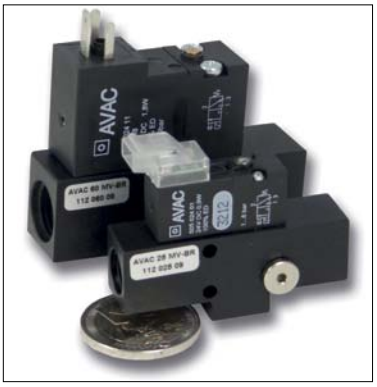
AVAC

Product Catalogue
Edition 2019-1
Ejectors and Accessories



Innovation prize
”Award for Blechexpo”

AVAC MULTI-CIRCUIT Ejector AMS was appointed the most innovative product in category Handling technology/robotics at the Blechexpo 2017 in Stuttgart, the international trade fair for sheet metal working.

All our products are manufactured in the European Union.

The Ejectors are developed and produced in Sweden.

The Sensors are developed and produced in Germany.

Important!

Make sure all components in the vacuum system are without electricity, compressed air and vacuum before service/repair is done. Disconnect electricity/compressed air/vacuum supply and blow compressed air into the holding valves so that no vacuum remains. Ensure that all parts are removed from the suction cups. Now that the system is safe service/repair may be done.

Important!

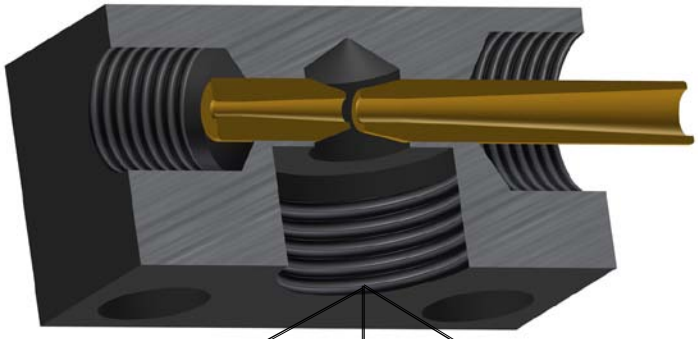
Holding valves are not safety valves. Details held with vacuum will be released eventually if air supply is interrupted. Air will leak into any system even if holding valves are used.

NOTE!

All technical data in this catalog are typical data. Air quality is essential for product life expectancy and a safe, problem free operation, see ISO 8573-1

Index Page

- Consider the system - create technical solutions!



Handling and packaging of sensitive food products

Handling of small and sensitive electronic products

Heavy lifting

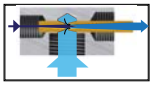
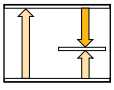
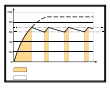
AVAC offer you vacuum components and knowledge and together with your imagination we can solve all possible problems where vacuum is part of the technical solution!

A complete program of Ejectors and accessories

AVAC Vakuumteknik AB has developed and worked with ejectors since 1980 with the goal of creating robust, simple, easily mounted, adapted ejectors for creation of vacuum. They are designed with the goal of minimizing air consumption. The product range is constantly developing to keep up with our customers raising demands on vacuum products for increased safety, better control, reduced dimensions, easier installation and better energy efficiency.

This catalogue is divided in the following parts to support search for information

Part 1: TECHNIQUE


Here you will find know-how about vacuum technique to optimize any specific vacuum application.

Part 2: BASE EJECTORS



This is our basic ejector series with different capacities, with and without blow-off connection and with various mounting options.

Part 3: SOLENOID OPERATED EJECTORS


This series is available with different capacities equipped with one solenoid valve to generate vacuum and one option with a second solenoid valve for blow-off.

Part 4: MULTI-CIRCUIT EJECTORS





Ejectors with 4, 5 or 6 independent vacuum circuits. Offers a simplified assembly with a good overview. The ejector is equipped with AVAC's patented release function.
Also available equipped with AVAC Monitoring System (AMS).

NEW: MULTI Supply valve.

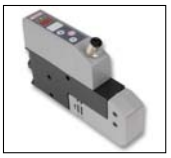
Part 5: BOOSTER RELEASE EJECTORS

Perfect to mount directly onto the suction cup. The ejector is based on AVAC´s patented blow-off function with gentle release and accuracy.

Part 6: EJECTORS WITH VACUUM HOLDING VALVE


Ejectors with vacuum holding valve. Dense material allows considerable air savings in combination with appropriate control system and a vacuum sensor.

Part 7: EJECTORS WITH AIR SAVING DEVICE

Ejectors with an integrated pneumatic (2BV AIR SAVE) or electronic (MFE) control circuit that shuts off the air supply when the high set point is reached and restarts when reaching the low level. This enables considerable air savings in handling of dense materials.

To release the object from the suction cup a blow-off signal is required.

NEW: AUTOVAC MFE.

Part 8: ACCESSORIES VACUUM



Accessories to simplify the installation.

- Blow Off Valve (RR)
- Silencer SILPO, G1/8 to G1

Part 9: VACUUM-/PRESSURE SENSORS




Four different models of vacuum- and pressure sensors to monitor and control a various applications.

Part 10: APPLICATIONS


Here you can find some cases showing how we meet specific demands from our customers.

The power of vacuum

Picture of the statue, Magdeburg, Germany

In the summer of 1657 the German scientist Otto von Guericke did an experiment where he put two large hemispheres made of copper together (Magdeburg hemispheres), which was fitted with a seal between them. Using a vacuum pump he designed he then created a vacuum inside them Eight horses were harnessed to each hemisphere and tried to pull them apart without success. When the air pressure was released back into the hemispheres they fell apart by themselves.

This shows that the air pressure from the outside combined with the vacuum on the inside creates massive amounts of power.

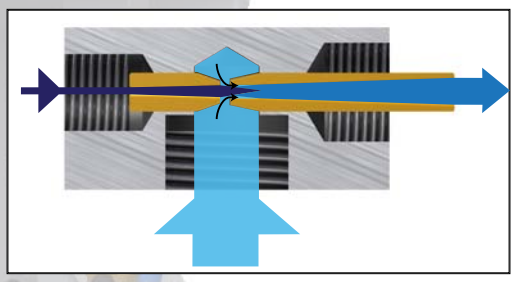
Just the atmospheric pressure at sea level is able to create a force of about 10 tons per square meter.

The lifting force is created with the use of suction cups where the air is sucked out and the air pressure from outside means that the object is held by the suction cup.

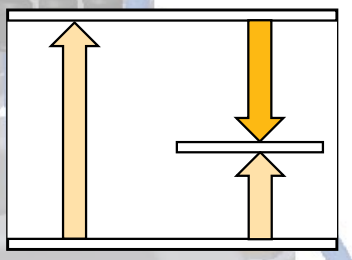
Part 1: TECHNIQUE

Here you will find know-how about vacuum technique to optimize any specific vacuum application.

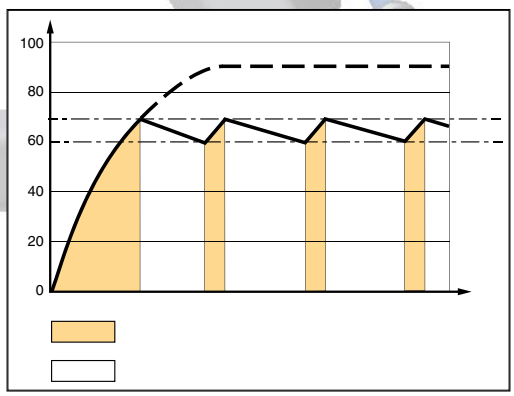
Ejector function principle



Definition of vacuum

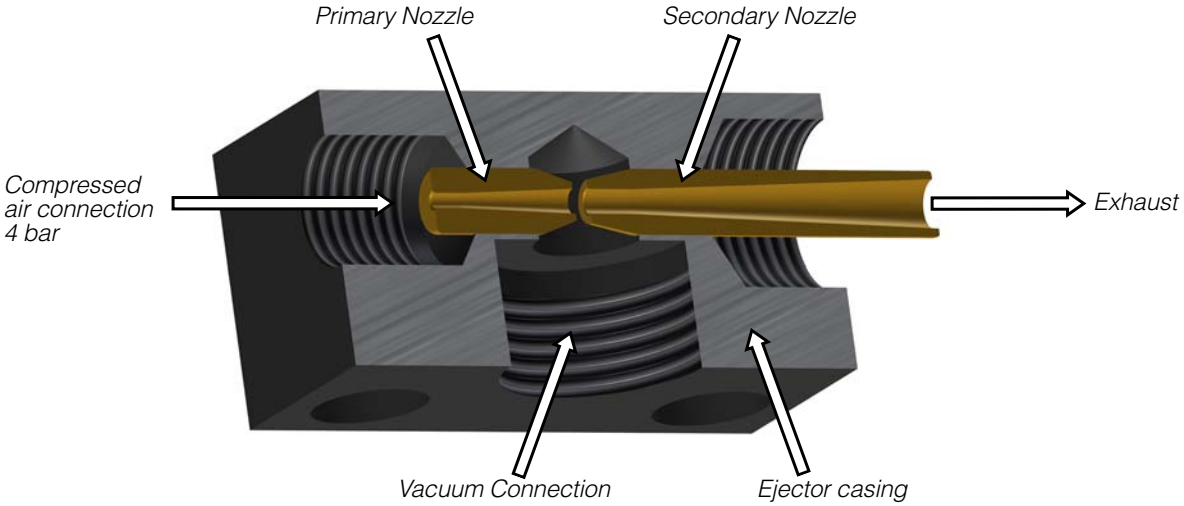


Potential air savings and control



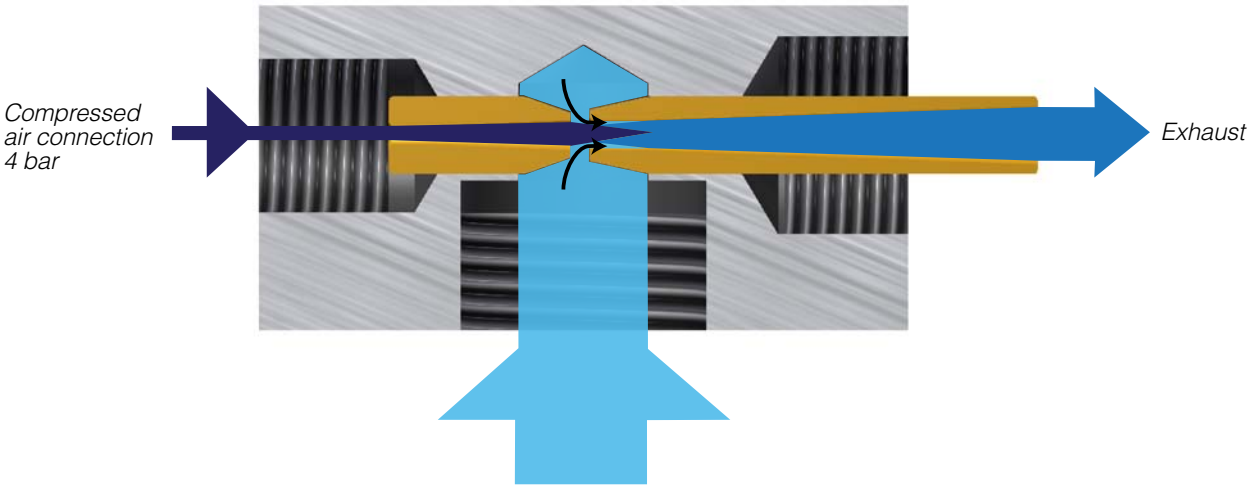
Different combinations of ejectors and suction cups to achieve shorter cycle times, improved safety and reduced air consumption.

Operating principle of ejectors



Our ejectors operate by the venturi principle which means that compressed air is led in through a primary nozzle where it is blown to a secondary nozzle which draws the air from the vacuum connection. Depending on the nozzle design different vacuum levels can be obtained. Our standard ejectors are designed so that the levels can be achieved according to the curve on page 8.

This design of the ejector has the benefit of no moving parts and are easy to build in thanks to small dimensions.

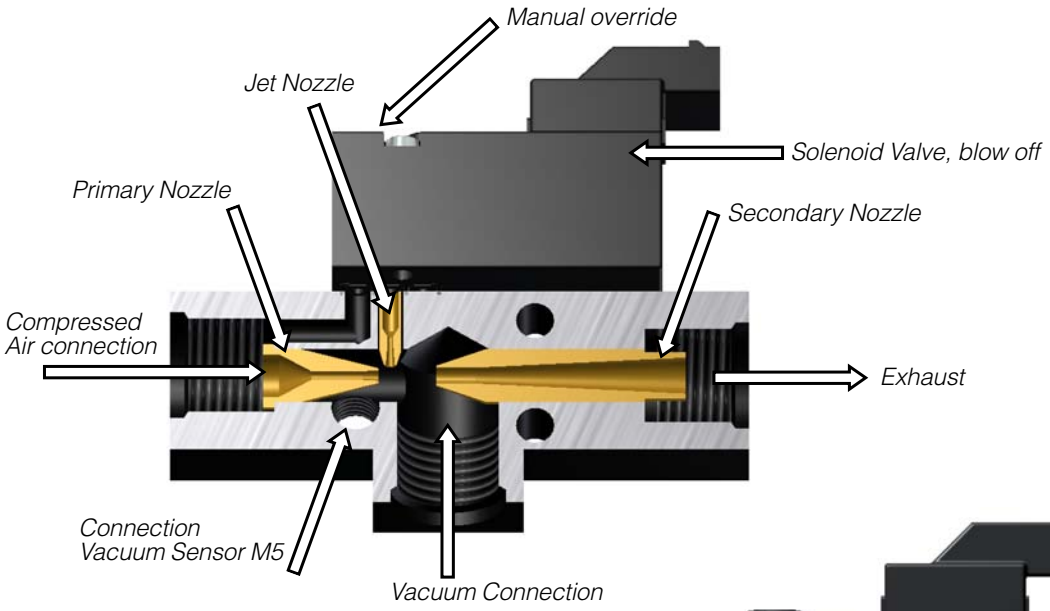


The Venturi principle

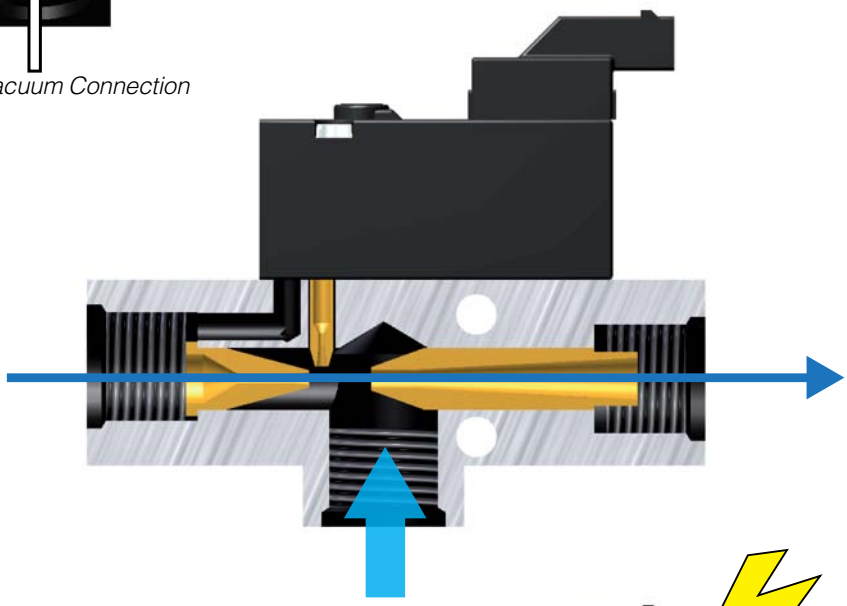
Physically, this is described as: Venturi effect is the decrease in fluid pressure that results when a fluid flows through a constricted part of the tube. The effect is named after the Italian physicist Giovanni Batista Venturi (1746-1822).

The ejectors lead the compressed air in through the primary nozzle where it is expanded and the compressed air energy is converted into kinetic energy. The air jet speed increases, the temperature and the pressure decreases in the vacuum connection. The advantages of the Venturi principle is that there are no moving parts, has small dimensions, low maintenance cost and rapid response.

Functional description of the Booster Release Ejector

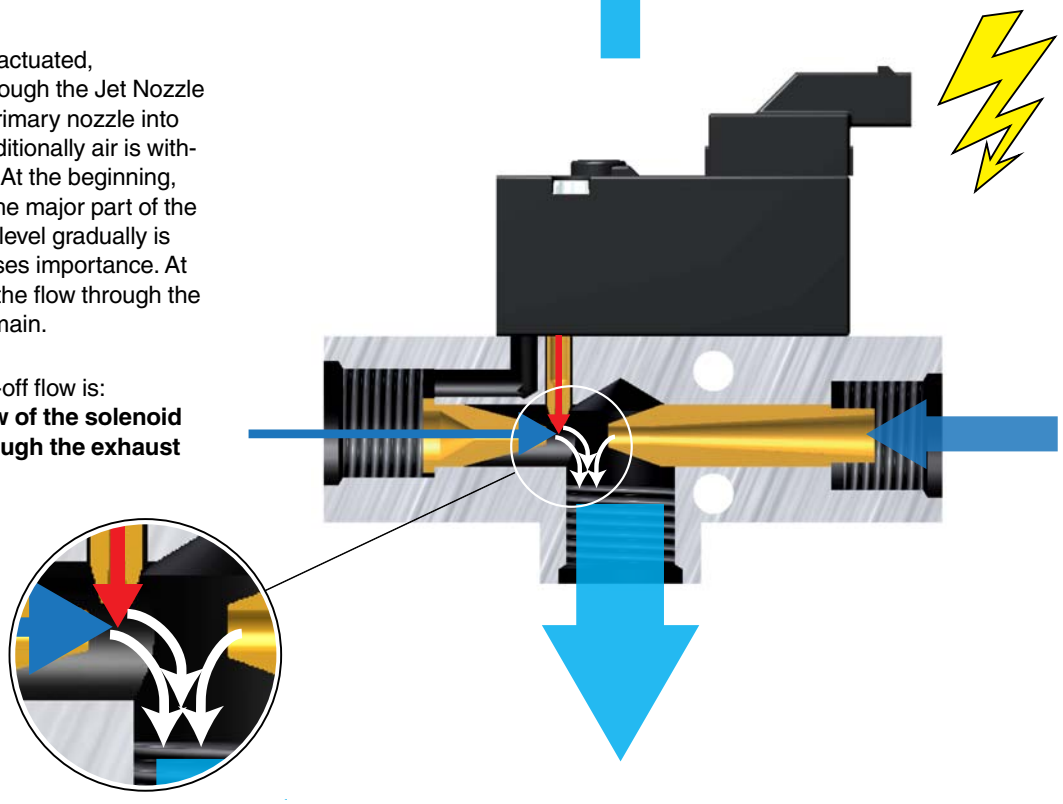


Vacuum is produced
The ejector is supplied with compressed air which is led through the primary nozzle and blown to the secondary nozzle, drawing the air from the vacuum connection where vacuum is achieved.



