smallest generator could evacuate the air from an entirely airtight container down to 90 % vacuum. The reason for using larger generators is the time taken, because although the small generator can eventually raise the same vacuum as a large one, it will take longer.

When selecting an generator, add the total volume of the suction cup(s) to obtain the volume to be evacuated by the generator. The generator can then be selected on the basis of the time taken to raise the necessary vacuum and on safety aspects resulting from leakage.

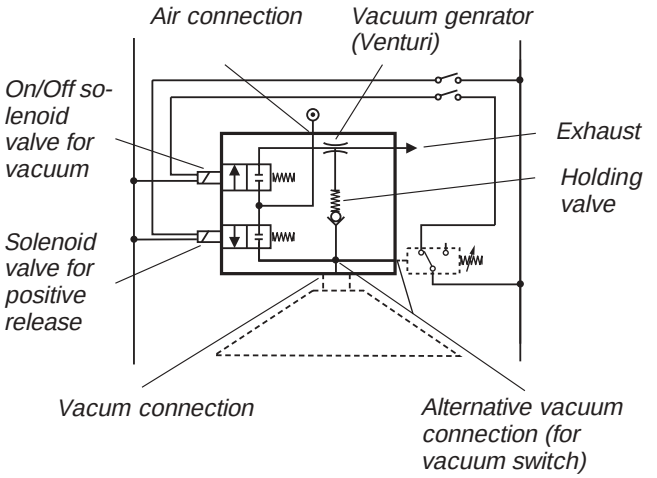
Generators	Air consumption at 4 bar pressure in Nl/min	Time to evacate 1 litres volume to 75% vacuum in s	Vacuum flow in Nl/min
P5V-GSN02A1	18	9	14
P5V-GPN0312	30	6	32
P5V-GPN0412	42	4,5	37
P5V-GMB06142CP	60	3	88
P5V-GAR1214	120	1,5	121
P5V-GMB18142CP	180	1	161
P5V-GAR2414	240	0,7	284
P5V-GMB36142CP	360	0,5	285
P5V-GPN4214	420	0,4	286
P5V-GAN7214	720	0,25	483

Generator evacuation times vacuum flows.

There is also a certain air volume in the hoses and valves etc. Generally, this volume is negligible, as the generator capacity should be chosen to provide a certain margin of safety, as leakage can never entirely be avoided.

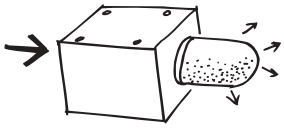
Note also that the smaller the safety margin, the greater the care that must be taken to avoid leakage, and the more frequently the system should be inspected in order to detect possible leaks in connections and in the suction cups. The suction cups are subject to wear and tear, and must be replaced at regular intervals.

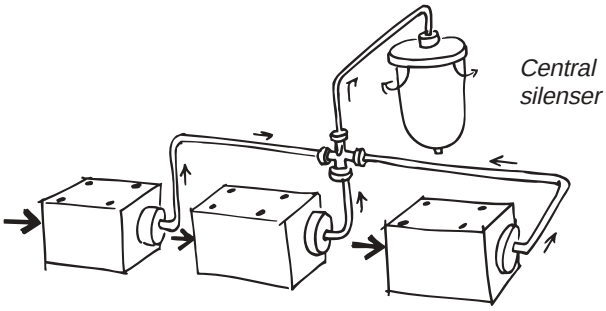
Generators consume relatively large quantities of air if operated continuously, which can become expensive if employed for such applications as long-duration holding of items.



Schematic diagram of an Autovac system for compressed air conservation.

In order to save compressed air, components have therefore been developed in recent years that consume compressed air only when building up the vacuum or when it drops below a preset level. This allows air consumption to be reduced to about 1% of what an ordinary generator would consume in continuous operation. Compressed air consumption is affected by general airtightness of the system and the permeability of the material to be lifted.

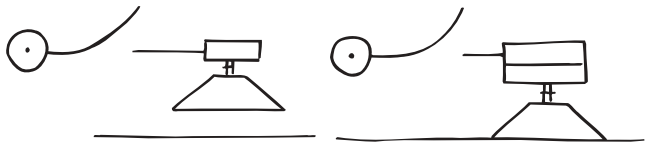




Silencing generator exhausts.

The venturi principle of establishing a vacuum requires a high air velocity through the generator. Traditionally, the high noise level of generator exhausts is usually dealt with by fitting silencers, which involves a back pressure for the generator which reduces the air velocity and therefore also reduces the power of the generator. This applies particularly if any dirt is carried over in the air, either from the vacuum cup or in the compressed air, which will gradually block the silencer.

In order to counter this, a hole is drilled in the end of sintered plastic silencers, which means that such silencers are effectively merely a pipe with porous walls, in which no significant back pressure can be built up and which cannot be blocked by dirt.



Operating principle of the VSA holding valve.

The vacuum in a suction cup is maintained by a continuous air flow through the generator. If this flow should be interrupted, e.g. by rupture of the compressed air hose, the generator immediately ceases to be able to maintain the vacuum. Air enters the system and the load is released.

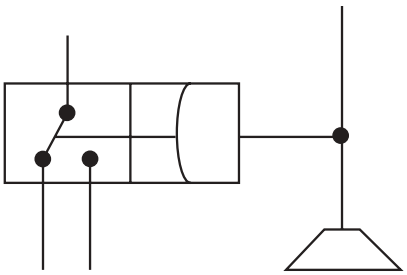
In order to prevent the suction cup from being filled with air in the event of loss of the compressed air supply to the generator, a holding valve is fitted between the generator and the suction cup. This valve operates in the same way as a check valve, i.e. when the generator is not evacuating air, the surrounding atmospheric pressure presses the ball against its seat and prevents atmospheric air from entering the vacuum system.

Although the holding valve may be closed, this does not mean that the vacuum will be maintained indefinitely in the system. Air will find its way in through worn parts of the vacuum cup, leakage through valves and fittings, surface unevenness of the load or permeability of the material. The rubber seal around the edge of the vacuum cup becomes damaged and worn with time. For sensitive applications, it is therefore important to replace the suction cups at regular intervals in order to prevent the load from being dropped in the event of failure of the compressed air supply.

As mentioned above, the quality of the valves and fittings is important, particularly in applications where holding valves are used. When using a holding valve in situations in which there is a risk of damage in the event of loss of the compressed air supply, care should be taken in selecting the suction cup, as cups are available for use on uneven materials.

Holding valves are generally used in applications in which the air permeability through the material is negligible: glass, sheet metal, plastics etc. Holding valves are also fitted with positive release valves, to which a compressed air supply is connected for providing pressure to drop the part.

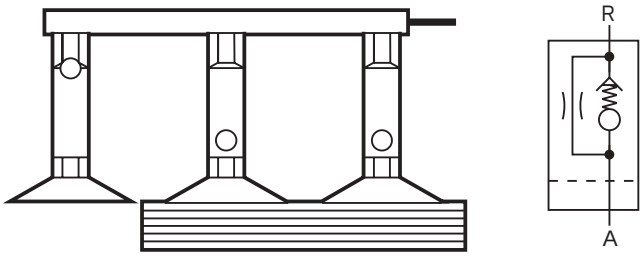
Vacuum switch



Principle of operation of a vacuum switch.

If an attempt is made to lift the load before the generator has established the necessary vacuum, it may be dropped. A vacuum switch is therefore used to check that the correct vacuum has been achieved. It is connected to the suction cup, so that it senses the pressure in the suction cup. The surrounding atmospheric air pressure presses against a membrane in the switch, opening or closing an electric contact when the necessary vacuum is reached, thus providing an appropriate signal to the control system.

Vacuum switches may either have a fixed vacuum setting - usually 75 % vacuum - or a variable setting.

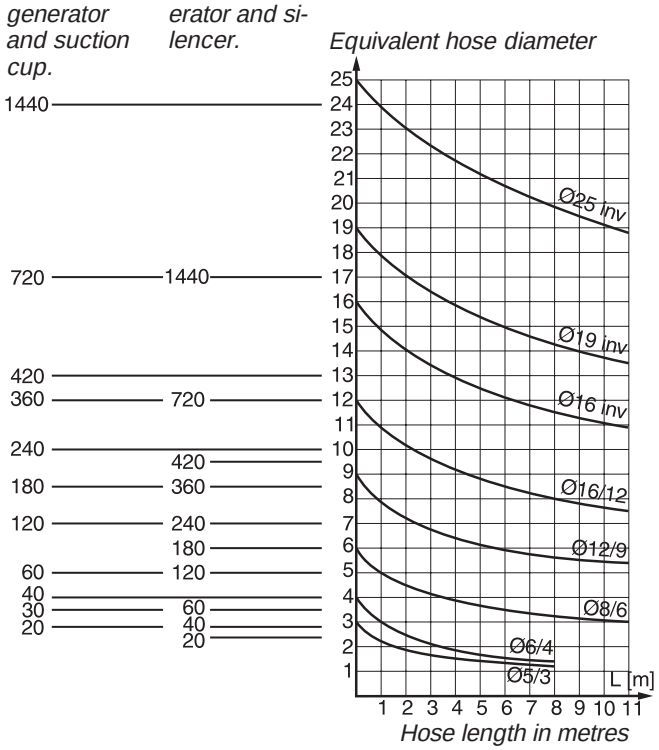


Principle of operation of a flow valve.

A flow valve operates by permitting a slight air flow through it when attaching the suction cups to the load. If the load should drop, so that a high air flow passes through the valve, the ball lifts off its seat and closes the valve.

An example of use of a flow valve is in applications in which a central vacuum pump is connected to several suction cups, and where there is a risk of one or more of the cups dropping the load. If this occurred, and the system did not incorporate flow valves, all the cups would then lose their grip, as the vacuum power unit would be incapable of maintaining the necessary vacuum with such a high inward air leakage.

Choice of hoses



Hose dimensioning between generator and suction cup, and between generator and silencer.

The capacity of the entire vacuum installation depends on ensuring that all the hoses used are correctly dimensioned. If the hose which connects the power valve to the generator is underdimensioned, the generator will not receive enough compressed air, and will have difficulty breathing. The consequence will be that the capacity of the installation will fall, even if all the other components are correctly dimensioned. The table shows that the length of the hoses is decisive for the amount of air which reaches the components. The longer the hose is, the greater is the diameter required.

It should be noted that all bends and angles reduce air flow and should therefore be avoided as far as possible. If possible, select hoses which are a further dimension larger.

The hose which connects the generator to the suction cup should be dimensioned in accordance with the table above. If this hose is underdimensioned, the flow of air evacuated from the suction cup is restricted and it takes longer time to achieve the vacuum in the suction cup than calculated, even if the generator is correctly dimensioned. In some cases, the generator is mounted directly on the suction cup, and this does not then have to be considered.

The hose which connects the generator with the silencer, if a centrally located silencer is fitted, should be dimensioned in accordance with the table on the previous page. The venturi generator operates on the principle of high air speed through the generator, and everything which brakes this air flow also adversely affects the capacity of the generator. For this reason, the hoses from the generator to the silencer are of large diam-

eter. On this hose as well, every elbow and bend has a braking effect on the air flow and should be avoided as far as possible. The silencer is frequently located directly adjacent to the generator, and dimensioning does not have to be considered in such cases.

The table below shows some of the most common hose dimensions and their volume capacity at various lengths.

Diameter in mm		Area in mm²	Air volume in cm³ Hose length			
External	Internal	Internal	1 m	5 m	10 m	100 m
4	2,70	5,7	5,7	28,5	57	570
5	3,15	7,8	7,8	39	78	780
6	4	12,6	12,6	63	126	1260
8	6	28,3	28,3	142	283	2830
12	9	63,6	63,6	318	636	6360
16	12	113	113	565	1130	11300
22	16	201	201	1005	2010	20100

Volume of air in various hose dimensions.

The volume of air in the suction cup and the volume of air in any hoses should be added to find the total volume of air which has to be evacuated by the generator.

It is important to note, when selecting hoses, that hoses maintain the tolerances and quality requirements relevant to the environment in which the hoses will be used.

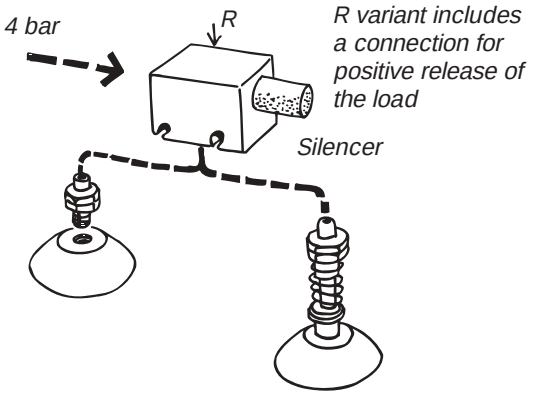
Choice of fittings

When fittings are selected, the most important single criterion is minimising leakage. Cap nuts used to be specified for fittings. Recent product development has permitted quick-release couplings to also be used for vacuum installations, however. When quick-release couplings are used, the tolerances of the hoses used become even more important, so we recommend that users should contact their suppliers for advice on optimising component selection when quick-release couplings are used.

Method of mounting

Each vacuum application requires its particular combination of vacuum components. We describe below those most commonly employed.

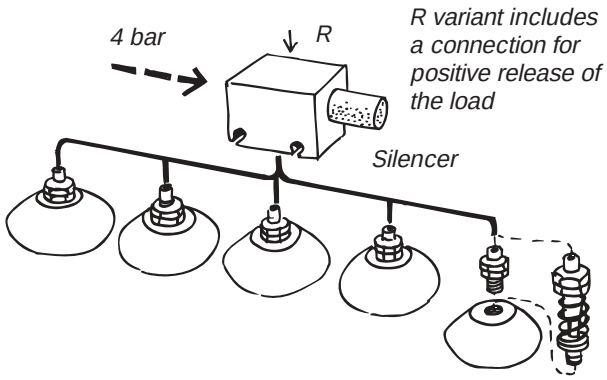
Local mounting



Local mounting: Type P5V-GSN, -GCN, -GP, -GA standard generators.

This combination of vacuum components is the basic combination for applications in which an generator is the vacuum source.

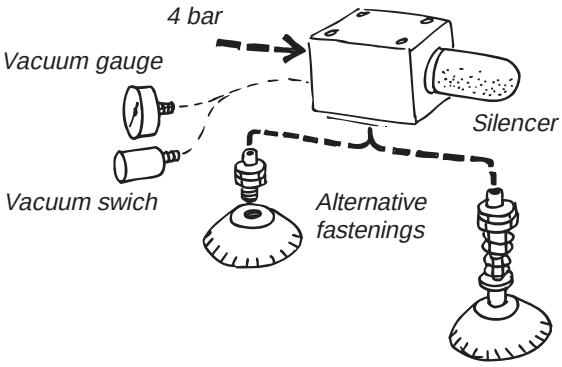
Central installation



Central installation: Type P5V-GSN, -GCN, -GP, -GA standard generators.

This combination is suitable where the shape of the load is such that several suction cups are required, and where there is little or no risk of any of the vacuum cups losing its grip or where there is no risk of damage.

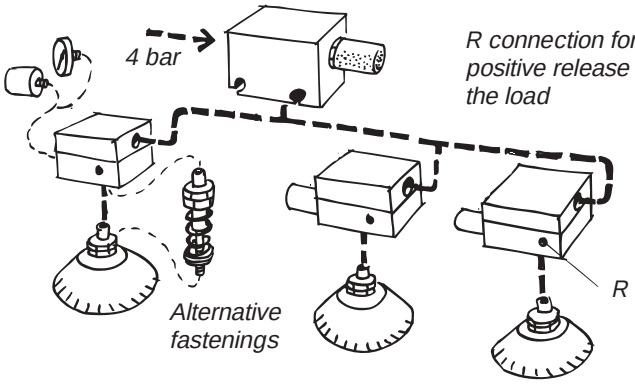
Direct mounting, one generator type P5V-GW AirSaver on each suction cup



Direct mounting, one generator type P5V-GW AirSaver with integral holding valve for enhanced safety.

Use this combination where there is a risk of dropping the load or risk of injury.

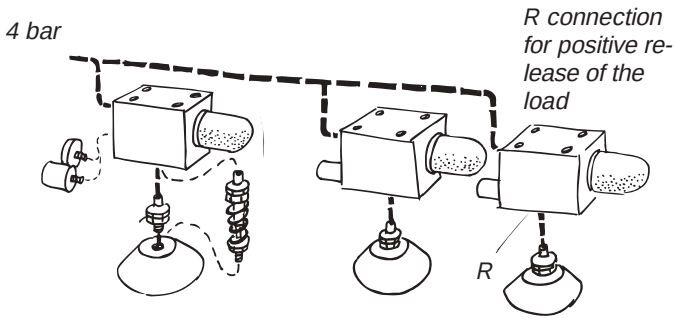
Central installation with a holding valve for each suction cup



Central installation with a holding valve VSA60 for each suction cup.

Use this combination of vacuum components when several suction cups are powered from one generator, and where there is a risk of injury or damage if the load should be dropped.

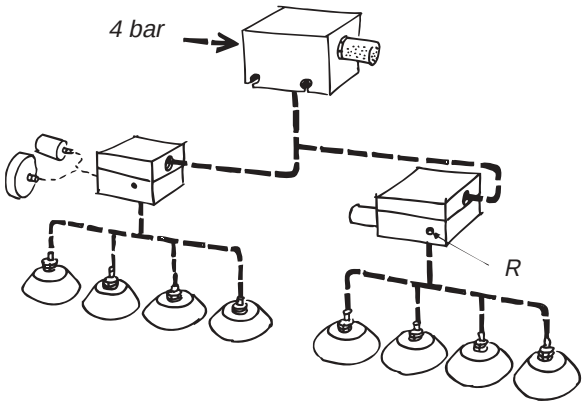
Generators type P5V-GW AirSaver with integral holding valve



Alternative arrangement to central installation, employing local generators type P5V-GW AirSaver with integral holding valves.

Use this combination in the same way as the previous example, i.e. where there is a risk of injury or damage if the load is dropped. However, this arrangement further increases safety by providing an generator for each suction cup.

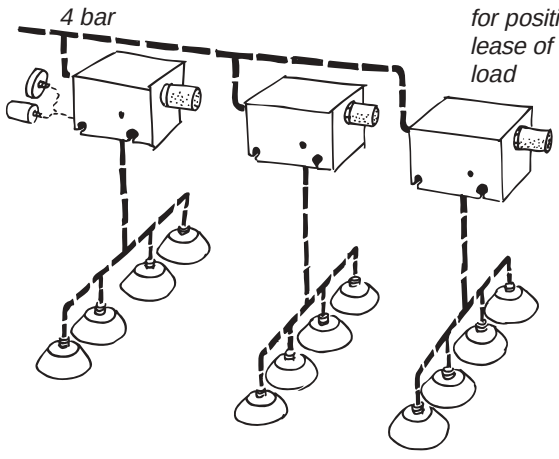
Simplified safety with holding valves



Simplified safety with holding valves VSA60.

Use this combination when there is only a limited risk of damage.

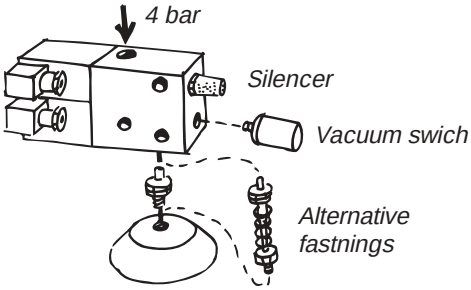
Simplified safety with multiple generators type P5V-GW AirSaver



Simplified safety with multiple generators type P5V-GW AirSaver.

In the same way as described in the previous example, this arrangement is intended for use where there is only a limited risk of damage in the event of loss of the compressed air supply or if one or more suction cup(s) loses its/their grip. However, safety is improved with this arrangement, as vacuum is maintained in the other groups of suction cups.

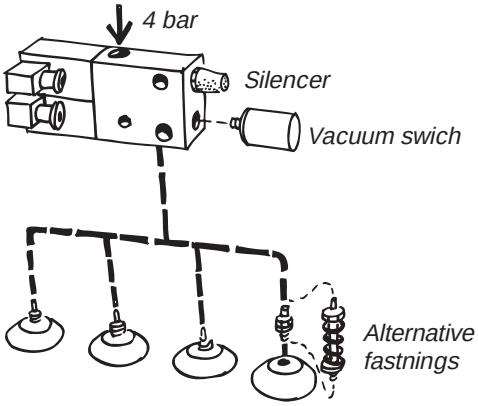
Conservation of compressed air



Multi Function system for compressed air conservation.

Use this combination of components where the load is to be supported for long periods of time, which would result in high compressed air consumption if a conventional generator arrangement was used.

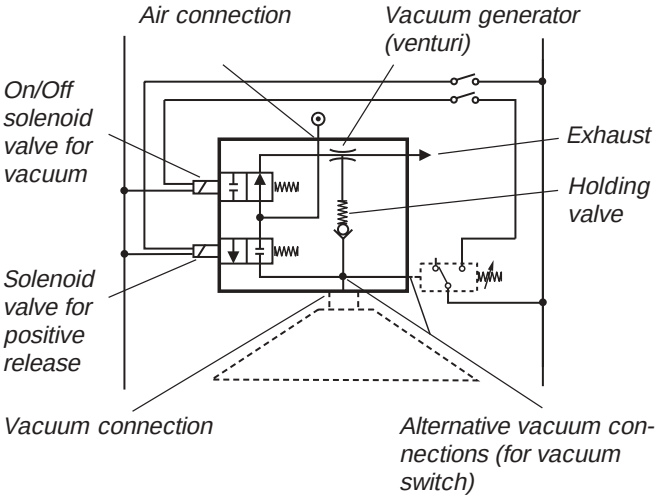
Conservation of compressed air with a central vacuum system



Multi Function system for compressed air conservation with a central generator.

Use this combination of components where several suction cups are required in order to hold the part, and where there is only slight risk of damage in the event of failure of the air supply or if one or more of the suction cups loses its grip.

Safety in the event of loss of power supply and conservation of compressed air

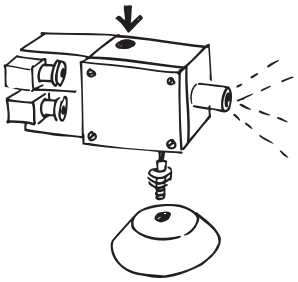


Schematic diagram of Multi Function unit, incorporating safety features against loss of power supply.

Use this arrangement where the requirements are the same as in the two previous examples, but where there is also a risk of loss of power supply.

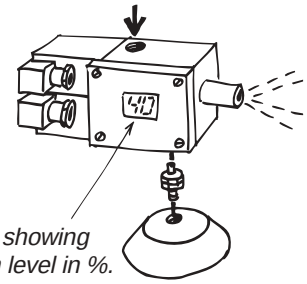
Alarm if vacuum falls below safe level

P5V-GMC
P5V-GMG



24 V DC
Alarm signal to other systems if vacuum drops below 40%.

P5V-GMD



24 V DC
Alarm signal to other systems if vacuum drops below 40%.

Display showing vacuum level in %.

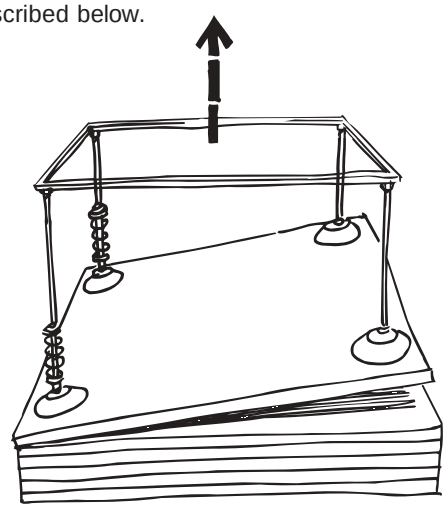
Multi Function advaced.

Use this combination of components when an alarm signal to the control system is required, to indicate that the vacuum level has fallen below some predetermined safety level; often about 40 % vacuum.

This system interrupts the compressed air supply when a vacuum of 75 % has been attained, turning it on again when the vacuum has fallen to 60 %. Both these settings can be adjusted. In addition, a further (adjustable) setting is provided, e.g. 40 % vacuum, at which an alarm will be generated, indicating that there is a risk of the part being dropped.

Separating horizontal materials with sprung suction cup mounts

Theoretically, a force of 10 tonnes would be required to separate two 1 m2 sheets of material if there was no air between them. The various ways of solving this problem differ, depending on the particular applications, but the commonest means are described below.

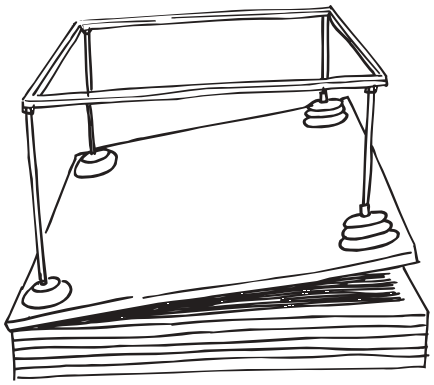


Separating horizontal sheet materials, e.g. glass or other smooth materials, using sprung suction cups.

When sheet metal, glass or other impermeable materials are to be lifted, e.g. from a palett, the suction cups are often lowered on to the upper surface by a powered mechanism. This means that the cups are pressed down onto the material, thus also pressing out any air between the sheets.

Use this arrangement when the sheets to be lifted can flex slightly.

Separating horizontal sheet materials using bellows suction cups



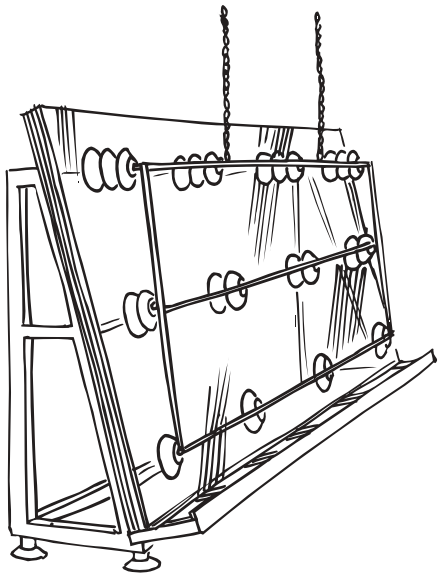
Separating horizontal sheet materials, e.g. glass or other smooth materials, using bellows suction cups.

In the same way as for the previous example, this arrangement is used when there is a risk of lifting several sheets at a time.

The difference between them is that this arrangement is more reliable, but has the disadvantage that the bellows suction cups have a tendency to greater wear in this application, thus increasing their service requirements.

Separating standing sheets using bellows suction cups

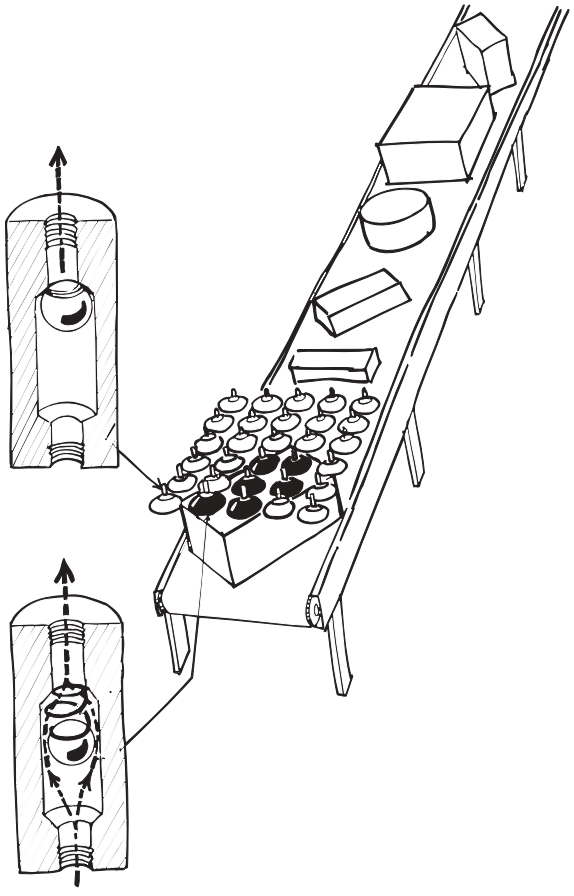
Use this arrangement, involving the use of standard suction cups, low bellows cups and high bellows cups, when lifting materials that are stacked vertically.



Separating standard sheets of metal, glass or similar materials using bellows suction cups.

Application of flow valves

When lifting parts that are of varying shapes and/or sizes, some of the suction cups may be outside the edges of the part, with the result that they either cause the other suction cups to lose their grip, if used with a central generator, or that an unnecessarily large amount of compressed air is used if there is one generator for each suction cup. This can be prevented by the use of flow valves fitted to each suction cup, closing off the flow between the generator and the suction cup if it becomes excessive. In other words, these flow valves can be used in applications where differently sized objects must be picked up, and where it is not possible to sense and mechanically or electrically interrupt the flow to the suction cups. As operation of these flow valves depends on air flow through them, they cannot be used in conjunction with an Multi Function, AirSaver unit.or holding valve VSA 60.



Application of flow valves when lifting parts of varying shapes and sizes.

Factors to consider in the choice of vacuum products

- The weight of the objects to be moved
- Direction of movement
- Material and surface structure of the object
- Shape of the object
- Available air pressure and flow
- Environmental considerations
- Working speed

Useful calculations

Size and number of suction cups to be selected.

Theoretical holding force = vacuum pressure x suction cup area.

Use safety factor **S** to compensate for unevenness and porosity in the surface and to ensure that sufficient holding force is always available. More than one suction cup may be necessary, depending on the force required and/or size of the object to be held.

The area of each suction cup can be derived from the formula:

$$A = \frac{F \times S \times 10^4}{P \times n} \quad mm^2$$

Circular suction cups are generally dimensioned in accordance with their diameter.

$$D = 113 \times \sqrt{(F \times S)/(P \times n)} \quad mm$$

Where F = Force [N]
A = Area of suction cup [mm^2]
D = Diameter of suction cup [mm]
P = Vacuum pressure [mbar]
n = Number of suction cups
S = Safety factor
(normally 4 for vertical lifting devices and 3 for horizonal ones)

The theoretical maximum vacuum pressure at sea level is 1013 mbar. Due to inefficiency in the vacuum generator, 75% of this value is said to be a practical and reliable value, i.e. 750 mbar.

If we specify the vacuum pressure as 750 mbar, the formula above can be specified as follows:

$$D = 4{,}12 \times \sqrt{F \times S/n} \quad mm$$

If we also want to specify the weight of the load in kg, right in the formula, this can be written as:

$$D = 13 \times \sqrt{W \times S/n} \quad mm$$

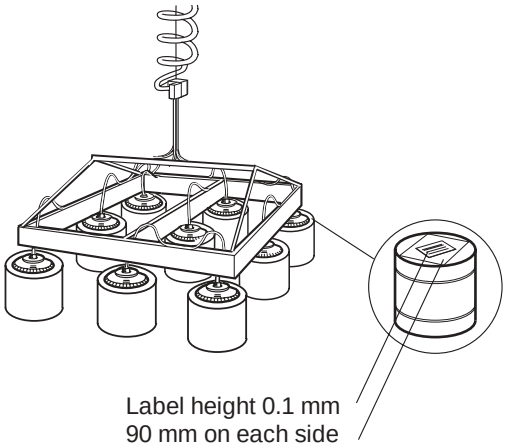
Where W= Weight of load [kg]

Example: To lift a container weighing 25 kg with one single suction cup, 75% vacuum and safety factor 2, the suction cup must have a diameter of at least

$$D = 13 \times \sqrt{25 \times 2/1} = 92 \text{ mm}$$

Real-life example

Lifting device to lift 9 paint tins of 5 kg each.



Total weight = 9 x 5 = 45 kg = 450 N
The label on the lid, of height 0.1 mm, causes a certain amount of leakage.

The available lifting area of 90 mm permits the use of a suction cup of 80 mm diameter.

This gives a lifting force of 185 N at 75% vacuum (please refer to the tables on pages 22-23). This gives a total for the entire lifting frame of 1665 N, which exceeds 450 N by a good margin, but is needed for safety during any acceleration/deceleration in the vertical direction.

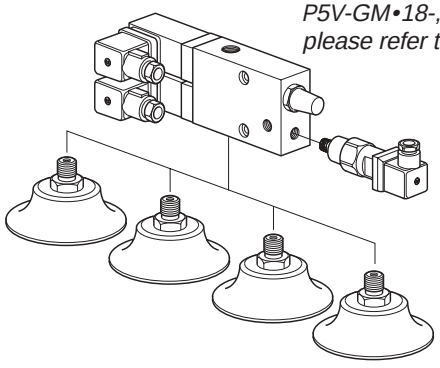
The total volume of the suction cups is 9 x 27.3 cm^3 = 245.7 cm^3, or app. 0.25 l.

Assumed volume in hoses/fittings when 12/9 hose is used:
Hose 4 m x 64 cm^3 = 256 cm^3, or app. 0.26 l.
Other volume = 0.49 l.
Total volume = 0.25 + 0.26 + 0.49 l = 1.0 l.