The Release Phase
When the solenoid valve is actuated, compressed air is blown through the Jet Nozzle linking off the air from the primary nozzle into the vacuum connection. Additionally air is withdrawn through the exhaust. At the beginning, the withdrawn air signifies the major part of the blow-off. When the vacuum level gradually is sinking the withdrawn air loses importance. At atmospheric pressure only the flow through the jet- and primary nozzles remain.

It means that the total Blow-off flow is:
The Ejector flow + the flow of the solenoid valve + air withdrawn through the exhaust

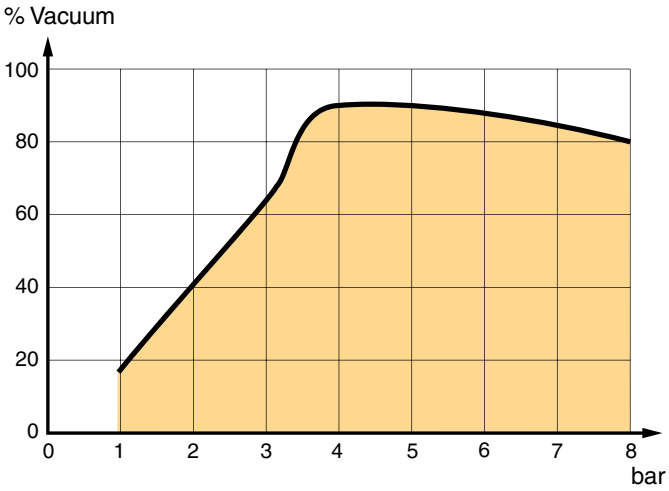


General data ejectors

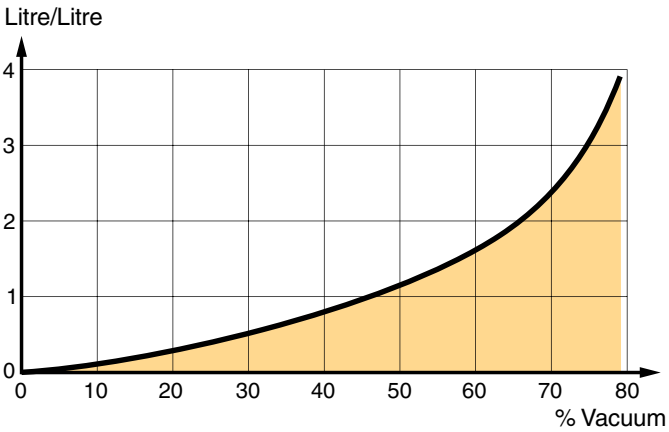
Our ejectors are designed to produce a high vacuum level and the nozzles design provide very low air consumption. To get the lowest air consumption possible our nozzles are designed for an optimum supply pressure of 4 bar . A higher pressure will not achieve a higher vacuum, but only result in much higher air consumption and higher noise levels from the ejector.

The diagrams show the different vacuum levels obtained at different supply pressure and air consumption to evacuate one litre volume to different vacuum levels.

All ejectors in our program are designed to these curves.



Vacuum level as a function of air supply pressure



Air consumption in litres to evacuate one litre from atmosphere pressure to different vacuum levels

Recommended ISO quality class for compressed air according to ISO 8573-1: 2010 to avoid disruption in production with the ejectors are:

Quality clas	Pollution Max number of particles per m³			Water Max pressure dew point		Oil Max concentration
	0.1 - 0.5 µm	0.5 - 1.0 µm	1.0 - 5.0 µm	°C	°F	mg/m³
1	100	1	0	-70	-94	0.01
2	100 000	1 000	10	-40	-40	0.1
3	-	10 000	500	-20	-4	1
4	-	-	1 000	3	37,4	5
5	-	-	20 000	7	44,6	-
6	-	-	-	10	50	-

Quality Class ISO 8573-1: 2010 [3:4:1] is recommended for the supply of our products when used indoors to avoid disruption in production

This means the following:

(3) Max particles per cubic meter of compressed air:

size 0.5 - 1.0 µm 10 000 particles
size 1.0 - 5.0 µm 500 particles

(4) Water content

Dew point +3 °C

(1) Max oil concentration

0.01 mg/m³

(For outdoor use the pressure dew point has to be below ambient temperature)

How vacuum is defined

Vacuum can be defined as a pressure below ambient pressure. It can be seen as a negative pressure relative to the local atmospheric pressure, an absolute pressure, or as %.

-0.6 Bar (e) = 0.4 bar (a) = 60% vacuum

Vacuum level

Our ejectors are all designed to acquire a high vacuum level, which allows a high lifting force to be obtained at a given area or a smaller sized suction cups can be used without loss of lifting force.

At 75% vacuum a suction cup with 100 mm diameter provides a lifting force of 590 N.

At 45% vacuum level a suction cup of nearly 170 mm in diameter is required to achieve the same lifting force.

A high vacuum level together with low air permeability in the handled material is the ideal combination for a successful solution.

What is the cycle time required on the machine?

All our ejectors can provide the same vacuum level, the only difference is they have different flow capacities to quickly empty a volume.

Thus it is essential to calculate the volume of which is placed under vacuum. (Suction cup (s) + connections + hoses + tubes + possibly other volumes) and then identify the requirements necessary for the time used to attain the vacuum level required before lifting can be done.

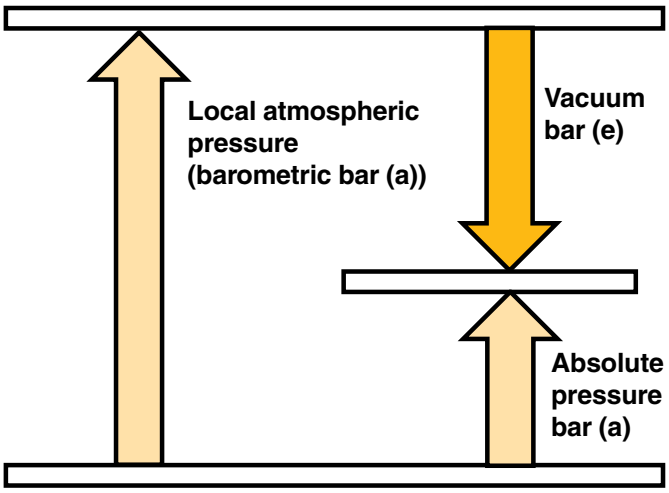
It is recommended to use a vacuum sensor to ensure that the correct vacuum level is reached before lifting is done. This allows the lifting to be done immediately when the required vacuum level is reached and no unnecessary waiting time is needed.

For a safe and quick delivery of the handled object Rapid Release signal (RR) should be used so that no unnecessary time is used in the cycle.

There is also a difference in the time aspect depending on what the final vacuum you decide to use as it takes unnecessarily long time if you for example decide to use 85% vacuum. To calculate the time required a vacuum value commonly used is 75%, and the size of the suction cups is selected for double safety to be obtained, which means that the vacuum level may drop to 37% before the object is dropped.

It is also common when using ejectors with an air saving function that the signal from the vacuum sensor to the control system allows the air supply to be turned off at 75% vacuum and resume at 65%. This allows large savings in compressed air.

Remember that more than 95% is possible to save.



Pipe / tube diameter (mm)		Volume (cm³)		
Outside mm	Inside mm	L = 1 m	L = 5 m	L = 10 m
4	2.7	5.7	28.5	57
6	4	12.6	63	126
8	6	28.3	142	283
12	9	63	318	636
16	12	113	565	1130
22	16	201	1005	2010

Standard ejectors (high vacuum)

Ejector size	Air consumption		Time to evacuate a liter to 75% vacuum (s)
	Nl/s	Nl/min	
10	0,17	10	18
20	0,33	20	9
30	0,5	30	6
40	0,7	40	4,5
50	0,8	50	3,8
60	1	60	3,8
MFE 100H	1,6	95	1,4*
100	1,7	100	2
120	2	120	1,5
150	2,5	150	1,2
MFE 200H	2,8	170	0,75*
180	3	180	1
240	4	240	0,7
MFE 300H	4,4	265	0,6*
360	6	360	0,5
MFE 400H	6,3	380	0,4*
420	7	420	0,4
720	12	720	0,25

* Time to evacuate 1litre air from atmospheric pressure to 70% vacuum.

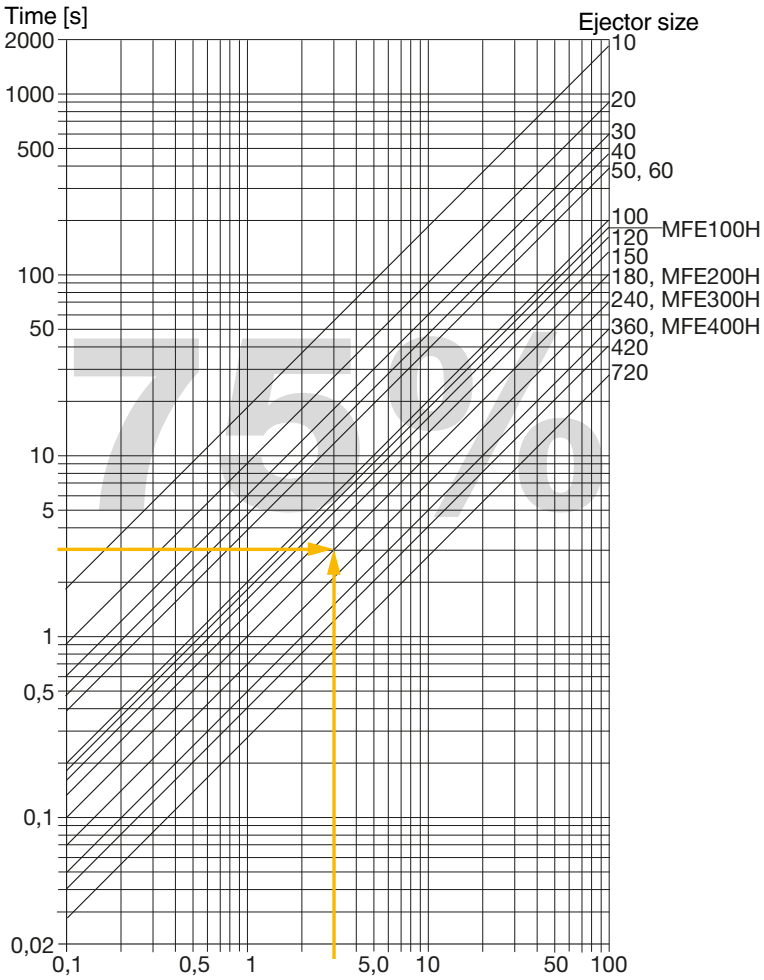
INLINE LS/LG high flow ejectors

Ejector size	Air consumption at 5 bar supply pressure		Time to evacuate a liter to 50% vacuum (s)
	Nl/s	Nl/min	
10	0,22	13	4,1
20	0,44	26	2

Chart, evacuation time for standard ejectors (high vacuum level)
The chart shows the evacuation time in seconds to 75% vacuum at various volumes and ejector sizes.

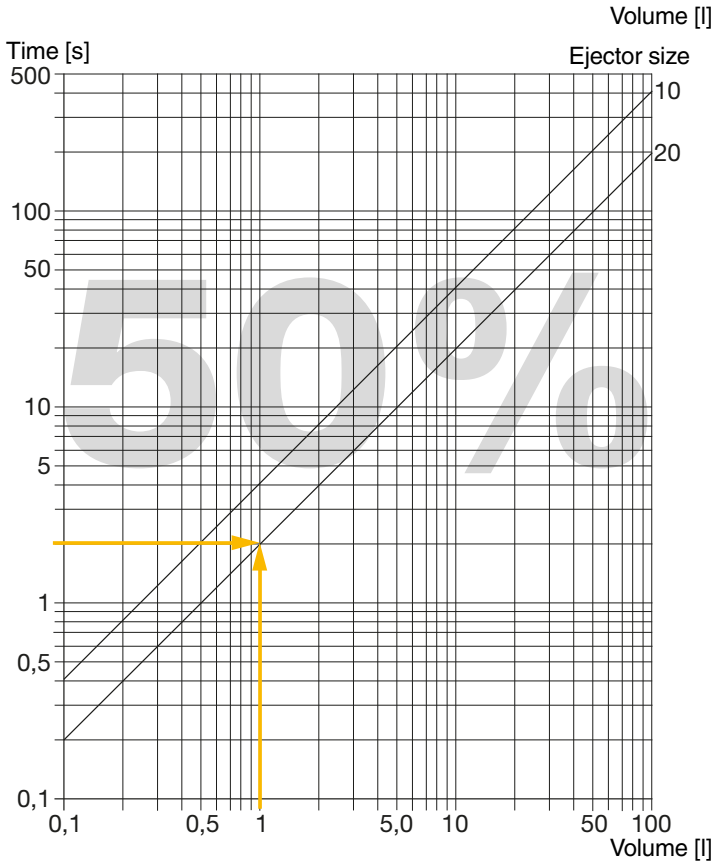
The chart shows that it takes 3 sec. to evacuate a 3 liter volume to 75% vacuum with an ejector size 180.

If less vacuum is required:
- 65% vacuum is reached in 2/3rd of the time
- 55% vacuum is reached in 1/2 the time



Chart, evacuation time for INLINE LS/LG (high vacuum flow)
Ejectors with nozzles for high vacuum flow. The chart shows the evacuation time in seconds to reach 50% vacuum at various volumes and ejector sizes.

The chart shows that it takes 2 sec. to evacuate a 1 liter volume to 50% vacuum with an ejector size 20.



Vacuum flow of the ejector and the primary nozzle diameter

By handling of not air tight materials, it is an advantage to know the vacuum flow of the ejector.

It makes it possible to compensate for leakages and increases the safety by lifting.

The chart shows the vacuum flow of the ejectors at different vacuum level and also the diameter of the primary nozzle.

Some ejectors have more than one primary nozzle as shown in the chart.

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AVAC 10/ 10E	7,5	6,5	5,5	4,0	2,5	1,0	0,8	0,5	0,3	0,5
AVAC 20-RR	14,2	12,5	9,8	6,5	4,0	3,0	2,0	0,9	0,5	0,7
AVAC 30-RR	20,1	17,8	15,3	13,0	10,8	8,3	4,8	1,8	0,7	0,95
AVAC 50-RR	32,0	28,2	23,8	19,5	16,3	13,3	9,5	4,5	1,5	1,1
AVAC 60-RR	44,0	38,9	33,4	28,2	21,0	16,3	11,8	4,8	2,0	1,25
AVAC 120-RR	88,0	76,5	67,1	56,5	47,0	36,4	24,0	11,1	5,0	2 x 1,25
AVAC 240-M-RR	175,0	148,7	130,0	111,7	93,5	72,8	50,8	19,3	11,5	4 x 1,25
AVAC 420-M-RR	308,0	240,0	217,7	183,1	147,4	116,6	83,4	45,2	20,8	7 x 1,25
AVAC 720	441,0	343,0	294,0	248,0	188,0	133,0	96,0	51,0	25,0	2 x 3,1
AVAC 10 IL-LS	14	12	10	7,6	5,0	2,6	0,4	-	-	0,5
AVAC 10 IL-HS	8	7	6	5,2	4,2	3,4	2,4	1,3	0,6	0,5
AVAC 10 IL-LG	14	12	10	7,6	5,0	2,6	0,4	-	-	0,5
AVAC 10 IL-HG	8	7	6	5,2	4,2	3,4	2,4	1,3	0,6	0,5
AVAC 20 IL-LS	29	25	21	16,2	11,0	5,8	1,0	-	-	0,7
AVAC 20 IL-HS	15	13	10,8	8,8	7,2	5,6	4,0	2,6	1,6	0,7
AVAC 20 IL-LG	29	25	21	16,2	11,0	5,8	1,0	-	-	0,7
AVAC 20 IL-HG	15	13	10,8	8,8	7,2	5,6	4,0	2,6	1,6	0,7
AVAC 10 MV	7,5	6,5	5,5	4,0	2,5	1,0	0,8	0,5	0,3	0,5
AVAC 20 MV	14,2	12,5	9,8	6,5	4,0	3,0	2,0	0,9	0,5	0,7
AVAC 30 MV	20,1	17,8	15,3	13,0	10,8	8,3	4,8	1,8	0,7	0,95
AVAC 40 MV	28,0	24,4	20,7	17,0	14,5	10,8	7,0	3,4	1,1	1,1
AVAC 60 MV	44,0	38,9	33,4	28,2	21,0	16,3	11,8	4,8	2,0	1,25
AVAC 10 MV-MV	7,5	6,5	5,5	4,0	2,5	1,0	0,8	0,5	0,3	0,5
AVAC 20 MV-MV	14,2	12,5	9,8	6,5	4,0	3,0	2,0	0,9	0,5	0,7
AVAC 30 MV-MV	20,1	17,8	15,3	13,0	10,8	8,3	4,8	1,8	0,7	0,95
AVAC 40 MV-MV	28,0	24,4	20,7	17,0	14,5	10,8	7,0	3,4	1,1	1,1
AVAC 4K-10(-MV)-RR(-AMS)	7,5	6,5	5,5	4,0	2,5	1,0	0,8	0,5	0,3	0,5
AVAC 4K-20(-MV)-RR(-AMS)	14,2	12,5	9,8	6,5	4,0	3,0	2,0	0,9	0,5	0,7
AVAC 5K-10(-MV)-RR(-AMS)	7,5	6,5	5,5	4,0	2,5	1,0	0,8	0,5	0,3	0,5
AVAC 5K-20(-MV)-RR(-AMS)	14,2	12,5	9,8	6,5	4,0	3,0	2,0	0,9	0,5	0,7
AVAC 6K-10(-MV)-RR(-AMS)	7,5	6,5	5,5	4,0	2,5	1,0	0,8	0,5	0,3	0,5
AVAC 6K-20(-MV)-RR(-AMS)	14,2	12,5	9,8	6,5	4,0	3,0	2,0	0,9	0,5	0,7
AVAC 25 MV-BR	26,0	21,0	18,3	15,5	13,3	10,3	7,3	2,5	0,4	0,8
AVAC 60 MV-BR	65	52	40	35	31	24	18	11	1	1,2
AVAC 2BV(-AS)-20	12,8	11,3	8,8	5,9	3,6	2,7	1,8	0,8	0,3	0,7
AVAC 2BV(-AS)-30	17,3	15,5	13,3	11,5	9,0	6,3	3,8	1,3	0,6	0,95
AVAC 2BV(-AS)-40	27,6	23,2	19,5	17,0	14,0	10,3	6,0	3,2	0,9	1,1
AVAC 2BV(-AS)-60	42,6	37,6	32,0	27,0	20,1	15,3	10,3	3,3	1,5	1,25
AVAC 2BV(-AS)-100	64,0	56,4	47,6	39,0	32,6	26,6	19,0	9,0	3,0	2 x 1,1
AVAC 2BV(-AS)-150	96,0	84,6	71,4	58,5	48,9	39,9	28,5	13,5	4,5	3 x 1,1
AUTOVAC 60	42,6	37,6	32,0	27,0	20,1	15,3	10,3	3,3	1,5	1,25
AUTOVAC 180	105,0	86,0	75,3	64,6	52,0	40,8	24,5	10,0	4,5	2,1
AUTOVAC 360	168,0	136,0	120,0	102,0	85,0	56,2	41,0	22,0	11,0	3,1
AUTOVAC MFE 100H	65	60	54	47	35	28	22	12	3	1,5
AUTOVAC MFE 200H	105	96	87	72	56	45	34	19	5	2,0
AUTOVAC MFE 300H	155	140	126	109	81	66	50	28	8	2,5
AUTOVAC MFE 400H	230	207	187	162	121	97	75	42	11	3,0

Choose the right size pipe and tube

Long and/or small diameter tubes or hoses throttles the flow and causes a pressure drop in the compressed air supply, on the vacuum side or creates a too high back-pressure on the exhaust side, the sizing of both tube lengths and tube diameter is important to get the most out of the vacuum plant.

The valve for the compressed air supply to the ejector is chosen so that the valve flow rate (Qn) is larger than the ejectors air consumption.

Below, the chart shows the appropriate sizes of tubes (hoses) for vacuum /exhaust side.

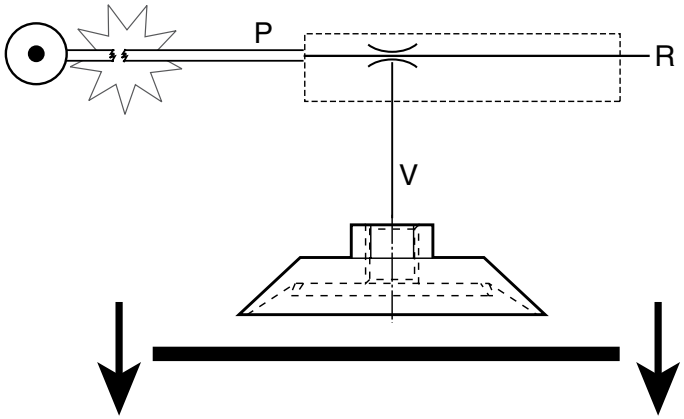
Ejector size Air consumption in Nl/min	On the vacuum side			On the exhaust side		
	Tube or hose length 1 m	Tube or hose length 3 m	Tube or hose length 5 m	Tube or hose length 1 m	Tube or hose length 3 m	Tube or hose length 5 m
	Internal diameter of tube or hose (mm)			Internal diameter of tube or hose (mm)		
10	3	4	4	3	3	4
20	4	4	6	3	4	6
30	6	6	6	4	6	6
40	6	6	9	4	6	6
50	6	6	9	6	6	6
60	6	9	9	6	6	6
120	9	12	12	6	9	9
180	12	12	12	9	9	9
240	12	16	16	9	9	9
360	16	16	16	12	12	12
420	16	16	19	12	12	16
720	19	25	25	16	16	16

Conversion table for pressure units

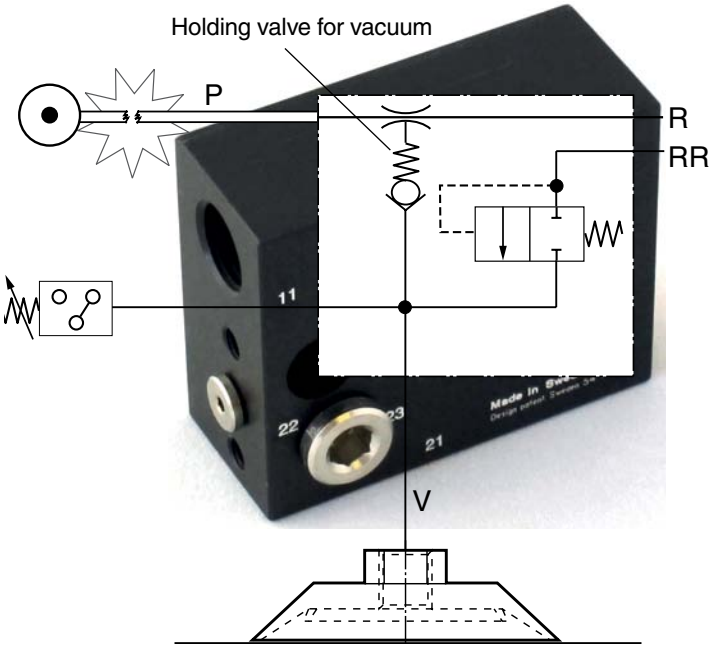
Units	bar	mbar	kPa	MPa	psi	ft H_2O	in H_2O	mm Hg	Torr	in Hg	kp/cm^2
bar	1	1000	100	0.1	14.5038	33.4553	401.463	750.064	750.064	29.53	1.01972
mbar	0.001	1	0.1	0.0001	0.0145	0.03346	0.40146	0.75006	0.75006	0.02953	0.00102
kPa	0.01	10	1	0.001	0.14504	0.33455	4.01463	7.50064	7.50064	0.2953	0.0102
MPa	10	10000	1000	1	145.04	334.55	4014.63	7500.64	7500.64	295.3	10.1972
psi	0.06895	68.9476	6.89476	0.0068948	1	2.30666	27.6799	51.7151	51.7151	2.03602	0.07031
ft H_2O	0.02989	29.8907	2.98907	0.0029891	0.43353	1	12	22.4199	22.4199	2.8959	0.03048
in H_2O	0.00249	2.49089	0.24909	0.0002491	0.03613	0.08333	1	1.86833	1.86833	0.88267	0.00254
mm Hg	0.00133	1.33322	0.13332	0.0001333	0.01934	0.0446	0.5324	1	1	0.07356	0.00136
Torr	0.00133	1.33322	0.13332	0.0001333	0.01934	0.0446	0.5324	1	1	0.07356	0.00136
in Hg	0.03386	33.8639	3.38639	0.0033864	0.49115	1.13293	13.5951	25.4	25.4	1	0.03453
kp/cm^2	0.98067	980.665	98.0665	0.0980665	14.2233	32.8084	393.701	735.561	735.561	28.959	1

Example: 6 bar = 6 x 100 kPa = 600 kPa = 6 x 0.1MPa = 0.6 kPa

Holding valve means increased safety



Vacuum is generated when the ejector is supplied with air. If the air supply would be interrupted by e.g., a compressor failure, a malfunctioning valve or a loose connection, the vacuum will not be maintained as atmospheric pressure leaks into the suction cup, causing an unforeseen drop of the object.



An ejector equipped with a holding valve prevents the atmospheric pressure from leaking through the vacuum port into the vacuum area.

This is how the holding valve works:

When the ejector is operating, the holding valve is opens and air can be evacuated from the suction cup.

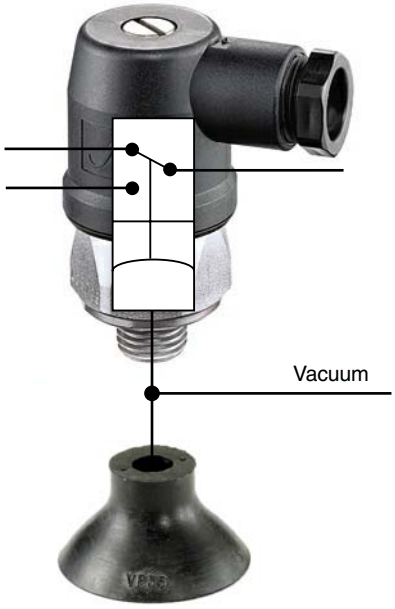
When vacuum is not created, the valve is closed. The leakage in the vacuum circuit, reduces the vacuum level gradually. How long it will take until the object is dropped depends on the leakage flow.

The holding valve is mainly used in applications where air tight materials are handled e.g. plastic, metal or glass.

As the vacuum holding valve is maintaining the vacuum level, a blow-off function is required to release the object rapidly and with accuracy.

NOTE: The holding valve cannot be regarded as a safety product, but to be considered as a possibility to extend the time until the object is dropped.

Vacuum sensor



If the correct vacuum level is not reached before attempting to lift /hold objects it may loosen/ drop.

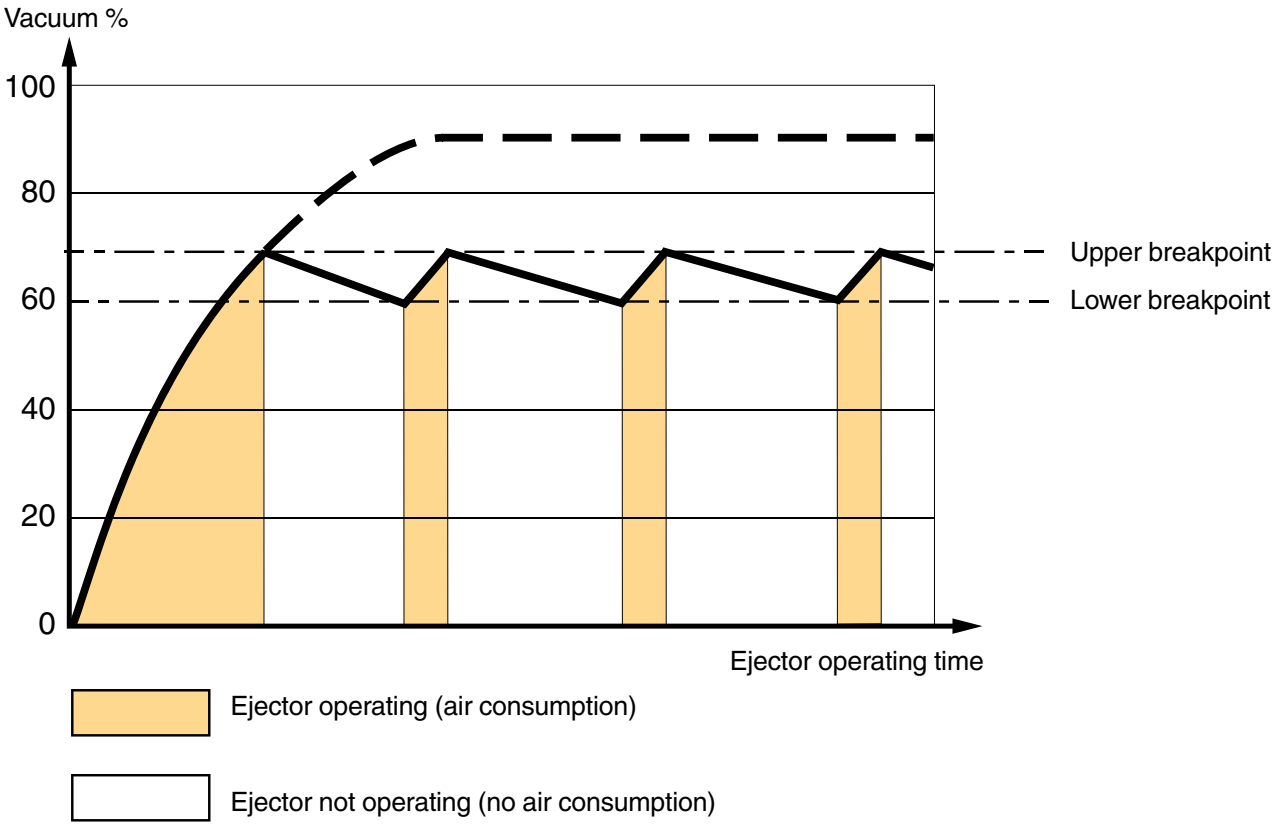
In order to both ensure the correct vacuum level and to not lose any time, a vacuum sensor should be used to give a signal to the controller that the required vacuum level is reached and the lifting can start.

Vacuum sensors of today normally have several outputs which can be adjusted to different input signals to the controller. This is essential when the ejectors are equipped with a holding valve and when air-saving function is desired. A signal is given when the set vacuum level is reached, whereby the compressed air supply to the ejector is stopped. A second signal to the controller is given when a minimum required vacuum level is reached due to leakage of air into the suction cups. This signal triggers the compressed air supply to resume again until the set vacuum level is reached.

P = Air connection
V = Vacuum Connection
R = Exhaust
RR = Blow off signal (Rapid Release)

Potential energy savings and control of:

2BV and 2BV-AS Ejectors
AUTOVAC Ejectors
AUTOVAC MFE Ejectors



The air supply valve (2/2 NC) is activated and the ejector starts generating vacuum. The valve remains activated until the Upper breakpoint vacuum level has been reached. The vacuum sensor provides the controller with a signal to interrupt the air supply to the ejector. The vacuum level is maintained thanks to the integrated vacuum holding valve.

In all vacuum systems leakages occur in suction cups, connections and tubes, which gradually decrease the vacuum level.

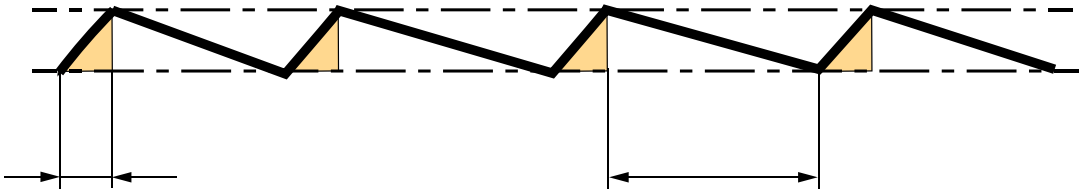
When the vacuum level reaches the preset minimum value, the vacuum sensor provides a signal to the controller to open the air supply again. When the maximum vacuum level again is reached, the valve is shut off and this procedure continues until the object shall be released.

The gap between the set maximum and the minimum vacuum level is the hysteresis. In most cases the hysteresis of the vacuum sensor is adjustable which in many cases makes it possible to save more than 95% of the air consumption.

As the vacuum holding valve is maintaining the vacuum level, the solenoid valve for blow-off has to be activated to release the object rapidly and with accuracy.

Surveillance

By adding a surveillance system it is possible to monitor the air tightness of the system. If the solenoid valve actuates too frequently, it is mostly due to a leakage in the system. Measures should be taken to overhaul the vacuum circuit.

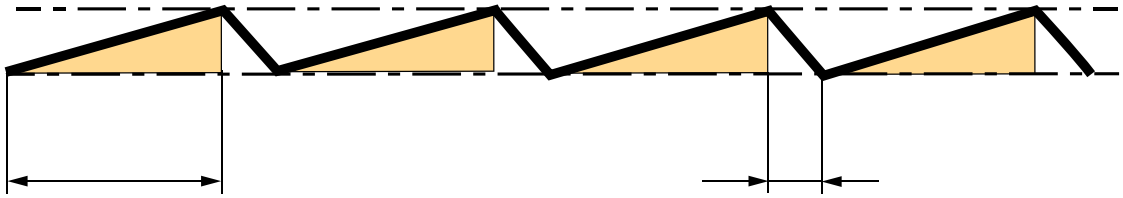


1. Short activation = airtight system
2. Long non-activation = airtight system

Ejector operating (air consumption)

Ejector not operating (no air consumption)

1. Short gap from activation to non-activation of air supply, signifies an airtight system.
2. Long gap from activation to non-activation of air supply signifies an airtight system.



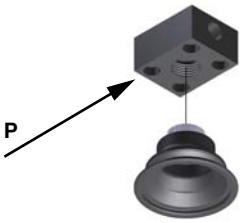
1. Long activation (air consumption)
2. Short non-activation = leaking system

Ejector operating (air consumption)

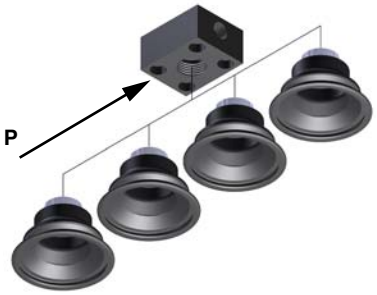
Ejector not operating (no air consumption)

1. Long gap from activation to non-activation of air supply signifies a NOT airtight system that should be checked in order to avoid unnecessary air consumption.
2. Short gap from activation to non-activation of air supply signifies a NOT airtight system system that should be checked in order to avoid unnecessary air consumption.

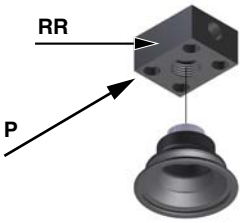
Different applications of the ejectors with risks and opportunities that can provide a faster process, improved safety and reduced air consumption.



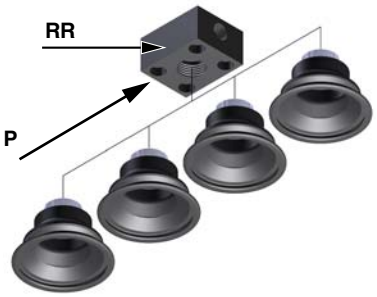
1. **One MINI, ORIGINAL or MV Ejector connected to a single suction cup**
   a. Provides good safety as only the leakage at the current suction cup affects the vacuum level
   b. Interuption of air supply results in the suction cup releasing the handled object
   c. The handled object is held for a short time until the cup is filled with air via the ejector exhaust port.