The P5V-GM.18 Multi-function generator with integrated vacuum latching and blow-off valve evacuates 1 l to 75% vacuum in 1 sec, and has an air consumption in continual operation of 3 l/s. This generator should be supplemented by a type P5V-SV vacuum switch to reduce air consumption.

Evacuation time for the system with a volume of 1 l becomes 1l / 1l/s = 1 sec.

Air consumption during application is 3 l/s x 1 s = 3 l.
If we assume a sequence time of 30 sec, and leakage of 2-5%, caused by the label, we get the following air consumption:
(30 s - 1 s) x 3 l/s x 5% = 4.35 l
Total air consumption = 3 x 4.25 = 7.35 l



P5V-GM•18-, (1 pc) please refer to pages 47-49.

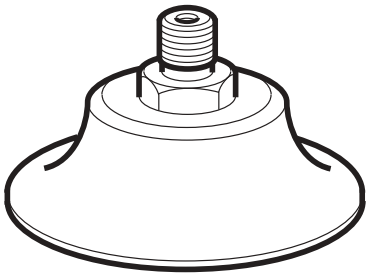
P5V-SVVA16K, 1 pc) please refer to page 52.

pftm-80-g2-nbr, (9 pcs) Complete with G1/4 male union please refer to pages 21-23.

Multi-function generator P5V-GM with vacuum monitor P5V-SV

The simplest type of flat suction cups, without internal ribs, and available over the diameter range Ø5 - Ø50 mm. These cups are intended for lifting surfaces that are flat or only slightly bowed: they are less suitable for use with porous or soft materials.

Flat suction cups with internal ribs, Ø60 - Ø200 mm diameter, are suitable for lifting flat or slightly bowed materials such as cardboard, sheets of wood, metal and other soft porous materials. The ribs prevent the load from being sucked into the cup. The suction cup itself has good rigidity and deforms only slightly under vacuum. It is also suitable for use when lifting vertical materials, as the stiffening ribs provide addition friction.



For dimensions see page 62

Specification

Suction cup	Nitrile, NBR	Silicone, SI
Working temperature [°C]	-20 to +120	-60 to +250
Colour	Black	White
Hardness , Shore-A [°Sh]	55 ±5	55 ±5

Options and additional information

Material on request

Suction cup	Chloroprene	Fluorocarbon	Urethane	Nitrile, anti-static	Silicone, anti-static
				For Ø2-Ø50	For Ø2-Ø50
Working temperature [°C]	-30 to +140	-10 to +230	-30 to +120	-30 to +120	-60 to +250
Colour	Green	Black with white dots	Blue	Blue with black dots	Black with red dots
Hardness , Shore-A [°Sh]	55 ±5	70 ±5	55 ±5	70 ±5	55 ±5
Electrial resistance [Ωm]				800 to 1000	5 to 15

Selection guide (Refer to symbol index on page 10)

Flat - Simple PFG/PFTM/PFTF

Ø2 to Ø50 mm

Flat - Ribbed PFG/PFTM/PFTF

Ø60 to Ø200

Order key

P F T F - 1 5 - NBR - G1

	Type
G	pad only
TM	male fitting
TF	female fitting

Ø		
2A	025	080
3.5A	030	095
5A	035	120
10A	040	150
15A	050	200
20B	060	

	Material
NBR	Nitrile, NBR
SI	Silicone, SI

Port size	
M5	M5
G1	G1/8"
G2	G1/4"
G4	G1/2"

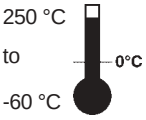
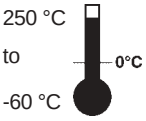
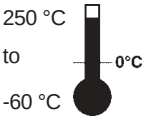
Possible combinations and order codes see main data sheets.

Main data for flat suction cups, Nitrile, NBR

Symbol	Ø mm	Port size	Area cm^2	Volume cm^3	Lifting force (N)		Spring movement mm	Lot	Weight Kg	Order code	Old order code
Suction cup, Nitrile, NBR with female threaded fitting											
	15	G1/8	1,80	0,2	6,5	3,3	1,9	10	0,027	**PFTF-15A-NBR-G1**	P5V-CFF01511N
	20	G1/8	3,10	0,5	11,6	5,8	2,3	10	0,034	**PFTF-20B-NBR-G1**	P5V-CFF02011N
	25	G1/8	4,90	1,1	18,1	9,0	3,0	10	0,044	**PFTF-25-NBR-G1**	P5V-CFF02511N
	25	G1/4	4,90	1,1	18,1	9,0	3,0	10	0,050	**PFTF-25-NBR-G2**	P5V-CFF02512N
	30	G1/8	7,10	1,1	26,0	13,0	2,0	10	0,045	**PFTF-30-NBR-G1**	P5V-CFF03011N
	30	G1/4	7,10	1,1	26,0	13,0	2,0	10	0,051	**PFTF-30-NBR-G2**	P5V-CFF03012N
	35	G1/8	9,60	2,3	35,4	17,7	3,0	1	0,046	**PFTF-35-NBR-G1**	P5V-CFF03511N
	35	G1/4	9,60	2,3	35,4	17,7	3,0	1	0,052	**PFTF-35-NBR-G2**	P5V-CFF03512N
	40	G1/8	12,60	3,0	46,2	23,1	3,5	1	0,047	**PFTF-40-NBR-G1**	P5V-CFF04011N
	40	G1/4	12,60	3,0	46,2	23,1	3,5	1	0,053	**PFTF-40-NBR-G2**	P5V-CFF04012N
	50	G1/8	19,60	7,3	72,2	36,1	4,0	1	0,093	**PFTF-50-NBR-G1**	P5V-CFF05011N
	50	G1/4	19,60	7,3	72,2	36,1	4,0	1	0,093	**PFTF-50-NBR-G2**	P5V-CFF05012N
	60	G1/4	28,30	12,7	104,0	52,0	5,0	1	0,034	**PFTF-60-NBR-G2**	P5V-CFR06012N
	80	G1/4	50,20	27,3	184,8	92,4	6,0	1	0,063	**PFTF-80-NBR-G2**	P5V-CFR08012N
	95	G1/4	70,90	39,3	260,6	130,3	6,0	1	0,101	**PFTF-95-NBR-G2**	P5V-CFR09512N
	120	G1/2	113,00	77,3	415,6	207,9	6,0	1	0,500	**PFTF-120-NBR-G4**	P5V-CFR12014N
	150	G1/2	176,60	197,0	649,8	324,9	9,0	1	0,700	**PFTF-150-NBR-G4**	P5V-CFR15014N
	200	G1/2	314,00	387,0	1155,1	577,6	11,3	1	0,944	**PFTF-200-NBR-G4**	P5V-CFR20014N
Suction cup, Nitrile, NBR with male threaded fitting											
	2	M5	0,05	0,001	0,2	0,1	0,1	10	0,003	**PFTM-2A-NBR-M5**	P5V-CFF002C5N
	3	M5	0,12	0,003	0,5	0,2	0,2	10	0,003	**PFTM-3.5A-NBR-M5**	P5V-CFF003C5N
	5	M5	0,20	0,005	0,7	0,4	0,5	10	0,003	**PFTM-5A-NBR-M5**	P5V-CFF005C5N
	10	M5	0,80	0,070	2,9	1,4	1,5	10	0,004	**PFTM-10A-NBR-M5**	P5V-CFF010C5N
	15	M5	1,80	0,200	6,5	3,3	1,9	10	0,023	**PFTM-15A-NBR-M5**	P5V-CFF015C5N
	20	G1/8	3,10	0,500	11,6	5,8	2,3	10	0,031	**PFTM-20B-NBR-G1**	P5V-CFF020A1N
	25	G1/8	4,90	1,100	18,1	9,0	3,0	10	0,040	**PFTM-25-NBR-G1**	P5V-CFF025A1N
	25	G1/4	4,90	1,100	18,1	9,0	3,0	10	0,050	**PFTM-25-NBR-G2**	P5V-CFF025A2N
	30	G1/8	7,10	1,100	26,0	13,0	2,0	10	0,041	**PFTM-30-NBR-G1**	P5V-CFF030A1N
	30	G1/4	7,10	1,100	26,0	13,0	2,0	10	0,051	**PFTM-30-NBR-G2**	P5V-CFF030A2N
	35	G1/8	9,60	2,300	35,4	17,7	3,0	1	0,042	**PFTM-35-NBR-G1**	P5V-CFF035A1N
	35	G1/4	9,60	2,300	35,4	17,7	3,0	1	0,052	**PFTM-35-NBR-G2**	P5V-CFF035A2N
	40	G1/8	12,60	3,000	46,2	23,1	3,5	1	0,043	**PFTM-40-NBR-G1**	P5V-CFF040A1N
	40	G1/4	12,60	3,000	46,2	23,1	3,5	1	0,053	**PFTM-40-NBR-G2**	P5V-CFF040A2N
	50	G1/8	19,60	7,300	72,2	36,1	4,0	1	0,026	**PFTM-50-NBR-G1**	P5V-CFF050A1N
	50	G1/4	19,60	7,300	72,2	36,1	4,0	1	0,035	**PFTM-50-NBR-G2**	P5V-CFF050A2N
	60	G1/4	28,30	12,700	104,0	52,0	5,0	1	0,034	**PFTM-60-NBR-G2**	P5V-CFR060A2N
	80	G1/4	50,20	27,300	184,8	92,4	6,0	1	0,063	**PFTM-80-NBR-G2**	P5V-CFR080A2N
	95	G1/4	70,90	39,300	260,6	130,3	6,0	1	0,101	**PFTM-95-NBR-G2**	P5V-CFR095A2N
Suction cup, Nitrile, NBR without fitting											
	2	-	0,05	0,001	0,2	0,1	0,1	10	0,001	**PFG-2A-NBR**	P5V-CFF00200N
	3	-	0,12	0,003	0,5	0,2	0,2	10	0,001	**PFG-3.5A-NBR**	P5V-CFF00300N
	5	-	0,20	0,005	0,7	0,4	0,5	10	0,001	**PFG-5A-NBR**	P5V-CFF00500N
	10	-	0,80	0,070	2,9	1,4	1,5	10	0,002	**PFG-10A-NBR**	P5V-CFF01000N
	15	-	1,80	0,200	6,5	3,3	1,9	10	0,004	**PFG-15A-NBR**	P5V-CFF01500N
	20	-	3,10	0,500	11,6	5,8	2,3	10	0,004	**PFG-20B-NBR**	P5V-CFF02000N
	25	-	4,90	1,100	18,1	9,0	3,0	10	0,005	**PFG-25-NBR**	P5V-CFF02500N
	30	-	7,10	1,100	26,0	13,0	2,0	10	0,006	**PFG-30-NBR**	P5V-CFF03000N
	35	-	9,60	2,300	35,4	17,7	3,0	1	0,007	**PFG-35-NBR**	P5V-CFF03500N
	40	-	12,60	3,000	46,2	23,1	3,5	1	0,012	**PFG-40-NBR**	P5V-CFF04000N
	50	-	19,60	7,300	72,2	36,1	4,0	1	0,024	**PFG-50-NBR**	P5V-CFF05000N
	60	-	28,30	12,700	104,0	52,0	5,0	1	0,024	**PFG-60-NBR**	P5V-CFR06000N
	80	-	50,20	27,300	184,8	92,4	6,0	1	0,053	**PFG-80-NBR**	P5V-CFR08000N
	95	-	70,90	39,300	260,6	130,3	6,0	1	0,092	**PFG-95-NBR**	P5V-CFR09500N
	120	-	113,00	77,300	415,6	207,9	6,0	1	0,260	**PFG-120-NBR**	P5V-CFR12000N
	150	-	176,60	197,000	649,8	324,9	9,0	1	0,461	**PFG-150-NBR**	P5V-CFR15000N
	200	-	314,00	387,000	1155,1	577,6	11,3	1	0,833	**PFG-200-NBR**	P5V-CFR20000N

Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface
Safety factor n = 2. Please see page 20 for detailed information and calculating example.

Main data for flat suction cups, Silicone, SI

Symbol	Ø mm	Port size	Area cm²	Volume cm³	Lifting force (N)		Spring movement mm	Lot	Weight Kg	Order code	Old order code
Suction cup, Silicone, SI with female threaded fitting											
	15	G1/8	1,80	0,2	6,5	3,3	1,9	10	0,026	**PFTF-15A-SI-G1**	P5V-CFF01511S
	20	G1/8	3,10	0,5	11,6	5,8	2,3	10	0,033	**PFTF-20B-SI-G1**	P5V-CFF02011S
	25	G1/8	4,90	1,1	18,1	9,0	3,0	10	0,043	**PFTF-25-SI-G1**	P5V-CFF02511S
	25	G1/4	4,90	1,1	18,1	9,0	3,0	10	0,049	**PFTF-25-SI-G2**	P5V-CFF02512S
	30	G1/8	7,10	1,1	26,0	13,0	2,0	10	0,044	**PFTF-30-SI-G1**	P5V-CFF03011S
	30	G1/4	7,10	1,1	26,0	13,0	2,0	10	0,050	**PFTF-30-SI-G2**	P5V-CFF03012S
	35	G1/8	9,60	2,3	35,4	17,7	3,0	1	0,045	**PFTF-35-SI-G1**	P5V-CFF03511S
	35	G1/4	9,60	2,3	35,4	17,7	3,0	1	0,051	**PFTF-35-SI-G2**	P5V-CFF03512S
	40	G1/8	12,60	3,0	46,2	23,1	3,5	1	0,046	**PFTF-40-SI-G1**	P5V-CFF04011S
	40	G1/4	12,60	3,0	46,2	23,1	3,5	1	0,052	**PFTF-40-SI-G2**	P5V-CFF04012S
	50	G1/8	19,60	7,3	72,2	36,1	4,0	1	0,093	**PFTF-50-SI-G1**	P5V-CFF05011S
	50	G1/4	19,60	7,3	72,2	36,1	4,0	1	0,093	**PFTF-50-SI-G2**	P5V-CFF05012S
	60	G1/4	28,30	12,7	104,0	52,0	5,0	1	0,033	**PFTF-60-SI-G2**	P5V-CFR06012S
	80	G1/4	50,20	27,3	184,8	92,4	6,0	1	0,060	**PFTF-80-SI-G2**	P5V-CFR08012S
	95	G1/4	70,90	39,3	260,6	130,3	6,0	1	0,092	**PFTF-95-SI-G2**	P5V-CFR09512S
	120	G1/2	113,00	77,3	415,6	207,9	6,0	1	0,497	**PFTF-120-SI-G4**	P5V-CFR12014S
	150	G1/2	176,60	197,0	649,8	324,9	9,0	1	0,696	**PFTF-150-SI-G4**	P5V-CFR15014S
	200	G1/2	314,00	387,0	1155,1	577,6	11,3	1	1,066	**PFTF-200-SI-G4**	P5V-CFR20014S
Suction cup, Silicone, SI with male threaded fitting											
	2	M5	0,05	0,001	0,2	0,1	0,1	10	0,002	**PFTM-2A-SI-M5**	P5V-CFF002C5S
	3	M5	0,12	0,003	0,5	0,2	0,2	10	0,002	**PFTM-3.5A-SI-M5**	P5V-CFF003C5S
	5	M5	0,20	0,005	0,7	0,4	0,5	10	0,002	**PFTM-5A-SI-M5**	P5V-CFF005C5S
	10	M5	0,80	0,070	2,9	1,4	1,5	10	0,003	**PFTM-10A-SI-M5**	P5V-CFF010C5S
	15	M5	1,80	0,200	6,5	3,3	1,9	10	0,022	**PFTM-15A-SI-M5**	P5V-CFF015C5S
	20	G1/8	3,10	0,500	11,6	5,8	2,3	10	0,030	**PFTM-20B-SI-G1**	P5V-CFF020A1S
	25	G1/8	4,90	1,100	18,1	9,0	3,0	10	0,039	**PFTM-25-SI-G1**	P5V-CFF025A1S
	25	G1/4	4,90	1,100	18,1	9,0	3,0	10	0,049	**PFTM-25-SI-G2**	P5V-CFF025A2S
	30	G1/8	7,10	1,100	26,0	13,0	2,0	10	0,040	**PFTM-30-SI-G1**	P5V-CFF030A1S
	30	G1/4	7,10	1,100	26,0	13,0	2,0	10	0,050	**PFTM-30-SI-G2**	P5V-CFF030A2S
	35	G1/8	9,60	2,300	35,4	17,7	3,0	1	0,041	**PFTM-35-SI-G1**	P5V-CFF035A1S
	35	G1/4	9,60	2,300	35,4	17,7	3,0	1	0,051	**PFTM-35-SI-G2**	P5V-CFF035A2S
	40	G1/8	12,60	3,000	46,2	23,1	3,5	1	0,042	**PFTM-40-SI-G1**	P5V-CFF040A1S
	40	G1/4	12,60	3,000	46,2	23,1	3,5	1	0,052	**PFTM-40-SI-G2**	P5V-CFF040A2S
	50	G1/8	19,60	7,300	72,2	36,1	4,0	1	0,025	**PFTM-50-SI-G1**	P5V-CFF050A1S
	50	G1/4	19,60	7,300	72,2	36,1	4,0	1	0,034	**PFTM-50-SI-G2**	P5V-CFF050A2S
	60	G1/4	28,30	12,700	104,0	52,0	5,0	1	0,033	**PFTM-60-SI-G2**	P5V-CFR060A2S
	80	G1/4	50,20	27,300	184,8	92,4	6,0	1	0,060	**PFTM-80-SI-G2**	P5V-CFR080A2S
	95	G1/4	70,90	39,300	260,6	130,3	6,0	1	0,092	**PFTM-95-SI-G2**	P5V-CFR095A2S
Suction cup, Silicone, SI without fitting											
	2	-	0,05	0,001	0,2	0,1	0,1	10	0,001	**PFG-2A-SI**	P5V-CFF00200S
	3	-	0,12	0,003	0,5	0,2	0,2	10	0,001	**PFG-3.5A-SI**	P5V-CFF00300S
	5	-	0,20	0,005	0,7	0,4	0,5	10	0,001	**PFG-5A-SI**	P5V-CFF00500S
	10	-	0,80	0,070	2,9	1,4	1,5	10	0,002	**PFG-10A-SI**	P5V-CFF01000S
	15	-	1,80	0,200	6,5	3,3	1,9	10	0,002	**PFG-15A-SI**	P5V-CFF01500S
	20	-	3,10	0,500	11,6	5,8	2,3	10	0,003	**PFG-20B-SI**	P5V-CFF02000S
	25	-	4,90	1,100	18,1	9,0	3,0	10	0,004	**PFG-25-SI**	P5V-CFF02500S
	30	-	7,10	1,100	26,0	13,0	2,0	10	0,005	**PFG-30-SI**	P5V-CFF03000S
	35	-	9,60	2,300	35,4	17,7	3,0	1	0,005	**PFG-35-SI**	P5V-CFF03500S
	40	-	12,60	3,000	46,2	23,1	3,5	1	0,006	**PFG-40-SI**	P5V-CFF04000S
	50	-	19,60	7,300	72,2	36,1	4,0	1	0,011	**PFG-50-SI**	P5V-CFF05000S
	60	-	28,30	12,700	104,0	52,0	5,0	1	0,023	**PFG-60-SI**	P5V-CFR06000S
	80	-	50,20	27,300	184,8	92,4	6,0	1	0,050	**PFG-80-SI**	P5V-CFR08000S
	95	-	70,90	39,300	260,6	130,3	6,0	1	0,089	**PFG-95-SI**	P5V-CFR09500S
	120	-	113,00	77,300	415,6	207,9	6,0	1	0,259	**PFG-120-SI**	P5V-CFR12000S
	150	-	176,60	197,000	649,8	324,9	9,0	1	0,460	**PFG-150-SI**	P5V-CFR15000S
	200	-	314,00	387,000	1155,1	577,6	11,3	1	0,830	**PFG-200-SI**	P5V-CFR20000S

Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface
Safety factor n = 2. Please see page 20 for detailed information and calculating example.

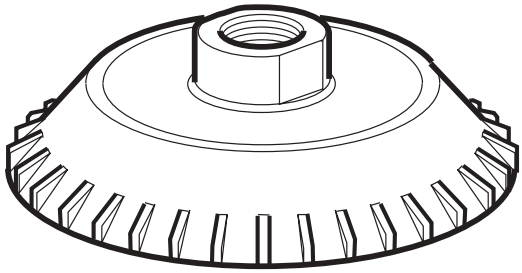
Flat suction cups - Strong

P5V-CFS

The Series P5V-CFS range of suction cups is designed for maximum lifting force. Double sealing lips provide additional safety. The outer sealing lip becomes effective in the event of overload, and also protects against wear. Its design is such that it can also grip bowed surfaces.

This suction cup is available in Nitrilee rubber, with 50 °Shore A hardness. Operating temperature range is from –20 °C to +70 °C.

The cup, which incorporates an aluminium body member, has an internally threaded vacuum connection.



For dimensions see page 65

Specification

Suction cup	**Nitrile, NBR**	Suction cup supplied complete with female fitting
Working temperature [°C]	-20 to +70	
Colour	Black	
Hardness, Shore-A [°Sh]	50	

Options and additional information

Material on request

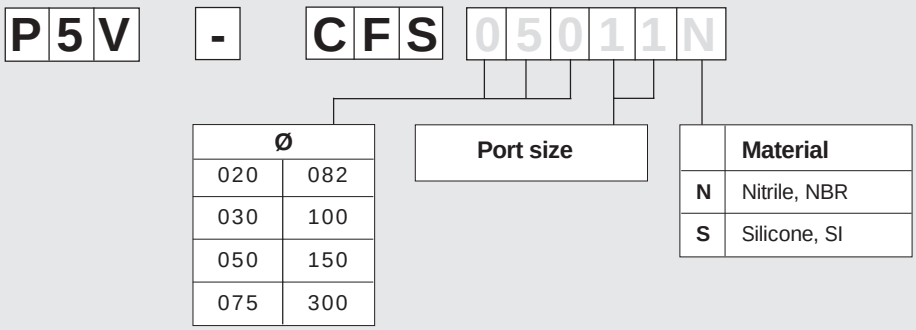
Suction cup	**Silicone, SI**	Suction cup supplied complete with female fitting
Working temperature [°C]	-60 to +250	
Colour	White	
Hardness, Shore-A [°Sh]	50	

Selection guide (refer to symbol index on page 10)

Flat - Strong P5V-CFS

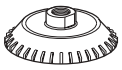
Ø20 to Ø300 mm

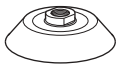
Order key



Possible combinations and order codes see main data sheet.

Main data for flat suction cups, Nitrile, NBR

Symbol	Ø mm	Port size	Area cm²	Volume cm³	Lifting force (N)		Spring movement mm	Weight Kg	Order code
Suction cup, Nitrile, NBR with female threaded fitting									
	20	M5	3,1	1,7	11,6	5,8	1,6	0,010	**P5V-CFS02035N**
	30	M5	7,1	2,7	26,0	13,0	2,2	0,012	**P5V-CFS03035N**
	50	G1/8	19,6	10,0	72,2	36,1	3,7	0,014	**P5V-CFS05011N**
	75	G1/4	44,2	30,0	162,4	81,2	5,5	0,038	**P5V-CFS07512N**
	100	G3/8	78,5	66,7	288,8	144,4	7,5	0,085	**P5V-CFS10013N**
	150	G1/2	176,6	208,3	649,8	324,9	11,0	0,300	**P5V-CFS15014N**
	300	G1	706,5	1467,0	2599,0	1299,5	19,0	1,800	**P5V-CFS30018N**

Symbol	Ø mm	Ansl.	Area cm²	Volume cm³	Lifting force (N)		Spring movement mm	Weight Kg	Order code
Suction cup, extra deep, Nitrile, NBR with female threaded fitting									
	82	G1/4	52,8	40,0	198	99	8,1	0,046	**P5V-CFS08212N**

Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface
Safety factor n = 2. Please see page 20 for detailed information and calculating example.

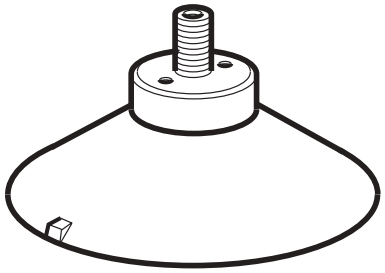
This range of low-profile suction cups has been developed primarily for handling sheet metal for presses in the motor industry.

The cups are made from thermosetting plastic. In addition to a high oil resistance to both mineral and vegetable oils, the material is also resistant to lithium-based and silicon-based greases.

The material also has a high resistance to the effects of weather, ozone and ultraviolet light, giving it a performance that is superior to that of other soft thermoplastics.

The mechanical characteristics of the material are fully comparable with those of vulcanised rubber.

The mounting hardware is of steel, generously sized in order to allow it to be transferred from cup to cup. The suction cups themselves are low-cost items, to be regarded as consumables.



For dimensions see page 65

Specification

Suction cup	**Thermoplastic, Alcryn®**
Working temperature [°C]	-40 to +120
Colour	Black
Hardness, Shore-A [°Sh]	60

Selection guide (refer to symbol index on page 10)

Flat - Profiled P5V-CFA

Ø45 to Ø100 mm

Order key

P	5	V	-	C	F	A	0	6	0	0	0	A

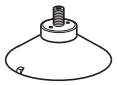
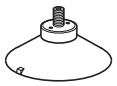
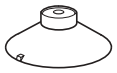
Ø
045
060
080
100

Port size

	Material
A	Alcryn®

Possible combinations and order codes see main data sheet.

Main data for flat suction cups, Alcryn®

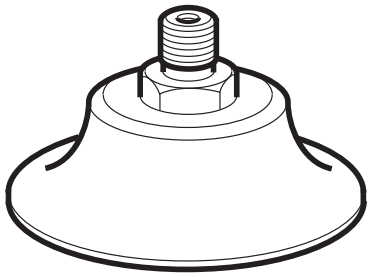
Symbol	Ø	Port size	Area	Volume	Lifting force (N)		Spring movement	Weight	Order code
	mm		cm^2	cm^3			mm	Kg	
Suction cup with male threaded fitting, M10									
	45	M10	15,9	1,0	58,5	29,2	5,0	0,065	**P5V-CFA045CAA**
	60	M10	28,3	2,0	104,0	52,0	7,3	0,070	**P5V-CFA060CAA**
	80	M10	50,2	3,5	184,8	92,4	8,2	0,080	**P5V-CFA080CAA**
	100	M10	78,5	7,5	288,8	144,4	10,3	0,093	**P5V-CFA100CAA**
Suction cup with male threaded fitting, G1/4									
	45	G1/4	15,9	1,0	58,5	29,2	5,0	0,065	**P5V-CFA045A2A**
	60	G1/4	28,3	2,0	104,0	52,0	7,3	0,070	**P5V-CFA060A2A**
	80	G1/4	50,2	3,5	184,8	92,4	8,2	0,080	**P5V-CFA080A2A**
	100	G1/4	78,5	7,5	288,8	144,4	10,3	0,093	**P5V-CFA100A2A**
Suction cup without fitting									
	45	-	15,9	1,0	58,5	29,2	5,0	0,009	**P5V-CFA04500A**
	60	-	28,3	2,0	104,0	52,0	7,3	0,014	**P5V-CFA06000A**
	80	-	50,2	3,5	184,8	92,4	8,2	0,026	**P5V-CFA08000A**
	100	-	78,5	7,5	288,8	144,4	10,3	0,037	**P5V-CFA10000A**

Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface
Safety factor n = 2. Please see page 20 for detailed information and calculating example.

These suction cups have been specially designed to handle objects with flat surfaces, which are wet or oily for other reasons, such as sheets of metal or glass.

The suction cup has up to twice the efficiency and holding force of the equivalent size of the more conventional PFG/PFTF/PFTM range, during horizontal or vertical accelerations, such as twisting or positioning of workpieces. This is thanks to the internal ridges which give the suction cup a more effective area of contact. If the surfaces are also wet or oily, the difference is even greater.

In a more conventional suction cup, without internal ridges, an oil film can be formed between the suction cup and the object, which prevents direct contact and thus adversely affects the lifting force and fixing of workpieces. The use of anti-slip suction cups with internal ridges breaks the oil film, fixes and lifts the workpiece.



For dimensions see page 66

Specification

Suction cup	**Nitrile, NBR**	**Urethane, U**
Working temperature [°C]	-20 to +120	-30 to +100
Colour	Black	Blue
Hardness , Shore-A [°Sh]	55 ±5	55 ±5

Selection guide (Refer to symbol index on page 10)

Flat - Anti-Slip PFOG/PFOTF/PFOTM

Ø20 to Ø40 mm

Order key

P F O T F - 2 0 - NBR - G1

	Type
G	pad only
TM	male fitting
TF	female fitting

Ø
020
025
030
035
040

	Material
NBR	Nitrile, NBR
SI	Silicone, SI

Port size	
G1	**G1/8"**
G2	**G1/4"**

Possible combinations and order codes see main data sheets.

Main data for flat suction cups, Nitrile, NBR

Symbol	Ø mm	Port size	Area cm^2	Volume cm^3	Lifting force (N)		Spring movement mm	Lot	Weight Kg	Order code	Old order code
Suction cup, Nitrile, NBR with female threaded fitting											
	20	G1/8	3,10	0,5	11,6	5,8	2,3	10	0,034	**PFOTF-20-NBR-G1**	P5V-CFC02011N
	25	G1/8	4,90	1,1	18,1	9,0	3,0	10	0,044	**PFOTF-25-NBR-G1**	P5V-CFC02511N
	25	G1/4	4,90	1,1	18,1	9,0	3,0	10	0,050	**PFOTF-25-NBR-G2**	P5V-CFC02512N
	30	G1/8	7,10	1,1	26,0	13,0	2,0	10	0,045	**PFOTF-30-NBR-G1**	P5V-CFC03011N
	30	G1/4	7,10	1,1	26,0	13,0	2,0	10	0,051	**PFOTF-30-NBR-G2**	P5V-CFC03012N
	35	G1/8	9,60	2,3	35,4	17,7	3,0	1	0,046	**PFOTF-35-NBR-G1**	P5V-CFC03511N
	35	G1/4	9,60	2,3	35,4	17,7	3,0	1	0,052	**PFOTF-35-NBR-G2**	P5V-CFC03512N
	40	G1/8	12,60	3,0	46,2	23,1	3,5	1	0,047	**PFOTF-40-NBR-G1**	P5V-CFC04011N
	40	G1/4	12,60	3,0	46,2	23,1	3,5	1	0,053	**PFOTF-40-NBR-G2**	P5V-CFC04012N
Suction cup, Nitrile, NBR with male threaded fitting											
	20	G1/8	3,10	0,5	11,6	5,8	2,3	10	0,031	**PFOTM-20-NBR-G1**	P5V-CFC020A1N
	25	G1/8	4,90	1,1	18,1	9,0	3,0	10	0,040	**PFOTM-25-NBR-G1**	P5V-CFC025A1N
	25	G1/4	4,90	1,1	18,1	9,0	3,0	10	0,050	**PFOTM-25-NBR-G2**	P5V-CFC025A2N
	30	G1/8	7,10	1,1	26,0	13,0	2,0	10	0,041	**PFOTM-30-NBR-G1**	P5V-CFC030A1N
	30	G1/4	7,10	1,1	26,0	13,0	2,0	10	0,051	**PFOTM-30-NBR-G2**	P5V-CFC030A2N
	35	G1/8	9,60	2,3	35,4	17,7	3,0	1	0,042	**PFOTM-35-NBR-G1**	P5V-CFC035A1N
	35	G1/4	9,60	2,3	35,4	17,7	3,0	1	0,052	**PFOTM-35-NBR-G2**	P5V-CFC035A2N
	40	G1/8	12,60	3,0	46,2	23,1	3,5	1	0,043	**PFOTM-40-NBR-G1**	P5V-CFC040A1N
	40	G1/4	12,60	3,0	46,2	23,1	3,5	1	0,053	**PFOTM-40-NBR-G2**	P5V-CFC040A2N
Suction cup, Nitrile, NBR without fitting											
	20	-	3,10	0,5	11,6	5,8	2,3	10	0,002	**PFOG-20-NBR**	P5V-CFC02000N
	25	-	4,90	1,1	18,1	9,0	3,0	10	0,004	**PFOG-25-NBR**	P5V-CFC02500N
	30	-	7,10	1,1	26,0	13,0	2,0	10	0,004	**PFOG-30-NBR**	P5V-CFC03000N
	35	-	9,60	2,3	35,4	17,7	3,0	1	0,006	**PFOG-35-NBR**	P5V-CFC03500N
	40	-	12,60	3,0	46,2	23,1	3,5	1	0,010	**PFOG-40-NBR**	P5V-CFC04000N

Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface. Safety factor n = 2. Please see page 20 for detailed information and calculating example.