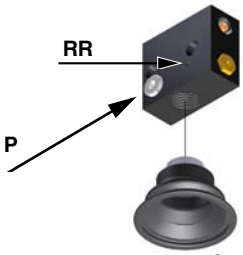
2. **One MINI, ORIGINAL or MV Ejector connected to multiple suction cups**
   a. Provides less security as every suction cups leakage affects the vacuum level of all the others in the circuit
   b. Interuption of air supply results in the suction cups releasing the handled objects
   c. The handled objects are held for a short time until the suction cups are filled with air from the ejectors exhaust port



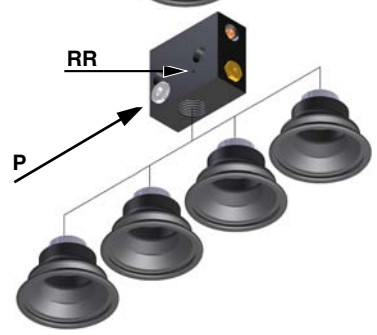
3. **One ORIGINAL Ejector with RR connection or MV-MV Ejector connected to a single suction cup**
   a. Provides good safety as only leakage at the current suction cups affect the vacuum level
   b. Interruption of air supply or power supply to the MV ejector results in the suction cup releasing the handled object
   c. A signal via the RR port or via the second solenoid valve is required for the Blow-off signal (RR) to quickly release the object from the suction cup in a controlled manner



4. **One ORIGINAL Ejector with RR connection or MV-MV Ejector connected to multiple suction cups**
   a. Provides less safety as leakage at any suction cup affect the vacuum level of all the others in the circuit
   b. Interruption of air supply or power supply to the MV ejector results in the suction cup releasing the handled object
   c. A signal via the RR port or via the second solenoid valve is required for the Blow-off signal (RR) to quickly release the objects from the suction cups in a controlled manner

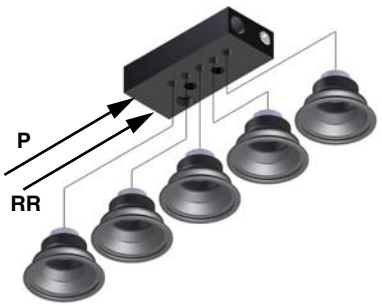


5. **One 2BV or a BVX EJECTOR connected to a single suction cup**
   a. Provides good safety as only leakage at the current suction cup affect the vacuum level
   b. Should there be an interruption of air supply, then the suction cup will continue to hold the handled object, thanks to the built-in holding valve,until leakage causes the vacuum level to drop so low that the object is dropped
   c. A signal via the RR port must be given for the Blow-off signal (RR) to quickly remove the objects from the suction cup in a controlled manner



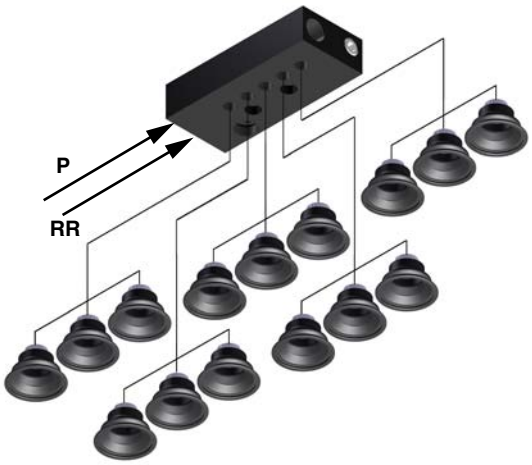
6. **One 2BV or BVX EJECTOR connected to multiple suction cups**
   a. Provides less safety as leakage at any suction cups affect the vacuum level of all the others in the circuit
   b. Should there be an interruption of air supply, then the suction cup will continue to hold the handled object, thanks to the built-in holding valve,until leakage causes the vacuum level to drop so low that the object is dropped
   c. A signal via the RR port is required for the Blow-off signal (RR) to quickly release the objects from the cups in a controlled manner

P = Air connection RR = Rapid Release



7. MULTICIRCUIT EJECTOR 4K, 5K and 6K with a suction cup attached to each circuit

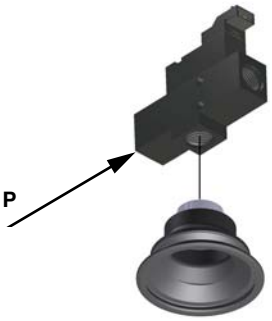
a. Provides good safety as only leakage at the current suction cup affect the vacuum level in the circuit
b. Interuption of air supply results in the suction cup releasing the handled object
c. A signal via the RR port is required for the Blow-off signal (RR) to quickly release the objects from the suction cup in a controlled manner



8. MULTICIRCUITS EJECTOR 4K, 5K and 6K with several suction cups attached to each circuit

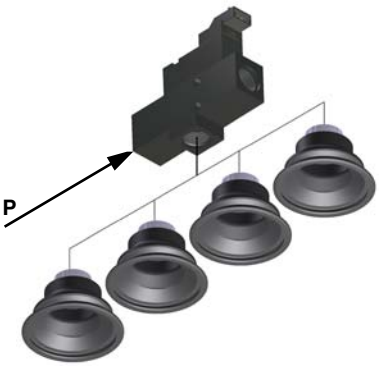
a. Provides less safety as leakage at any suction cup affect the vacuum level of all the others in the circuit
b. Interuption of air supply results in the suction cups releasing the handled objects
c. A signal via the RR port is required for the Blow-off signal (RR) to quickly release the objects from the suction cup in a controlled manner

---



9. One Booster Release Ejector connected to a single suction cup

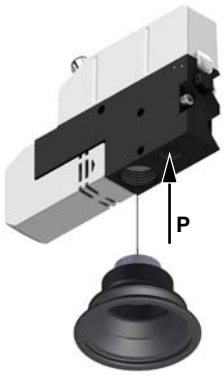
a. Provides good safety as only leakage at the current suction cup affects the vacuum level
b. Interruption of air supply to the ejector results in the suction cup releasing the handled object
c. A signal via the solenoid valve on the ejector is required for the strong Blow-off signal **(The Ejector flow + the flow of the solenoid valve + air withdrawn through the exhaust)** to quickly release the object from the suction cup in a soft and controlled manner



10. One Booster Release Ejector connected to multiple suction cups

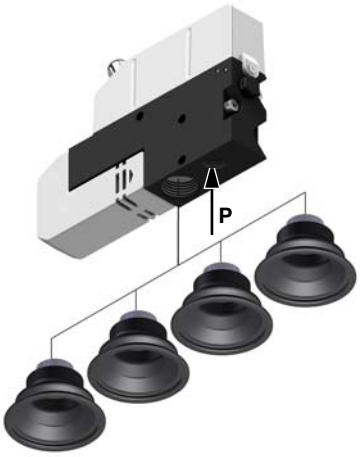
a. Provides less safety as leakage at any suction cup affects the vacuum level of all the others in the circuit
b. Interruption of air supply to the ejector results in the suction cup releasing the handled object
c. A signal via the solenoid valve on the ejector is required for the strong Blow-off signal **(The Ejector flow + the flow of the solenoid valve + air withdrawn through the exhaust)** to quickly release the objects from the suction cups in a soft and controlled manner

P = Air connection RR = Rapid Release



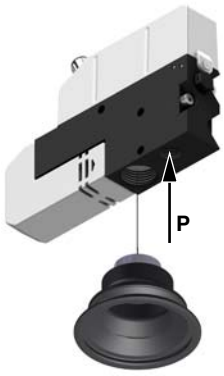
11. AUTOVAC MFE (NC version) connected to a single suction cup

a. Provides good safety as only leakage at the current suction cup affect the vacuum level in the circuit
b. Should there be an interruption of air supply, then the suction cup will continue to hold the handled object, thanks to the built-in holding valve,until leakage causes the vacuum level to drop so low that the object is dropped
c. As both a sensor and control system are integrated in Autovac MFE (NC)
   i. The object can be lifted as soon as necessary vacuum level is reached, resulting in shorter cycle times
   ii. Upon reaching the desired vacuum level the control system receive a signal to turn off the air supply and when the vacuum level drops it opens it again. This may result in > 95% savings in compressed air
d. A signal to the solenoid valve is required for the Blow-off signal (RR) to quickly release the objects from the suction cup in a controlled manner



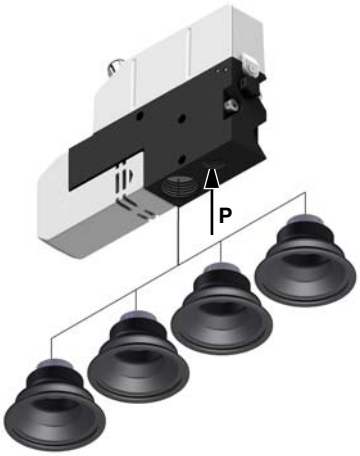
12. AUTOVAC MFE (NC version) connected to multiple suction cups

a. Provides less safety as leakage at any suction cup affect the vacuum level of all the others in the circuit
b. Should there be an interruption of air supply, then the suction cup will continue to hold the handled object, thanks to the built-in holding valve,until leakage causes the vacuum level to drop so low that the object is dropped or if the leakage is too large lifting cannot be done.
c. As both a sensor and control system are integrated in Autovac MFE (NC)
   i. The objects can be lifted as soon as the necessary vacuum level is reached, resulting in shorter cycle times
   ii. Upon reaching the desired vacuum level the control system receive a signal to turn off the air supply and when the vacuum level drops it opens it again. This may result in > 95% savings in compressed air
d. . A signal to the solenoid valve is required for the Blow-off signal (RR) to quickly release the objects from the suction cup in a controlled manner



13. AUTOVAC MFE (NO version) connected to a single suction cup

a. Provides good safety as only leakage at the current suction cup affect the vacuum level in the circuit
b. Should there be an interruption of air supply, then the suction cup will continue to hold the handled object, thanks to the built-in holding valve,until leakage causes the vacuum level to drop so low that the object is dropped
c. When the solenoid valve for air supply is of the type Normally Open (NO), it will continuously provide the ejector with compressed air upon power failure
d. As both a sensor and control system are integrated in Autovac MFE (NO)
   i. The object can be lifted as soon as the necessary vacuum level is reached, resulting in shorter cycle times
   ii. Upon reaching the desired vacuum level the control system receive a signal to turn off the air supply and when the vacuum level drops it opens it again. This may result in > 95% savings in compressed air
e. A signal to the solenoid valve is required for the Blow-off signal (RR) to quickly release the object from the suction cup in a controlled manner



14. AUTOVAC MFE (NO version) connected to multiple suction cups

a. Provides less safety as leakage at any suction cup affect the vacuum level of all the others in the circuit
b. Should there be an interruption of air supply, then the suction cup will continue to hold the handled object, thanks to the built-in holding valve,until leakage causes the vacuum level to drop so low that the object is dropped or if the leakage is too large lifting cannot be done.
c. When the solenoid valve for the air supply is of the type Normally Open (NO), it will continuously provide the ejector with compressed air upon power failure
d. As both a sensor and control system are integrated in Autovac MFE (NO)
   i. The objects can be lifted as soon as necessary vacuum level is reached, resulting in shorter cycle times
   ii. Upon reaching the desired vacuum level the control system receive a signal to turn off the air supply and when the vacuum level drops it opens it again. This may result in > 95% savings in compressed air
e. A signal to the solenoid valve is required for the Blow-off signal (RR) to quickly release the objects from the suction cups in a controlled manner

P = Air connection

Part 2: BASE EJECTORS

Our basic series includes the following ejector models:

MINI Ejectors

Suitable for handling of small items and when miniature built-in dimensions are required.

See page 22.

MINI

ORIGINAL Ejectors

Available in different sizes and capacities with a robust design that suits most vacuum applications. Except for AVAC ORIGINAL 720, all models are equipped with an additional connection for blow-off or a vacuum sensor.

See page 23.

ORIGINAL

INLINE Ejectors

Simple mounting directly in the hose line or on the suction cup. The compact design and low weight makes it suitable for Pick & Place applications. High vacuum version for air tight materials and a high flow version for porous materials.

See page 27.

INLINE

Ejectors AVAC 10 and 10E

- >85 % vacuum at 4 bar supply pressure
- Very compact
- Low weight
- Quick response
- No moving parts
- Robust
- Easy mounting

The compact size of the Mini ejector and the low weight makes it suitable for applications in the electronics industry.

AVAC 10 has an extra mounting thread M5 to facilitate attachment.

Materials

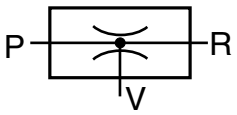
Body	Black anodized aluminium
Nozzles	Brass

Temperature

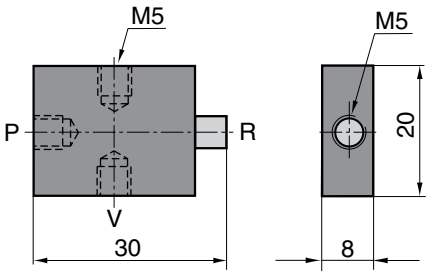
Temperature range	-10 to +70 ˚C

Compressed air

Pressure	max 8 bar
Optimum supply pressure	4 bar

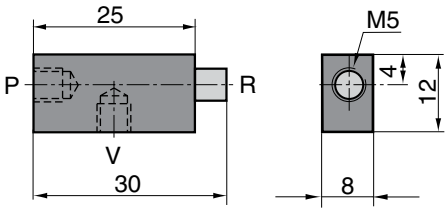


AVAC 10



P = Air connection V = Vacuum Connection

AVAC 10E



R = Exhaust

3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AVAC 10/ 10E	7.5	6.5	5.5	4.0	2.5	1.0	0.8	0.5	0.3	0.5

Designation	Air consumption Nl/min	Evacuation time (s)*	Weight g	Order no.
AVAC 10	10	18	13	**110 010 00**
AVAC 10E	10	18	8	**110 010 01**

* Time to evacuate 1 litre air from the atmospheric pressure to 75% vacuum.

Operating Instructions
http://www.avac.se/pdfi/I-MINI.pdf

Ejectors AVAC 20, 30, 50, 60, 120, 240, 420 and 720

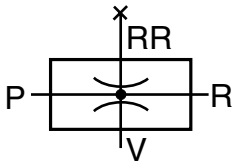
with or without a RR connection (Rapid Release)

- > 85% vacuum at 4 bar supply pressure
- Very compact
- Low weight
- Quick response
- Controlled Rapid Release (RR)
- Connection for vacuum sensor, etc. (RR)
- No moving parts
- Robust
- Easy mounting

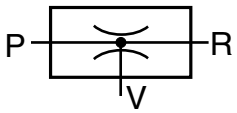
Our series ORIGINAL ejectors creates a high vacuum at over 85% using only low supply pressure of 4 bar. The internal design of the nozzle combined with the low supply pressure makes them extremely efficient with low energy consumption.

Rapid Release (RR) connection is used when a quick and controlled release signal of the held object is desired. It can also be used to connect other equipment such as a vacuum sensor, vacuum gauge or similar.

When the RR connection is not needed in the current application, please apply the supplied M5 and G1/8 plug into the connection.



AVAC 20 to 420



AVAC 720

Materials

Body	Black anodized aluminium
Nozzles	Brass

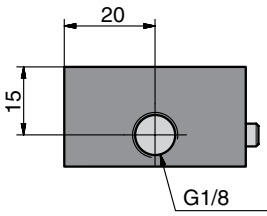
Temperature

Temperature range	-10 to +70 ˚C

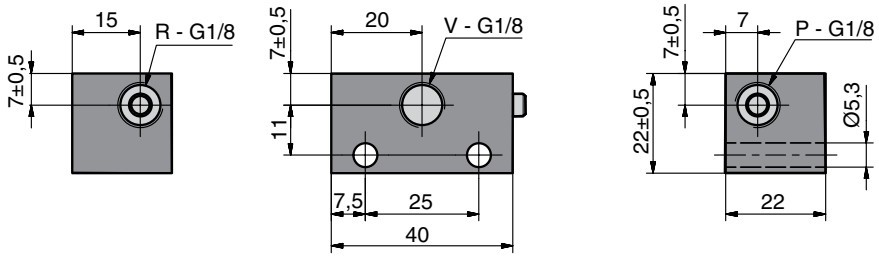
Compressed air

Pressure	max 8 bar
Optimum supply pressure	4 bar

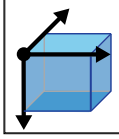
AVAC 20-RR



RR connection for blow off signal or the connection of other equipment.

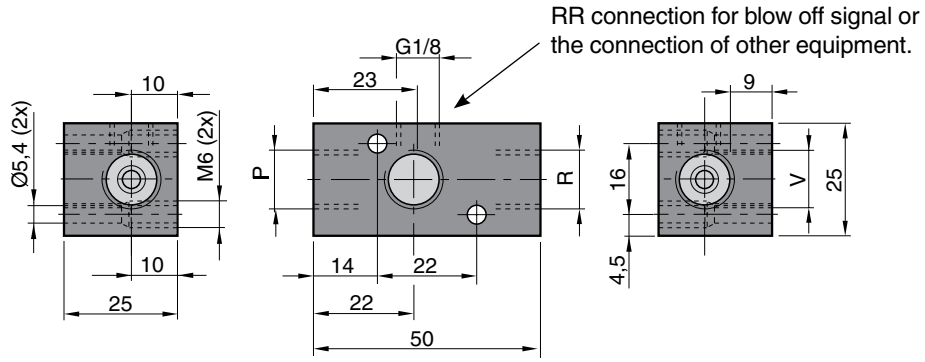


P = Air connection
V = Vacuum Connection
R = Exhaust
RR = Blow off (Rapid Release)