Main data for flat suction cups, Urethane, U

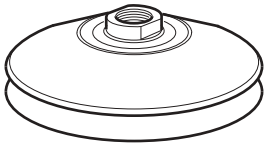
Symbol	Ø mm	Port size	Area cm^2	Volume cm^3	Lifting force (N)		Spring movement mm	Lot	Weight Kg	Order code	Old order code
Suction cup, Urethane, U with female threaded fitting											
	20	G1/8	3,10	0,5	11,6	5,8	2,3	10	0,034	**PFOTF-20-U-G1**	P5V-CFC02011U
	25	G1/8	4,90	1,1	18,1	9,0	3,0	10	0,044	**PFOTF-25-U-G1**	P5V-CFC02511U
	25	G1/4	4,90	1,1	18,1	9,0	3,0	10	0,050	**PFOTF-25-U-G2**	P5V-CFC02512U
	30	G1/8	7,10	1,1	26,0	13,0	2,0	10	0,045	**PFOTF-30-U-G1**	P5V-CFC03011U
	30	G1/4	7,10	1,1	26,0	13,0	2,0	10	0,051	**PFOTF-30-U-G2**	P5V-CFC03012U
	35	G1/8	9,60	2,3	35,4	17,7	3,0	1	0,046	**PFOTF-35-U-G1**	P5V-CFC03511U
	35	G1/4	9,60	2,3	35,4	17,7	3,0	1	0,052	**PFOTF-35-U-G2**	P5V-CFC03512U
	40	G1/8	12,60	3,0	46,2	23,1	3,5	1	0,047	**PFOTF-40-U-G1**	P5V-CFC04011U
	40	G1/4	12,60	3,0	46,2	23,1	3,5	1	0,053	**PFOTF-40-U-G2**	P5V-CFC04012U
Suction cup, Urethane, U with male threaded fitting											
	20	G1/8	3,10	0,5	11,6	5,8	2,3	10	0,031	**PFOTM-20-U-G1**	P5V-CFC020A1U
	25	G1/8	4,90	1,1	18,1	9,0	3,0	10	0,040	**PFOTM-25-U-G1**	P5V-CFC025A1U
	25	G1/4	4,90	1,1	18,1	9,0	3,0	10	0,050	**PFOTM-25-U-G2**	P5V-CFC025A2U
	30	G1/8	7,10	1,1	26,0	13,0	2,0	10	0,041	**PFOTM-30-U-G1**	P5V-CFC030A1U
	30	G1/4	7,10	1,1	26,0	13,0	2,0	10	0,051	**PFOTM-30-U-G2**	P5V-CFC030A2U
	35	G1/8	9,60	2,3	35,4	17,7	3,0	1	0,042	**PFOTM-35-U-G1**	P5V-CFC035A1U
	35	G1/4	9,60	2,3	35,4	17,7	3,0	1	0,052	**PFOTM-35-U-G2**	P5V-CFC035A2U
	40	G1/8	12,60	3,0	46,2	23,1	3,5	1	0,043	**PFOTM-40-U-G1**	P5V-CFC040A1U
	40	G1/4	12,60	3,0	46,2	23,1	3,5	1	0,053	**PFOTM-40-U-G2**	P5V-CFC040A2U
Suction cup, Urethane, U without fitting											
	20	-	3,10	0,5	11,6	5,8	2,3	10	0,002	**PFOG-20-U**	P5V-CFC02000U
	25	-	4,90	1,1	18,1	9,0	3,0	10	0,004	**PFOG-25-U**	P5V-CFC02500U
	30	-	7,10	1,1	26,0	13,0	2,0	10	0,004	**PFOG-30-U**	P5V-CFC03000U
	35	-	9,60	2,3	35,4	17,7	3,0	1	0,006	**PFOG-35-U**	P5V-CFC03500U
	40	-	12,60	3,0	46,2	23,1	3,5	1	0,010	**PFOG-40-U**	P5V-CFC04000U

Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface
Safety factor n = 2. Please see page 20 for detailed information and calculating example.

This suction cup has been specially designed to handle objects with smooth and somewhat irregular surfaces, which are wet or oily for other reasons, such as sheets of metal or glass.

The suction cup has up to twice the efficiency and holding force of the equivalent size of the more conventional PBTF/ PBTM range, during horizontal or vertical accelerations, such as twisting or positioning of workpieces. This is thanks to the internal ridges which give the suction cup a more effective area of contact. If the surfaces are also wet or oily, the difference is even greater.

The suction cup is particularly useful for handling thin sheets of metal which have a tendency to irregularity. When the vacuum is applied, the lips of the bellows seal efficiently against the sheet of metal, pull it down to the ridges which break the oil film, fix and lift the component.



For dimensions see page 67

Specification

Suction cup	Nitrile, NBR	Urethane, U
Working temperature [°C]	-20 to +120	-30 to +100
Colour	Black	Blue
Hardness , Shore-A [°Sh]	55 ±5	70 ±5

Selection guide (refer to symbol index on page 10)

Short bellows PBOG

Ø35-Ø110 mm

Order key

P	B	O	G	-	1	1	0	-	G1	-	NBR

	Type
	Anti-Slip, ribbed

Ø
035
050
075
110

Port size

	Material
NBR	Nitrile, NBR
SI	Silicone, SI

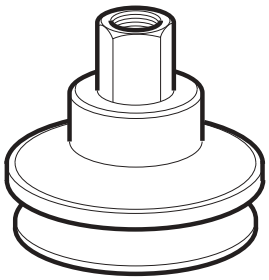
Possible combinations and order codes see main data below.

Main data for short bellows, Nitrile, NBR and Urethane, U

Symbol	Ø	Port size	Area	Volume	Lifting force (N)	Spring movement	Lot	Weight	Order code	Old order code
	mm		cm^2	cm^3		mm		Kg		
Suction cup, Nitrile, NBR with female threaded fitting										
	35	G1/8	9,6	10	36	5,5	1	0,009	**PBOG-35-NBR**	P5V-CBC03511N
	50	G1/8	19,6	40	74	7,5	1	0,023	**PBOG-50-NBR**	P5V-CBC05011N
	75	G1/4	44,2	120	168	11,0	1	0,078	**P5V-CBC07512N**	
	110	G3/8	96,7	350	367	17,0	1	0,195	**PBOG-110-NBR**	P5V-CBC11013N
Suction cup, Urethane, U with female threaded fitting										
	35	G1/8	9,6	10	36	5,5	1	0,009	**PBOG-35-U-70SH**	P5V-CBC03511U
	50	G1/8	19,6	40	74	7,5	1	0,023	**PBOG-50-U-70SH**	P5V-CBC05011U
	75	G1/4	44,2	120	168	11,0	1	0,078	**P5V-CBC07512U**	
	110	G3/8	96,7	350	367	17,0	1	0,214	**PBOG-110-U-70SH**	P5V-CBC11013U

Bellows cups, short, serie PBTF/PBTM/P5B-CBB, Ø10 - Ø150

Short bellows suction cups are suitable for use when the bellows have to accommodate differences in height or level. The use of several short bellows cups on a common lifting frame allows objects of varying heights and shapes, such as corrugated sheet, to be lifted.
Bellows suction cups also provide a certain limited lifting effect as a result of their own flexibility, which can be employed to separate thin parts. They are not, however, suitable for lifting vertical surfaces.



For dimensions:
PBTF/PBTM/P5V-CBB, see page 68
PCTF/PCTM/PCGP5V-CBL, see page 70

Bellows cups, long, serie PCTF/PCTM/PCG/P5B-CBL, Ø9 - Ø88

Long bellows suction cups are suitable for the same applications as short bellows suction cups, with the difference that they can accommodate greater differences in height and also that they have a greater inherent lifting range.
In the same way as for the short suction cups, these suction cups are not suitable for use when lifting vertical surfaces.

Specification

Suction cup	**Nitrile, NBR**	**Silicone, SI**
Working temperature [°C]	-20 to +120	-60 to +250
Colour	Black	White
Hardness , Shore-A [°Sh]	55 ±5	55 ±5

Options and additional information

Material on request

Suction cup	**Chloroprene**	**Urethane**	**Nitrile, anti-static**	**Silicone, anti-static**
			For PBTF/TM/P5V-CBB Ø10-50	For PBTF/TM/P5V-CBB Ø10-50
Working temperature [°C]	-30 to +140	-30 to +120	-30 to +120	-60 to +250
Colour	Green	Blue	Blue with black dots	Black with red dots
Hardness , Shore-A [°Sh]	55 ±5	55 ±5	70 ±5	55 ±5
Elektric resistance [Ωm]			800 to 1000	5 to 15

Selection guide (refer to symbol index on page 10)

Bellows - Short PBTF/PBTM/P5V-CBB
Ø10 to Ø150 mm

Bellows - Long PCTF/PCTM/PCG/P5V-CBL
Ø9 to Ø88

Order key

P B TF - 75 - NBR - G1

Type	
B	Short 1.1/2
C	Long 2.1/2

Thread	
G	pad only
TM	male fitting
TF	female fitting

Ø	
10	40
10A	50
15	60
15A	75
18	90
20	110
20B	150
30	

Material	
NBR	Nitrile
SI	Silicone

Port size	
M5	**M5**
G1	**G1/8"**
G2	**G1/4"**
G4	**G1/2"**

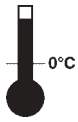
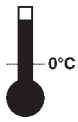
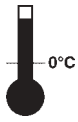
Possible combinations and order codes see main data sheets.

Main data for short bellows cups, Nitrile, NBR

Symbol	Ø mm	Port size	Area cm^2	Volume cm^3	Lifting force (N)	Spring movement mm	Lot	Weight Kg	Order code	Old order code
Suction cup, Nitrile, NBR with female threaded fitting										
	20	G1/8	3,8	0,70	13,9	9,0	10	0,033	**PBTF-20B-NBR-G1**	P5V-CBB02011N
	30	G1/8	8,6	8,00	31,5	18,0	10	0,049	**PBTF-30-NBR-G1**	P5V-CBB03011N
	30	G1/4	8,6	8,00	31,5	18,0	10	0,061	**PBTF-30-NBR-G2**	P5V-CBB03012N
	40	G1/8	14,5	12,70	53,4	15,5	1	0,055	**PBTF-40-NBR-G1**	P5V-CBB04011N
	40	G1/4	14,5	12,70	53,4	15,5	1	0,068	**PBTF-40-NBR-G2**	P5V-CBB04012N
	50	G1/8	23,3	32,00	85,8	19,9	1	0,105	**PBTF-50-NBR-G1**	P5V-CBB05011N
	50	G1/4	23,3	32,00	85,8	19,9	1	0,118	**PBTF-50-NBR-G2**	P5V-CBB05012N
	75	G1/4	47,8	105,00	175,7	22,0	1	0,075	**PBTF-75-NBR-G2**	P5V-CBB07512N
	110	G1/2	103,8	309,00	381,9	33,0	1	0,524	**PBTF-110-NBR-G4**	P5V-CBB11014N
	150	G1/2	191,0	734,00	702,8	38,0	1	0,975	**PBTF-150-NBR-G4**	P5V-CBB15014N
Suction cup, Nitrile, NBR with male threaded fitting										
	10	M5	0,9	0,07	3,2	4,0	10	0,004	**PBTM-10A-NBR-M5**	P5V-CBB010C5N
	15	M5	2,0	0,30	7,4	6,0	10	0,005	**PBTM-15A-NBR-M5**	P5V-CBB015C5N
	20	G1/8	3,8	0,70	13,9	9,0	10	0,013	**PBTM-20B-NBR-G1**	P5V-CBB020A1N
	30	G1/8	8,6	8,00	31,5	18,0	10	0,047	**PBTM-30-NBR-G1**	P5V-CBB030A1N
	30	G1/4	8,6	8,00	31,5	18,0	10	0,057	**PBTM-30-NBR-G2**	P5V-CBB030A2N
	40	G1/8	14,5	12,70	53,4	15,5	1	0,052	**PBTM-40-NBR-G1**	P5V-CBB040A1N
	40	G1/4	14,5	12,70	53,4	15,5	1	0,061	**PBTM-40-NBR-G2**	P5V-CBB040A2N
	50	G1/8	23,3	32,00	85,8	19,9	1	0,102	**PBTM-50-NBR-G1**	P5V-CBB050A1N
	50	G1/4	23,3	32,00	85,8	19,9	1	0,111	**PBTM-50-NBR-G2**	P5V-CBB050A2N
	75	G1/4	47,8	105,00	175,7	22,0	1	0,920	**PBTM-75-NBR-G2**	P5V-CBB075A2N
Suction cup, Nitrile, NBR without fitting										
	10	-	0,9	0,07	3,2	4,0	10	0,001	**PBG-10A-NBR**	P5V-CBB01000N
	15	-	2,0	0,30	7,4	6,0	10	0,002	**PBG-15A-NBR**	P5V-CBB01500N
	20	-	3,8	0,70	13,9	9,0	10	0,003	**PBG-20B-NBR**	P5V-CBB02000N
	30	-	8,6	8,00	31,5	18,0	10	0,009	**PBG-30-NBR**	P5V-CBB03000N
	40	-	14,5	12,70	53,4	15,5	1	0,015	**PBG-40-NBR**	P5V-CBB04000N
	50	-	23,3	32,00	85,8	19,9	1	0,024	**PBG-50-NBR**	P5V-CBB05000N
	75	-	47,8	105,00	175,7	22,0	1	0,082	**PBG-75-NBR**	P5V-CBB07500N
	110	-	103,8	309,00	381,9	33,0	1	0,287	**PBG-110-NBR**	P5V-CBB11000N
	150	-	191,0	734,00	702,8	38,0	1	0,790	**PBG-150-NBR**	P5V-CBB15000N

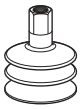
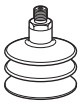
Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface
Safety factor n = 2. Please see page 20 for detailed information and calculating example.

Main data for short bellows cups, Silicone, SI

Symbol	Ø mm	Port size	Area cm²	Volume cm³	Lifting force (N)	Spring movement mm	Lot	Weight Kg	Order code	Old order code
Suction cup, Silicone, SI with female threaded fitting										
	20	G1/8	3,8	0,7	13,9	9,0	10	0,033	**PBTF-20B-SI-G1**	P5V-CBB02011S
	30	G1/8	8,6	8,0	31,5	18,0	10	0,048	**PBTF-30-SI-G1**	P5V-CBB03011S
	30	G1/4	8,6	8,0	31,5	18,0	10	0,060	**PBTF-30-SI-G2**	P5V-CBB03012S
	40	G1/8	14,5	12,7	53,4	15,5	1	0,054	**PBTF-40-SI-G1**	P5V-CBB04011S
	40	G1/4	14,5	12,7	53,4	15,5	1	0,067	**PBTF-40-SI-G2**	P5V-CBB04012S
250 °C to -60 °C 	50	G1/8	23,3	32,0	85,8	19,9	1	0,103	**PBTF-50-SI-G1**	P5V-CBB05011S
	50	G1/4	23,3	32,0	85,8	19,9	1	0,116	**PBTF-50-SI-G2**	P5V-CBB05012S
	75	G1/4	47,8	105,0	175,7	22,0	1	0,075	**PBTF-75-SI-G2**	P5V-CBB07512S
	110	G1/2	103,8	309,0	381,9	33,0	1	0,508	**PBTF-110-SI-G4**	P5V-CBB11014S
	150	G1/2	191,0	734,0	702,8	38,0	1	1,016	**PBTF-150-SI-G4**	P5V-CBB15014S
Suction cup, Silicone, SI with male threaded fitting										
	10	M5	0,9	0,1	3,2	4,0	10	0,004	**PBTF-10A-SI-M5**	P5V-CBB010C5S
	15	M5	2,0	0,3	7,4	6,0	10	0,004	**PBTF-15A-SI-M5**	P5V-CBB015C5S
	20	G1/8	3,8	0,7	13,9	9,0	10	0,013	**PBTF-20B-SI-M5**	P5V-CBB020A1S
	30	G1/8	8,6	8,0	31,5	18,0	10	0,046	**PBTF-30-SI-G1**	P5V-CBB030A1S
	30	G1/4	8,6	8,0	31,5	18,0	10	0,056	**PBTF-30-SI-G2**	P5V-CBB030A2S
250 °C to -60 °C 	40	G1/8	14,5	12,7	53,4	15,5	1	0,051	**PBTF-40-SI-G1**	P5V-CBB040A1S
	40	G1/4	14,5	12,7	53,4	15,5	1	0,060	**PBTF-40-SI-G2**	P5V-CBB040A2S
	50	G1/8	23,3	32,0	85,8	19,9	1	0,100	**PBTM-50-SI-G1**	P5V-CBB050A1S
	50	G1/4	23,3	32,0	85,8	19,9	1	0,109	**PBTM-50-SI-G2**	P5V-CBB050A2S
	75	G1/4	47,8	105,0	175,7	22,0	1	0,085	**PBTM-75-SI-G2**	P5V-CBB075A2S
Suction cup, Silicone, SI without fitting										
	10	-	0,9	0,1	3,2	4,0	10	0,001	**PBG-10A-SI**	P5V-CBB01000S
	15	-	2,0	0,3	7,4	6,0	10	0,001	**PBG-15A-SI**	P5V-CBB01500S
	20	-	3,8	0,7	13,9	9,0	10	0,002	**PBG-20B-SI**	P5V-CBB02000S
	30	-	8,6	8,0	31,5	18,0	10	0,008	**PBG-30-SI**	P5V-CBB03000S
	40	-	14,5	12,7	53,4	15,5	1	0,014	**PBG-40-SI**	P5V-CBB04000S
250 °C to -60 °C 	50	-	23,3	32,0	85,8	19,9	1	0,022	**PBG-50-SI**	P5V-CBB05000S
	75	-	47,8	105,0	175,7	22,0	1	0,075	**PBG-75-SI**	P5V-CBB07500S
	110	-	103,8	309,0	381,9	33,0	1	0,272	**PBG-110-SI**	P5V-CBB11000S
	150	-	191,0	734,0	702,8	38,0	1	0,780	**PBG-150-SI**	P5V-CBB15000S

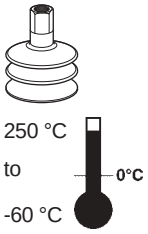
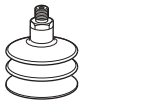
Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface
Safety factor n = 2. Please see page 20 for detailed information and calculating example.

Main data for long bellows cups, Nitrile, NBR

Symbol	Ø mm	Port size	Area cm^2	Volume cm^3	Lifting force (N)	Spring movement mm	Lot	Weight Kg	Order code	Old order code
Suction cup, Nitrile, NBR with female threaded fitting										
	9	G1/8	0,6	0,15	2,3	3	10	0,007	**PCTF-10-NBR-G1**	P5V-CBL00911N
	14	G1/8	1,5	0,98	5,7	9	10	0,007	**PCTF-15-NBR-G1**	P5V-CBL01411N
	18	G1/8	2,4	1,35	8,8	9	10	0,009	**PCTF-18-NBR-G1**	P5V-CBL01811N
	20	G1/8	3,1	2,00	11,6	9	10	0,014	**PCTF-20-NBR-G1**	P5V-CBL02011N
	32	G1/8	8,0	10,00	29,6	13	10	0,028	**PCTF-30-NBR-G1**	P5V-CBL03211N
	32	G1/4	8,0	10,00	29,6	13	10	0,041	**PCTF-30-NBR-G2**	P5V-CBL03212N
	42	G1/8	13,9	19,50	50,9	20	1	0,033	**PCTF-40-NBR-G1**	P5V-CBL04211N
	42	G1/4	13,9	19,50	50,9	20	1	0,046	**PCTF-40-NBR-G2**	P5V-CBL04212N
	62	G1/8	30,2	72,50	111,0	27	1	0,070	**PCTF-60-NBR-G1**	P5V-CBL06211N
	62	G1/4	30,2	72,50	111,0	27	1	0,082	**PCTF-60-NBR-G2**	P5V-CBL06212N
Suction cup, Nitrile, NBR with male threaded fitting										
	5	G1/8	0,2	0,07	0,8	4	10	0,003		P5V-CBL005A1N
	7	G1/8	0,4	0,10	1,5	6	10	0,005		P5V-CBL007A1N
	9	M5	0,6	0,15	2,3	3	10	0,005	**PCTM-10-NBR-M5**	P5V-CBL009C5N
	9	M6	0,6	0,15	2,3	3	10	0,005	**PCTM-10-NBR-M6**	P5V-CBL009C6N
	9	G1/8	0,6	0,15	2,3	3	10	0,011	**PCTM-10-NBR-G1**	P5V-CBL009A1N
	14	M5	1,5	0,98	5,7	9	10	0,005	**PCTM-15-NBR-M5**	P5V-CBL014C5N
	14	M6	1,5	0,98	5,7	9	10	0,005	**PCTM-15-NBR-M6**	P5V-CBL014C6N
	14	G1/8	1,5	0,98	5,7	9	10	0,007	**PCTM-15-NBR-G1**	P5V-CBL014A1N
	18	M5	2,4	1,35	8,8	9	10	0,007	**PCTM-18-NBR-M5**	P5V-CBL018C5N
	18	M6	2,4	1,35	8,8	9	10	0,007	**PCTM-18-NBR-M6**	P5V-CBL018C6N
	18	G1/8	2,4	1,35	8,8	9	10	0,009	**PCTM-18-NBR-G1**	P5V-CBL018A1N
	20	M5	3,1	2,00	11,6	9	10	0,012	**PCTM-20-NBR-M5**	P5V-CBL020C5N
	20	M6	3,1	2,00	11,6	9	10	0,012	**PCTM-20-NBR-M6**	P5V-CBL020C6N
	20	G1/8	3,1	2,00	11,6	9	10	0,014	**PCTM-20-NBR-G1**	P5V-CBL020A1N
	32	G1/8	8,0	10,00	29,6	13	10	0,030	**PCTM-30-NBR-G1**	P5V-CBL032A1N
	32	G1/4	8,0	10,00	29,6	13	10	0,039	**PCTM-30-NBR-G2**	P5V-CBL032A2N
	42	G1/8	13,9	19,50	50,9	20	1	0,033	**PCTM-40-NBR-G1**	P5V-CBL042A1N
	42	G1/4	13,9	19,50	50,9	20	1	0,043	**PCTM-40-NBR-G2**	P5V-CBL042A2N
	62	G1/8	30,2	72,50	111,0	27	1	0,069	**PCTM-60-NBR-G1**	P5V-CBL062A1N
	62	G1/4	30,2	72,50	111,0	27	1	0,078	**PCTM-60-NBR-G2**	P5V-CBL062A2N
	88	G1/4	60,8	165,00	223,6	42	1	0,200	**PCTM-90-NBR-G2**	P5V-CBL088A2N
Suction cup, Nitrile, NBR without fitting										
	5	-	0,2	0,07	0,8	4	10	0,003		P5V-CBL00500N
	7	-	0,4	0,10	1,5	6	10	0,005		P5V-CBL00700N
	9	-	0,6	0,15	2,3	3	10	0,001	**PCG-10-NBR**	P5V-CBL00900N
	14	-	1,5	0,98	5,7	9	10	0,001	**PCG-15-NBR**	P5V-CBL01400N
	18	-	2,4	1,35	8,8	9	10	0,002	**PCG-18-NBR**	P5V-CBL01800N
	20	-	3,1	2,00	11,6	9	10	0,008	**PCG-20-NBR**	P5V-CBL02000N
	32	-	8,0	10,00	29,6	13	10	0,015	**PCG-30-NBR**	P5V-CBL03200N
	42	-	13,9	19,50	50,9	20	1	0,019	**PCG-40-NBR**	P5V-CBL04200N
	62	-	30,2	72,50	111,0	27	1	0,052	**PCG-60-NBR**	P5V-CBL06200N
	88	-	60,8	165,00	223,6	42	1	0,166	**PCG-90-NBR**	P5V-CBL08800N

Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface
Safety factor n = 2. Please see page 20 for detailed information and calculating example.

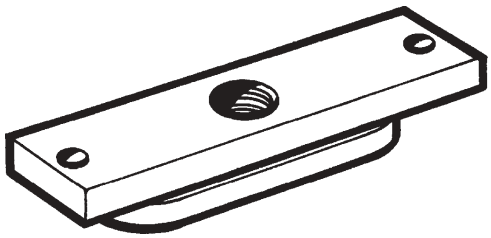
Main data for long bellows cups, Silicone, SI

Symbol	Ø mm	Port size	Area cm^2	Volume cm^3	Lifting force (N)	Spring movement mm	Lot	Weight Kg	Order code	Old order code
Suction cup, Silicone, SI with female threaded fitting										
	9	G1/8	0,6	0,15	2,3	3	10	0,006	**PCTF-10-SI-G1**	P5V-CBL00911S
	14	G1/8	1,5	0,98	5,7	9	10	0,006	**PCTF-15-SI-G1**	P5V-CBL01411S
	18	G1/8	2,4	1,35	8,8	9	10	0,008	**PCTF-18-SI-G1**	P5V-CBL01811S
	20	G1/8	3,1	2,00	11,6	9	10	0,013	**PCTF-20-SI-G1**	P5V-CBL02011S
250 °C	32	G1/8	8,0	10,00	29,6	13	10	0,027	**PCTF-30-SI-G1**	P5V-CBL03211S
	32	G1/4	8,0	10,00	29,6	13	10	0,040	**PCTF-30-SI-G2**	P5V-CBL03212S
to 0°C	42	G1/8	13,9	19,50	50,9	20	1	0,032	**PCTF-40-SI-G1**	P5V-CBL04211S
	42	G1/4	13,9	19,50	50,9	20	1	0,045	**PCTF-40-SI-G2**	P5V-CBL04212S
-60 °C	62	G1/8	30,2	72,50	111,0	27	1	0,069	**PCTF-60-SI-G1**	P5V-CBL06211S
	62	G1/4	30,2	72,50	111,0	27	1	0,081	**PCTF-60-SI-G2**	P5V-CBL06212S
Suction cup, Silicone, SI with male threaded fitting										
	5	G1/8	0,2	0,07	0,8	4	10	0,003	-	P5V-CBL005A1S
	7	G1/8	0,4	0,10	1,5	6	10	0,005	-	P5V-CBL007A1S
	9	M5	0,6	0,15	2,3	3	10	0,004	**PCTM-10-SI-M5**	P5V-CBL009C5S
	9	M6	0,6	0,15	2,3	3	10	0,004	**PCTM-10-SI-M6**	P5V-CBL009C6S
	9	G1/8	0,6	0,15	2,3	3	10	0,010	**PCTM-10-SI-G1**	P5V-CBL009A1S
250 °C	14	M5	1,5	0,98	5,7	9	10	0,004	**PCTM-15-SI-M5**	P5V-CBL014C5S
	14	M6	1,5	0,98	5,7	9	10	0,004	**PCTM-15-SI-M6**	P5V-CBL014C6S
to 0°C	14	G1/8	1,5	0,98	5,7	9	10	0,006	**PCTM-15-SI-G1**	P5V-CBL014A1S
	18	M5	2,4	1,35	8,8	9	10	0,006	**PCTM-18-SI-M5**	P5V-CBL018C5S
	18	M6	2,4	1,35	8,8	9	10	0,006	**PCTM-18-SI-M6**	P5V-CBL018C6S
-60 °C	18	G1/8	2,4	1,35	8,8	9	10	0,008	**PCTM-18-SI-G1**	P5V-CBL018A1S
	20	M5	3,1	2,00	11,6	9	10	0,011	**PCTM-20-SI-M5**	P5V-CBL020C5S
	20	M6	3,1	2,00	11,6	9	10	0,011	**PCTM-20-SI-M6**	P5V-CBL020C6S
	20	G1/8	3,1	2,00	11,6	9	10	0,013	**PCTM-20-SI-G1**	P5V-CBL020A1S
	32	G1/8	8,0	10,00	29,6	13	10	0,025	**PCTM-30-SI-G1**	P5V-CBL032A1S
	32	G1/4	8,0	10,00	29,6	13	10	0,034	**PCTM-30-SI-G2**	P5V-CBL032A2S
	42	G1/8	13,9	19,50	50,9	20	1	0,029	**PCTM-40-SI-G1**	P5V-CBL042A1S
	42	G1/4	13,9	19,50	50,9	20	1	0,039	**PCTM-40-SI-G2**	P5V-CBL042A2S
	62	G1/8	30,2	72,50	111,0	27	1	0,066	**PCTM-60-SI-G1**	P5V-CBL062A1S
	62	G1/4	30,2	72,50	111,0	27	1	0,075	**PCTM-60-SI-G2**	P5V-CBL062A2S
	88	G1/4	60,8	165,00	223,6	42	1	0,198	**PCTM-90-SI-G2**	P5V-CBL088A2S
Suction cup, Silicone, SI without fitting										
	5	-	0,2	0,07	0,8	4	10	0,003	**-**	P5V-CBL00500S
	7	-	0,4	0,10	1,5	6	10	0,005	**-**	P5V-CBL00700S
	9	-	0,6	0,15	2,3	3	10	0,001	**PCG-10-SI**	P5V-CBL00900S
	14	-	1,5	0,98	5,7	9	10	0,001	**PCG-15-SI**	P5V-CBL01400S
250 °C	18	-	2,4	1,35	8,8	9	10	0,001	**PCG-18-SI**	P5V-CBL01800S
	20	-	3,1	2,00	11,6	9	10	0,007	**PCG-20-SI**	P5V-CBL02000S
to 0°C	32	-	8,0	10,00	29,6	13	10	0,010	**PCG-30-SI**	P5V-CBL03200S
	42	-	13,9	19,50	50,9	20	1	0,015	**PCG-40-SI**	P5V-CBL04200S
-60 °C	62	-	30,2	72,50	111,0	27	1	0,051	**PCG-60-SI**	P5V-CBL06200S
	88	-	60,8	165,00	223,6	42	1	0,164	**PCG-90-SI**	P5V-CBL08800S

Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface
Safety factor n = 2. Please see page 20 for detailed information and calculating example.

Oval suction cups, with a rubber strip skirt, are used for rough and/or abrasive surfaces. The rubber strip ensures an effective seal, while the oval shape provides high lifting force and good stability when handling thin or narrow items.

The mounting plate must not be subjected to twisting forces, and should therefore be secured by means of a swivel joint.



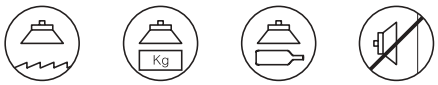
For dimensions see page 72

Specification

Working temperature [°C]	-20 to +70
Colour	Black
Hardness, Shore-A [°Sh]	50
Mounting plate	Aluminium

Selection guide (refer to symbol index on page 10)

Oval - Space Saver P5V-CVS



Order key

P 5 V - C V S 0 2 0 1 1 N

	Dimension
020	60x20 mm
032	100x32 mm

Port size

Possible combinations and order codes see main data sheet.

Main data for Oval Suction Cups, Nitrile, NBR

Symbol	Dim.	Port size	Volume	Lifting force (N)	Weight	Order code
	mm		cm^3		Kg	
Suction cup, Nitrile, NBR with female threaded fitting						
	60x20	G1/8	2,9	41,8	0,02	**P5V-CVS02011N**
	100x32	G1/4	9,8	121,4	0,07	**P5V-CVS03212N**

Specified values are theoretical and calculated according to formula
Lifting force = pressure x area / safety factor (F = p x A / n), at 75% vacuum, on flat and dry surface
Safety factor n = 2. Please see page 20 for detailed information and calculating example.

Performance data, generators

The generators from Parker have been designed for high-vacuum performance over a wide operating range. The operating characteristics of the nozzles in all models are as shown in the diagram on the right. As air consumption is directly proportional to the pressure of the supplied air, we recommend that the supply air pressure is regulated to 4 bar in order to minimise air consumption and achieve the best possible vacuum. It is at this supply air pressure that air consumption and generator response times are specified.

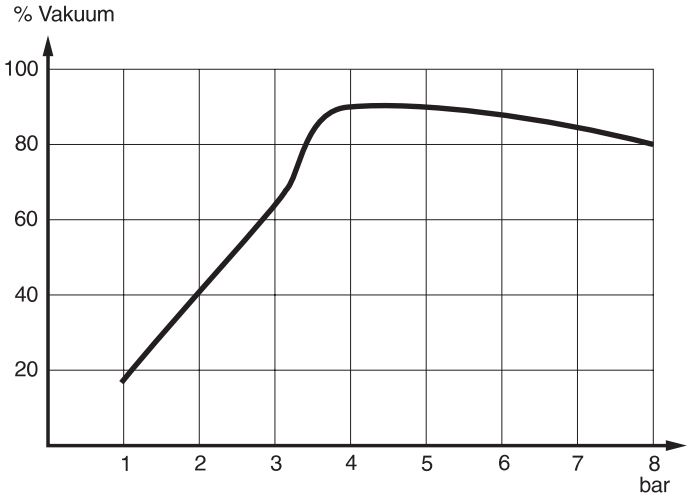
A particularly important characteristic of an generator intended for use in conjunction with suction cups for applications such as lifting sheet materials is that a safe lifting vacuum should be quickly raised. It is not safe to lift heavy loads before a vacuum of at least 75% has been raised, which means that it is of lesser importance whether an generator can raise a vacuum of 30 - 40% quickly.

What is important is in knowing which generator can quickly achieve a vacuum of 75%. The more quickly an generator can evacuate a particular volume to 75% vacuum, the less the quantity of air required to evacuate a lifting system to the safe lifting level.