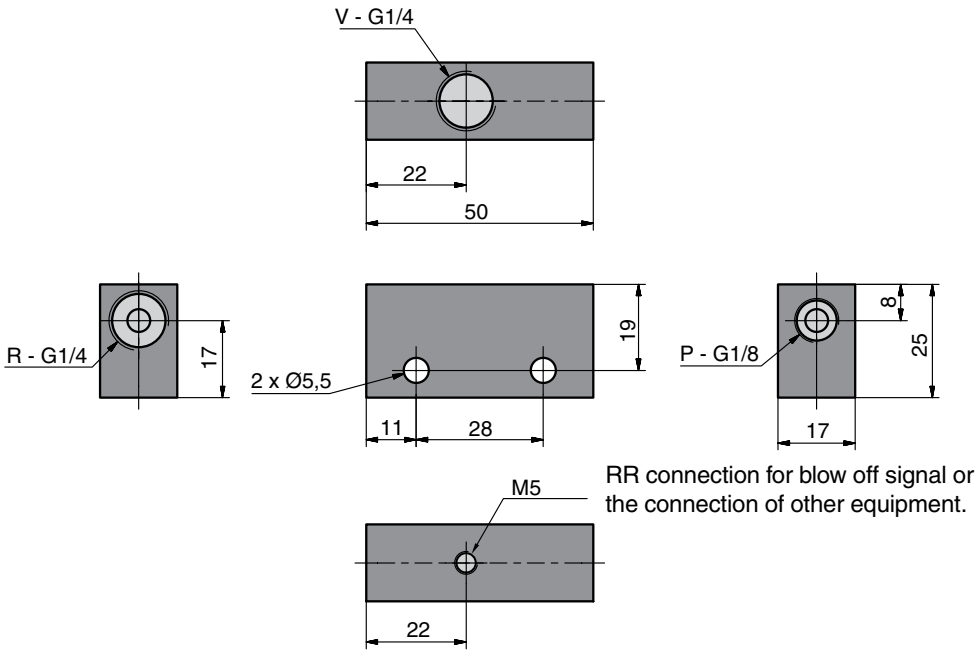


3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

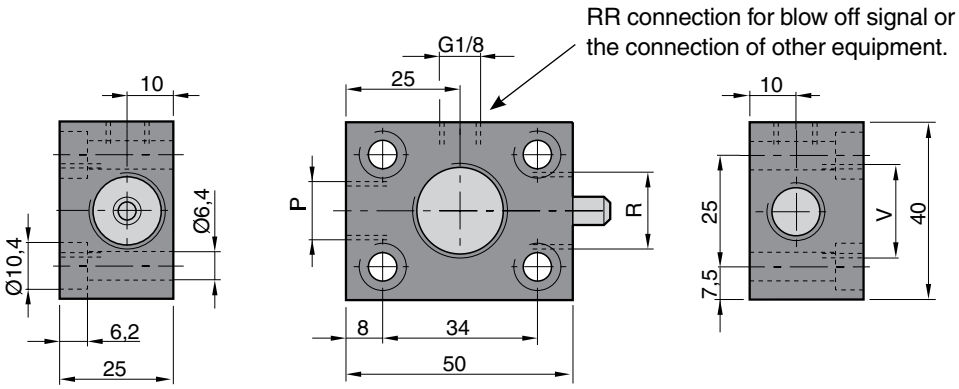
AVAC 30-RR



AVAC 50-RR



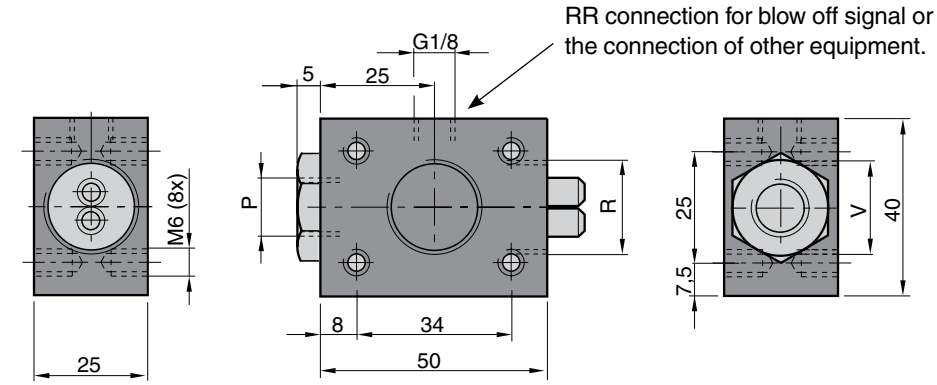
AVAC 60-RR



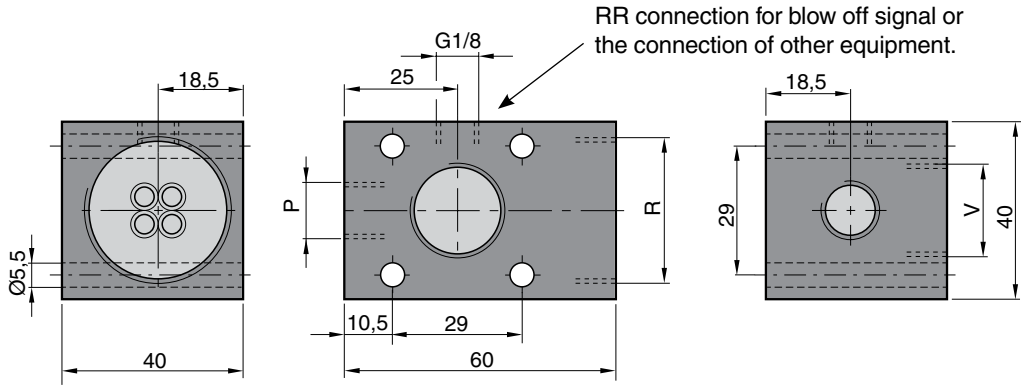
P = Air connection
V = Vacuum Connection
R = Exhaust
RR = Blow off (Rapid Release)

3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

AVAC 120-RR

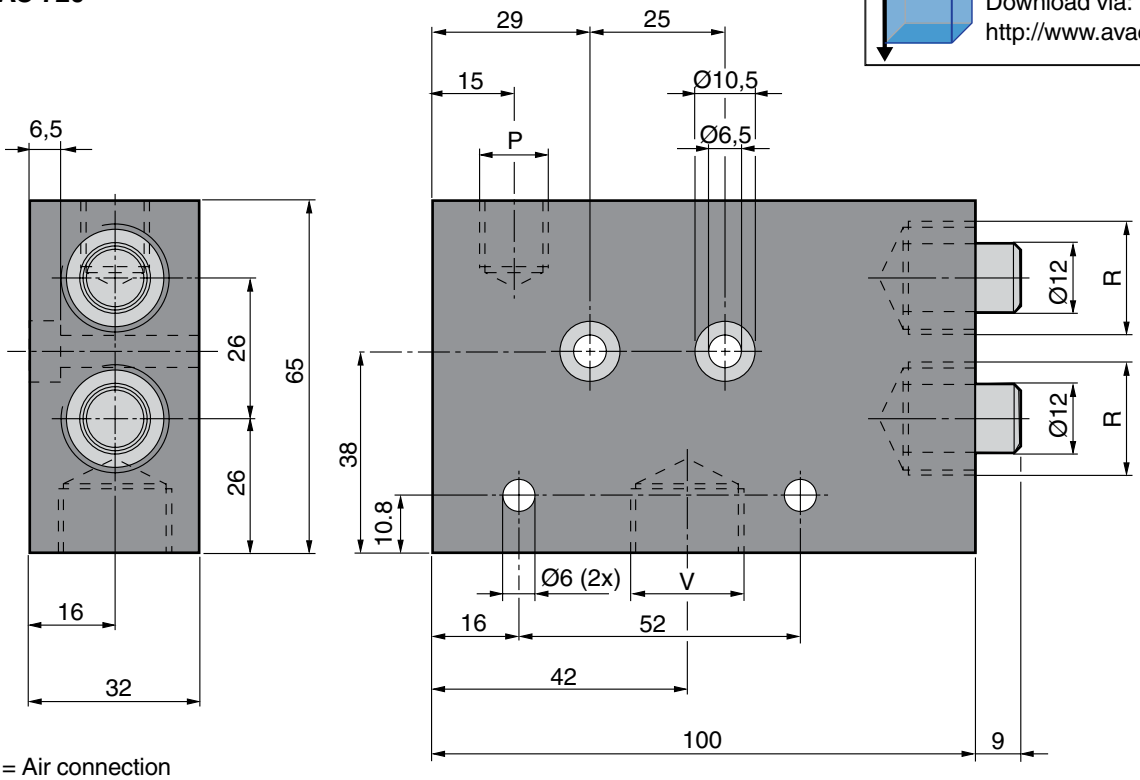


AVAC 240-M-RR and 420-M-RR



3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

AVAC 720



P = Air connection
V = Vacuum Connection
R = Exhaust
RR = Blow off (Rapid Release)

Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AVAC 20-RR	14.2	12.5	9.8	6.5	4.0	3.0	2.0	0.9	0.5	0.7
AVAC 30-RR	20.1	17.8	15.3	13.0	10.8	8.3	4.8	1.8	0.7	0.95
AVAC 50-RR	32.0	28.2	23.8	19.5	16.3	13.3	9.5	4.5	1.5	1.1
AVAC 60-RR	44.0	38.9	33.4	28.2	21.0	16.3	11.8	4.8	2.0	1.25
AVAC 120-RR	88.0	76.5	67.1	56.5	47.0	36.4	24.0	11.1	5.0	2 x 1.25
AVAC 240-M-RR	175.0	148.7	130.0	111.7	93.5	72.8	50.8	19.3	11.5	4 x 1.25
AVAC 420-M-RR	308.0	240.0	217.7	183.1	147.4	116.6	83.4	45.2	20.8	7 x 1.25
AVAC 720	441.0	343.0	294.0	248.0	188.0	133.0	96.0	51.0	25.0	2 x 3.1

Ejectors AVAC ORIGINAL

Designation	Connection threads				Air consumption Nl/min.	Evacuation time (s)*	Weight g	Order no.
	P	V	R	RR				
AVAC 20-RR	G1/8	G1/8	G1/8	G1/8	20	9	45	**110 020 01**
AVAC 30-RR	G1/4	G1/4	G1/4	G1/8	30	6	72	**110 030 01**
AVAC 50-RR	G1/8	G1/4	G1/4	M5	50	4	45	**110 050 01**
AVAC 60-RR	G1/4	G1/2	G3/8	G1/8	60	3	105	**110 060 01**
AVAC 120-RR	G1/4	G1/2	G1/2	G1/8	120	1.5	110	**110 120 01**
AVAC 240-M-RR	G1/4	G1/2	G1	G1/8	240	0.7	225	**110 241 01**
AVAC 420-M-RR	G1/4	G1/2	G1	G1/8	420	0.4	240	**110 421 01**
AVAC 720**	G1/4	G1/2	2 x G1/2	-	720	0.25	560	**110 720 00**

* Time to evacuate 1l air from atmospheric pressure to 75% vacuum.

** AVAC 720 is not equipped with an RR connection

All ejectors with RR connection are delivered with a G1/8 or M5 plug for use when the need for an RR connection is not in the application

Operating Instructions
http://www.avac.se/pdfi/I-ORIGINAL.pdf

Blow Off Valve (Rapid Release) via RR port on ORIGINAL Ejectors

- A blow off signal is sent into the RR port directly from a 2/2 valve
- When a 3/2 valve is used as blow off signal a Blow Off Valve that is mounted to the RR connection has to be used
- When a 2/2 valve or 3/2 valve and a throttled blow off signal is used, a Blow Off Valve has to be mounted in the RR connection
- For more information see page 80.

AVAC 10 IL and 20 IL INLINE Ejectors

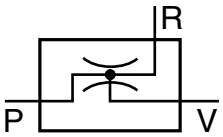
- High vacuum version (H) for air tight materials
- High flow version (L) for porous materials
- Alternative attachments
  - Push-in connection 6 mm
  - External G1/8 thread
- Very compact
- Low weight
- Reactive
- No moving parts
- Robust design
- Facile attachment

The very compact design and the low weight of the inline ejector makes in suitable for applications in e.g. the electronic industry. Both the compressed air as well as the vacuum connections are available with push-in fittings alternatively external threads which simplifies the installation of the ejector.

The ejectors are available with nozzles for high vacuum (H) alternatively high flow (L) and in two sizes.

Materials

Body	POM, glass inforced
Nozzles	Aluminium
Seals	NBR
External G1/8 thread	Anodized aluminium
Push-in connection 6 mm	POM/Brass nickel plated



Temperature

Temperature range	-10 to +70 ˚C

Compressed air

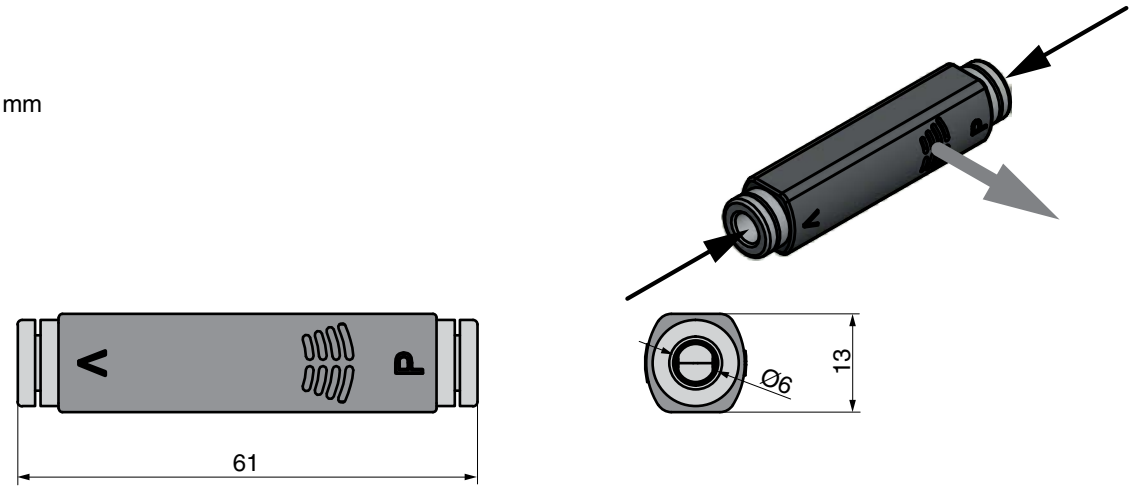
Pressure	max 8 bar
Optimum supply pressure	5 bar

Ejectors available in two versions:
H version with high vacuum nozzles for air tight materials
L version with high flow nozzles for porous materials

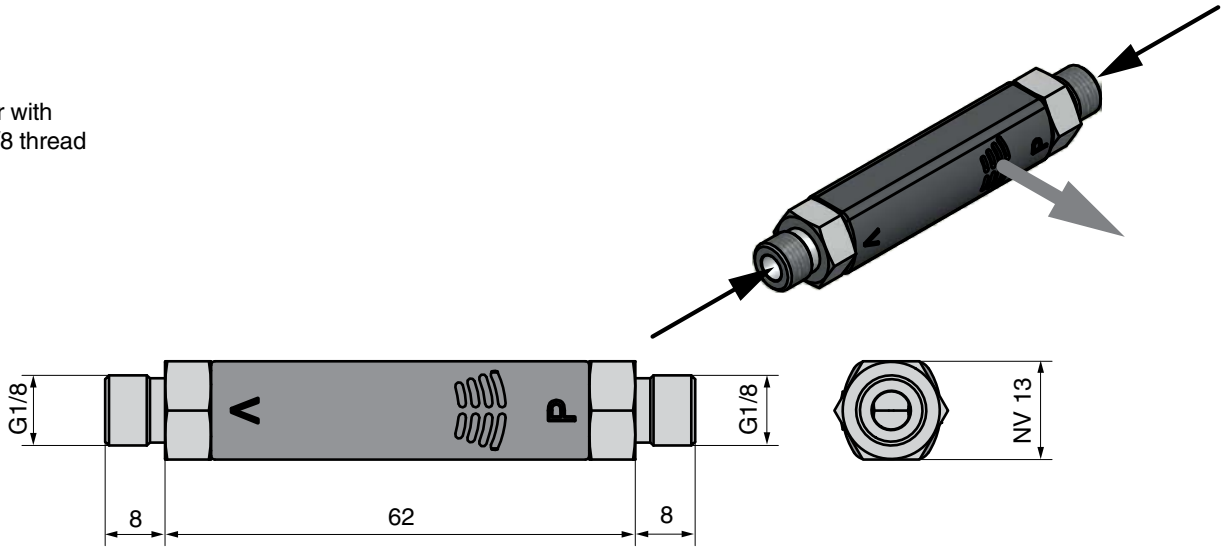
Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AVAC 10 IL-LS	14	12	10	7.6	5.0	2.6	0.4	-	-	0.5
AVAC 10 IL-HS	8	7	6	5.2	4.2	3.4	2.4	1.3	0.6	0.5
AVAC 10 IL-LG	14	12	10	7.6	5.0	2.6	0.4	-	-	0.5
AVAC 10 IL-HG	8	7	6	5.2	4.2	3.4	2.4	1.3	0.6	0.5
AVAC 20 IL-LS	29	25	21	16.2	11.0	5.8	1.0	-	-	0.7
AVAC 20 IL-HS	15	13	10.8	8.8	7.2	5.6	4.0	2.6	1.6	0.7
AVAC 20 IL-LG	29	25	21	16.2	11.0	5.8	1.0	-	-	0.7
AVAC 20 IL-HG	15	13	10.8	8.8	7.2	5.6	4.0	2.6	1.6	0.7

Inline Eejector with
Push-in connection 6 mm



Inline Ejector with
External G1/8 thread



P = Air connection
V = Vacuum Connection
R = Exhaust

3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Ejectors AVAC INLINE

Designation	Vacuum level	Vacuum flow	Connection	Air consumption Nl/min	Vacuum level*	Evacuation time (s)**	Weight g	Order no.
AVAC 10 IL-LS	Low	High	Push-in connection 6 mm	13	63	4.1	12	**110 010 20**
AVAC 10 IL-HS	High		Push-in connection 6 mm	13	88	15.2	12	**110 010 21**
AVAC 10 IL-LG	Low	High	External G1/8 thread	13	63	4.1	15	**110 010 22**
AVAC 10 IL-HG	High		External G1/8 thread	13	88	15.2	15	**110 010 23**
AVAC 20 IL-LS	Low	High	Push-in connection 6 mm	26	62	2	12	**110 020 20**
AVAC 20 IL-HS	High		Push-in connection 6 mm	26	90	7.3	12	**110 020 21**
AVAC 20 IL-LG	Low	High	External G1/8 thread	26	62	2	15	**110 020 22**
AVAC 20 IL-HG	High		External G1/8 thread	26	90	7.3	15	**110 020 23**

* All data at 5 bar supply pressure
** Time to evacuate 1 litre air from the atmospheric pressure to 75% vacuum for HS/HG and 50% vacuum for LS/LG.

Operating Instructions
http://www.avac.se/pdfi/I-INLINE.pdf

Part 3: SOLENOID OPERATED EJECTORS

This series is available in two versions.

MV series

Ejectors with one solenoid valve for vacuum generation.

See page 30

MV series

MV-MV series

Ejectors with one solenoid valve for vacuum generation and one for blow-off.

See page 32

MV-MV series

Ejectors 10, 20, 30, 40 and 60 MV

- > 85% vacuum at 5 bar supply pressure (5bar required due to pressure drop over solenoid valve)
- Very compact
- Low weight
- Quick response
- Robust
- Simplified wiring for electricity
- Easy mounting

Solenoid valve-operated ejector without blow off system (RR), with air consumption 10-60 Nl/min in anodized aluminum with integrated solenoid valve for creating vacuum. The MV-ejector has a simplified and compact design and offers minimal electrical wiring. When directly mounted on the suction cup, the integrated solenoid valve of the MV-ejector offers a minimum response time.

Materials

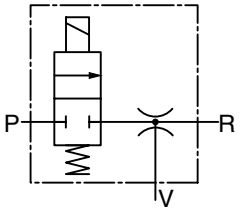
Body	Black anodized aluminium
Nozzle	Brass

Temperature

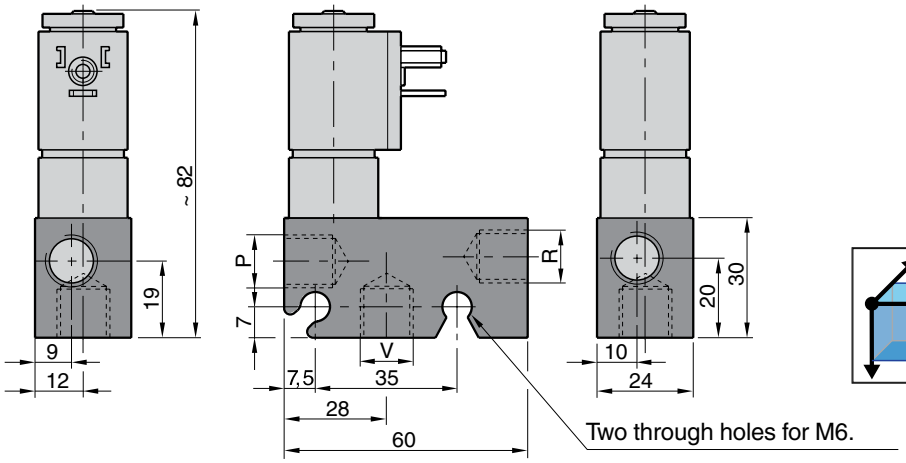
Temperature range	-10 to +50 ˚C

Compressed air

Pressure	max 7 bar
Optimum supply pressure	5 bar

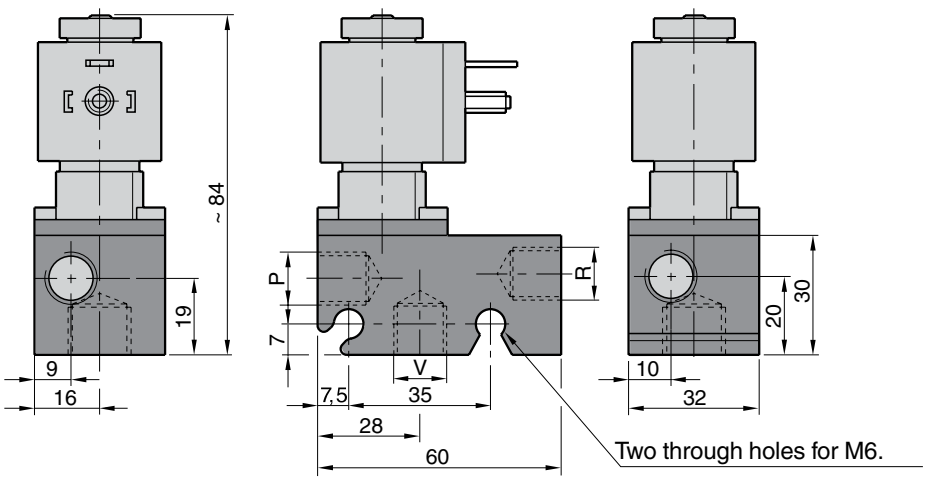


AVAC 10, 20, 30 and 40 MV



3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

AVAC 60 MV



P = Air connection
V = Vacuum Connection
R = Exhaust

Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AVAC 10 MV	7.5	6.5	5.5	4.0	2.5	1.0	0.8	0.5	0.3	0.5
AVAC 20 MV	14.2	12.5	9.8	6.5	4.0	3.0	2.0	0.9	0.5	0.7
AVAC 30 MV	20.1	17.8	15.3	13.0	10.8	8.3	4.8	1.8	0.7	0.95
AVAC 40 MV	28.0	24.4	20.7	17.0	14.5	10.8	7.0	3.4	1.1	1.1
AVAC 60 MV	44.0	38.9	33.4	28.2	21.0	16.3	11.8	4.8	2.0	1.25

Designation	Connection threads			Air consumption Nl/min.	Evacuation time (s)*	Weight g	Order no.
	P	V	R				
AVAC 10 MV, 24VDC	G1/4	G1/4	G1/4	10	18	185	**112 010 04**
AVAC 20 MV, 24VDC	G1/4	G1/4	G1/4	20	9	185	**112 020 04**
AVAC 30 MV, 24VDC	G1/4	G1/4	G1/4	30	6	190	**112 030 04**
AVAC 40 MV, 24VDC	G1/4	G1/4	G1/4	40	4.5	190	**112 040 04**
AVAC 60 MV, 24VDC	G1/4	G3/8	G1/4	60	3	260	**112 060 04**

* Time to evacuate 1 litre air from atmospheric pressure to 75% vacuum.

Solenoid valve for AVAC10, 20, 30 and 40 MV

Voltage 24 VDC
Power 4,8 W
Max. pressure 7 bar
Protection class IP65 (with cable connector mounted)

Cable connector according to EN175301-803 type B, (former DIN 43650-B), ISO 6952, to be ordered separately

Designation	Order no.
Cable connector Type B with LED and surge protection	**590 000 01**

We recommend using the cable connector equipped with LED indicators for an easy overview and troubleshooting, and equipped with surge protection in order to both protect and provide other electrical/electronic equipment a longer lifespan.

Solenoid valve for AVAC 60 MV

Voltage 24 VDC
Power 4,5 W
Max. pressure 10 bar
Protection class IP65 (with cable connector mounted)

Cable connector according to EN175301-803 Type A, (former DIN 43650-A), ISO 4400 to be ordered separately

Designation	Order no.
Cable connector Type A with LED and surge protection	**590 024 00**

Operating Instructions
http://www.avac.se/pdfi/I-MV.pdf

Ejectors AVAC 10, 20, 30 and 40 MV-MV

- > 85% vacuum at 5 bar supply pressure (5bar required due to pressure drop over solenoid valve)
- Very compact
- Low weight
- Quick response
- Controlled blow off
- Robust
- Simplified wiring for electricity
- Easy mounting

Solenoid valve-operated ejector with blow off (RR) and air consumption of 10-40 l/min of anodized aluminum with an integrated solenoid valve for creating vacuum and one for controlling the blow off. When directly mounted on the suction cup, the integrated solenoid valves for vacuum and Rapid Release offer a minimum response time and greater accuracy.

Materials

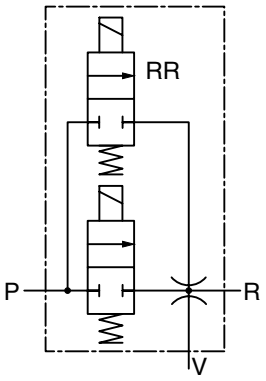
Body	Black anodized aluminium
Nozzle	Brass

Temperature

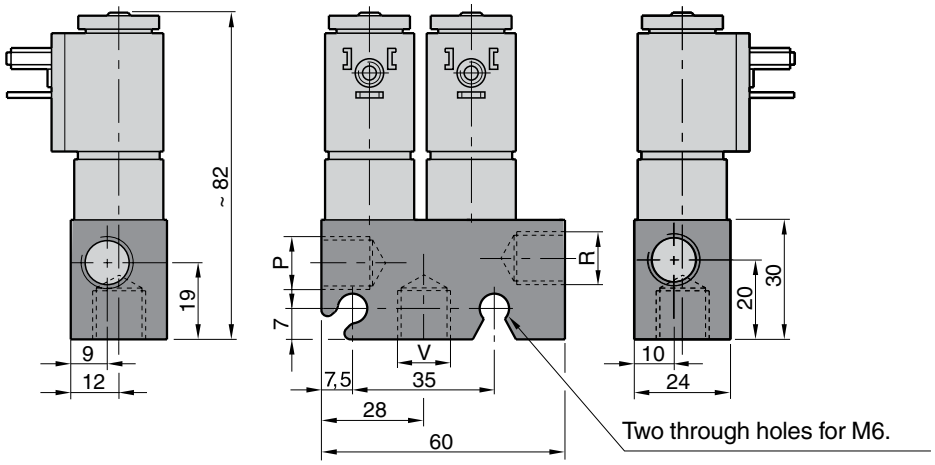
Temperature range	-10 to +50 ˚C

Compressed air

Pressure	max 7 bar
Optimum supply pressure	5 bar



AVAC 10, 20, 30 and 40 MV- MV



P = Air connection
V = Vacuum Connection
R = Exhaust

3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AVAC 10 MV-MV	7.5	6.5	5.5	4.0	2.5	1.0	0.8	0.5	0.3	0.5
AVAC 20 MV-MV	14.2	12.5	9.8	6.5	4.0	3.0	2.0	0.9	0.5	0.7
AVAC 30 MV-MV	20.1	17.8	15.3	13.0	10.8	8.3	4.8	1.8	0.7	0.95
AVAC 40 MV-MV	28.0	24.4	20.7	17.0	14.5	10.8	7.0	3.4	1.1	1.1

Designation	Connection threads			Air consumption Nl/min.	Evacuation time (s)*	Weight g	Order no.
	P	V	R				
AVAC 10 MV-MV, 24VDC	G1/4	G1/4	G1/4	10	18	280	**112 010 05**
AVAC 20 MV-MV, 24VDC	G1/4	G1/4	G1/4	20	9	280	**112 020 05**
AVAC 30 MV-MV, 24VDC	G1/4	G1/4	G1/4	30	6	290	**112 030 05**
AVAC 40 MV-MV, 24VDC	G1/4	G1/4	G1/4	40	4.5	290	**112 040 05**

* Time to evacuate 1 litre air from atmospheric pressure to 75% vacuum.

Solenoid valve for AVAC 10, 20, 30 and 40 MV-MV

Voltage 24 VDC
Power 4,8 W
Max. pressure 7 bar
Protection class IP65 (with cable connector mounted)

Cable connector according to EN175301-803 type B, (former DIN 43650-B), ISO 6952, to be ordered separately

Designation	Order no.
Cable connector Type B with LED and surge protection	**590 000 01**

We recommend using the cable connector equipped with LED indicators for an easy overview and troubleshooting, and equipped with surge protection in order to both protect and provide other electrical/electronic equipment a longer lifespan.

Operating Instructions
http://www.avac.se/pdfi/I-MV-MV.pdf

Part 4: MULTI-CIRCUIT EJECTORS

MULTI-CIRCUIT Ejectors

Ejectors with four, five or six separate vacuum circuits in size 10, 20 and 30. The ejectors offers a simple mounting and a good overview and is equipped with a rapid release function which is patented by AVAC.

Air operated blow-off

See page 41

Solenoid operated blow-off

See page 41

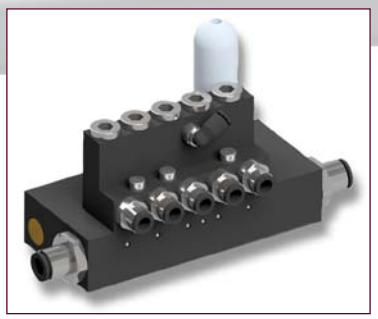
Equipped with AVAC Monitoring System (AMS)

See page 43

PATENTED

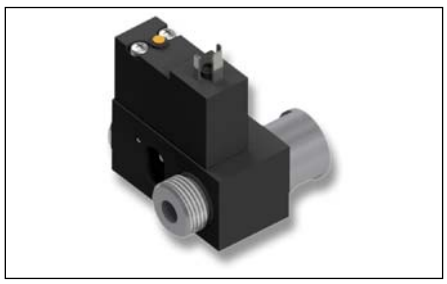
See page 43

Equipped with Vacuum holding valves

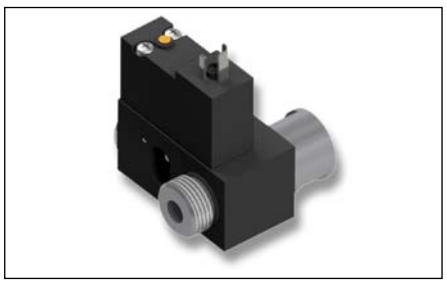


See page 48

MULTI Supply valves

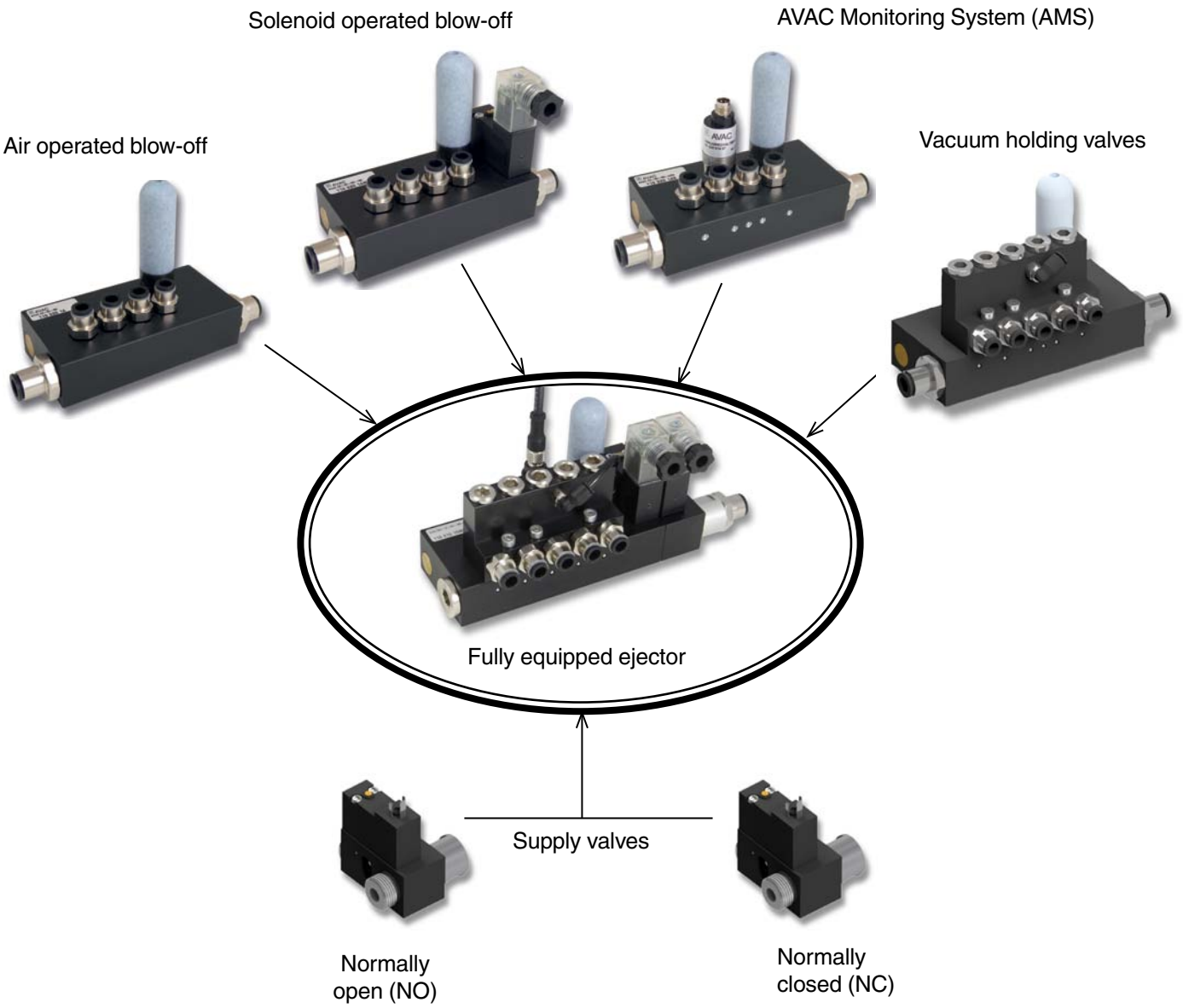


Normally open (NO)
See page 51



Normally closed (NC)
See page 51

Configuration options



General technical data for MULTI-CIRCUIT Ejectors

Nozzle/ Size	Primary nozzle(s) Ø mm	Air consumption Nl/min.	Evacuation time (s)*	Vacuum flow at different vacuum level [Nl/min]								
				0%	10%	20%	30%	40%	50%	60%	70%	80%
10	0,50	10	18	7,5	6,5	5,5	4,0	2,5	1,0	0,8	0,5	0,3
20	0,70	20	9	14,2	12,5	9,8	6,5	4,0	3,0	2,0	0,9	0,5
30	0,85	30	6	22,0	19,5	16,5	13,0	9,5	6,0	3,5	1,5	1,0

* Time to evacuate 1 litre air from atmospheric pressure to 75% vacuum.