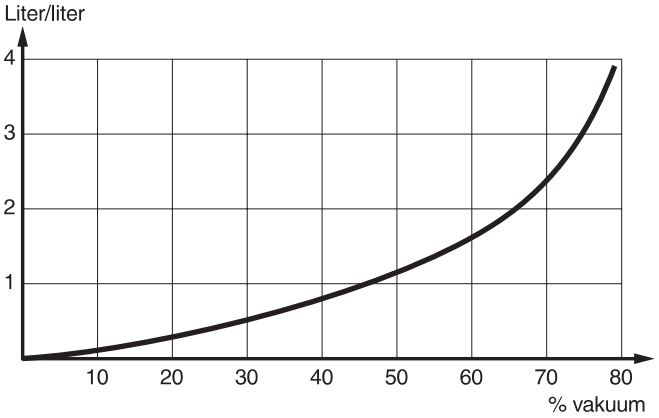
All generator models have a performance characteristic as shown in the diagram to the right, which indicates the quantity of compressed air (at a pressure of 4 bar) required to evacuate one litre of air to various vacuum levels as shown.
The Multi Function opens up new potentials for significant energy and cost savings, in addition to increasing safety in the event of loss of air or electricity supply.

A complete Multi Function unit consists of an generator with main air supply solenoid valve, a holding valve with solenoid valve for positive release and a connection for a vacuum switch, all built into a single unit.

All models incorporate an generator design in accordance with our standard generators, which means that they have excellent performance.

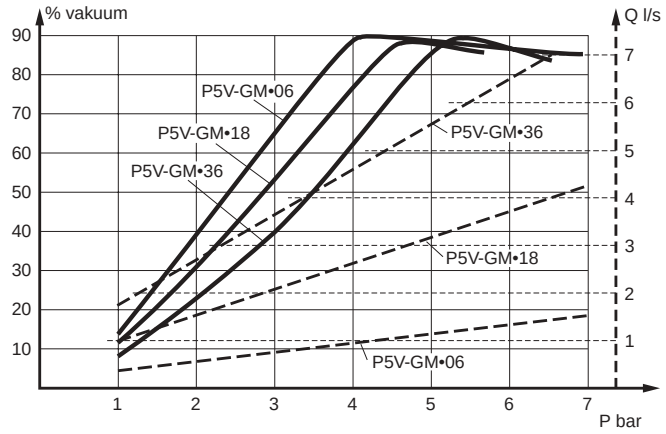


Vacuum as a function of supply air pressure.



Air consumption in litres to evacuate 1 litre of air from 1 atmosphere to various vacuums.

Performance diagram - Multi-Function



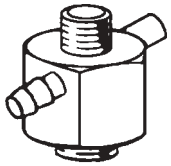
The continuous lines show the vacuum level in % as a function of supply air pressure. The dotted lines indicate air consumption as a function of supply air pressure.

Mini Generator - Single

P5V-GSN

Mini Generator - Single is a small generator, suitable for mounting directly on a suction cup. Made of brass, it has an M8 thread for securing directly to a machine or tool. Three different variants are available, differing in respect of the mounting thread, which can be either internal or external G1/8 or external G1/4.

Air consumption is 20 l/min at a supply pressure of 4 bar.



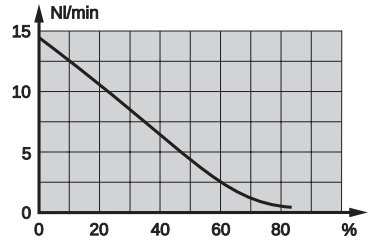
For dimensions see page 73

Specification

Material

Body, nozzles	Brass

Suction flow as function of vacuum level



Order key

P 5 V - G S N 0 2 A 1

	Port size vacuum
A1	G1/8 Male
A2	G1/4 Male
11	G1/8 Female

Main data for Mini Generator - Single

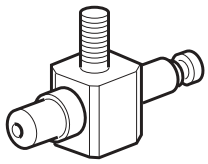
Time to evacuate 1litre to 75% vacuum s	Air consumption at 4 bar Nl/min	Port size (vacuum)	Weight Kg	Order code
9	20	G1/8 Male	0,05	**P5V-GSN02A1**
9	20	G1/4 Male	0,05	**P5V-GSN02A2**
9	20	G1/8 Female	0,05	**P5V-GSN0211**

Air supply pressure for optimum vacuum level (90%): 4 bar

Mini Generator - Compact

P5V-GCN

The Compact Mini-generator is made from aluminium profile, with air consumption of 12 to 20 l/min at 4 bar supply pressure. Complete with “Push-in” unions for air supply and a tubular ceramic silencer on the outlet port. M6 and M10 attachment for direct fixing to machinery or tools.



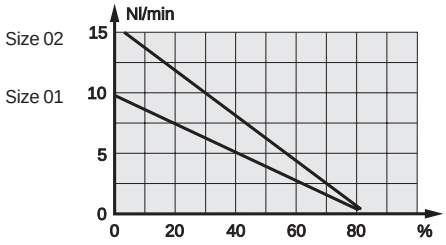
For dimensions see page 73

Specification

Material

Body	Aluminium
Nozzle	Brass
Silencer	Ceramic
Fitting	"Push-in"

Suction flow as function of vacuum level



Order key

P	5	V	-	G	C	N	0	1	1	1

	Size
01	12 Nl/min
02	20 Nl/min

Port size vacuum

Possible combinations and order codes see main data below.

Main data for Mini Generator - Compact

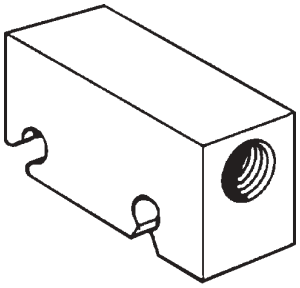
Time to evacuate 1litre to 75% vacuum s	Air consumption at 4 bar Nl/min	Port size (vacuum)	Weight Kg	Order code
15	12	G1/8 Female	0,030	**P5V-GCN0111**
8	20	G1/4 Female	0,040	**P5V-GCN0212**

Air supply pressure for optimum vacuum level (80%): 4 bar

Genarators, serie P5V-GP, are manufactured from standard profile aluminium blocks in a very wide range, having air consumptions from 20 l/min to 420 l/min at 4 bar supply pressure.

As standard, generators are supplied without positive release function, but can be fitted with this function as a special feature in the R version.

Generators with 30 respective 60 Nl air consumption per min can also be fitted with solenoids for supply pressure and positive release function.



For dimensions see page 74

Specification

Material

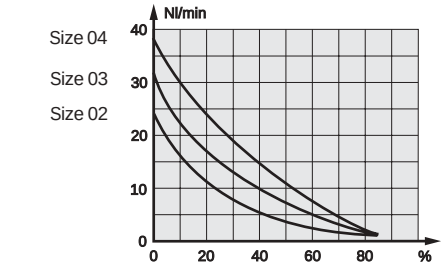
Body	Aluminium profile
Nozzle	Brass

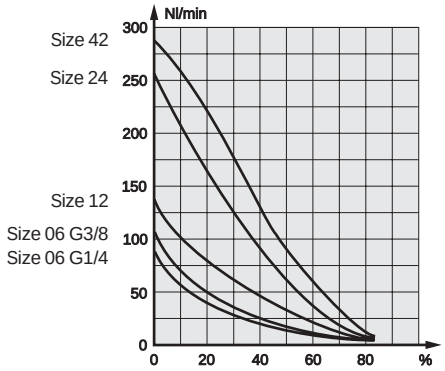
Options and additional information

Nozzles in acetal plastic on request
Rapid release option

Solenoid option:	24 VDC, 4-5 W Max tpressure 7 bar Cable connector DIN 43650 Enclosure IP65

Suction flow as function of vacuum level





Order key

P5V - GP E0312 2CP

For solenoid option only

	Options and accessories
E	Solenoid operated air supply
N	no option
R	With rapid release connection
S	Solenoid operated air supply with solenoid rapid release

	Size
02	20 Nl/min
03	30 Nl/min
04	40 Nl/min
06	60 Nl/min
12	120 Nl/min
24	240 Nl/min
42	420 Nl/min

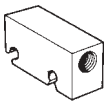
Port size vacuum

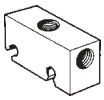
Possible combinations and order codes see main data sheet.

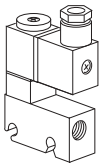
Air supply pressure for optimum vacuum level (90%): 4 bar

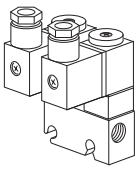
Main data for generator, Compact - Profiled

Time to evacuate 1litre to 75% vacuum s	Air consumption at 4 bar Nl/min	Port size (vacuum)	Weight Kg	Order code
Basic				
9,0	20	Female G1/8	0,06	**P5V-GPN0211**
6,0	30	Female G1/4	0,08	**P5V-GPN0312**
4,5	40	Female G1/4	0,08	**P5V-GPN0412**
3,0	60	Female G1/4	0,08	**P5V-GPN0612**
3,0	60	Female G3/8	0,10	**P5V-GPN0613**
1,5	120	Female G3/8	0,13	**P5V-GPN1213**
0,7	240	Female G1/2	0,25	**P5V-GPN2414**
0,4	420	Female G1/2	0,26	**P5V-GPN4214**
With rapid release connection				
9,0	20	Female G1/8	0,06	**P5V-GPR0211**
6,0	30	Female G1/4	0,08	**P5V-GPR0312**
4,5	40	Female G1/4	0,08	**P5V-GPR0412**
3,0	60	Female G1/4	0,08	**P5V-GPR0612**
3,0	60	Female G3/8	0,10	**P5V-GPR0613**
1,5	120	Female G3/8	0,13	**P5V-GPR1213**
0,7	240	Female G1/2	0,25	**P5V-GPR2414**
0,4	420	Female G1/2	0,26	**P5V-GPR4214**
With solenoid				
6,0	30	Female G1/4	0,19	**P5V-GPE03122CP**
3,0	60	Female G1/4	0,27	**P5V-GPE06132CP**
With solenoid and rapid release				
6,0	30	Female G1/4	0,28	**P5V-GPS03122CP**







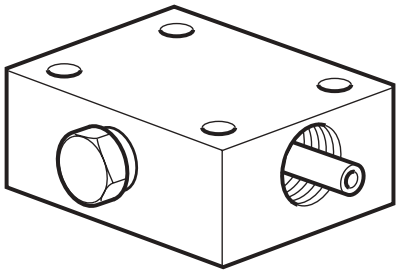


Air supply pressure for optimum vacuum level (90%): 4 bar

This range of generators give high vacuum at low supply pressure, which makes them economical on energy. The generators provide more than 85% vacuum at 4 bar supply pressure, and are made from anodised aluminium with no moving parts, which gives them high reliability.

Typical applications are suction cups, evacuation of moulds, metering of fluids and powders, vacuum chucks, leakage finding, evacuation of contaminated media etc.

The generators are provided with a special union for quick and controlled component blow-off. This union can also be used to add optional equipment such as a vacuum monitor, vacuum gauge etc.



For dimensions see page 76

Specification

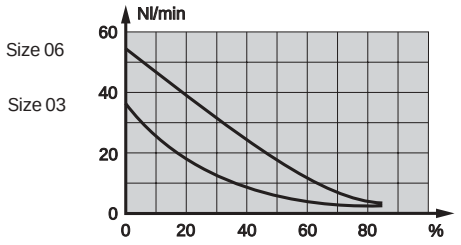
Material

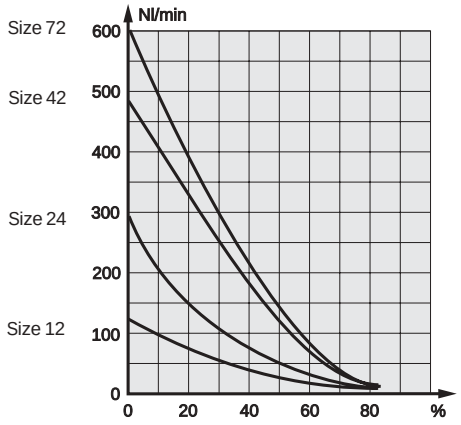
Body	Aluminium
Nozzle	Brass

Options and additional information

Nozzle in acetal plastic on request.

Suction flow as function of vacuum level





Order key

P 5 V - G A R 0 3 1 2

	Options and accessories
R*	With rapid release connection
V*	Fitted with holding valve with rapid release connection
N	No rapid release, only Size 72
*	These features are not available on size 72

	Size
03	30 Nl/min
06	60 Nl/min
12	120 Nl/min
24	240 Nl/min
42	420 Nl/min
72	720 Nl/min

Port size vacuum

Possible combinations and order codes see main data sheet.

Main data for generator, Compact - Solid

Time to evacuate 1litre to 75% vacuum s	Air consumption at 4 bar Nl/min	Port size (vacuum)	Weight Kg	Order code
Basic				
6,00	30	Female G1/4	0,08	**P5V-GAR0312**
3,00	60	Female G1/2	0,11	**P5V-GAR0614**
1,50	120	Female G1/2	0,14	**P5V-GAR1214**
0,75	240	Female G1/2	0,19	**P5V-GAR2414**
0,45	420	Female G3/4	0,24	**P5V-GAR4216**
0,25	720	Female G1/2	0,55	**P5V-GAN7214**
With holding valve				
3,00	60	Female G1/2	0,32	**P5V-GAV0614**
1,50	120	Female G1/2	0,34	**P5V-GAV1214**
0,75	240	Female G1/2	0,40	**P5V-GAV2414**
0,45	420	Female G3/4	0,45	**P5V-GAV4216**

Air supply pressure for optimum vacuum level (92%): 4 bar

Main data for Vacuum Holding Valve + Connection Cap, for stand alone use

Weight Kg	Order code
0,25	**8204950211**

Main data for Vacuum Holding Valve, to be fitted to Compact Solid Generators from P5V-GAR0614 to P5V-GAR4216

Weight Kg	Order code
0,11	**8204950201**

Generators in sizes 06-42 can also be combined with a vacuum lock, VSA60, which is a valve manifold containing two independent valves, a vacuum latching valve and an air entry valve which is installed directly on the generator. The low spring force means that the vacuum drop across the latching valve is minimal. When air supply to the generator ceases, the VSA60 retains the load with vacuum maintained. This gives energy savings and offers increased safety at the same time. The workpiece can be released quickly with a controlled compressed air signal via the air entry port of the vacuum lock.

The VSA60 can also be used separately, complete with flange unions and a housing to cover it, when you want to install generators centrally, in order to supply several suction cups with vacuum at the same time.

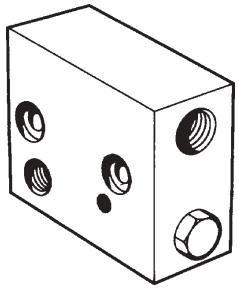
Please refer to the warning text on page 2 as well.

A range of generators, incorporating integral holding and rapid release valve features. The generators are available in four sizes, with air consumptions ranging from 20 l/min to 60 l/min at a supply pressure of 4 bar.

Incorporation of a holding valve allows vacuum to be maintained for a time after loss of the compressed air supply. The length of this time depends on the amount of leakage in the system. The holding function also allows compressed air to be saved, by operating the generator intermittently and monitoring the pressure with a vacuum switch.

The rapid release valve is used to break the vacuum by means of compressed air, in order quickly to release the load. Operation of this valve has been improved, so that it now opens at a pressure of only 0.5 bar, which means that a low pressure can be used for releasing the load.

See also the warning on page 2.



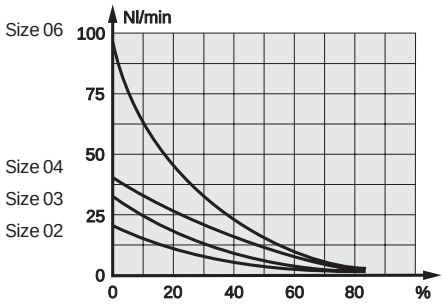
For dimensions see page 77

Specification

Material

Body	Aluminium
Nozzle	Brass
Seals	Nitrile, NBR

Suction flow as function of vacuum level



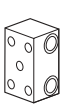
Order key

P 5 V - G W V 0 2 1 4

	Size
02	20 Nl/min
03	30 Nl/min
04	40 Nl/min
06	60 Nl/min

Main data for Generator Compact - AirSaver

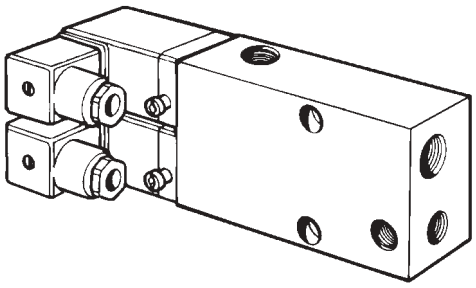
Time to evacuate 1litre to 75% vacuum s	Air consumption at 4 bar Nl/min	Port size (vacuum)	Weight Kg	Order code
9,0	20	G1/2 Female	0,18	**P5V-GWV0214**
6,0	30	G1/2 Female	0,18	**P5V-GWV0314**
4,5	40	G1/2 Female	0,18	**P5V-GWV0414**
3,0	60	G1/2 Female	0,18	**P5V-GWV0614**



Adaptor P5V-SB•
For fitting P5V-SB• vacuum switch directly to type P5V-GW generator — 0,040 — **9127 3686-93**

Air supply pressure for optimum vacuum level (90%): 4 bar

- Significant energy and cost savings
- Improve system safety
- Solenoid oprated
- Integral holding valve and solenoid controlled rapid release valve
- Connection port for vacuum switch

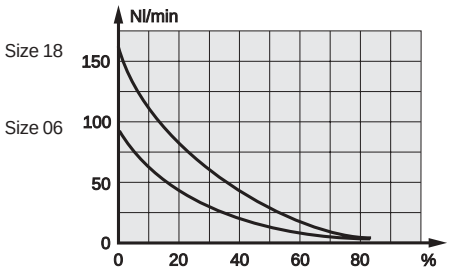


For dimensions see page 78

Specification

Body	Aluminium
Nozzle	Brass
Seals	Nitrile, NBR

Suction flow as function of vacuum level



Order key

P 5 V - G M B 0 6 1 4 2 C P

	Options and accessories
B	Solenoid (NC) operated air supply, solenoid rapid release and holding valve
F	Solenoid (NO) operated air supply, solenoidl(NC) rapid release and holding valve Only for 24 V DC

	Size
06	60 Nl/min
18	180 Nl/min
36	360 Nl/min

Voltage

Possible combinations and order codes see main data sheet.

Multi-Function provides new scope for significant energy and cost savings, as well as improving system safety in the event of loss of compressed air or electricity supply.

A complete unit consists of an generator with solenoid-valve-controlled air supply, holding valve, rapid release solenoid valve and connection point for a vacuum switch.

The large opening in the generator block is the vacuum opening, to which are connected pipes etc. to a number of suction cups for lifting the load, e.g. metal sheet.

To produce a vacuum, compressed air must be supplied to the generator nozzles. This air supply is controlled by means of the upper solenoid valve.

The function of the integral holding valve is to maintain vacuum in the suction cups and pipes until it is eventually broken by leakage between the suction cup and the load. Such leakage is unavoidable, and eventually the load will always be released. A vacuum switch is therefore connected to the vacuum duct in the generator block: when the vacuum has fallen to a preset lower level, the switch will operate and energise the upper solenoid valve for a short period, until vacuum has again been built up to a preset level at which the vacuum switch again operates, this time de-energising the solenoid valve and turning off the air supply.

In order to be able quickly to release the load when required, the lower solenoid valve controls admission of compressed air to the hoses and therefore also to the suction cups. If this were not done, the action of the integral holding valve would keep the load secured to the suction cups, carrying it back to the starting point of the cycle.

The benefits of Autovac are:
– Quieter lifting
– Safer lifting
– About 95% saving of compressed air consumption

The table below shows air consumption in brackets, as the generator stops as soon as the suction cup has gripped the load. Air consumption is therefore almost negligible.

The Multi-Function size 06, 18 and 36 units consume 60, 180 and 360 l/min respectively in continuous operation. Relative to the smallest model, the size 60, the sizes 180 and 360 exhaust air from a given volume respectively three times and six times as quickly.

Total air consumption is therefore the same for all three models.

Multi-Function P5V-GM•18 and -36 units are recommended if the total suction cup area is large and if a risk of leakage can be accepted between the suction cups and the load, as well as for applications when short cycle times are required.

All generator blocks are manufactured from black anodised aluminium. The venturi nozzles are manufactured from brass, and the holding valves from aluminium, stainless steel and Nitrilee rubber.

The solenoid valves, fitted to the Multi-Function units, are two-port valves, normally closed, with 3 mm passages. On the type P5V-GMF, the solenoid valve controlling the air supply to the generator is replaced by a normally-open two-port valve, available only in a 24 V DC version.

The cable set incorporates LED or lamp indication.
Solenoid valves are intended for operation from AC, and have an operating burden of 21 VA, with a holding burden of 12 VA/ 8W. Maximum air supply pressure is 10 bar.

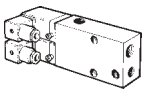
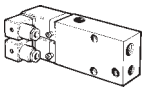
For DC solenoid valves, the operating load for a warm valve is 8 W, and the maximum supply air pressure is 6 bar.

See also the warning on page 2.

Designation	Optimum[3] operating pressure	Vacuum[1]	Air consumption	Time to evacuate 1 litre to 75% vakuum[2]	Weight
	bar	%	Nl/min.	s	kg
P5V-GM•06	4.2	80-90	(60)	3 (4.5)	0.8
P5V-GM•18	4.8	80-90	(180)	1 (2)	1
P5V-GM•36	5.5	80-90	(360)	0.5 (1)	1,5

1) At optimum supply pressure, but affected by vacuum drop across the holding valve (max = 10%). See also the function diagram
2) At 0% vacuum drop across the holding valve. Figures in brackets show the time with 10% vacuum drop across the holding valve.
3) Maximum vacuum achieved by the generator will be obtained at a supply air pressure of 4 bar, but these higher supply pressures are required in order to allow for pressure drop across the solenoid valve.

Main data for Multi-Function-generator

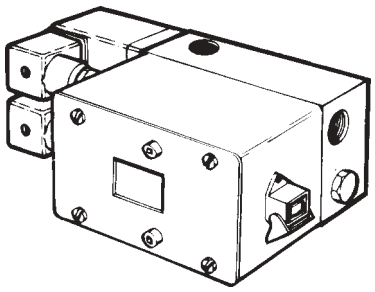
	Time to evacuate 1litre to 75% vacuum s	Air consumption at 4 bar Nl/min	Port size (vacuum)	Weight Kg	Voltage	Order code
Fitted with NC solenoid for air supply	3,0	60	G1/2 Female	0,78	24 VDC	**P5V-GMB06142CP**
	3,0	60	G1/2 Female	0,78	24 V/50Hz	**P5V-GMB06141CP**
	3,0	60	G1/2 Female	0,78	110 V/50Hz	**P5V-GMB06141EP**
	3,0	60	G1/2 Female	0,78	220 V/50Hz	**P5V-GMB06141HP**
	1,2	180	G1/2 Female	0,93	24 VDC	**P5V-GMB18142CP**
	1,2	180	G1/2 Female	0,93	24 V/50Hz	**P5V-GMB18141CP**
	1,2	180	G1/2 Female	0,93	110 V/50Hz	**P5V-GMB18141EP**
	1,2	180	G1/2 Female	0,93	220 V/50Hz	**P5V-GMB18141HP**
	0,5	360	G1/2 Female	1,45	24 VDC	**P5V-GMB36142CP**
Fitted with NO solenoid for air supply	1,2	180	G1/2 Female	0,93	24 VDC	**P5V-GMF18142CP**
						

Advanced Multi-Function generator employ electronics to provide independent control of presettable operating levels, i.e. for starting and stopping vacuum generation. The vacuum switch is a precision piezoelectric switch. The units also permit a minimum safety level to be set, in order to ensure that the load is not dropped, to provide an alarm signal. This is not possible when using conventional vacuum switches of the membrane type.

It is also possible to incorporate a display for indicating the actual vacuum pressure in the system.

They are suitable for use in applications requiring very high safety levels, e.g. press lines in the motor industry.

See also the warning on page 2.



For dimensions see page 79

Specification

Body	Aluminium
Nozzle	Brass
Seals	Nitrile, NBR

Options and additional information

Generator Multi-Function Advanced provide:

Dangerously low vacuum	ALARM
Low vacuum	Generator start
High vacuum	Generator stop

P5V-GMD18 and -36 also provide:

Direct numeric read-out of vacuum level.

Order key

P	5	V	-	G	M	C	1	8	1	4	2	C	P

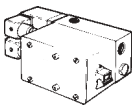
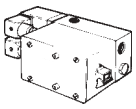
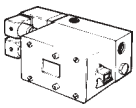
	Options and accessories
C	Solenoid (NC) operated air supply, solenoid rapid release and holding valve, inclusive electronic control system.
G	Solenoid (NO) operated air supply, solenoidl(NC) rapid release and holding valve, inclusive electronic control system.
D	As C + display for vacuum level.

	Size
18	180 Nl/min
36	360 Nl/min

	Voltage
2C	24 VDC

Possible combinations and order codes see main data sheet.

Main data for Multi-Function-generator

	Time to evacuate 1l to 75% vacuum s	Air consumption at 4 bar Nl/min	Port size (vacuum)	Weight Kg	Order code
With NC solenoid for air supply	1,2	180	G1/2 Female	1,50	**P5V-GMC18142CP**
	0,5	360	G1/2 Female	1,50	**P5V-GMC36142CP**
					
With NO solenoid for air supply	1,2	180	G1/2 Female	1,50	**P5V-GMG18142CP**
	0,5	360	G1/2 Female	1,50	**P5V-GMG36142CP**
					
With NC solenoid for air supply and display	1,2	180	G1/2 Female	1,50	**P5V-GMD18142CP**
	0,5	360	G1/2 Female	1,50	**P5V-GMD36142CP**
					
Female cable connector for connection to electric control system, 6 pins				0,05	**9126900674**

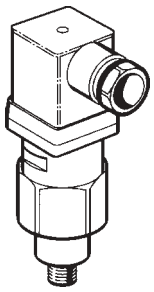
Designation	Optimum[3] operating pressure bar	Vacuum[1] %	Air consumption Nl/min.	Time to evacuate 1 litre to 75% vakuum[2] s	Weight kg
P5V-GM•18	4.8	80-90	(180)	1 (2)	1,5
P5V-GM•36	5.5	80-90	(360)	0.5 (1)	1,5

1) At optimum supply pressure, but affected by vacuum drop across the holding valve (max = 10%). See also the function diagram
2) At 0% vacuum drop across the holding valve. Figures in brackets show the time with 10% vacuum drop across the holding valve.
3) Maximum vacuum achieved by the generator will be obtained at a supply air pressure of 4 bar, but these higher supply pressures are required in order to allow for pressure drop across the solenoid valve.

Vacuum Switch P5V-SV

The P5V-SV is an improved adjustable vacuum switch of membrane type, having changeover contact function. Cables are connected using a DIN 43650A cable set. The switch is capable of withstanding positive pressures up to 35 bar. It is easy to adjust, has low weight and it is attractively designed.

As delivered, the switch is preset for 75% vacuum.



For dimensions see page 80

Specification

Material

Body	Black anodised aluminium
Cap	Thermoplastic

Technical data

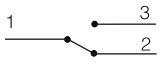
Working pressure	15% to 90% vacuum (-0,15 to -0,9 bar)
Working temperature [°C]	-40 to +80
Maximum over pressure	Up to 35 bar

Options and additional information

Repeatability	±2%
Hysteresis	20% of the preset value (0,15 bar at 75% vacuum)
Enclosure	IP 65
Contact loading	250 VAC/24 VDC 5 A inductive 7 A resistive

Preset value: 75% vacuum

Main data for Vacuum Switch

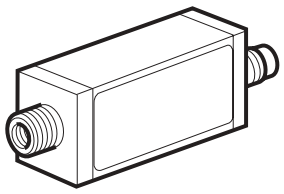
Symbol	Connection (vacuum)	Weight Kg	Order code
	Male G1/8	0,090	**P5V-SVVA16K**

Semi-conductor based vacuum/pressure switch. For pressure ranges of 0 - 1 bar and for -1 to+10 bar, which serve as both switches and sensors.

A piezo-resistive sensor converts the vacuum/pressure to an electrical signal, which is amplified and transmitted, to both an analogue signal output and to a digital switch.

The analogue signal can be used for setting, remote reading of current vacuum/pressure etc., or for production control.

Switching pressure and hysteresis of the digital switch are set by individual potentiometers. When the pressure has fallen to the set vacuum value, or has risen to the set pressure value, an output signal is generated. A built-in LED indicates switch status and facilitates setting.



For dimensions see page 80

Specification

Material

Body	Poly-carbonate
Bracket	Surface treated steel
Pressure connection	Zinc

Technical data

	MPS-V1G-PC/NC	MPS-V1E-PC/NC	MPS-P1G-PC/NC	MPS-P1E-PC/NC
Working pressure [bar]	0 to -1 bar	0 to -1 bar	-1 to 10	-1 to 10
Working temperature [°C]	0 to +50	0 to +50	0 to +50	0 to +50
Overpressure [bar]	+5 bar	+5 bar	+15 bar	+15 bar
Switch function	PNP alt. NPN	PNP alt. NPN	PNP alt. NPN	PNP alt. NPN
Electrical connection	M8-Connector, 4 pins	M8-Connector, 4 pins	M8-Connector, 4 pins	M8-Connector, 4 pins
Air connection	M5F and G1/8, M	Flange and M5	M5F and G1/8, M	Flange and M5

Options and additional information

Other technical data, see page 54.
Function see diagram, page 54.

Order key

M P S - V 1 E - PC

	Pressure range
V	0 to -1 bar
P	0 to 10 bar

	Pressure conn.
E	Flange mounting with O-ring or M5 Female
G	G1/8 Male or M5 Female

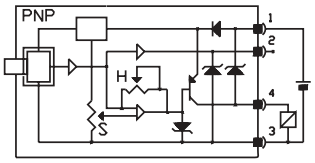
	Electrical connection
PC	PNP, M8-Connector 4 pins + LED
NC	NPN, M8-Connector 4 pins + LED

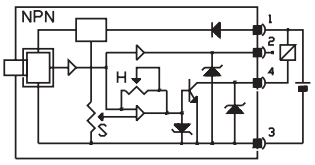
Possible combinations and order codes see main data sheet.

Technical data

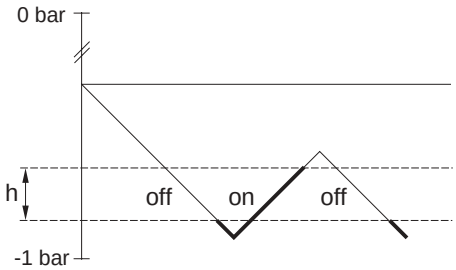
Media	Non corrosive gases and non lubricated air
Power supply	10,8 - 30 VDC ripple (P-P) 10% max. reverse voltage protection
Switch output	N.O., max 125 mA, status indication by LED switching point setting by 3-turn trimmer PNP or NPN version NOTE! Pressure Switch MPC-P1G-PC/NC and MPS-P1E-PC/NC are normally closed in area 0 to -1 bar
Analog output	1 - 5 VDC ± 0,04 V
Hystereses	Adjustable (3 - 25%) MPS-V1G-PC/NC, MPS-V1E-PC/NC: 2 - 20% (-0,3 to - 1 bar) setting by 3/4-turn trimmer
Enclosure	IP 65 (without venting connection IP 40)
Accuracy	± 1% F.S.
Thermal error	± 3% F.S. in temperature range 0 - 50 °C (32-122 °F)
Response time	<5 ms
Current consumption	<20 mA
Spike protection	400 VP, 1 ms
Insulation resistance	>100 MW at 500 VDC
Operating temperature	0 - 50 °C (32 - 122 °F)
Storage temperature	-10 - 60 °C (14-140 °F)
Humidity	35 - 85% RH
Vibration resistance	10 - 55 Hz, 1,5 mm, 2 hrs
Shock resistance	100 G

Schematic diagram

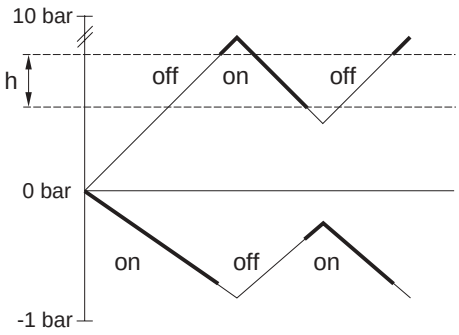




Pins	Function
1	Supply voltage, V+
2	Analog output
3	Common –, V–
4	Switch output, PNP alt. NPN



MPS-V1E-PC/NC
MPS-V1G-PC/NC



MPC-P1G-PC/NC
MPS-P1E-PC/NC

Main data for Vacuum Switch/Pressure Switch

Description	Connection (vacuum/pressure)	Weight Kg	Order code	Old order code
Vacuum switch, (0 to -1 bar), PNP output	M5 inv./G1/8 male	0,030	**MPS-V1G-PC**	P5V-SCVA15CP
Vacuum switch, (0 to -1 bar), NPN output	M5 inv./G1/8 male	0,030	**MPS-V1G-NC**	P5V-SCVA15CN
Vacuum switch, (0 to -1 bar), PNP output	Flange/M5 female	0,043	**MPS-V1E-PC**	P5V-SBV355CP
Vacuum switch, (0 to -1 bar), NPN output	Flange/M5 female	0,043	**MPS-V1E-NC**	P5V-SBV355CN
Pressure switch , (-1 to +10 bar), PNP output	M5 inv./G1/8 male	0,030	**MPS-P1G-PC**	P5V-SCCA15CP
Pressure switch, (-1 to +10 bar), NPN output	M5 inv./G1/8 male	0,030	**MPS-P1G-NC**	P5V-SCCA15CN
Pressure switch , (-1 to +10 bar), PNP output	Flange/M5 female	0,043	**MPS-P1E-PC**	P5V-SBC355CP
Pressure switch , (-1 to +10 bar), NPN output	Flange/M5 female	0,043	**MPS-P1E-NC**	P5V-SBC355CN

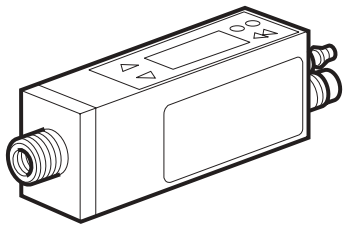
Cables

Connection cables, see page 56.

Electronic semiconductor-based vacuum/pressure switch with LED display to indicate vacuum/pressure level of the selected pressure unit. For non-corrosive gases and un-lubricated air. Available for pressure ranges of 0 - 1 bar and for -1 to+10 bar. It serves as both a normally open NO and normally closed NC switch, and has two independently adjustable switching points with adjustable hysteresis.

Electrical connection by means of a four-pin M8 connector and compressed air unions are Male G 1/8 or Female M5.

Suitable for optimising and control of sequence times, automatic air misers used for lifting or transporting, or for other types of production equipment.



For dimensions see page 81

Specification

Material

Body	Poly-carbonate
Bracket	Surface treated steel
Pressure connection	Zinc

Technical data

	MPS-V2G-PC	MPS-V2G-NC	MPS-P2G-PC	MPS-P2G-NC
Working pressure [bar]	0 to -1 bar	0 to -1 bar	0 to 10	0 to 10
Working temperature [°C]	0 to +50	0 to +50	0 to +50	0 to +50
Overpressure [bar]	+5 bar	+5 bar	+15 bar	+15 bar
Switch function	PNP	NPN	PNP	NPN
Electrical connection	M8-Connector, 4 pins	M8-Connector, 4 pins	M8-Connector, 4 pins	M8-Connector, 4 pins
Air connection	M5F and G1/8, M	M5F and G1/8, M	M5F and G1/8, M	M5F and G1/8, M

Options and additional information

Display with 3-digit 7-segment LED
Other technical data, see page 56.
Function see diagram, page 56

Order key

M P S - P 2 G - PC

	Pressure range
V	0 to -1 bar
P	0 to 10 bar

	Pressure conn.
G	G1/8 Male or M5 Female

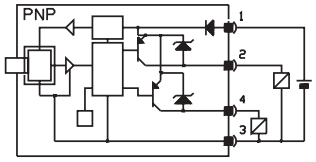
	Electrical connection
PC	PNP, M8-Connector 4 pins + LED
NC	NPN, M8-Connector 4 pins + LED

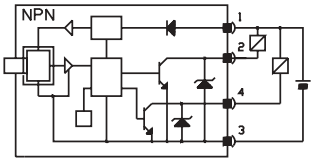
Possible combinations and order codes see main data sheet.

Technical data

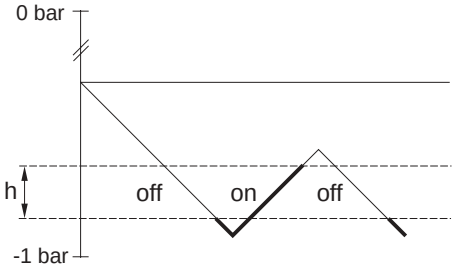
Media	Non corrosive gases and non lubricated air
Power supply	10,8 - 30 VDC ripple (P-P) 10% max. reverse voltage protection
2 switch outputs	Individually selectable NO or NC max 125 mA, indiction by individual LED display PNP or NPN version overcurrent protection
Display	3-digit 7-segment LED
Pressure units	bar, mmHg, inHg, kPa (MP2-V2G-PC, MP2-P2G-NC) bar, psi, kg/cm2, Mpa (MPS-P2G-PC, MPS-P2G-NC)
Display resolution	0,01 bar, 5 mmHg, 0,2 inHG, 1 kPa (MP2-V2G-PC, MP2-P2G-NC) 0,1 bar, 1 psi, 0,05 kg/cm2, 0,01 MPa (MPS-P2G-PC, MPS-P2G-NC)
Hysteresis	0 - 100% of switching point setting
Electrical connection	M8-Connector with 4 pins
Enclosure	IP 65 (without venting connection IP 40)
Accuracy	± 1% F.S.
Thermal error	± 3% F.S. in temperature range 0 - 50 °C (32-122 °F)
Response time	<5 ms
Current consumption	< 55 mA
Spike protection	350 VP, 1 ms
Insulation resistance	>100 MW at 500 VDC
Operating temperature	0 - 50 °C (32 - 122 °F)
Storage temperature	-10 - 60 °C (14-140 °F)
Humidity	35 - 85% RH
Vibration resistance	10 - 55 Hz, 1,5 mm, 2 hrs
Shock resistance	10 G

Schematic diagram

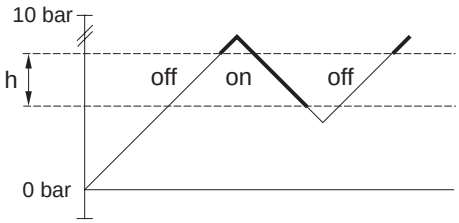




Pins	Function
1	Supply voltage, V+
2	Analog output
3	Common –, V–
4	Switch output, PNP alt. NPN



MPS-V2G-PC
MPS-V2G-NC



MPS-P2G-PC
MPS-P2G-NC

Main data for Vacuum Switch/Pressure Switch

	Description	Connection (vacuum/pressure)	Weight Kg	Order code	Old order code
	Vacuum switch, (0 to -1 bar), PNP output	M5 female/G1/8 male	0,035	**MPS-V2G-PC**	P5V-SAVA15CP
	Vacuum switch , (0 to -1 bar), NPN output	M5 female/G1/8 male	0,035	**MPS-V2G-NC**	P5V-SAVA15CN
	Pressure switch, (0 to +10 bar), PNP output	M5 female/G1/8 male	0,035	**MPS-P2G-PC**	P5V-SACA15CP
	Pressure switch , (0 to +10 bar), NPN output	M5 female/G1/8 male	0,035	**MPS-P2G-NC**	P5V-SACA15CN

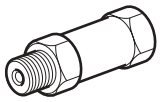
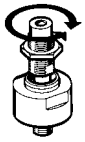
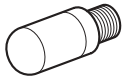
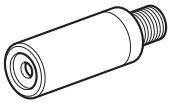
Cables

	Description	Material	Length m	Weight Kg	Order code	Old order code
	Cable with M8 female, threaded connector, straight	PVC	2	0,065	**CB-M8-4P-2M**	P8L-MC04A2A
	Cable with M8 female, threaded connector, straight	PUR	5	0,140	**CB-M8-4P-5M**	P8L-MC04A5A
	Cable with M8 female, threaded connector, angled	PUR	5	0,140	**CB-M8-4P-5M-90**	P8L-MC04R5A

Cable dimension 4 x 0,25 mm^2
Colour code, pins: 1 = Brown, 2 = White, 3 = Blue, 4 = Black

Main data for Vacuum components and accessories

For dimensions, see pages 81 to 85

	Material	Description	Connection	Weight Kg	Order code
Vacuum gauge	Black jointed steel				
		Vacuum gauge Ø40 *	Male G1/8	0,070	**P6G-DRA1V10**
		Vacuum gauge Ø63 **	Male G1/8	0,151	**P6G-FRA1V10**
		* 0 to -100 kPa and 0 to -1,0 bar dial. Accurancy±1,6%. Max +60 °C			
		** 0 to -1,0 bar dial with Coloured areas for visual reading Accurancy ±1,6 %. Max +60 °C			
Vacuum cut-off valve	Anodised aluminium				
		Female/Male	M5	0,0022	**P5V-BKS35**
		Female/Male	G1/8	0,0112	**P5V-BKS11**
		Female/Male	G1/4	0,0175	**P5V-BKS12**
		Female/Male	G3/8	0,0303	**P5V-BKS13**
		Female/Male	G1/2	0,0474	**P5V-BKS14**
		For use when there is a risk of one or more suction cups not in contact with the part to be lifted.			
Swivel mount	Galvanised steel and brass				
		Swiveling ball joint mounting 15°	Male G1/4	0,112	**9301054618**
Silencer	Sintered plastic				
			Male G1/4	0,004	**P6M-PAB2**
			Male G3/8	0,012	**P6M-PAB3**
			Male G1/2	0,035	**P6M-PAB4**
			Male G1	0,060	**P6M-PAB8**
Silencer	Body: Delrin Cartridge: Ceramic				
			Male G1/8	0,010	**P6M-CSA1**
			Male G1/8	0,025	**P6M-CBA1**
			Male G1/4	0,050	**P6M-CBA2**
			Male G3/8	0,057	**P6M-CBA3**
			Male G1/2	0,055	**P6M-CBA4**
			Male G1	0,060	**P6M-CBA8**

	Spring length mm	Connection vacuum	Connection Suction cup	Weight Kg	Order code	Old Order code
Spring support						
Material:	Mounting body: Galvanised steel, Mounting bearings: Brass, Spring: Surface treated steel					
	10	Female M3	Push-in, PFG/PFTM/PFTF Ø2-3,5	0,015	**FTYS-2A-10-M3**	P5V-ARC1110A
	15	Female M3	Push-in, PFG/PFTM/PFTF Ø2-3,5	0,020	**FTYS-2A-15-M3**	P5V-ARC1115A
	10	Female M5	Female M5	0,015	**FTYS-M5F-10-M5**	P5V-ARC2710A
	10	Female M5	Push-in, PFG/PFTM/PFTF Ø5-15, -PB• Ø10-15	0,020	**FTYS-5A-10-M5**	P5V-ARC1210A
	15	Female M5	Push-in, PFG/PFTM/PFTF Ø5-15, -PB• Ø10-15	0,030	**FTYS-5A-15-M5**	P5V-ARC1215A
	15	Female M5	Push-in, PF•• Ø20-40, -PB• Ø20-40	0,070	**FTYS-20B-15-M5**	P5V-ARC1315A
	30	Female M5	Push-in, PF•• Ø20-40, -PB• Ø20-40	0,030	**FTYS-20B-30-M5**	P5V-ARC1330A
	15	Female M5	Push-in, PFG/PFTM/PFTF Ø50, -PB• Ø50	0,070	**FTYS-50-15-M5**	P5V-ARC1415A
	30	Female M5	Push-in, PFG/PFTM/PFTF Ø50, -PB• Ø50	0,090	**FTYS-50-30-M5**	P5V-ARC1430A
	45	Female G1/8	Male M10x1,25	0,300	**FTYS-60-30-G1**	P5V-ARC2545E
	70	Female G1/8	Male M10x1,25	0,400	**FTYS-60-50-G1**	P5V-ARC2570E
	95	Female G1/8	Male M10x1,25	0,485	**FTYS-60-70-G1**	P5V-ARC2595E
	35	Female G1/4	Flange bracket 4XM8, see drawing, page 84	0,850	**FTYS-120-20-G2**	P5V-ARC4635E
	100	Female G1/4	Flange bracket 4XM8, see drawing, page 84	1,200	**FTYS-120-70-G2**	P5V-ARC46100E

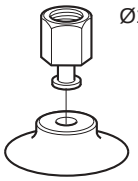
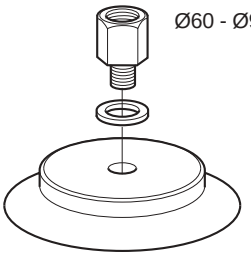
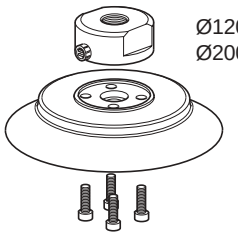
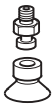
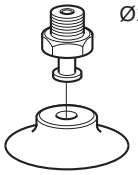
PF•• = PFOG/PFOTF/PFOTM/PFG/PFTM/PFTF PB•• = PBTF/PBTM/

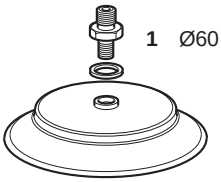
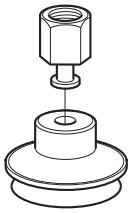
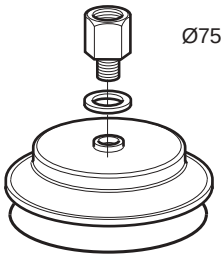
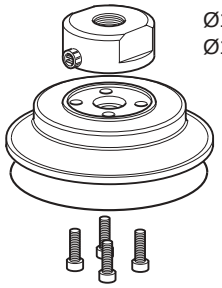
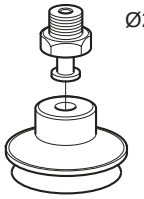
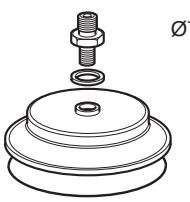
Main data for Vacuum components and accessories

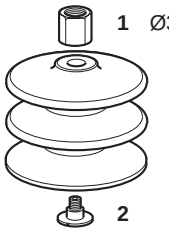
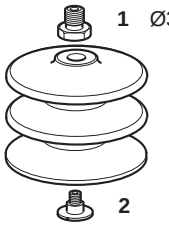
	Material	Connection	Weight Kg	Order code	Old order code
Grid filter	Brass				
		Male G1/8	0,001	**P5V-FLNA1**	
		Male G1/4	0,003	**P5V-FLNA2**	
		Male G1/2	0,007	**P5V-FLNA4**	
Male **threaded adaptor**	Zinc-plated Brass				
		M5/2	0,001	**FTM-2A-M5**	9301054672
		M5/2,5	0,002	**FTM-5A-M5**	9301054621
		M5/3,5	0,004	**CTM-10-M5**	9301054652
		M6/3,5	0,004	**CTM-10-M6**	9301054653
		G1/8M/3,5	0,006	**CTM-10-G1**	9301054651
Male threaded		G1/8M/5	0,003	**9301054671**	
Push-in adaptor	Aluminium	G1/8M-M6F	0,006	**ADA-G1M-M6F**	9301054623
		G1/4-G1/8F	0,010	**9301054655**	
		G1/4M-M6F	0,016	**ADA-G2M-M6F**	9301054624
		G1/4M-M10x1,25	0,007	**FTM-60-G2**	9301054625
		G1/8M/10	0,004	**FTM-20-G1**	9301054676
		G1/4M/10	0,006	**FTM-20B-G2**	9301054677
		G1/8M/14	0,005	**FTM-50-G1**	9301054678
		G1/4M/14	0,009	**FTM-50-G2**	9301054679
		Seal G1/8	0,001		9301054626
		Seal G1/4	0,001		9301054627
Double female threaded adaptor	Zinc-plated Brass				
		G1/8F/8	0,004	**9301054666**	
		G1/8F/10	0,005	**FTF-20-G1**	9301054668
		G1/4F/10	0,008	**FTF-20B-G2**	9301054669
		G1/8F/14	0,007	**FTF-50-G1**	9301054670
		G1/4F/14	0,010	**FTF-50-G2**	9301054674
Female threaded		G1/4F/M10x1,25	0,008	**FTF-60-G2**	9301054675
Push-in adaptor	Aluminium	G1/8F/3,5	0,006	**CTF-10-G1**	9301054654
		G1/8F-M5F	0,011	**ADA-G1F-M5F**	9301054628
		G1/8F-M6F	0,010	**ADA-G1F-M6F**	9301054629
		G1/4F-M6F	0,022	**ADA-G2F-M6F**	9301054630
		G1/2+1/8F	0,236	**FTF-120-G4**	9301054631
Screw	Zinc-plated Brass				
		M6M/32	0,008	**CTM-30-M6**	9301054650
		G1/8M/88	0,024	**CTM-90-G1**	9301054649
Double Male threaded adaptor	Zinc-plated Brass				
		M5-G1/2	0,050	**9721900145**	
		G1/8-G1/4	0,018	**9721900183**	
		G1/8-G1/2	0,042	**9721900146**	
		G1/4-G1/4	0,018	**9721900182**	
		G1/4-G1/2	0,044	**9721900147**	
		G3/8-G1/2	0,040	**9721900148**	
		G1/2-G1/2	0,050	**9721900150**	
		G1/2-G3/4	0,054	**0603602200**	
		G1/2-G1	0,135	**0603554100**	
		G3/4-G1	0,082	**0603554300**	
		G1/8-M5	0,008	**9721900149**	
Special mount	Surface treated steel				
		Male G1/4	0,050	**9121719318**	
		Male M10	0,054	**9121679950**	

For Suction cup Type P5V-CFA.

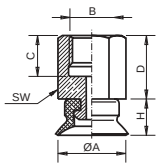
Connections for suction cups

	Suction cup Ø mm	Connection	Order code	Old order code
PFG, Female thread				
PFOG	15	G1/8, Female	**9301054666**	
 Ø15 - Ø50	20	G1/8, Female	**FTF-20-G1**	9301054668
	25	G1/8, Female	**FTF-20-G1**	9301054668
		G1/4, Female	**FTF-20B-G2**	9301054669
	30	G1/8, Female	**FTF-20-G1**	9301054668
		G1/4, Female	**FTF-20B-G2**	9301054669
	35	G1/8, Female	**FTF-20-G1**	9301054668
		G1/4, Female	**FTF-20B-G2**	9301054669
 Ø60 - Ø95	40	G1/8, Female	**FTF-20-G1**	9301054668
		G1/4, Female	**FTF-20B-G2**	9301054669
	50	G1/8, Female	**FTF-50-G1**	9301054670
		G1/4, Female	**FTF-50-G2**	9301054674
	60	G1/4, Female	**FTF-60-G2**	9301054675
	80	G1/4, Female	**FTF-60-G2**	9301054675
	95	G1/4, Female	**FTF-60-G2**	9301054675
PFG, Female thread				
 Ø120 - Ø200	120	G1/2, Female	**FTF-120-G4**	9301054631
	150	G1/2, Female	**FTF-120-G4**	9301054631
	200	G1/2, Female	**FTF-120-G4**	9301054631
PFG, Male thread				
PFOG	2	M5, Male	**FTM-2A-M5**	9301054672
 Ø2- Ø10	3	M5, Male	**FTM-2A-M5**	9301054672
	5	M5, Male	**FTM-5A-M5**	9301054621
	10	M5, Male	**FTM-5A-M5**	9301054621
	15	M5, Male	**FTM-5A-M5**	9301054621
 Ø15- Ø50	20	G1/8, Male	**FTM-20-G1**	9301054676
	25	G1/8, Male	**FTM-20-G1**	9301054676
	25	G1/4, Male	**FTM-20B-G2**	9301054677
	30	G1/8, Male	**FTM-20-G1**	9301054676
	30	G1/4, Male	**FTM-20B-G2**	9301054677
	35	G1/8, Male	**FTM-20-G1**	9301054676
	35	G1/4, Male	**FTM-20B-G2**	9301054677
	40	G1/8, Male	**FTM-20-G1**	9301054676
	40	G1/4, Male	**FTM-20B-G2**	9301054677
	50	G1/8, Male	**FTM-50-G1**	9301054678
	50	G1/4, Male	**FTM-50-G2**	9301054679

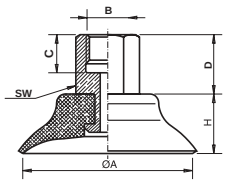
	Suction cup Ø mm	Connection	Order code	Old order code
PFG, Male thread				
 **1** Ø60 - Ø95	60	G1/4, Male	**FTM-60-G2**	9301054625
	80	G1/4, Male	**FTM-60-G2**	9301054625
	95	G1/4, Male	**FTM-60-G2**	9301054625
PBG, Female thread				
 Ø20 - Ø50	20	G1/8, Female	**FTF-20-G1**	9301054668
	30	G1/8, Female	**FTF-20-G1**	9301054668
	30	G1/4, Female	**FTF-20B-G2**	9301054669
	40	G1/8, Female	**FTF-20-G1**	9301054668
	40	G1/4, Female	**FTF-20B-G2**	9301054669
	50	G1/8, Female	**FTF-50-G1**	9301054670
	50	G1/4, Female	**FTF-50-G2**	9301054674
 Ø75	75	G1/4, Female	**FTF-60-G2**	9301054675
PBG, Female thread				
 Ø110 - Ø150	110	G1/2, Female	**FTF-120-G4**	9301054631
	150	G1/2, Female	**FTF-120-G4**	9301054631
PBG, Male thread				
 Ø10 - Ø15	10	M5, Male	**FTM-5A-M5**	9301054621
	15	M5, Male	**FTM-5A-M5**	9301054621
 Ø20 - Ø50	20	G1/8, Male	**FTM-20-G1**	9301054676
	30	G1/8, Male	**FTM-20-G1**	9301054676
	30	G1/4, Male	**FTM-20B-G2**	9301054677
	40	G1/8, Male	**FTM-20-G1**	9301054676
	40	G1/4, Male	**FTM-20B-G2**	9301054677
	50	G1/8, Male	**FTM-50-G1**	9301054678
	50	G1/4, Male	**FTM-50-G2**	9301054679
 Ø75	75	G1/4, Male	**FTM-60-G2**	9301054625

	Suction cup Ø mm	Connection	Order code, 1	Olde code 1	Connection	Order code, 2	Old code 2
PCG, Female thread							
 **1** Ø9 - Ø20	9	G1/8, Female	**CTF-10-G1**	9301054654			
	14	G1/8, Female	**CTF-10-G1**	9301054654			
	18	G1/8, Female	**CTF-10-G1**	9301054654			
	20	G1/8, Female	**CTF-10-G1**	9301054654			
 **1** Ø32 - Ø62							
	32	G1/8, Female	**ADA-G1-M6F**	9301054629	M6, Male	**CTM-30-M6**	9301054650
	32	G1/4, Female	**ADA-G2-M6F**	9301054630	M6, Male	**CTM-30-M6**	9301054650
	42	G1/8, Female	**ADA-G1-M6F**	9301054629	M6, Male	**CTM-30-M6**	9301054650
	42	G1/4, Female	**ADA-G2-M6F**	9301054630	M6, Male	**CTM-30-M6**	9301054650
2	62	G1/8, Female	**ADA-G1-M6F**	9301054629	M6, Male	**CTM-30-M6**	9301054650
	62	G1/4, Female	**ADA-G2-M6F**	9301054630	M6, Male	**CTM-30-M6**	9301054650
PCG, Male thread							
 **1** Ø7 - Ø20	5	G1/8, Male	**9301054671**				
	7	G1/8, Male	**9301054671**				
	9	M5, Male	**CTM-10-M5**	9301054652			
	9	M6, Male	**CTM-10-M6**	9301054653			
	9	G1/8, Male	**CTM-10-G1**	9301054651			
	14	M5, Male	**CTM-10-M5**	9301054652			
	14	M6, Male	**CTM-10-M6**	9301054653			
	14	G1/8, Male	**CTM-10-G1**	9301054651			
	18	M5, Male	**CTM-10-M5**	9301054652			
	18	M6, Male	**CTM-10-M6**	9301054653			
	18	G1/8, Male	**CTM-10-G1**	9301054651			
	20	M5, Male	**CTM-10-M5**	9301054652			
	20	M6, Male	**CTM-10-M6**	9301054653			
	20	G1/8, Male	**CTM-10-G1**	9301054651			
PCG, Male thread							
 **1** Ø32 - Ø88							
	32	G1/8, Male	**ADA-G1M-M6F**	9301054623	M5, Male	**CTM-30-M6**	9301054650
	32	G1/4, Male	**ADA-G2M-M6F**	9301054624	M5, Male	**CTM-30-M6**	9301054650
	42	G1/8, Male	**ADA-G1M-M6F**	9301054623	M5, Male	**CTM-30-M6**	9301054650
	42	G1/4, Male	**ADA-G2M-M6F**	9301054624	M5, Male	**CTM-30-M6**	9301054650
2	62	G1/8, Male	**ADA-G1M-M6F**	9301054623	M5, Male	**CTM-30-M6**	9301054650
	62	G1/4, Male	**ADA-G2M-M6F**	9301054624	M5, Male	**CTM-30-M6**	9301054650
	88	G1/4, Male	**9301054655**		G1/8, Male	**CTM-90-G1**	9301054649

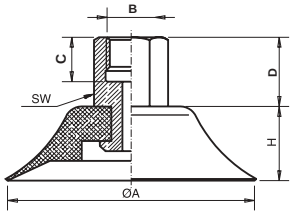
PFTF-15A-NBR/SI-G1



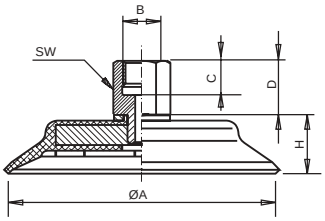
PFTF-20B-NBR/SI-G1
PFTF-25-NBR/SI-G1
PFTF-25-NBR/SI-G2
PFTF-30--NBR/SI-G1
PFTF-30-NBR/SI-G2
PFTF-35-NBR/SI-G1
PFTF-35-NBR/SI-G2
PFTF-40-NBR/SI-G1
PFTF-40-NBR/SI-G2



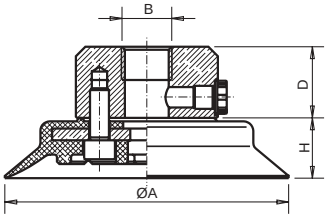
PFTF-50-NBR/SI-G1
PFTF-50-NBR/SI-G2



PFTF-60-NBR/SI-G2
PFTF-80-NBR/SI-G2
PFTF-95-NBR/SI-G2



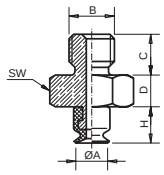
PFTF-120-NBR/SI-G4
PFTF-150-NBR/SI-G4
PFTF-200-NBR/SI-G4



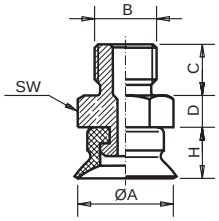
Flat suction cup with female fitting

Order code	Old order code	A	B	C	D	H	SW
PFTF-15A-NBR/SI-G1	P5V-CFF01511N/S	15	G1/8	9,0	14,0	8,0	13
PFTF-20B-NBR/SI-G1	P5V-CFF02011N/S	20	G1/8	9,0	14,0	12,3	13
PFTF-25-NBR/SI-G1	P5V-CFF02511N/S	25	G1/8	9,0	14,0	14,0	13
PFTF-25-NBR/SI-G2	P5V-CFF02512N/S	25	G1/4	11,0	17,5	14,0	17
PFTF-30-NBR/SI-G1	P5V-CFF03011N/S	30	G1/8	9,0	14,0	12,0	13
PFTF-30-NBR/SI-G2	P5V-CFF03012N/S	30	G1/4	11,0	17,5	12,0	17
PFTF-35-NBR/SI-G1	P5V-CFF03511N/S	35	G1/8	9,0	14,0	14,0	13
PFTF-35-NBR/SI-G2	P5V-CFF03512N/S	35	G1/4	11,0	17,5	14,0	17
PFTF-40-NBR/SI-G1	P5V-CFF04011N/S	40	G1/8	9,0	14,0	14,0	13
PFTF-40-NBR/SI-G2	P5V-CFF04012N/S	40	G1/4	11,0	17,5	14,0	17
PFTF-50-NBR/SI-G1	P5V-CFF05011N/S	50	G1/8	9,0	14,0	15,0	13
PFTF-50-NBR/SI-G2	P5V-CFF05012N/S	50	G1/4	11,0	17,5	15,0	17
PFTF-60-NBR/SI-G2	P5V-CFR06012N/S	60	G1/4	11,0	17,5	18,5	17
PFTF-80-NBR/SI-G2	P5V-CFR08012N/S	80	G1/4	11,0	17,5	20,5	17
PFTF-95--NBR/SI-G2	P5V-CFR09512N/S	95	G1/4	11,0	17,5	21,0	17
PFTF-120-NBR/SI-G4	P5V-CFR12014N/S	120	G1/2	-	30,0	25,5	-
PFTF-150-NBR/SI-G4	P5V-CFR15014N/S	150	G1/2	-	30,0	32,5	-
PFTF-200-NBR/SI-G4	P5V-CFR20014N/S	200	G1/2	-	30,0	37,5	-

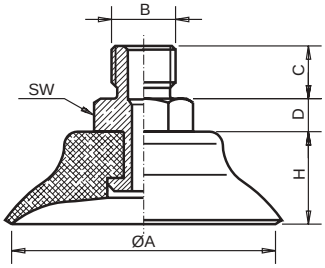
PFTM-2A-NBR/SI-M5
PFTM-3.5A-NBR/SI-M5
PFTM-5A-NBR/SI-M5



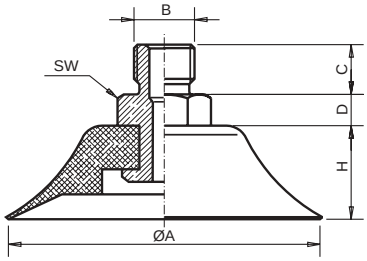
PFTM-10A-NBR/SI-M5
PFTM-15A-NBR/SI-M5



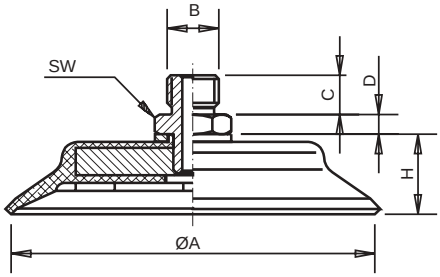
PFTM-20B-NBR/SI-G1
PFTM-25-NBR/SI-G1
PFTM-25-NBR/SI-G2
PFTM-30-NBR/SI-G1
PFTM-30-NBR/SI-G2
PFTM-35-NBR/SI-G1
PFTM-35-NBR/SI-G2
PFTM-40-NBR/SI-G1
PFTM-40-NBR/SI-G2



PFTM-50-NBR/SI-G1
PFTM-50-NBR/SI-G2



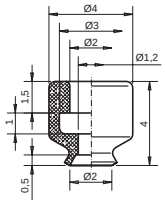
PFTM-60-NBR/SI-G2
PFTM-80-NBR/SI-G2
PFTM-95-NBR/SI-G2



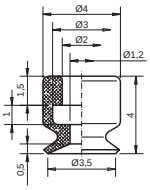
Flat suction cup with male fitting

Order code	Old order code	A	B	C	D	H	SW
PFTM-2A-NBR/SI-M5	P5V-CFF002C5N/S	2	M5	4,5	3,5	4,0	8
PFTM-3.5A-NBR/SI-M5	P5V-CFF003C5N/S	3	M5	4,5	3,5	4,0	8
PFTM-5A-NBR/SI-M5	P5V-CFF005C5N/S	5	M5	4,5	3,5	6,5	8
PFTM-10A-NBR/SI-M5	P5V-CFF010C5N/S	10	M5	4,5	3,5	7,5	8
PFTM-15A-NBR/SI-G1	P5V-CFF015A1N/S	15	G1/8	8,0	5,0	8,0	13
PFTM-20B-NBR/SI-G1	P5V-CFF020A1N/S	20	G1/8	8,0	5,0	12,3	13
PFTM-25-NBR/SI-G1	P5V-CFF025A1N/S	25	G1/8	8,0	5,0	14,0	13
PFTM-25-NBR/SI-G2	P5V-CFF025A2N/S	25	G1/4	10,0	5,0	14,0	17
PFTM-30-NBR/SI-G1	P5V-CFF030A1N/S	30	G1/8	8,0	5,0	12,0	13
PFTM-30-NBR/SI-G2	P5V-CFF030A2N/S	30	G1/4	10,0	5,0	12,0	17
PFTM-35-NBR/SI-G1	P5V-CFF035A1N/S	35	G1/8	8,0	5,0	14,0	13
PFTM-35-NBR/SI-G2	P5V-CFF035A2N/S	35	G1/4	10,0	5,0	14,0	17
PFTM-40-NBR/SI-G1	P5V-CFF040A1N/S	40	G1/8	8,0	5,0	14,0	13
PFTM-40-NBR/SI-G2	P5V-CFF040A2N/S	40	G1/4	10,0	5,0	14,0	17
PFTM-50-NBR/SI-G1	P5V-CFF050A1N/S	50	G1/8	8,0	5,0	15,0	13
PFTM-50-NBR/SI-G2	P5V-CFF050A2N/S	50	G1/4	10,0	5,0	15,0	17
PFTM-60-NBR/SI-G2	P5V-CFR060A2N/S	60	G1/4	10,0	5,0	18,5	17
PFTM-80-NBR/SI-G2	P5V-CFR080A2N/S	80	G1/4	10,0	5,0	20,5	17
PFTM-95-NBR/SI-G2	P5V-CFR095A2N/S	95	G1/4	10,0	5,0	21,0	17