Ordering key

1	1	0	0	1	0	1	4	M	S	B	C

Code	Primary nozzle(s) Ø mm
010	0,50
020	0,70
030	0,85

Code	No of circuits
14	4
15	5
16	6

Code	Performance
	Air operated blow-off
M	Solenoid operated blow-off
S	AVAC Monitoring System (AMS)
B	Equipped with vacuum holding valves
C	Supply valve normally closed NC
O	Supply valve normally open NO

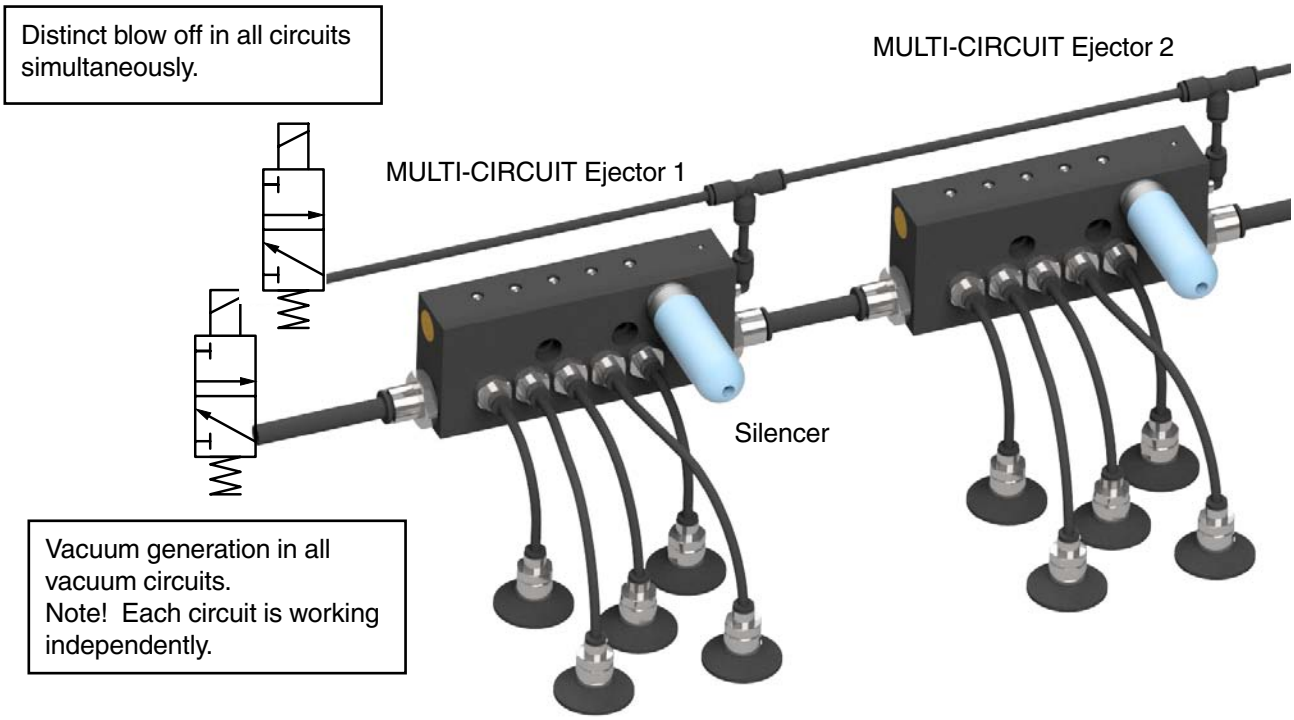
Example

MULTI-CICUIT Ejector with ordering key **110 010 14 MSBC** is equipped with:

Bas:
010 = Primary nozzles Ø0,5 mm
14 = 4 circuits
M = Solenoid operated blow-off
S = AVAC Monitoring System AMS
B = Equipped with vacuum holding valves
C = Supply valve, NC

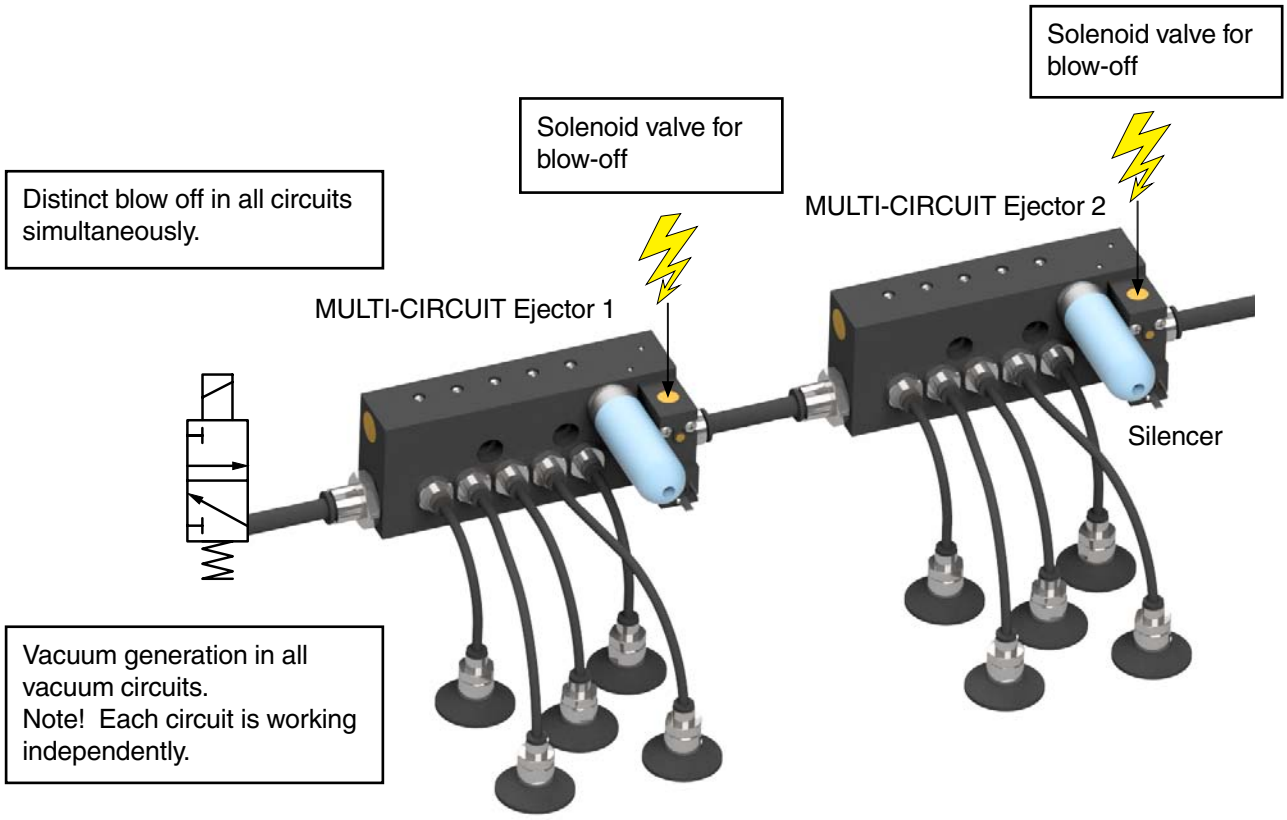
The ejector is delivered without fittings and silencers

MULTI-CIRCUIT Ejector with air operated blow-off

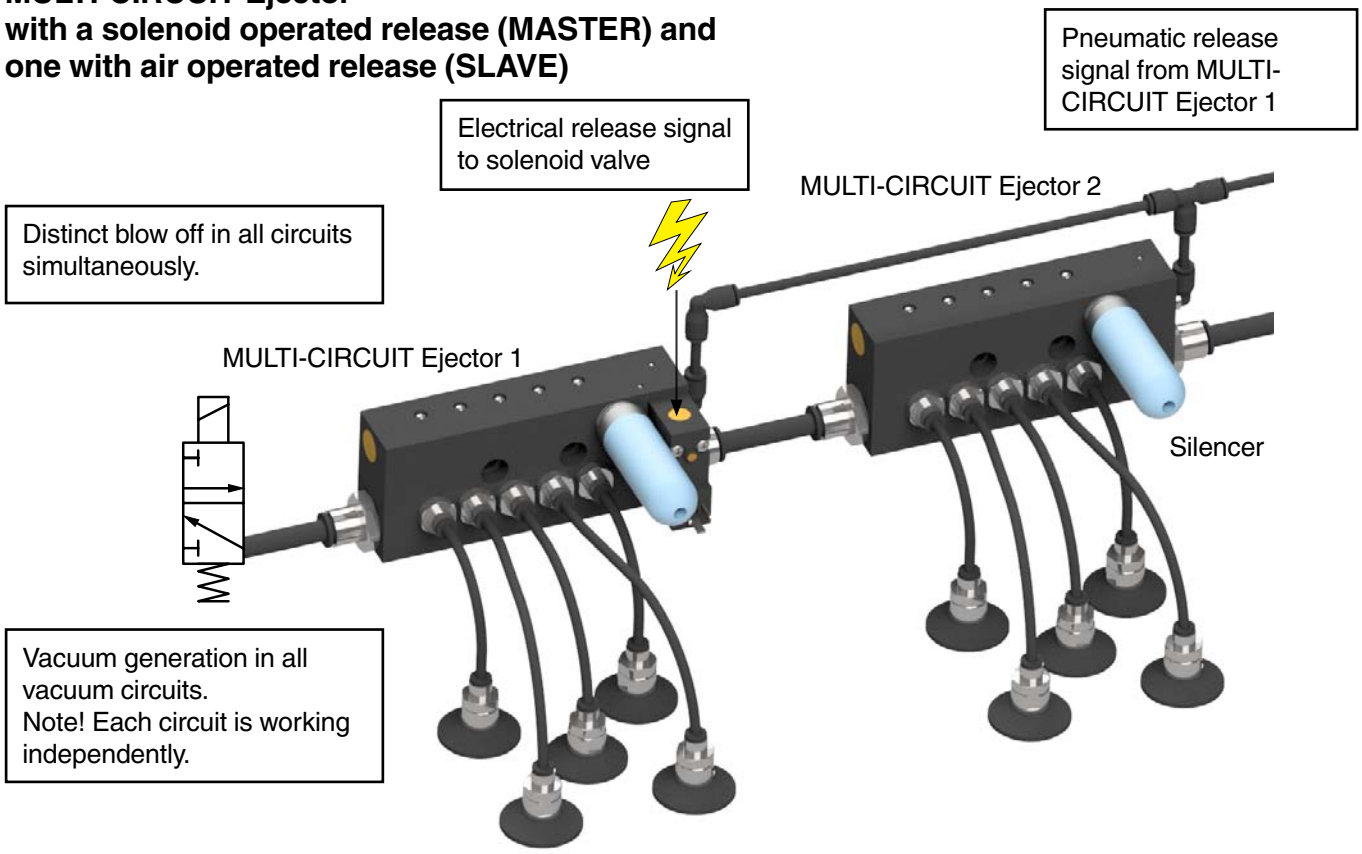


Installation in machines
The distance between the MULTI-CIRCUIT Ejectors and the volume in hoses and fittings influences the reaction time of the blow-off.

MULTI-CIRCUIT Ejector with solenoid operated release



MULTI-CIRCUIT Ejector with a solenoid operated release (MASTER) and one with air operated release (SLAVE)



Also applies to remaining MULTI-CIRCUIT Ejectors

Example of saving potential of components and work

Installation of MULTI-CIRCUIT Ejectors with solenoid operated blow-off and AVAC Monitoring System (AMS)

AMS

4 or 26

Products to be purchased, mounted and connected.

Reduced Costs

- Fewer Sensors
- Fewer system inputs
- Simplified installation
- Fewer fittings
- Fewer cables
- Simplified maintenance

Traditional installation of ejectors and vacuum sensors.

MULTI-CIRCUIT Ejectors 4K, 5K and 6K

With independent vacuum circuits & common blow off

- > 85% vacuum at 4 bar
- Very compact
- Low weight
- Quick response
- Controlled Rapid Release (RR)
- Robust
- Easy mounting
- Good overview as it is centrally mounted
- Greater safety as the vacuum circuits are completely separated from each other

Ejectors with four, five or six separate vacuum circuits. The circuits operate independently of each other so that the vacuum level of each circuit is secured even if the other circuits do not have contact with the object or the suction cup leaks.

The built-in blow off function (RR) releases objects distinctly in all circuits simultaneously.

Applications

Suitable for lifting with several suction cups where one or more suction cup may not be covered at times depending on the size and shape of the object being lifted, e.g. lifting of cans, where occasionally a can is missing.

Also suitable to use when a central location of all ejectors is preferred.

Multiple Assembly

The ejector also serves as a distribution block. Multiple devices can be connected in series, which simplifies assembly and installation with reduced cost and improved visibility as results.

See Ordering key on page 37

Patented Blow-off function

The ejector has an integrated Rapid Release function to ensure the object is released fast, distinct and in the right position
The response time is very short thanks to that the air supply for creating vacuum is reversed to create the release signal, this is controlled with a pilot signal in the RR connection.

Materials

Body	Black anodized aluminium
Nozzles	Brass
Piston	Acetal

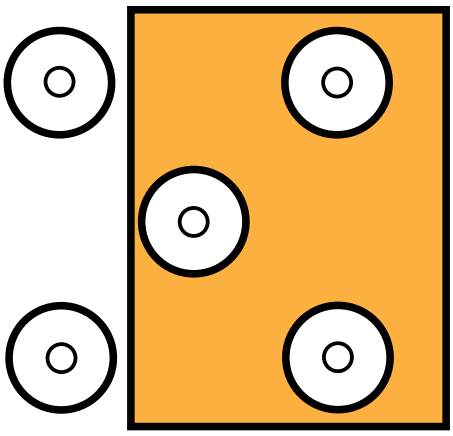
Temperature

Temperature range	-10 to +70 ˚C

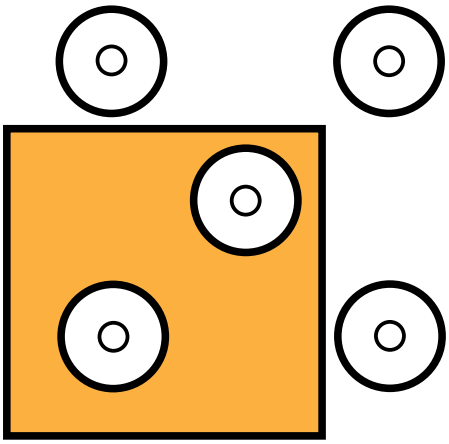
Compressed air

Pressure	max 8 bar
Optimum supply pressure	4.5 to 5 bar

5 suction cups with independent circuits, to handle objects with different shape.

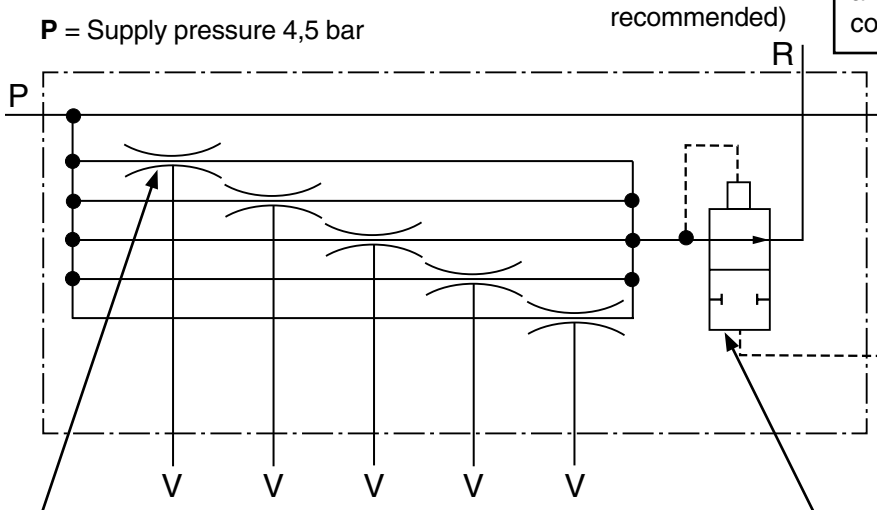


Case 1: With 2 of 5 suction cups without contact with the object, it may be lifted as long as the total lifting force is sufficient.



Case 2: With 3 of 5 suction cups without contact with the object, it may be lifted as long as the total lifting force is sufficient.

MULTI-CIRCUIT Ejector with air operated blow-off

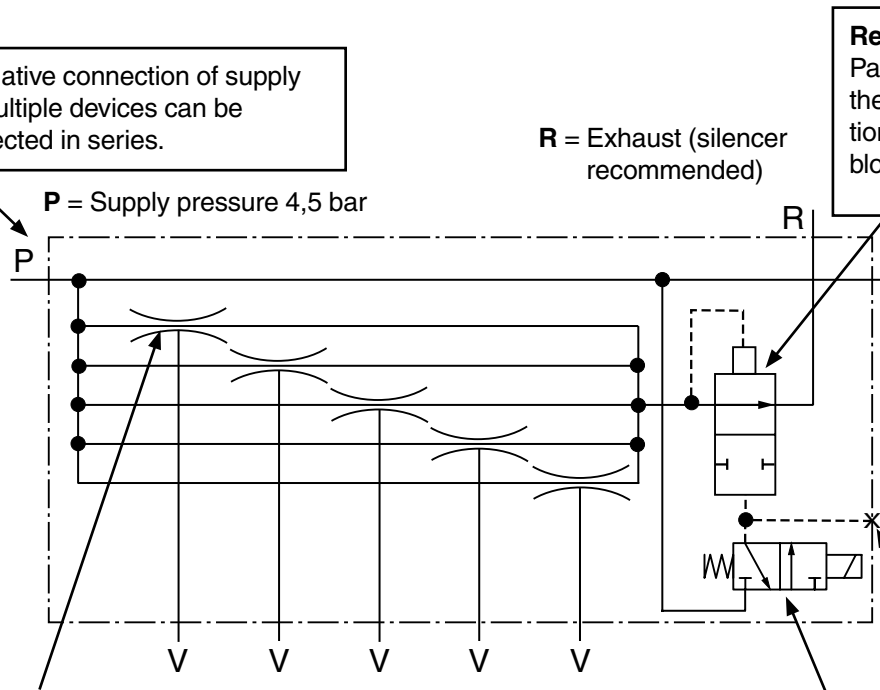


Ejectors
4, 5 or 6 individual circuits enable lifting of objects with different shape without contact to all suction cups.

One suction cup without contact with the object has no influence on the other circuits.

Release function
Patented release function reverses the supply air for vacuum generation for a distinct and simultaneous blow off in all vacuum circuits.

MULTI-CIRCUIT Ejector with solenoid operated blow-off



Ejectors
4, 5 or 6 individual circuits enable lifting of objects with different shapes without contact to all suction cups.

One suction cup without contact with the object has no influence on the other circuits.

MULTI-CIRCUIT Ejectors 4K, 5K and 6K

Equipped with AVAC Monitoring System (AMS)
One digital or analog sensor monitors all vacuum circuits

AMS

This version has the same features as the other versions and the AMS system makes it possible to monitor all vacuum circuits with just one digital or analog vacuum sensor.

The Multi-Circuit Ejectors with AMS is patented by AVAC.

The AMS system offers the following advantages

- One single vacuum sensor (digital or analog) monitors all vacuum circuits.
- Means a significantly lower cost for vacuum sensors and installation.
- Fewer inputs on the controller reduce the component and programming costs.
- Enables predictive maintenance in case of a system leakage.

The vacuum level in the sensor port reflects the vacuum level in the suction cups including those without contact with the object. (See chart on page 45).

Example

All suction cups in contact with the object

A MULTI-CIRCUIT Ejector with 6 circuits and with all suction cups in contact with the object, the sensor will reflect the vacuum level in all circuits.

The actual value is in this case is 85% vacuum, meaning full lifting capacity.

With 5 of 6 suction cups in contact with the object

If only five of the circuits are engaged and the sixth is not in contact and thus no vacuum, the sensor will indicate a vacuum level of 72 %.

As described above, all suction cups are engaged and thus lifting may be started when 72% vacuum is passed if the lifting force is sufficient.

Innovation prize "Award for Blechexpo"

AVAC MULTI-CIRCUIT Ejector AMS was appointed the most innovative product in category Handling technology/robotics at the Blechexpo 2017 in Stuttgart, the international trade fair for sheet metal working.

See Ordering key on page 37

Note

If the vacuum level gradually drops it may indicate a system leakage which should be taken care of.

Irregular objects can be identified by a strategic positioning of the suction cups.