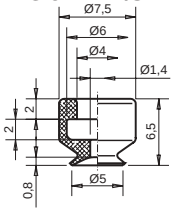
PFG-2A-NBR/SI



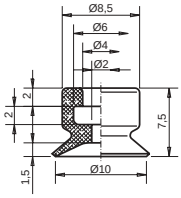
PFG-3.5A-NBR/SI



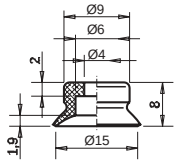
PFG-5A-NBR/SI



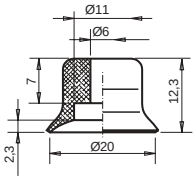
PFG-10A-NBR/SI



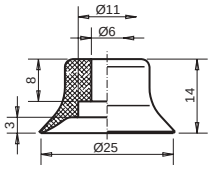
PFG-15A-NBR/SI



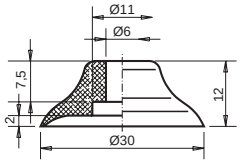
PFG-20B-NBR/SI



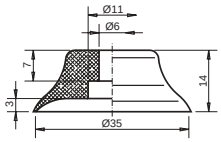
PFG-25-NBR/SI



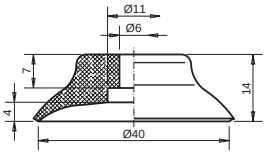
PFG-30-NBR/SI



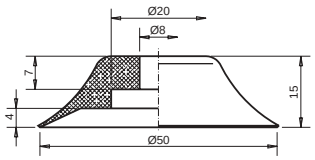
PFG-35-NBR/SI



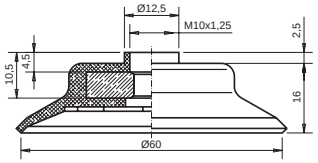
PFG-40-NBR/SI



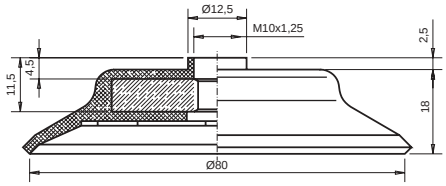
PFG-50-NBR/SI



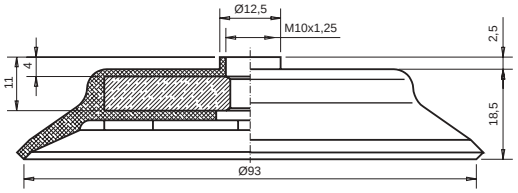
PFG-60-NBR/SI



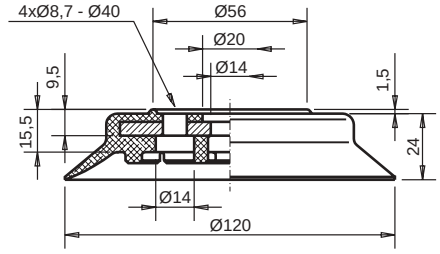
PFG-80-NBR/SI



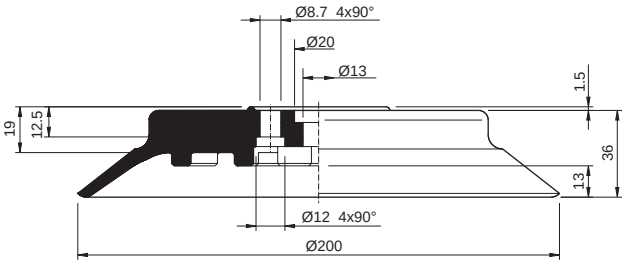
PFG-95-NBR/SI



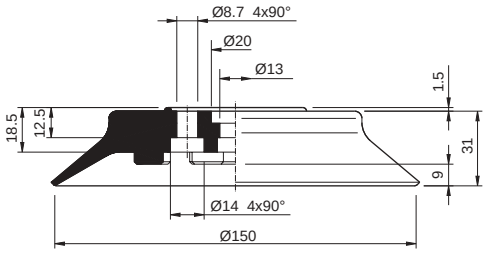
PFG-120-NBR/SI

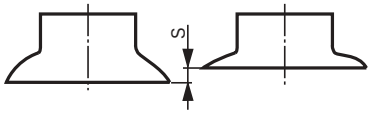


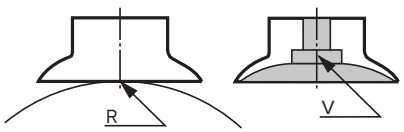
PFG-200-NBR/SI



PFG-150-NBR/SI



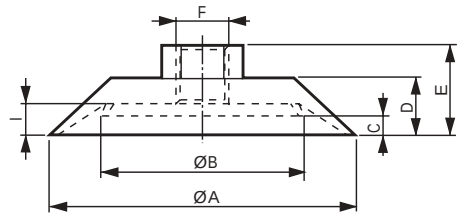


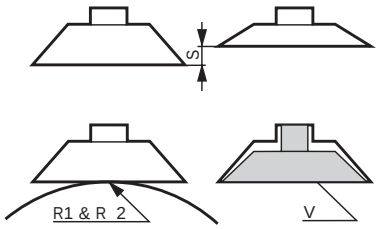


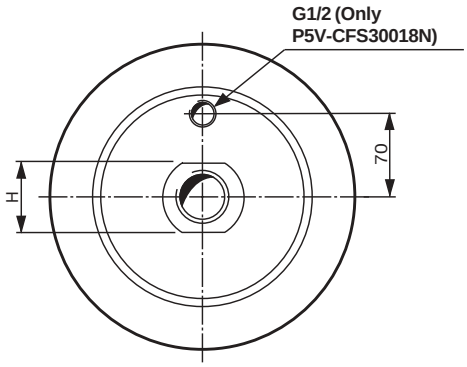
Order code	Old order code	R*	S cm³	V
PFG-2A-NBR/SI	P5V-CFF002••N/S			
PFG-3.5A-NBR/SI	P5V-CFF003••N/S			
PFG-5A-NBR/SI	P5V-CFF005••N/S	2,0	0,8	0,005
PFG-10A-NBR/SI	P5V-CFF010••N/S	5,5	1,5	0,07
PFG-15A-NBR/SI	P5V-CFF015••N/S	9,0	1,9	0,2
PFG-20B-NBR/SI	P5V-CFF020••N/S	13,0	2,3	0,5
PFG-25-NBR/SI	P5V-CFF025••N/S	17,5	3,0	1,1
PFG-30-NBR/SI	P5V-CFF030••N/S	26	2,0	1,1
PFG-35-NBR/SI	P5V-CFF035••N/S	31	3,0	2,3
PFG-40-NBR/SI	P5V-CFF040••N/S	37	3,5	3,0
PFG-50-NBR/SI	P5V-CFF050••N/S	41	4	7,3
PFG-60-NBR/SI	P5V-CFR060••N/S	70	5	12,7
PFG-80-NBR/SI	P5V-CFR080••N/S	100	6	27,3
PFG-95-NBR/SI	P5V-CFR095••N/S	150	6	39,3
PFG-120-NBR/SI	P5V-CFR120••N/S	365	6	77,3
PFG-150-NBR/SI	P5V-CFR150••N/S	380	9	197
PFG-200-NBR/SI	P5V-CFR200••N/S	430	13	387

* Minimum possible radius for lifting

Flat cups-profile, serie P5V-CFS



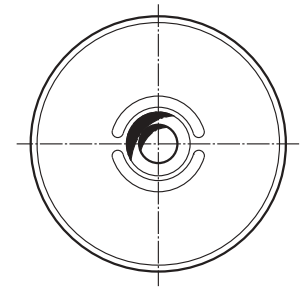


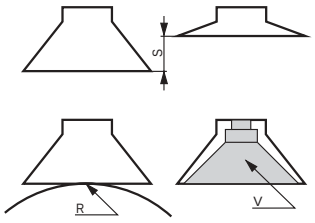


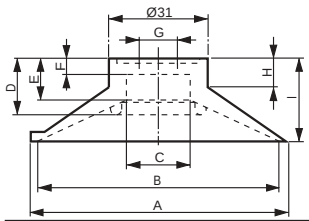
Order code	A	B	C	D	E	F	H	I	R1*	R2**	S	V cm³
P5V-CFS02035N	20	14	0,5	8	17,0	M5	8	0,8	27	29	1,6	1,7
P5V-CFS03035N	30	19	1,2	10	18,0	M5	8	2,2	38	49	2,2	2,7
P5V-CFS05011N	50	35	2,2	11	18,0	G1/8	13	3,7	98	80	3,7	10,0
P5V-CFS07512N	75	54	3,5	14	22,0	G1/4	17	5,5	177	124	5,5	30,0
P5V-CFS08212N	82	53	8,5	18	25,5	G1/4	17	10,5	177	167	8,0	46,0
P5V-CFS10013N	100	72	5,0	18	28,0	G3/8	22	7,5	254	161	7,5	66,7
P5V-CFS15014N	150	106	7,0	26	42,0	G1/2	27	11,0	309	252	11,0	208,3
P5V-CFS30018N	300	205	15,0	44	70,0	G1	46	19,0	1158	581	19,0	1467,0

* Minimum possible radius for lifting using the inner lip
** Minimum possible radius for lifting using the outer lip

Flat cups-profile, serie P5V-CFA

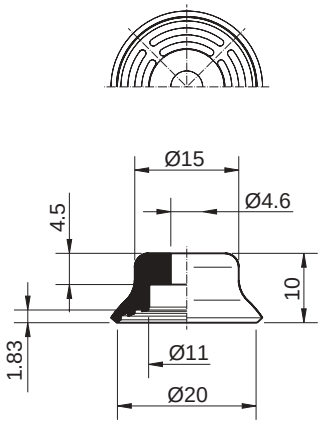




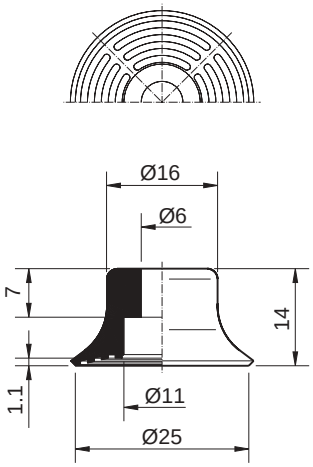


Order code	A	B	C	D	E	F	G	H	I	R*	S	V cm³
P5V-CFA04500A	45	42,5	20,3	-	13	6	12	15	24	22	5,0	1,0
P5V-CFA06000A	60	56,0	20,3	18,0	13	5	12	12	25	45	7,3	2,0
P5V-CFA08000A	80	76,0	20,3	17,6	13	5	12	9	26	75	8,2	3,5
P5V-CFA10000A	100	96,0	20,3	17,6	13	5	12	8	30	90	10,3	7,5

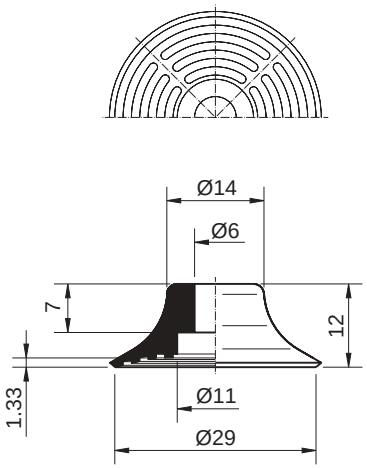
PFOG-20-NBR/U
PFOTF-20-G1-NBR/U
PFOTM-20-G1-NBR/U



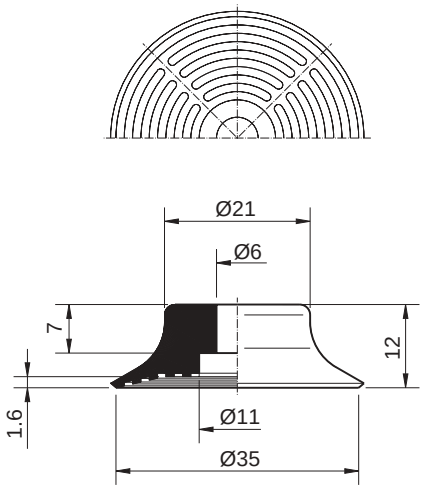
PFOG-25-NBR/U
PFOTF-25-G1-NBR/U
PFOTM-25-G1-NBR/U



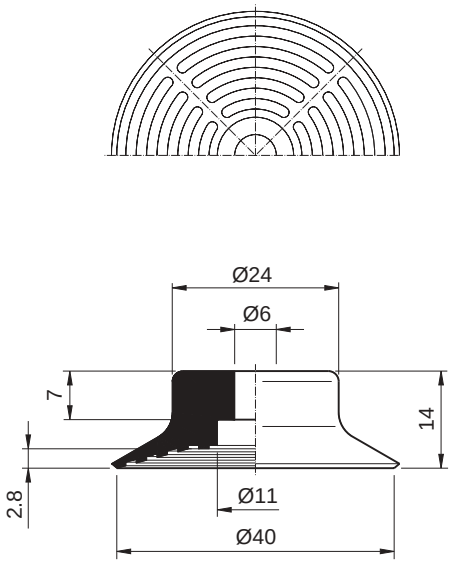
PFOG-30-NBR/U
PFOTF-30-G1-NBR/U
PFOTM-30-G1-NBR/U

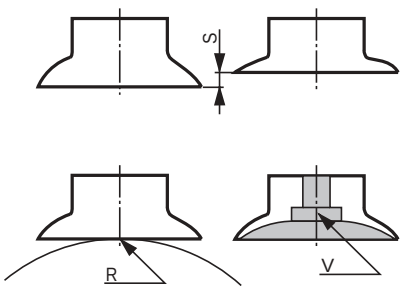


PFOG-35-NBR/U
PFOTF-35-G1-NBR/U
PFOTM-35-G1-NBR/U



PFOG-40-NBR/U
PFOTF-40-G1-NBR/U
PFOTM-40-G1-NBR/U

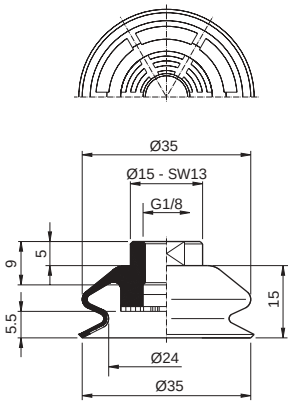




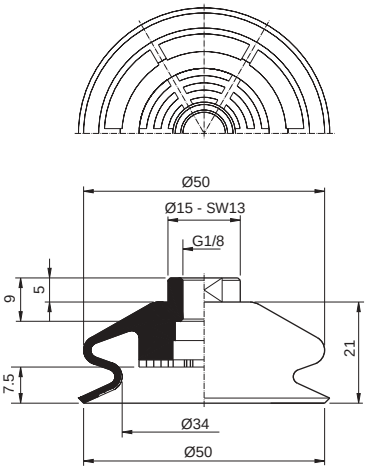
Order code	Old order code	R* cm³	S	V
PFOG-20-NBR/U	P5V-CFC020••N/U	13,0	1,8	0,5
PFOTF-20-G1-NBR/U	P5V-CFC020••N/U	13,0	1,8	0,5
PFOTM-20-G1-NBR/U	P5V-CFC020••N/U	13,0	1,8	0,5
PFOG-25-NBR/U	P5V-CFC025••N/U	17,5	1,1	1,0
PFOTF-25-G1/G2-NBR/U	P5V-CFC025••N/U	17,5	1,1	1,0
PFOTM-25-G1/G2-NBR/U	P5V-CFC025••N/U	17,5	1,1	1,0
PFOG-30-NBR/U	P5V-CFC030••N/U	26	1,3	1,0
PFOTF-30-G1/G2-NBR/U	P5V-CFC030••N/U	26	1,3	1,0
PFOTM-30-G1/G2-NBR/U	P5V-CFC030••N/U	26	1,3	1,0
PFOG-35-NBR/U	P5V-CFC035••N/U	31	1,6	2,0
PFOTF-35-G1/G2-NBR/U	P5V-CFC035••N/U	31	1,6	2,0
PFOTM-35-G1/G2-NBR/U	P5V-CFC035••N/U	31	1,6	2,0
PFOG-40-NBR/U	P5V-CFC040••N/U	37	2,8	2,5
PFOTF-40-G1/G2-NBR/U	P5V-CFC040••N/U	37	2,8	2,5
PFOTM-40-G1/G2-NBR/U	P5V-CFC040••N/U	37	2,8	2,5

* Minimum possible radius for lifting

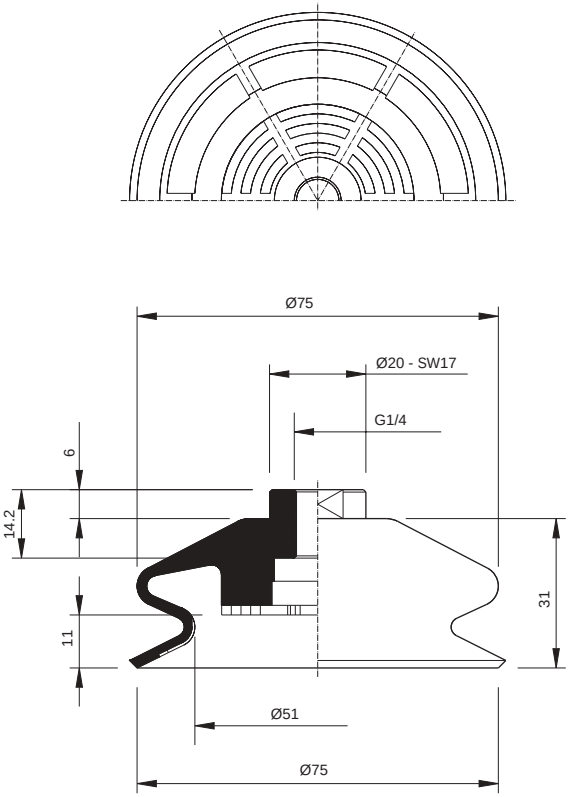
PBOG-35-NBR/U-70SH



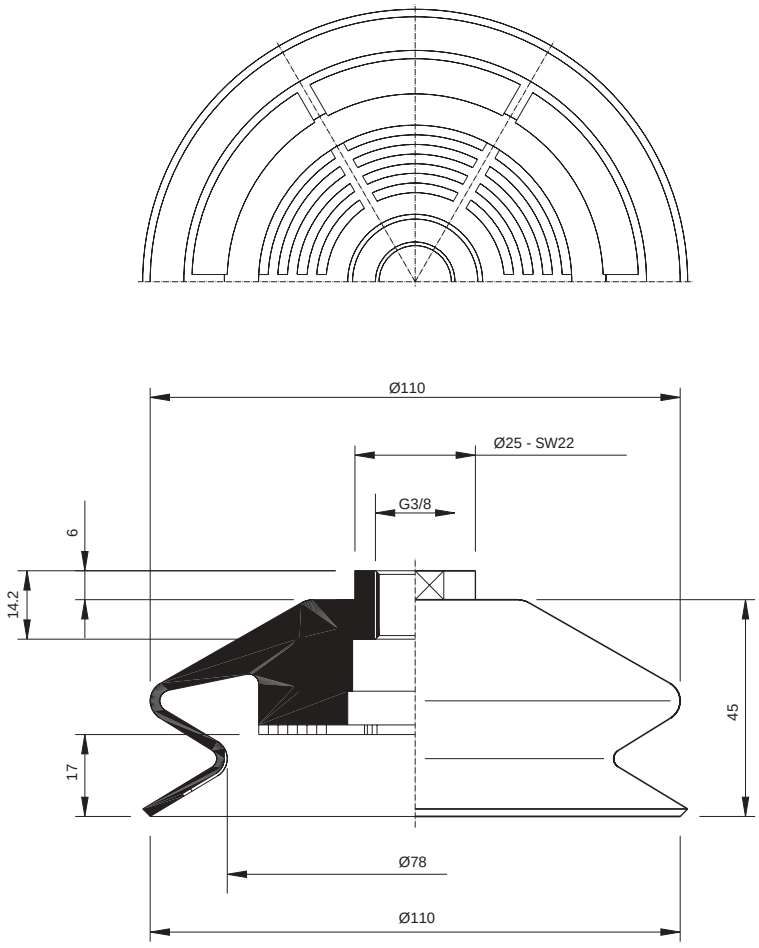
PBOG-50-NBR/U-70SH

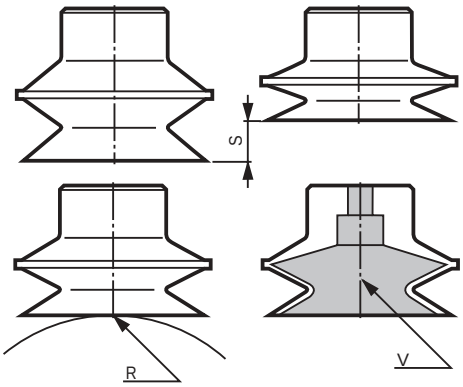


PBOG-75-NBR/U-70SH



PBOG-110-NBR/U-70SH

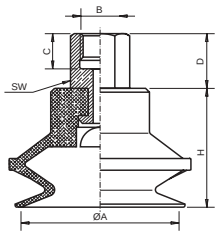




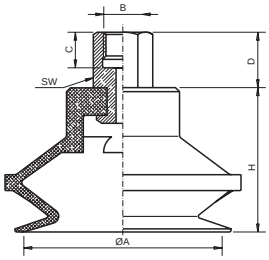
Order code	Old order code	R*	S cm³	V
PBOG-35-NBR/U-70SH	P5V-CBC035••N/U	15	5,5	10
PBOG-50-NBR/U-70SH	P5V-CBC050••N/U	26	7,5	40
PBOG-75-NBR/U-70SH	P5V-CBC075••N/U	31	11,0	120
PBOG-110-NBR/U-70SH	P5V-CBC110••N/U	85	17,0	350

* Minimum possible radius for lifting

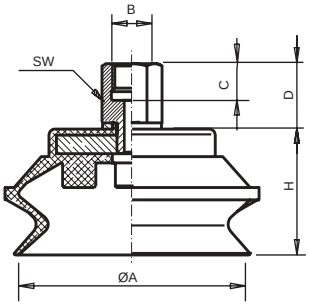
PBTF-20B-NBR/SI-G1
PBTF-30-NBR/SI-G1
PBTF-30-NBR/SI-G2
PBTF-40-NBR/SI-G1
PBTF-40-NBR/SI-G2



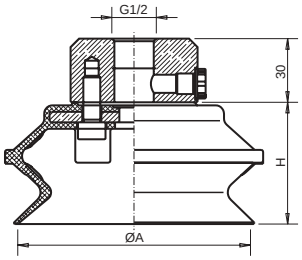
PBTF-50-NBR/SI-G1
PBTF-50-NBR/SI-G2



PBTF-75-NBR/SI-G2



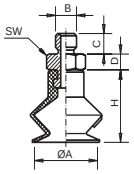
PBTF-110-NBR/SI-G4
PBTF-150-NBR/SI-G4



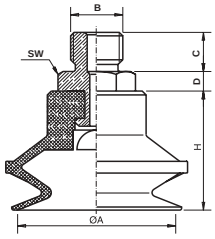
Short bellows suction cup with female fitting

Order code	Old order code	A	B	C	D	H	SW
PBTF-20B-NBR/SI-G1	P5V-CBB02011N/S	20	G1/8	8	14,0	22,0	13
PBTF-30-NBR/SI-G1	P5V-CBB03011N/S	30	G1/8	8	14,0	30,5	13
PBTF-30-NBR/SI-G2	P5V-CBB03012N/S	30	G1/4	10	17,5	30,5	17
PBTF-40-NBR/SI-G1	P5V-CBB04011N/S	40	G1/8	8	14,0	30,5	13
PBTF-40-NBR/SIG2	P5V-CBB04012N/S	40	G1/4	10	17,5	30,5	17
PBTF-50-NBR/SI-G1	P5V-CBB05011N/S	50	G1/8	8	14,0	36,5	13
PBTF-50-NBR/SIG2	P5V-CBB05012N/S	50	G1/4	10	17,5	36,5	17
PBTF-75-NBR/SIG2	P5V-CBB07512N/S	75	G1/4	11	17,5	41,0	17
PBTF-110-NBR/SI-G4	P5V-CBB11014N/S	110	G1/2	-	30,0	57,5	-
PBTF-150-NBR/SI-G4	P5V-CBB15014N/S	150	G1/2	-	30,0	77,5	-

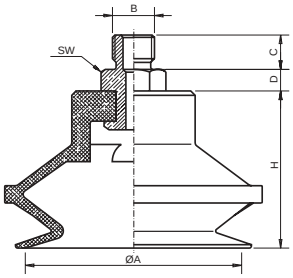
P5V-CBB010C5N/S
P5V-CBB015C5N/S



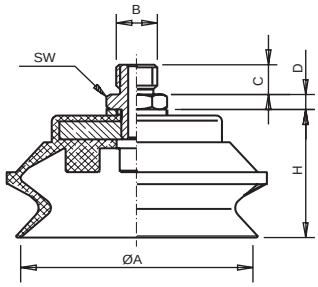
P5V-CBB020A1N/S
P5V-CBB030A1N/S
P5V-CBB030A2N/S
P5V-CBB040A1N/S
P5V-CBB040A2N/S



PBTM-50-G1-NBR/SI
PBTM-50-G2-NBR/SI



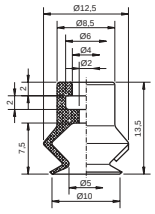
P5V-CBB075A2N/S



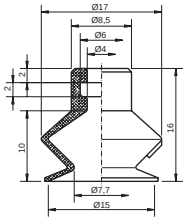
Short bellows suction cup with male fitting

Order code	Old order code	A	B	C	D	H	SW
PBTM-10A-NBR-M5	P5V-CBB010C5N/S	10	M5	4,5	3,5	13,5	8
PBTM-15A-NBR-M5	P5V-CBB015C5N/S	15	M5	4,5	3,5	16,0	8
PBTM-20B-NBR-G1	P5V-CBB020A1N/S	20	G1/8	8,0	5,0	22,0	13
PBTM-30-NBR-G1	P5V-CBB030A1N/S	30	G1/8	8,0	5,0	30,5	13
PBTM-30-NBR-G2	P5V-CBB030A2N/S	30	G1/4	10,0	5,0	30,5	17
PBTM-40-NBR-G1	P5V-CBB040A1N/S	40	G1/8	8,0	5,0	30,5	13
PBTM-40-NBR-G2	P5V-CBB040A2N/S	40	G1/4	10,0	5,0	30,5	17
PBTM-50-NBR-G1	P5V-CBB050A1N/S	50	G1/8	8,0	5,0	36,5	13
PBTM-50-NBR-G2	P5V-CBB050A2N/S	50	G1/4	10,0	5,0	36,5	17
PBTM-75-NBR-G2	P5V-CBB075A2N/S	75	G1/4	10,0	5,0	41,0	17

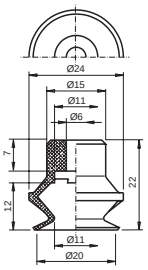
P5V-CBB01000N/S



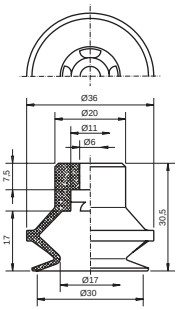
P5V-CBB01500N/S



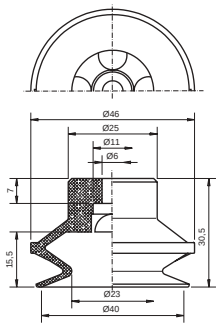
P5V-CBB02000N/S



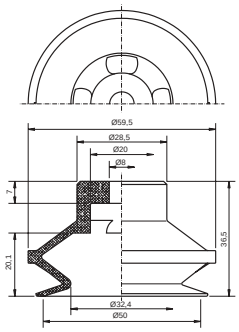
P5V-CBB03000N/S



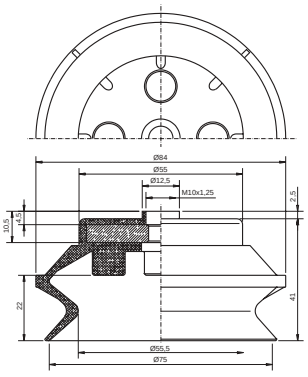
P5V-CBB04000N/S



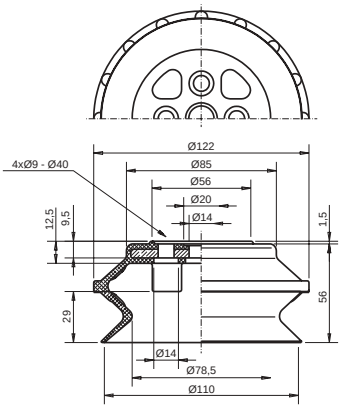
P5V-CBB05000N/S



P5V-CBB07500N/S



P5V-CBB11000N/S



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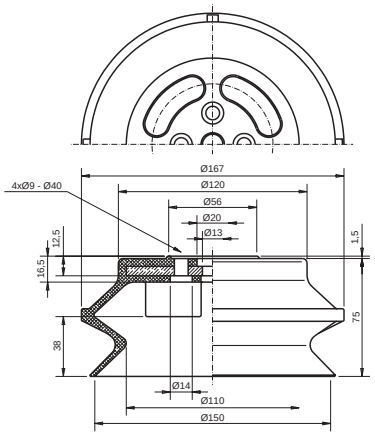
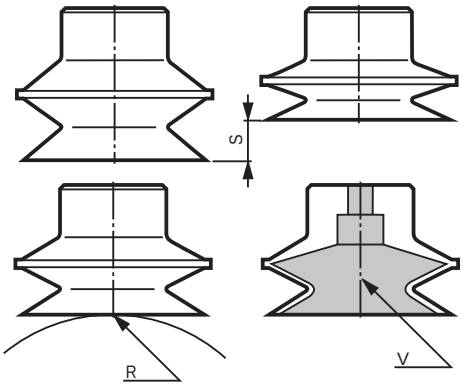
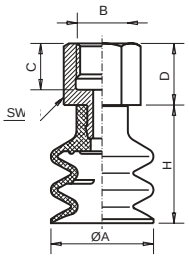




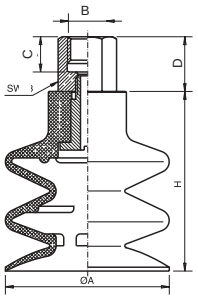
Order code	R*	S	V cm³
P5V-CBB010••N/S	2,0	4,0	0,07
P5V-CBB015••N/S	5,5	6,0	0,3
P5V-CBB020••N/S	9,0	9,0	0,7
P5V-CBB030••N/S	13,0	18,0	8,0
P5V-CBB040••N/S	17,5	15,5	12,7
P5V-CBB050••N/S	26	19,9	32
P5V-CBB075••N/S	31	22	105
P5V-CBB110••N/S	85	33	309
P5V-CBB150••N/S	250	38	734

* Minimum possible radius for lifting

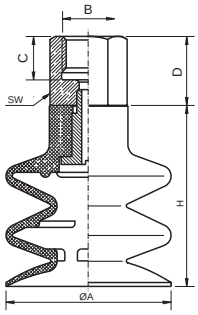
PCTF-10-NBR/SI-G1
PCTF-15-NBR/SI-G1
PCTF-18-NBR/SI-G1
PCTF-20-NBR/SI-G1



PCTF-30-NBR/SI-G1
PCTF-40-NBR/SI-G1
PCTF-60-NBR/SI-G1



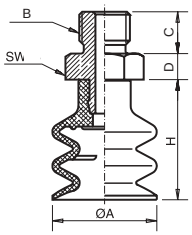
PCTF-30-NBR/SI-G2
PCTF-40-NBR/SI-G2
PCTF-60-NBR/SI-G2



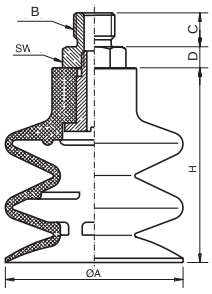
Long bellows suction cup with female fitting

Order code	Old order code	A	B	C	D	H	SW
PCTF-10-NBR/SI-G1	P5V-CBL00911N/S	9	G1/8	9,0	12,0	15,0	13
PCTF-15-NBR/SI-G1	P5V-CBL01411N/S	14	G1/8	9,0	12,0	23,0	13
PCTF-18-NBR/SI-G1	P5V-CBL01811N/S	18	G1/8	9,0	12,0	23,0	13
PCTF-20-NBR/SI-G1	P5V-CBL02011N/S	20	G1/8	9,0	12,0	23,0	13
PCTF-30-NBR/SI-G1	P5V-CBL03211N/S	32	G1/8	9,0	14,0	37,5	13
PCTF-30-NBR/SI-G2	P5V-CBL03212N/S	32	G1/4	11,0	17,5	37,5	17
PCTF-40-NBR/SI-G1	P5V-CBL04211N/S	42	G1/8	9,0	14,0	46,0	13
PCTF-40-NBR/SI-G2	P5V-CBL04212N/S	42	G1/4	11,0	17,5	46,0	17
PCTF-60-NBR/SI-G1	P5V-CBL06211N/S	62	G1/8	9,0	14,0	55,0	13
PCTF-60-NBR/SI-G2	P5V-CBL06212N/S	62	G1/4	11,0	17,5	55,0	17

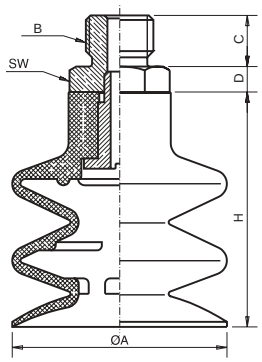
PCTM-10-NBR/SI-M5
PCTM-10-NBR/SI-M6
PCTM-15-M5-NBR/SI-M5
PCTM-15-M6-NBR/SI-M6
PCTM-18-M5-NBR/SI-M5
PCTM-18-M6-NBR/SI-M6
PCTM-20-M5-NBR/SI-M5
PCTM-20-M6-NBR/SI-M6
PCTM-20-NBR/SI-G1



PCTM-30-NBR/SI-G1
PCTM-40-NBR/SI-G1
PCTM-60-NBR/SI-G1



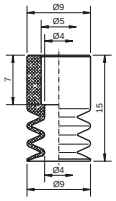
PCTM-30-NBR/SI-G2
PCTM-40-NBR/SI-G2
PCTM-60-NBR/SI-G2
PCTM-90-NBR/SI-G2



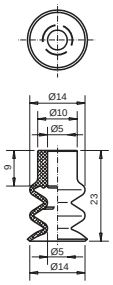
Long bellows suction cup with male fitting

Order code	Old order code	A	B	C	D	H	SW
PCTM-10-NBR/SI-M5	P5V-CBL009C5N/S	9	M5	4,5	3,5	15,0	8
PCTM-10-NBR/SI-M6	P5V-CBL009C6N/S	9	M6	4,5	3,5	15,0	8
PCTM-15–NBR/SI-M5	P5V-CBL014C5N/S	14	M5	4,5	3,5	23,0	8
PCTM-15-NBR/SI-M6	P5V-CBL014C6N/S	14	M6	4,5	3,5	23,0	8
PCTM-18-NBR/SI-M5	P5V-CBL018C5N/S	18	M5	4,5	3,5	23,0	8
PCTM-18-NBR/SI-M6	P5V-CBL018C6N/S	18	M6	4,5	3,5	23,0	8
PCTM-18-NBR/SI-G1	P5V-CBL018A1N/S	18	G1/8	8,0	5,0	23,0	13
PCTM-20-NBR/SI-M5	P5V-CBL020C5N/S	20	M5	4,5	3,5	23,0	8
PCTM-20-NBR/SI-M6	P5V-CBL020C6N/S	20	M6	4,5	3,5	23,0	8
PCTM-20-NBR/SI-G1	P5V-CBL020A1N/S	20	G1/8	8,0	5,0	23,0	13
PCTM-30-NBR/SI-G1	P5V-CBL032A1N/S	32	G1/8	8,0	5,0	37,5	13
PCTM-30-NBR/SI-G2	P5V-CBL032A2N/S	32	G1/4	10,0	5,0	37,5	17
PCTM-40-NBR/SI-G1	P5V-CBL042A1N/S	42	G1/8	8,0	5,0	46,0	13
PCTM-40-NBR/SI-G2	P5V-CBL042A2N/S	42	G1/4	10,0	5,0	46,0	17
PCTM-60-NBR/SI-G1	P5V-CBL062A1N/S	62	G1/8	8,0	5,0	55,0	13
PCTM-60-NBR/SI-G2	P5V-CBL062A2N/S	62	G1/4	10,0	5,0	55,0	17
PCTM-90-NBR/SI-G2	P5V-CBL088A2N/S	88	G1/4	10,0	5,0	87,5	17

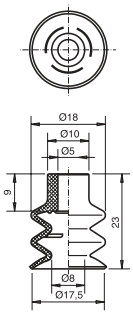
PCG-10-NBR/SI



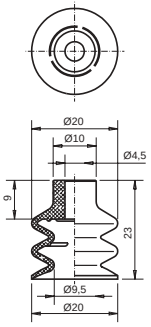
PCG-15-NBR/SI



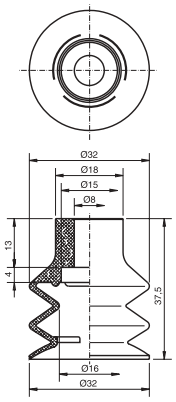
PCG-18-NBR/SI



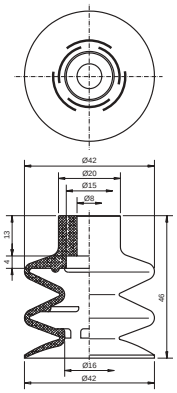
PCG-20-NBR



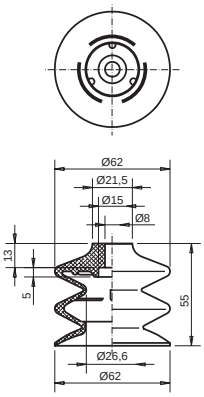
PCG-30-NBR/SI



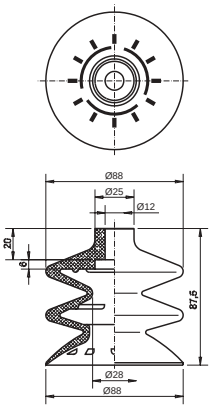
PCG-40-NBR/SI

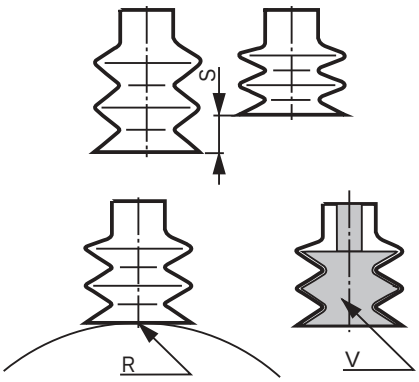


PCG-60-NBR/SI



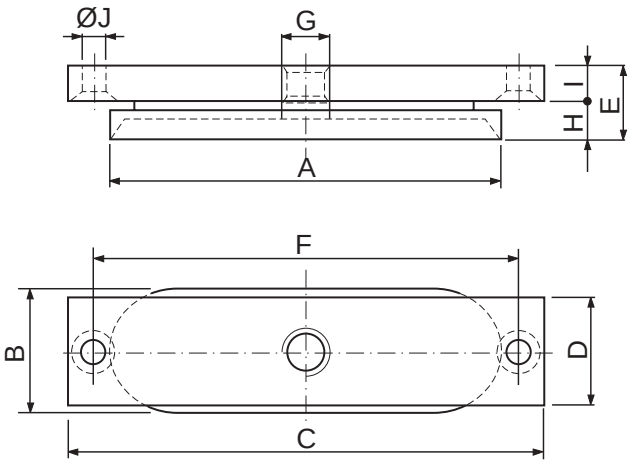
PCG-90-NBR/SI





Order code		R*	S	V cm³
PCG-10-NBR/SI	P5V-CBL009••N/S	4,5	3	0,15
PCTF-10-NBR/SI-G1	P5V-CBL009••N/S	4,5	3	0,15
PCTM-10-NBR/SI-G1	P5V-CBL009••N/S	4,5	3	0,15
PCTM-10-NBR/SI-M5/M6	P5V-CBL009••N/S	4,5	3	0,15
PCG-15-NBR/SI	P5V-CBL014••N/S	7,0	9	0,98
PCTF-15-NBR/SI-G1	P5V-CBL014••N/S	7,0	9	0,98
PCTM-15-NBR/SI-G1	P5V-CBL014••N/S	7,0	9	0,98
PCTM-15-NBR/SI-M5/M6	P5V-CBL014••N/S	7,0	9	0,98
PCG-18-NBR/SI	P5V-CBL018••N/S	9,0	9	1,35
PCTF-18-NBR/SI-G1	P5V-CBL018••N/S	9,0	9	1,35
PCTM-18-NBR/SI-G1	P5V-CBL018••N/S	9,0	9	1,35
PCTM-18-NBR/SI-M5/M6	P5V-CBL018••N/S	9,0	9	1,35
PCG-20-NBR/SI	P5V-CBL020••N/S	10	9	2,0
PCTF-20-NBR/SI-G1	P5V-CBL020••N/S	10	9	2,0
PCTM-20-NBR/SI-G1	P5V-CBL020••N/S	10	9	2,0
PCTM-20-NBR/SI-M5/M6	P5V-CBL020••N/S	10	9	2,0
PCG-30-NBR/SI	P5V-CBL032••N/S	17	13	10,0
PCTF-30-NBR/SI-G1/G2	P5V-CBL032••N/S	17	13	10,0
PCTM-30-NBR/SI-G1/G2	P5V-CBL032••N/S	17	13	10,0
PCTM-30-NBR/SI-M5/M6	P5V-CBL032••N/S	17	13	10,0
PCG-40-NBR/SI	P5V-CBL042••N/S	24	20	19,5
PCTF-40-NBR/SI-G1/G2	P5V-CBL042••N/S	24	20	19,5
PCTM-40-NBR/SI-G1/G2	P5V-CBL042••N/S	24	20	19,5
PCTM-40-NBR/SI-M5/M6	P5V-CBL042••N/S	24	20	19,5
PCG-60-NBR/SI	P5V-CBL062••N/S	42	27	72,5
PCTF-60-NBR/SI-G1/G2	P5V-CBL062••N/S	42	27	72,5
PCTM-60-NBR/SI-M5/M6	P5V-CBL062••N/S	42	27	72,5
PCG-90-NBR/SI	P5V-CBL088••N/S	65	42	165,0
PCTF-90-NBR/SI-G2	P5V-CBL088••N/S	65	42	165,0
PCTM-90-NBR/SI-G2	P5V-CBL088••N/S	65	42	165,0

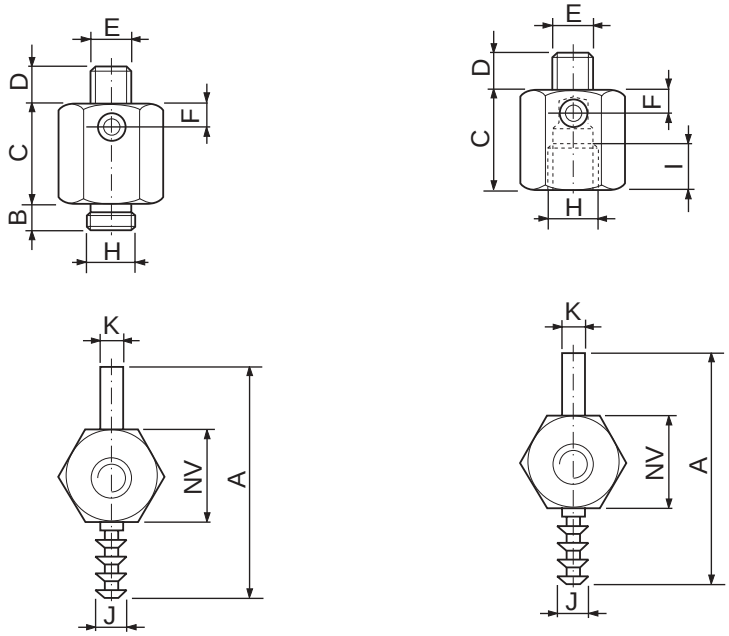
* Minimum possible radius for lifting



Order code	A	B	C	D	E	F	G	H	I	J	V cm³	R*
P5V-CVS02011N	60	20	75	20	12,5	65	G1/8	6,5	6	4,5	2,9	45
P5V-CVS03212N	100	32	126	30	14,0	112	G1/4	8,0	6	5,3	9,8	80

* Minimum possible radius for lifting

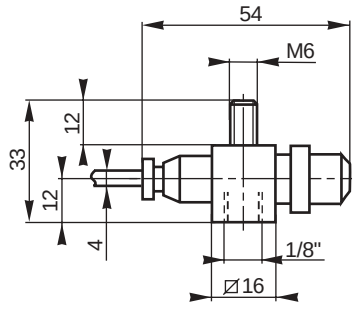
Mini generators - Single, serie P5V-GSN



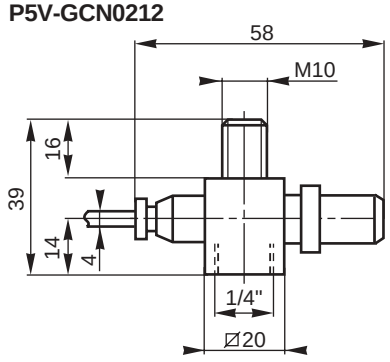
Order code	A	B	C	D	E	F	H Vacuum	J Inlet	K Outlet	NV
P5V-GSN02A1	46	6	18	8	M8	5	G1/8 M	8	5	19
P5V-GSN02A2	46	8	18	8	M8	5	G1/4 M	8	5	19
P5V-GSN0211	46	-	22	8	M8	5	G1/8 F	10	5	19

Mini generators - Compact, serie P5V-GCN

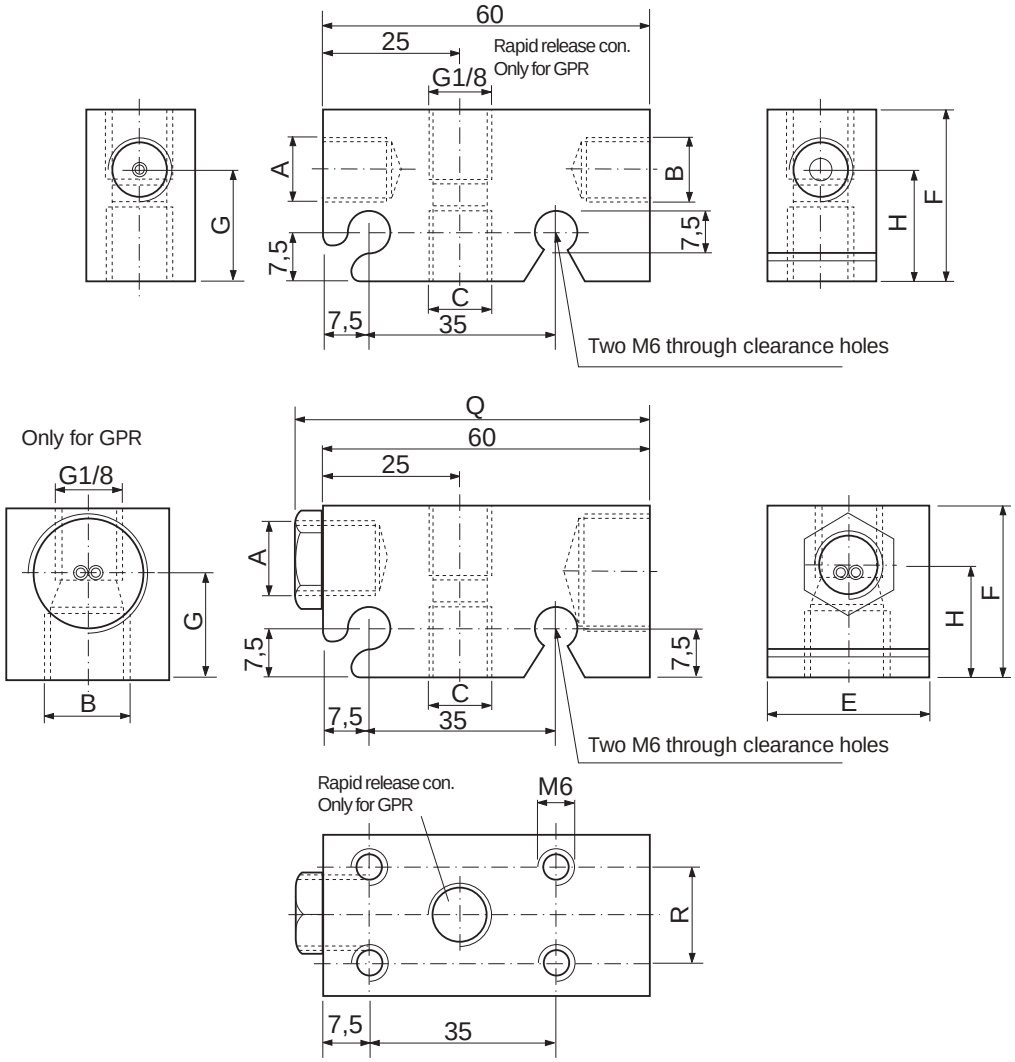
P5V-GCN0111



P5V-GCN0212



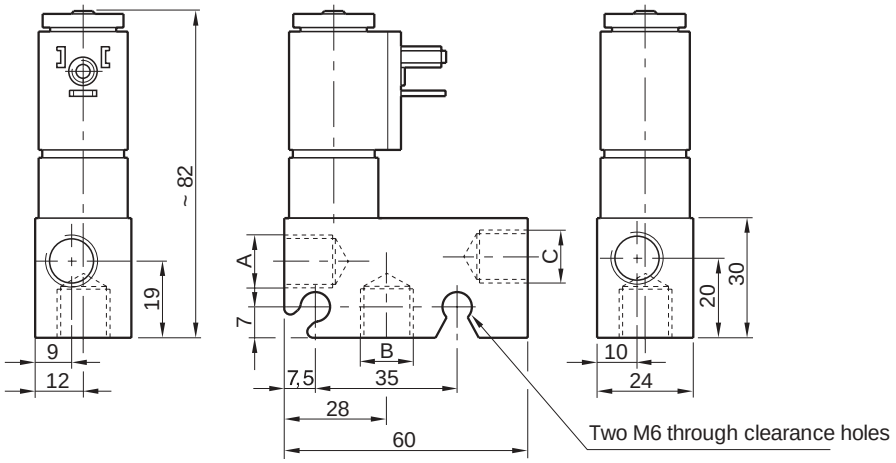
Generators Compact - Profiled, serie P5V-GPN/GPR



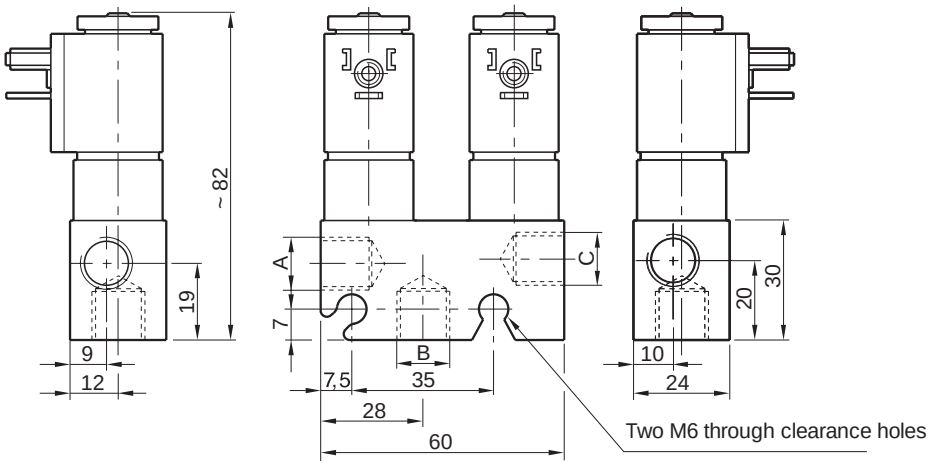
Order code	A Inlet	B Outlet	C Vacuum	E	F	G	H	Q	R	S
P5V-GPN/GPR0211	G1/8	G1/8	G1/8	15	30	19,0	20,0	-	-	-
P5V-GPN/GPR0312	G1/4	G1/4	G1/4	20	30	19,0	20,0	-	-	-
P5V-GPN/GPR0412	G1/4	G1/4	G1/4	20	30	19,0	20,0	-	-	-
P5V-GPN/GPR0612	G1/4	G1/4	G1/4	20	30	19,0	20,0	-	-	-
P5V-GPN/GPR0613	G1/4	G1/4	G3/8	25	30	19,0	20,0	-	-	-
P5V-GPN/GPR1213	G1/4	G1/2	G3/8	30	30	19,0	20,0	65	-	-
P5V-GPN/GPR2414	G1/4	G1	G1/2	40	45	26,5	26,5	65	25	34
P5V-GPN/GPR4214	G1/4	G1	G1/2	40	45	26,5	26,5	65	25	34

Generators Compact - Profiled, serie P5V-GPE/GPS

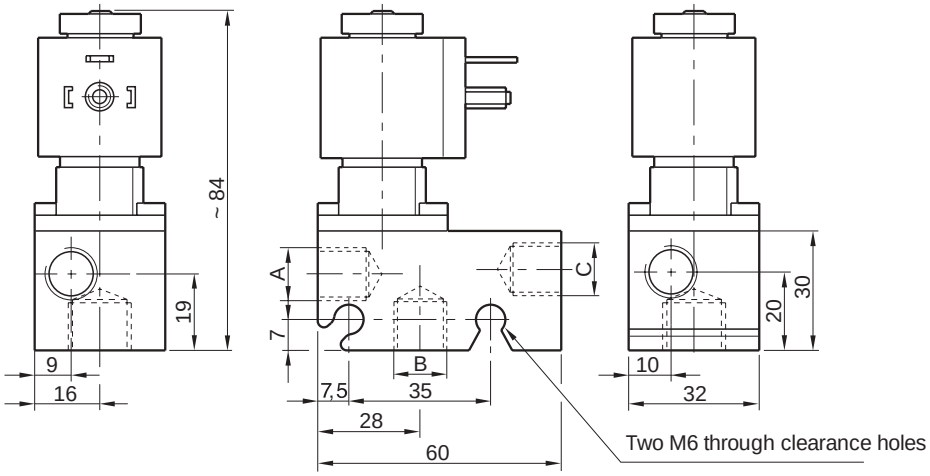
P5V-GPE03122CP



P5V-GPS03122CP



P5V-GPE06132CP

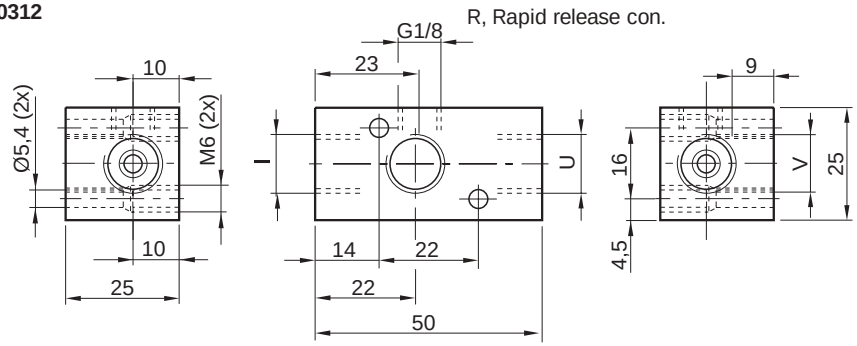


Order code	A Inlet	B Vacuum	C Outlet
P5V-GPE03122CP	G1/4	G1/4	G1/4
P5V-GPS03122CP	G1/4	G1/4	G1/4
P5V-GPE06132CP	G1/4	G3/8	G1/4

Generators Compact - Solid, serie P5V-GA

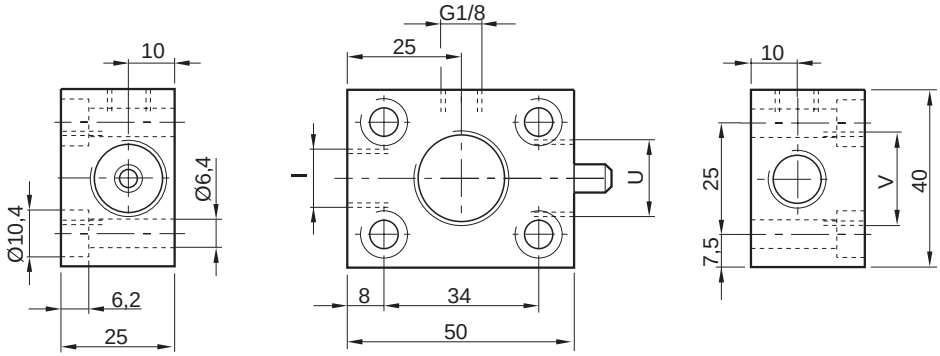
P5V-GAR0312

R, Rapid release con.



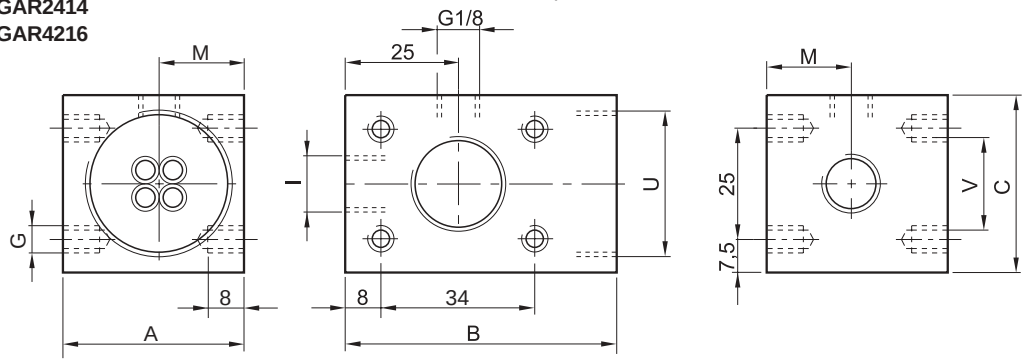
P5V-GAR0614

R, Rapid release con.



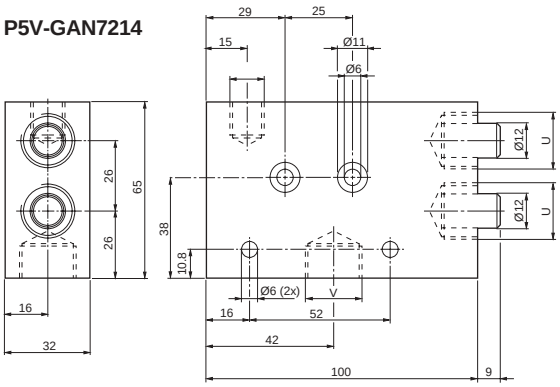
P5V-GAR1214
P5V-GAR2414
P5V-GAR4216

R, Rapid release con.



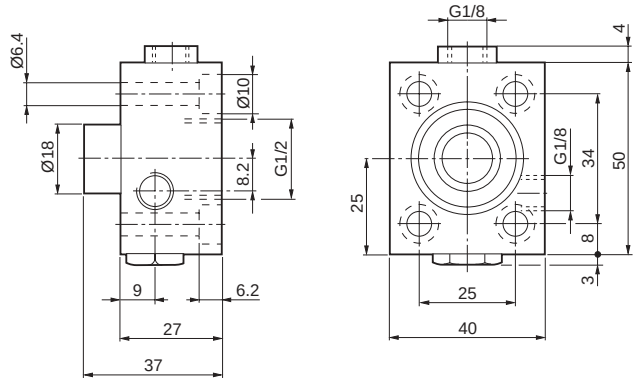
Order code	A	B	C	G	M	I Inlet	V Vacuum	U Outlet
P5V-GAR0312						G1/4	G1/4	G1/4
P5V-GAR0614						G1/4	G1/2	G3/8
P5V-GAR1214	25	50	40	M6	12,0	G1/4	G1/2	G1/2
P5V-GAR2414	40	60	40	M6	18,5	G1/4	G1/2	G1
P5V-GAR4216	40	60	40	M6	18,5	G1/4	G3/4	G1
P5V-GAN7214						G1/4	G1/2	G1/2

P5V-GAN7214

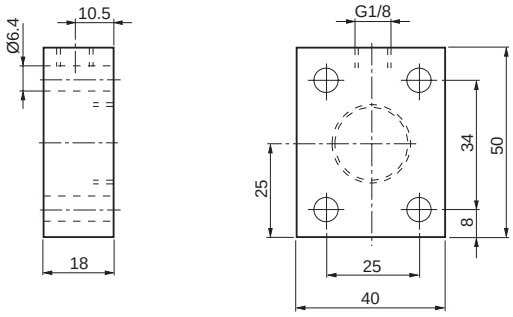


Holding valve

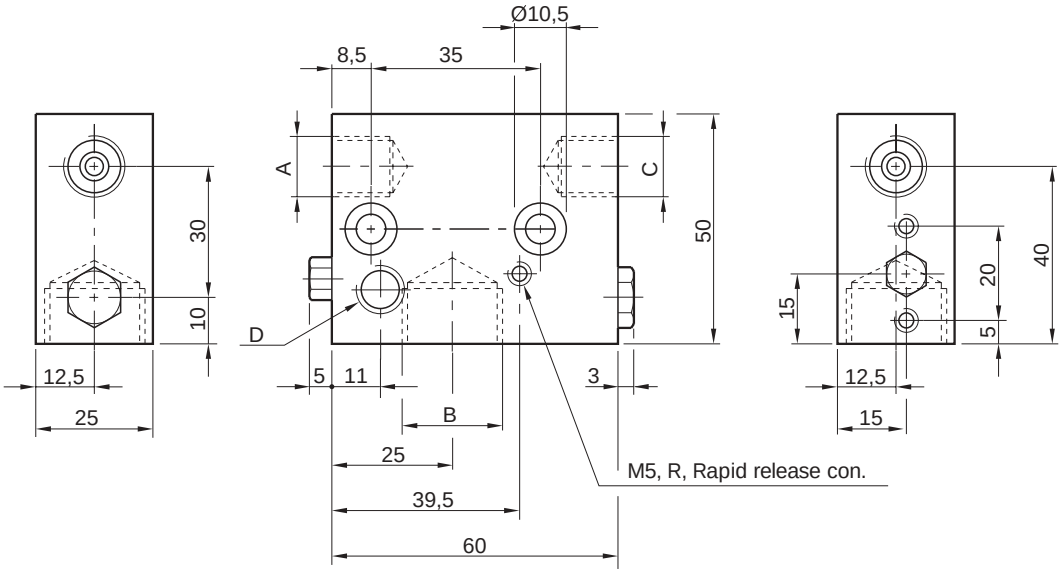
8204 9502-01



Connection cap



Generators Compact - AirSaver, serie GW

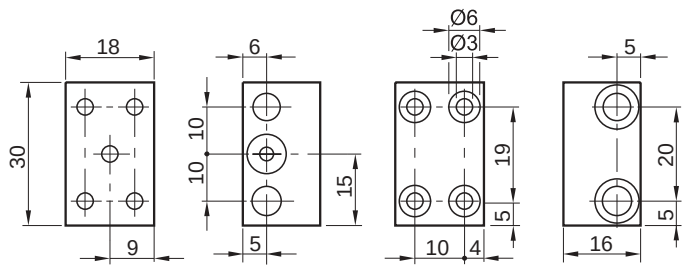


Order code	A Inlet	B Vacuum	C Outlet	D* Vacuum
P5V-GWV0214	G1/4	G1/2	G1/4	G1/8
P5V-GWV0314	G1/4	G1/2	G1/4	G1/8
P5V-GWV0414	G1/4	G1/2	G1/4	G1/8
P5V-GWV0614	G1/4	G1/2	G1/4	G1/8

* Connection for vacuum gauge etc

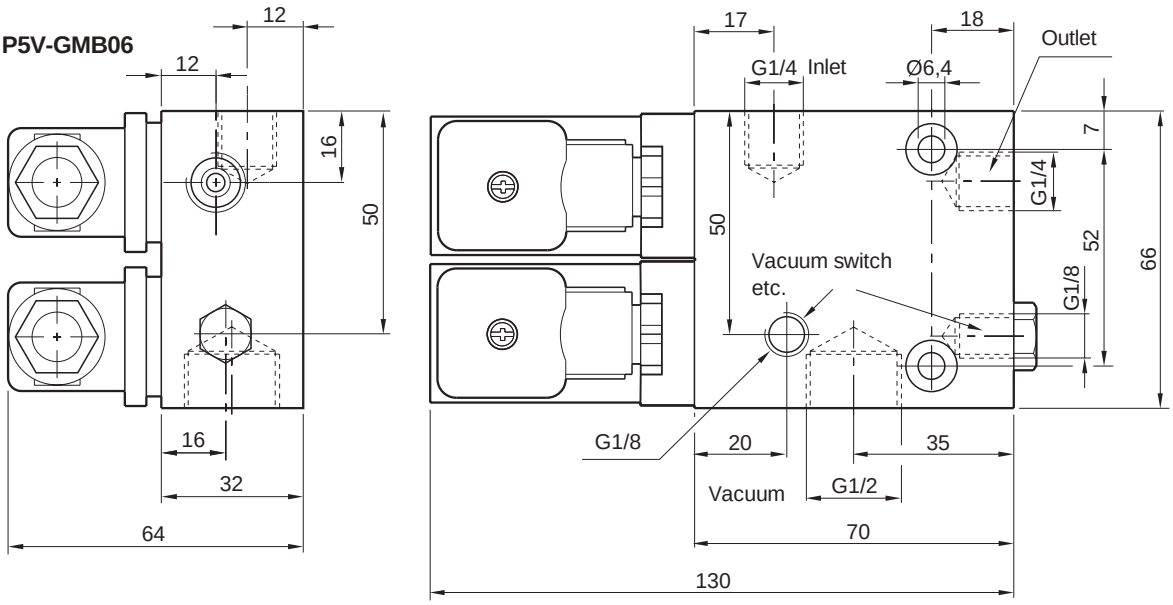
Adaptor P5V-SB•

9127 3686-93

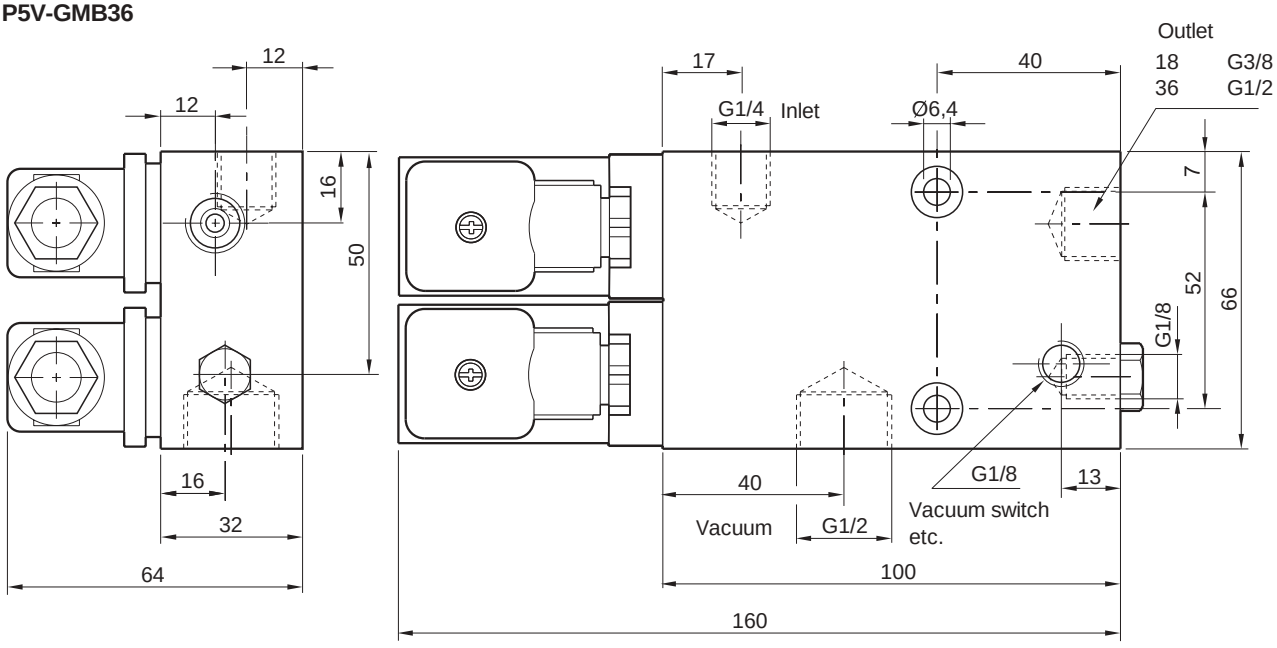


Generators - Serie Multi-Function

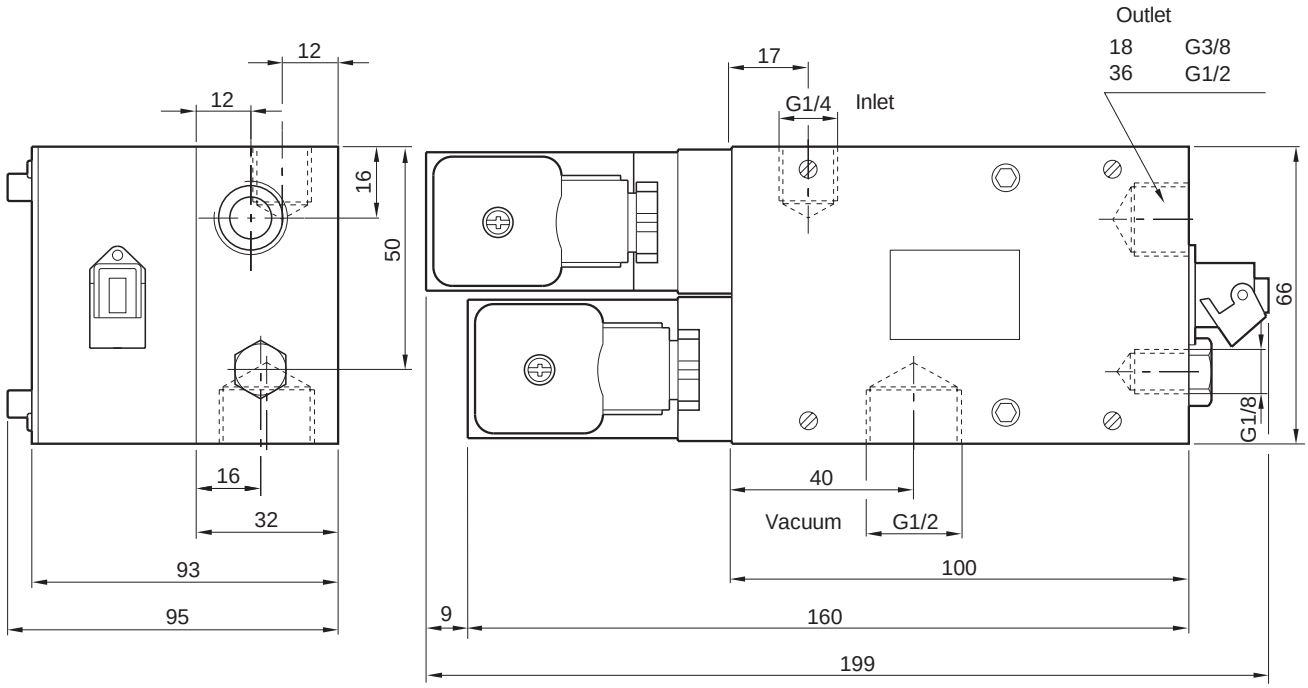
P5V-GMB06



P5V-GMB18, P5V-GMF18
P5V-GMB36

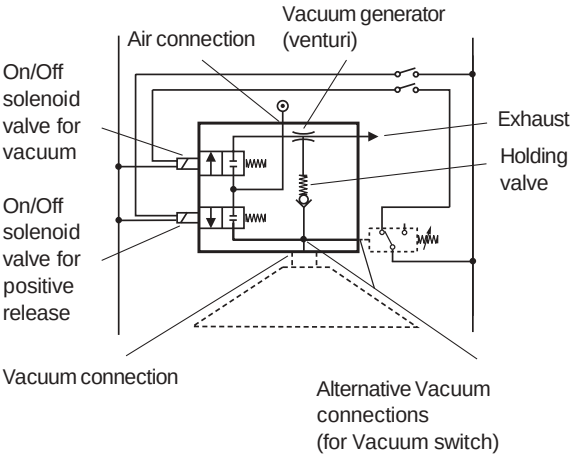


Generators - Serie Multi-Function

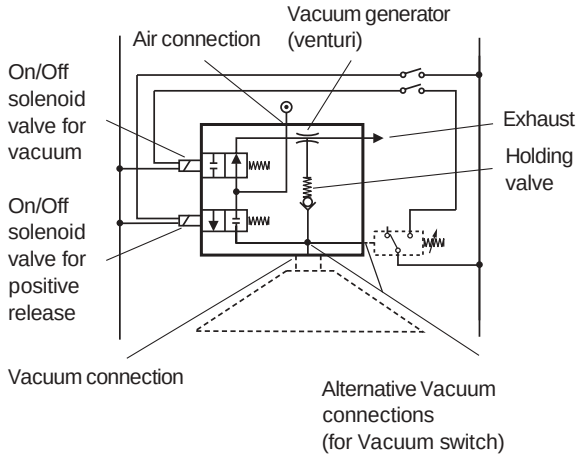


Schematic diagrams

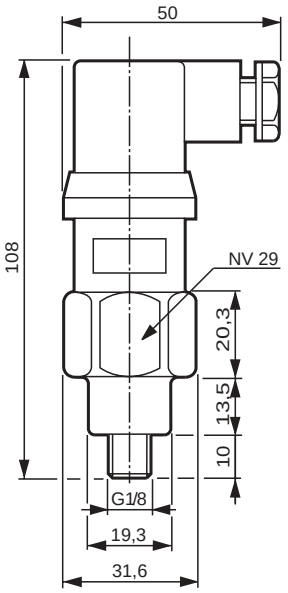
P5V-GMC
P5V-GMD

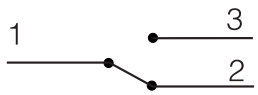


P5V-GMG



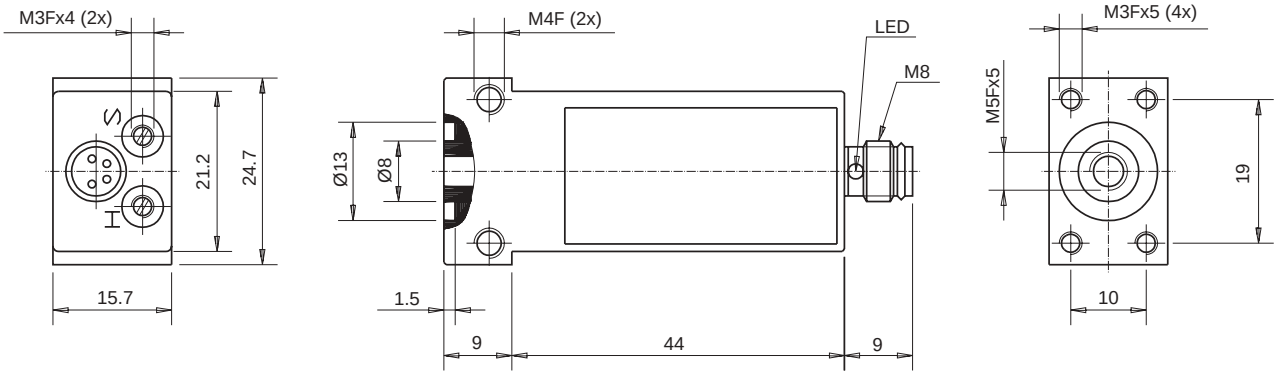
Vacuum switch, P5V-SVVA16K



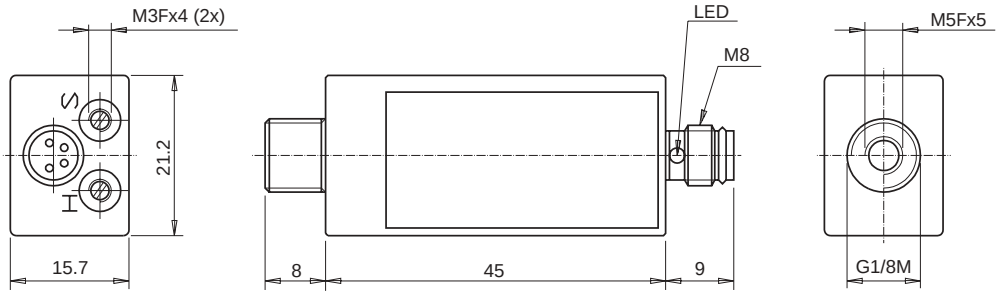


Electrical diagram

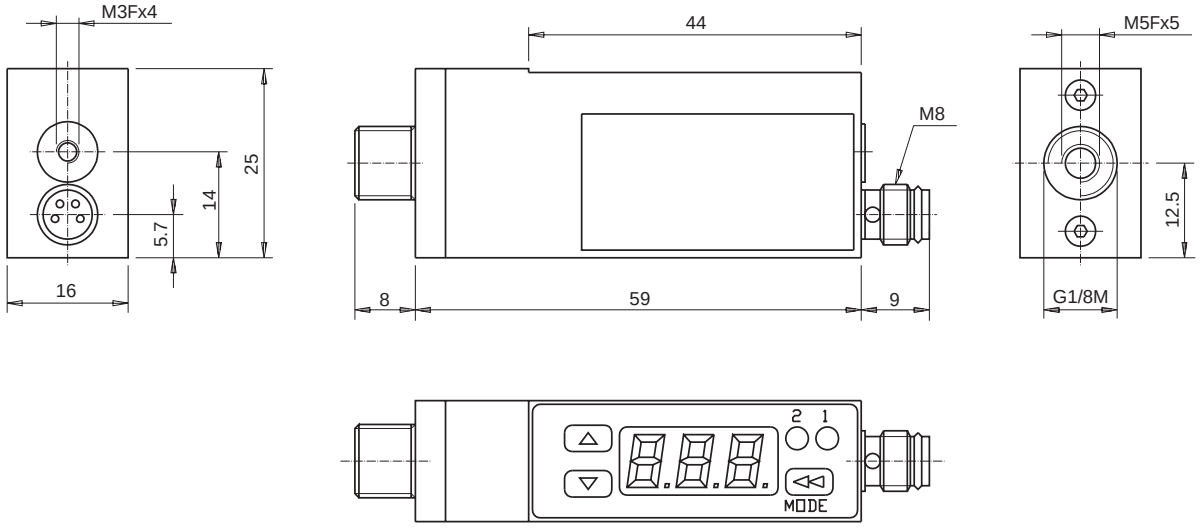
Vacuum and Pressure switch, MPS-1E



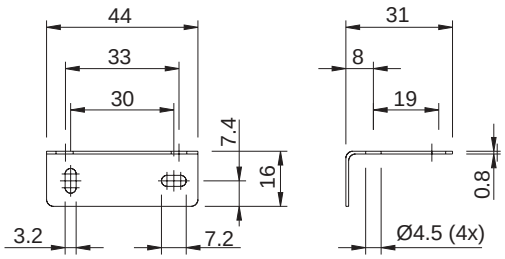
Vacuum and Pressure switch, MPS-1G



Vacuum and Pressure switch, MPS-2G

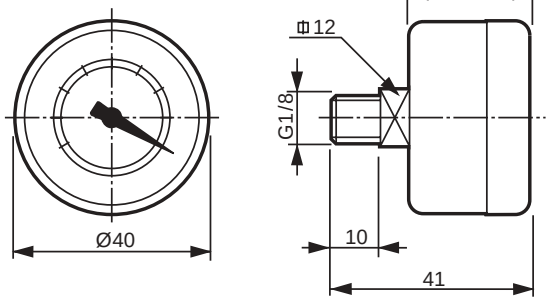


Bracket for MPS-1E

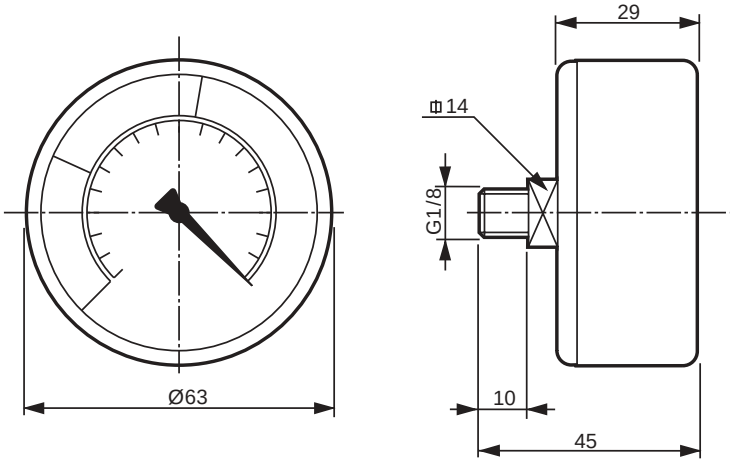


Vacuum Gauge

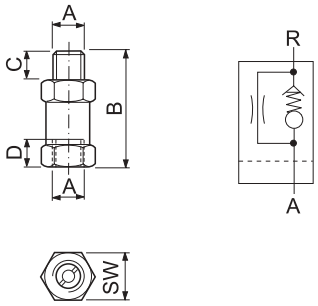
P6G-DRA1V10



P6G-FRA1V10

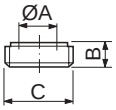


Vacuum cut-off valve



Order code	A	B	C	D	SW	Minimum operational flow Nl/min at Vacuum: 30%	60%
P5V-BKS35	M5	20	4,5	4,5	8	2,0	3,7
P5V-BKS11	G1/8	34	8,0	8,5	14	3,7	7,2
P5V-BKS12	G1/4	36	10,0	11,0	17	4,0	7,8
P5V-BKS13	G3/8	39	10,0	12,0	22	11,7	23,3
P5V-BKS14	G1/2	41	12,0	14,0	27	11,7	23,3

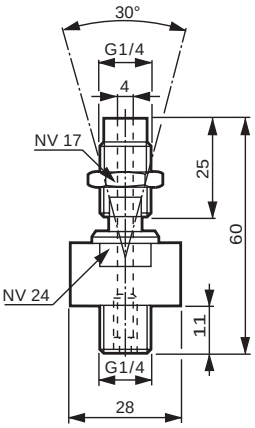
Grid filter



Order code	A	B	C
P5V-FLNA1	3,75	3,5	G1/8
P5V-FLNA2	6,40	4,0	G1/4
P5V-FLNA4	10,00	4,5	G1/2

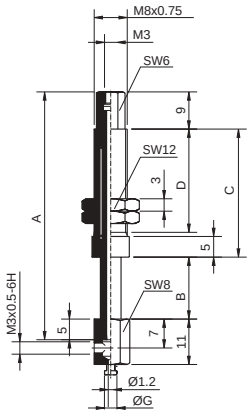
Swivel mount

9301 0546-18

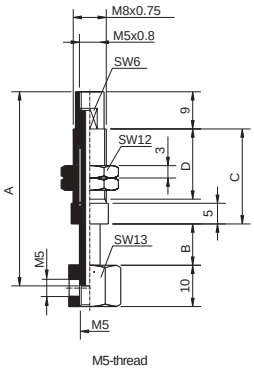


Spring mount

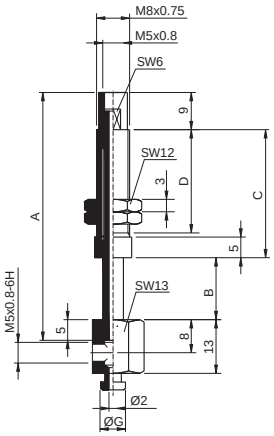
FTYS-2A-10-M3
FTYS-2A-15-M3



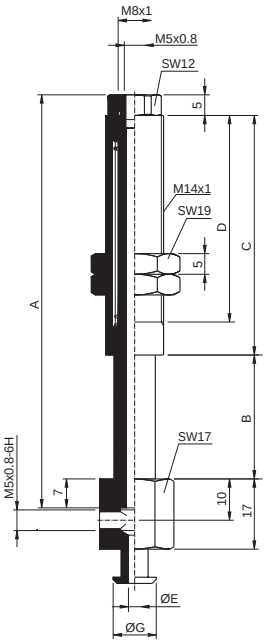
FTYS-M5F-10-M5



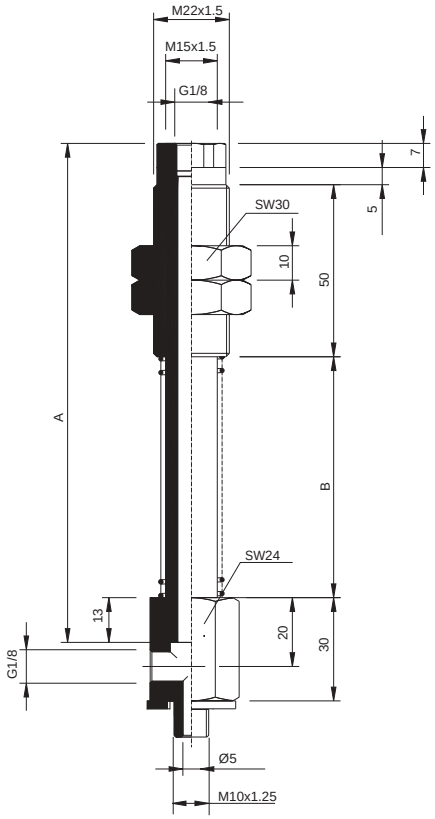
FTYS-5A-10-M5
FTYS-5A-15-M5



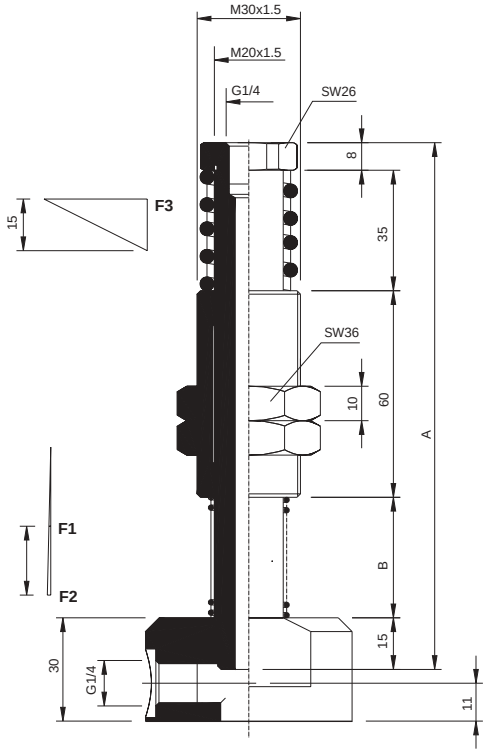
FTYS-20B-15-M5
FTYS-20B-30-M5
FTYS-50-15-M5
FTYS-50-30-M5

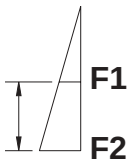


FTYS-60-30-G1
FTYS-60-50-G1
FTYS-60-70-G1



FTYS-120-20-G2
FTYS-120-70-G2





Order code	Ood order code	A mm	B mm	C mm	D mm	E mm	F1 N	F2 N	F3 N	G mm	For suction cups
FTYS-2A-10-M3	P5V-ARC1110A	47,0	10	23,0	17,0	-	0,062	0,12	-	3,0	PFG/PFTF/PFTM•Ø2-3,5
FTYS-2A-15-M3	P5V-ARC1115A	59,5	15	30,5	24,5	-	0,065	0,12	-	3,0	PFG/PFTF/PFTM•Ø2-3,5
FTYS-M5F-10-M5	P5V-ARC2710A	47,0	10	23,0	17,0	-	0,062	0,12	-		Female (thread) M5
FTYS-5A-10-M5	P5V-ARC1210A	47,0	10	23,0	17,0	-	0,062	0,12	-	6,0	PFG/PFTF/PFTM• Ø5-15, PBTF• Ø10-15
FTYS-5A-15-M5	P5V-ARC1215A	59,5	15	30,5	24,5	-	0,065	0,12	-	6,0	PFG/PFTF/PFTM• Ø5-15, PBTF• Ø10-15
FTYS-20B-15-M5	P5V-ARC1315A	63,0	15	36,0	28,0	3,0	0,250	0,50	-	10,5	PFOG/PFOTF/PFOTM/PFG/PFTM/PFTF/•• Ø20-40, PBTF• Ø20-40
FTYS-20B-30-M5	P5V-ARC1330A	100,0	30	58,0	50,0	3,0	0,296	0,60	-	10,5	PFOG/PFOTF/PFOTM/PFG/PFTM/PFTF/•• Ø20-40, PBTF• Ø20-40
FTYS-50-15-M5	P5V-ARC1415A	63,0	15	36,0	28,0	3,4	0,250	0,50	-	14,0	PFG/PFTF/PFTM• Ø50, PBTF• Ø50
FTYS-50-30-M5	P5V-ARC1430A	100,0	30	58,0	50,0	3,4	0,296	0,60	-	14,0	PFG/PFTF/PFTM• Ø50, PBTF• Ø50
FTYS-60-30-G1	P5V-ARC2545E	120,0	45	-	-	-	0,840	1,59	-	-	PFG/PFTF/PFTM• Ø60-95,PBTF• Ø75
FTYS-60-50-G1	P5V-ARC2570E	145,0	70	-	-	-	0,966	2,00	-	-	PFG/PFTF/PFTM• Ø60-95, PBTF• Ø75
FTYS-60-70-G1	P5V-ARC2595E	170,0	95	-	-	-	1,139	2,24	-	-	PFG/PFTF/PFTM• Ø60-95, PBTF• Ø75
FTYS-120-20-G2	P5V-ARC4635E	120,0	35	-	-	-	15,900	30,00	892	-	PFG/PFTF/PFTM• Ø120-200, PBTF• Ø110-150
FTYS-120-70-G2	P5V-ARC46100E	120,0	100	-	-	-	14,500	30,60	892	-	PFG/PFTF/PFTM• Ø120-200, PBTF• Ø110-150

Connections

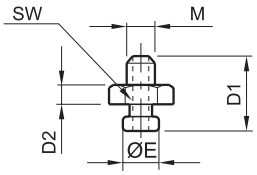
M5/2
M5/2,5
M5/3,5
M6/3,5

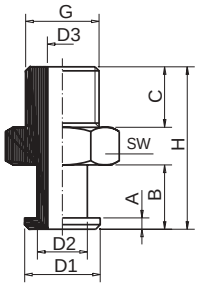
G1/8M/3,5
G1/8M/10
G1/4M/10
G1/8M/14
G1/4M/14

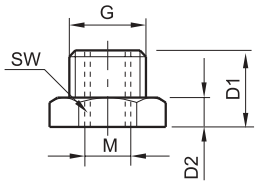
G1/8M-M6F
G1/4M-M6F
G1/4M-G1/8F

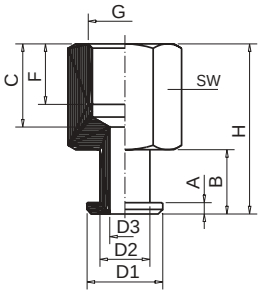
G1/8F/3,5
G1/8F/8
G1/8F/10
G1/4F/10
G1/8F/14
G1/4F/14

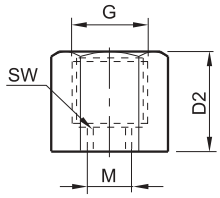
G1/8F-M5F
G1/8F-M6F
G1/4F-M6F



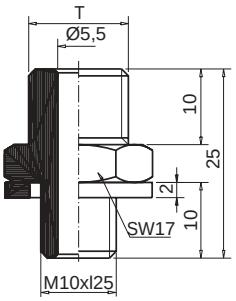




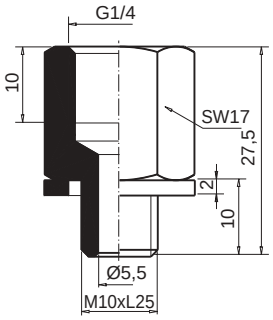


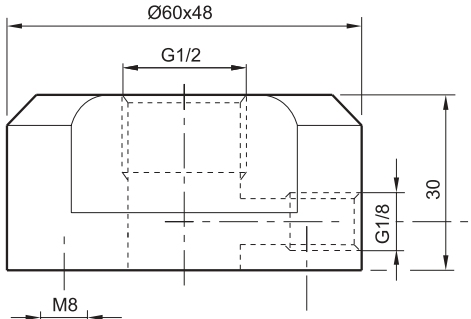


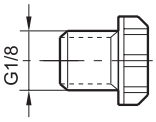
G1/4M-M10x1,25

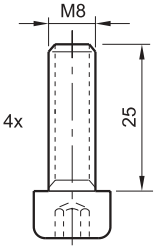


G1/4F-M10x1,25

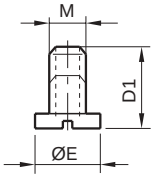








G1/2+1/8F complete

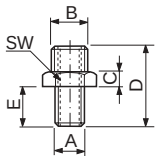


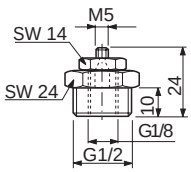
M6M/32
G1/8M/88

Description	Order code	Old order code	A	B	C	ØD1	ØD2	ØD3	ØE	F	G	H	SW	M
Male threaded connectors														
M5/2	**FTM-2A-M5**	9301054672	-	-	-	10,5	3,5	-	3,0	-	-	-	8	M5
M5/2,5	**FTM-5A-M5**	9301054621	-	-	-	12,0	3,5	-	6,0	-	-	-	8	M5
M5/3,5	**CTM-10-M5**	9301054652	-	-	-	16,0	5,0	-	6,4	-	-	-	7	M5
M6/3,5	**CTM-10-M6**	9301054653	-	-	-	16,5	5,0	-	6,5	-	-	-	7	M6
G1/8M/3,5	**CTM-10-G1**	9301054651	-	-	-	20,0	6,1	-	6,5	-	-	-	14	G1/8
G1/8M/5	**-**	9301054671	-	-	-	19,0	3,5	-	5,0	-	-	-	14	G1/8
G1/8M-M6F	**ADA-G1M-M6F**	9301054623	-	-	-	10,7	3,5	-	-	-	G1/8	-	13	M6
G1/4M-G1/8F	**-**	9301054655	-	-	-	13,0	5,0	-	-	-	G1/4	-	17	G1/8
G1/4M-M6F	**ADA-G2M-M6F**	9301054624	-	-	-	13,0	5,0	-	-	-	G1/4	-	17	M6
G1/4M-M10X1,25	**FTM-60-G2**	9301054625	See drawing above											
G1/8M/10	**FTM-20-G1**	9301054676	1,5	8,5	8	10,0	6,5	4,0	-	-	G1/8	21,0	13	-
G1/4M/10	**FTM-20B-G2**	9301054677	1,5	8,5	10	10,0	6,5	4,0	-	-	G1/4	23,0	17	-
G1/8M/14	**FTM-50-G1**	9301054678	1,5	8,5	8	14,0	8,5	4,0	-	-	G1/8	21,0	13	-
G1/4M/14	**FTM-50-G2**	9301054679	1,5	8,5	10	14,0	8,5	4,0	-	-	G1/4	23,0	17	-
Female threaded connectors														
G1/8F/3,5	**CTF-10-G1**	9301054654				18,0	12,0	-	6,0		G1/8		14	
G1/8F/8	-	9301054666	2,0	4,0	11	6,0	4,0	2,5		8	G1/8	18,0	13	
G1/8F/10	**FTF-20-G1**	9301054668	1,5	8,5	8	10,0	6,5	4,0	-	-	G1/8	22,0	13	-
G1/4F/10	**FTF-20B-G2**	9301054669	1,5	8,5	10	10,0	6,5	4,0	-	-	G1/4	25,5	17	-
G1/8F/14	**FTF-50-G1**	9301054670	1,5	8,5	8	14,0	8,5	4,0	-	-	G1/8	22,0	13	-
G1/4F/14	**FTF-50-G2**	9301054674	1,5	8,5	10	14,0	8,5	4,0	-	-	G1/4	25,5	17	-
G1/8F-M5F	**ADA-G1F-M5F**	9301054628	-	-	-	-	13	-	-	-	G1/8	-	13	M5
G1/8F-M6F	**ADA-G1F-M6F**	9301054629	-	-	-	-	13	-	-	-	G1/8	-	13	M6
G1/4F-M6F	**ADA-G2F-M6F**	9301054630	-	-	-	-	17	-	-	-	G1/4	-	17	M6
G1/4F/M10x1,25	**FTF-60-G2**	9301054675	See drawing above											
G1/2+1/8F	**FTF-120-G4**	9301054631	See drawing above											
(Including G1/8 plastic plug and M8 screw DIN912, 8,8)														
Screw														
M6M/32	**CTM-30-M6**	9301054650	-	-	-	20	-	-	14	-	-	-	-	M6
G1/8M/88	**CTM-90-G1**	9301054649	-	-	-	29	-	-	20	-	-	-	-	G1/8

Connecting nipples, for P5V-CFS

For direct connection between generators and suction cups, serie P5V-CFS



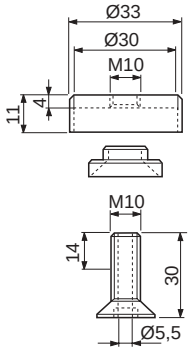


Desciption	Order code	A G1	B G2	C	D	E	SW
M5-G1/2	9721900145						
G1/8-G1/4	9721900183	1/4	1/8	5,1	19,0	8	17,0
G1/8-G1/2	9721900146	1/2	1/8	5,4	22,0	10	24,0
G1/4-G1/4	9721900182	1/4	1/4	5,0	21,0	8	14,0
G1/4-G1/2	9721900147	1/2	1/4	6,1	24,0	10	25,0
G3/8-G1/2	9721900148	1/2	3/8	6,2	24,5	10	25,0
G1/2-G1/2	9721900150	1/2	1/2	6,5	27,0	10	25,0
G1/2-G3/4	0603602200	3/4	1/2	7,1	30,5	12	27,0
G1/2-G1	0603554100	1	1/2	8,1	42,0	19	36,0
G3/4-G1	0603554300	1	3/4	8,0	34,0	13	33,5
G1/8-M5	9721900149	M5	1/8	4,2	14,5		14,5

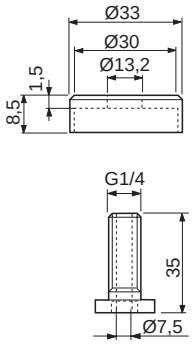
Connecting nipples for suction cups, serie P5V-CFA

For direct connection between generators and suction cups, serie P5V-CFA

9121679950



9121719318



Notes

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