Sensor must be ordered separate

Digital vacuum sensor

- The sensor monitors the vacuum level in all circuits
- E.g. one suction cup without contact means no feedback signal
- Feedback, released object

Analog vacuum sensor

- The sensor monitors the vacuum level in all circuits
- Indicates number of suction cups in contact with the object/s
- Useful with different shapes of objects
  – Expected suction cups in contact
  – Recognizing object shape
- Feedback, released object

MULTI-CIRCUIT Ejector with air operated blow-off

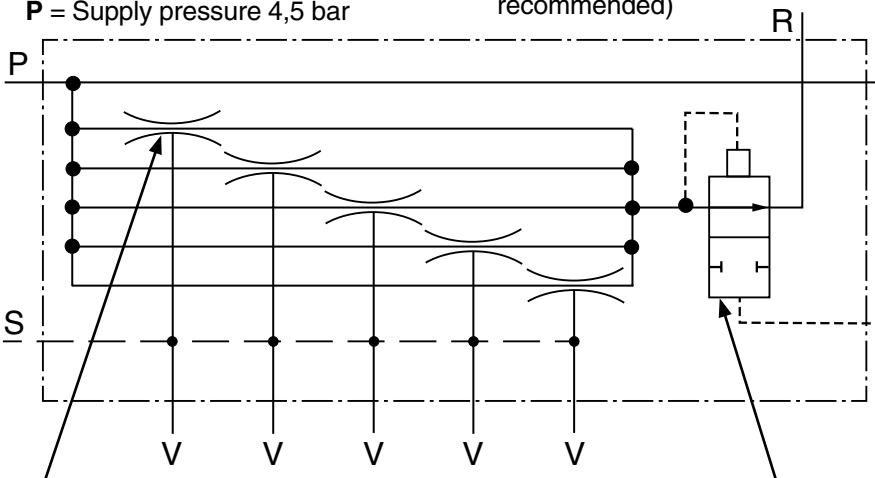
Equipped with AVAC Monitoring System (AMS)

AMS

Alternative connection of supply air. Multiple devices can be connected in series.

R = Exhaust (silencer recommended)

P = Supply pressure 4,5 bar



S = Sensor connection AMS

RR = Release signal

Ejectors
4, 5 or 6 individual circuits enable lifting of objects with different shape without contact to all suction cups.

One suction cup without contact with the object has only marginal influence on the other circuits.
(Only for the AMS version)

Release function
Patented release function reverses the supply air for vacuum generation for a distinct and simultaneous blow off in all vacuum circuits.

MULTI-CIRCUIT Ejector with solenoid operated blow-off

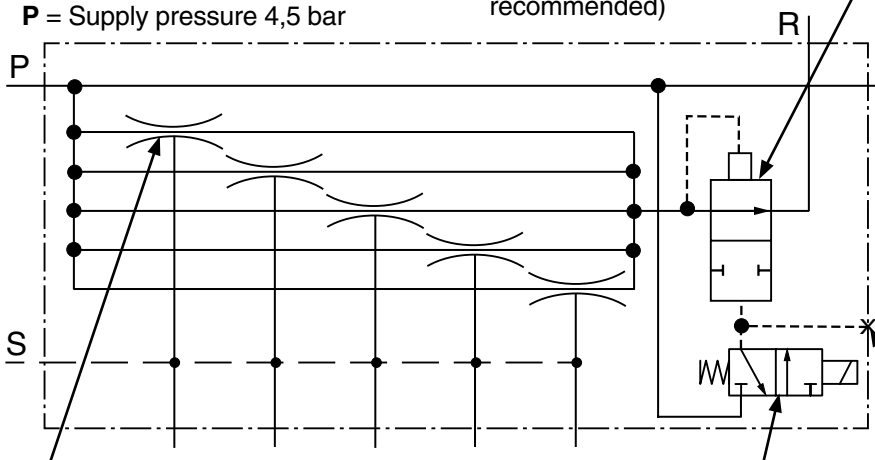
Equipped with AVAC Monitoring System (AMS)

Release function
Patented release function reverses the supply air for vacuum generation for a distinct and simultaneous blow off in all vacuum circuits.

Alternative connection of supply air. Multiple devices can be connected in series.

R = Exhaust (silencer recommended)

P = Supply pressure 4,5 bar



S = Sensor connection AMS

RR = Release signal

Ejectors
4, 5 or 6 individual circuits enable lifting of objects with different shapes without contact to all suction cups.

One suction cup without contact with the object has only marginal influence on the other circuits.
(Only for the AMS version)

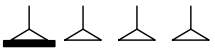
The RR-connection is plugged. By removing the plug several units can be connected to the blow-off signal.

Solenoid operated release function

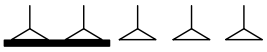
Charts for vacuum values in the sensor port as a function of the number of suction cups engaged/open and ejector capacity 85%.

AMS

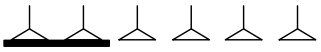
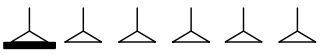
Vacuum level in MULTI-CIRCUIT Ejector 4K with AMS

	Circuit				Measured value in sensor port S
	1	2	3	4	
	85%	85%	85%	85%	85%
	81%	81%	81%	0%	60%
	80%	80%	0%	0%	21%
	78%	0%	0%	0%	4%

Vacuum level in MULTI-CIRCUIT Ejector 5K with AMS

	Circuit					Measured value in sensor port S
	1	2	3	4	5	
	85%	85%	85%	85%	85%	85%
	82%	82%	82%	82%	0%	68%
	80%	80%	80%	0%	0%	34%
	78%	78%	0%	0%	0%	13%
	76%	0%	0%	0%	0%	2%

Vacuum level in MULTI-CIRCUIT Ejector 6K with AMS

	Circuit						Measured value in sensor port S
	1	2	3	4	5	6	
	85%	85%	85%	85%	85%	85%	85%
	82%	82%	82%	82%	82%	0%	72%
	80%	80%	80%	80%	0%	0%	47%
	78%	78%	78%	0%	0%	0%	21%
	76%	76%	0%	0%	0%	0%	8%
	75%	0%	0%	0%	0%	0%	1%

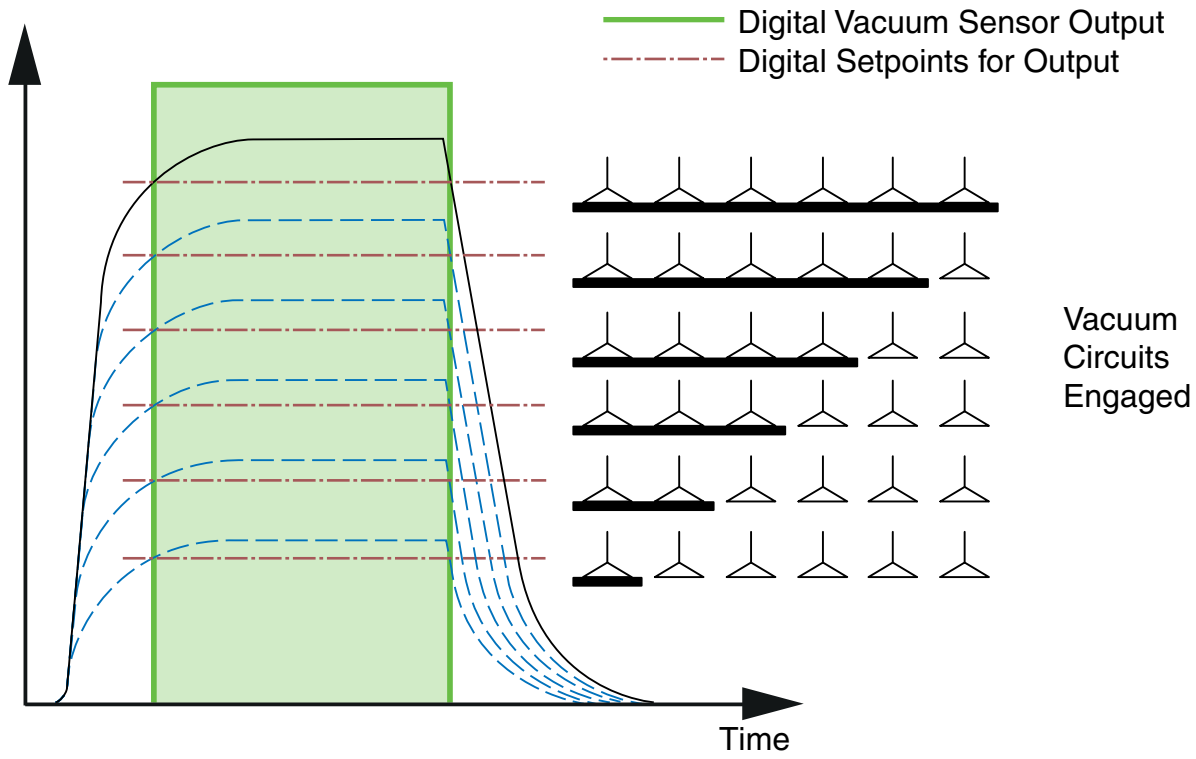
Vacuum levels in the charts are theoretical. The actual values depend on the volume, restrictions and potential leaks in the vacuum circuit. The actual values in the application should be measured so that the sensor can be adjusted accordingly.

Graphical Function Description

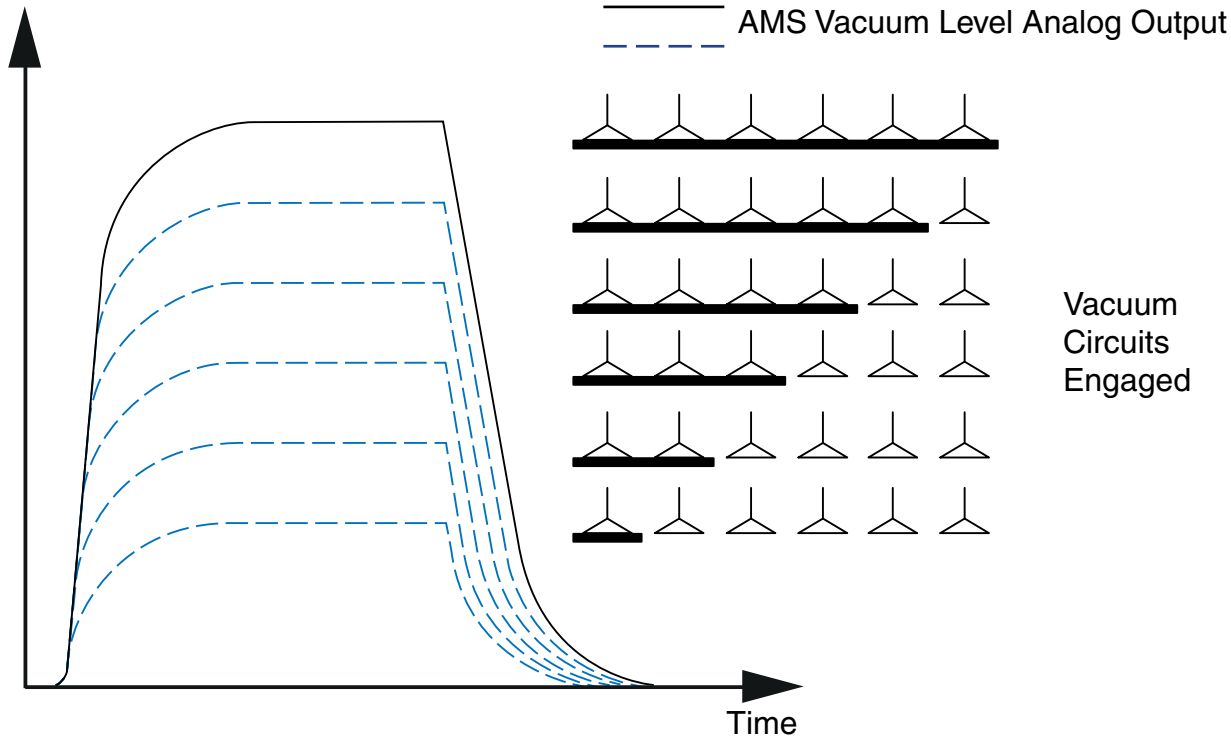
AMS

The graphs shows the vacuum level in the sensor port (S) and how it is monitored by a sensor. Monitoring can be done with either digital or analog vacuum sensors.

Digital Vacuum Sensor



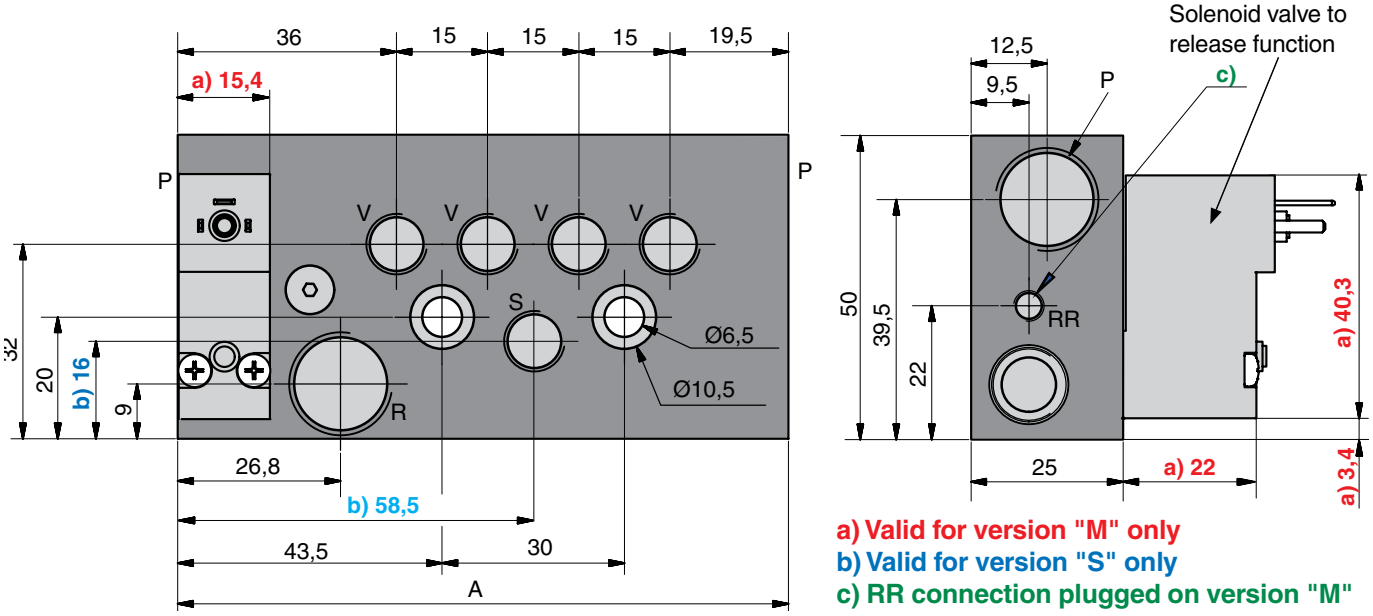
Analog Vacuum Sensor



The vacuum level in engaged circuits remains stable on a high level independent if other circuits are engaged or not.

Dimension

MULTI-CIRCUIT Ejector without Vacuum holding valves



a) Valid for version "M" only
b) Valid for version "S" only
c) RR connection plugged on version "M"

P = Air connection
V = Vacuum connection
R = Exhaust
S = Sensor connection
RR = Blow off (Rapid Release)

3D CAD FILES (STEP)
Download via:
http://www.avac.se/en

General technical data for MULTI-CIRCUIT Ejectors

Nozzle/ Size	Primary nozzle(s) Ø mm	Air consumption Nl/min.	Evacuation time (s)*	Vacuum flow at different vacuum level [Nl/min]								
				0%	10%	20%	30%	40%	50%	60%	70%	80%
10	0,50	10	18	7,5	6,5	5,5	4,0	2,5	1,0	0,8	0,5	0,3
20	0,70	20	9	14,2	12,5	9,8	6,5	4,0	3,0	2,0	0,9	0,5
30	0,85	30	6	22,0	19,5	16,5	13,0	9,5	6,0	3,5	1,5	1,0

* Time to evacuate 1 litre air from atmospheric pressure to 75% vacuum.

No of circuits	A [mm]	Connecting threads				Weight [g]	Tilläggsvikt för utförande [g]			
		P	V	R	RR	Standard and "S"	"M"	"B"	"C"	"O"
4	101	2xG3/8	4xG1/8	G3/8	M5	290	+40	+80	+120	+120
5	116		5xG1/8			330	+40	+100	+120	+120
6	131		6xG1/8			370	+40	+120	+120	+120

Code	Performance
	Air operated blow-off
M	Solenoid operated blow-off
S	AVAC Monitoring System (AMS)
B	Equipped with vacuum holding valves
C	Supply valve normally closed NC
O	Supply valve normally open NO

Operating Instructions
http://www.avac.se/pdfi/I-MULTI.pdf

MULTI-CIRCUIT Ejector with vacuum holding valves

Increased safety

This version has all the advantages of the MULTI-CIRCUIT Ejector. Additionally, each vacuum circuit has a separate built-in vacuum holding valve.

As long as the ejector generates vacuum the vacuum holdings valves are open. At loss of inlet pressure which interrupts the vacuum generation, the vacuum holding valves close between the ejector and the suction cup. It means that the vacuum in the suction cups remains until system leakage reduces the vacuum level.

At blow-off mode, a common signal is given to all vacuum holding valves to open simultaneously. This results in a system with quick response and with excellent visibility.

Reduced air consumption

An example how to save considerable amount of compressed air, this require an external control system and sensor in the AMS port.

As the sensor in the AMS port provides an output signal when all vacuum circuits have reached the pre-set vacuum level, the vacuum generation can be switched off, resulting in that all vacuum holding valves are closing.
The vacuum level in the suction cups is thus maintained, but in the event of a system leakage, the vacuum level will gradually decrease in the concerned circuit.

Since the sensor does not continuously monitor the vacuum level, the vacuum generation must be restarted to monitor the actual vacuum level in the suction cups. If the system is air tight, such a check takes less than 50ms which makes the air consumption for this almost negligible. How often this check should be made depends on the safety requirements for the specific application.

The vacuum level in the circuits are monitored via the AMS-sensor, and at each check, the vacuum generation restarts which restores the vacuum level to the pre-set level.

If the time to restore the vacuum level has increased more than expected, the cause of the leakage should be investigated. Before the leakage has been rectified a more frequent check of the vacuum level should be initiated.
Alternatively, a switch to continuous vacuum generation could be made.

Example

Gripping

6 cans should be lifted and placed in a cardboard box. Before lifting, vacuum is generated in all circuits and when the pre-set vacuum level is reached, the vacuum generation is switch off and lifting can start.

Occasional checks

If required, instantaneous checks of the vacuum level can be made during the course of the lift.
The signal value in the AMS port indicates if all suction cups are in contact with the cans. If the signal value deviates, this indicates a system leakage or suction cup without contact.
To ensure that all cans are in position before unloading, a final control of the AMS value can be made by restarting the vacuum generation.

Release

To release the cans, a blow-off signal is given which opens all vacuum holding valves and releases the cans.

Picture of a MULTI-CIRCUIT Ejector with solenoid valve operated blow-out and AVAC Monitoring System (AMS) equipped both with MULTI Supply valve and Vacuum Holding valves.

See Ordering key on page 37

Materials

Body:	Black anodized aluminium
Banjo screw:	Anodized aluminium
Piston:	Aluminium
Seals:	Nitril rubber NBR

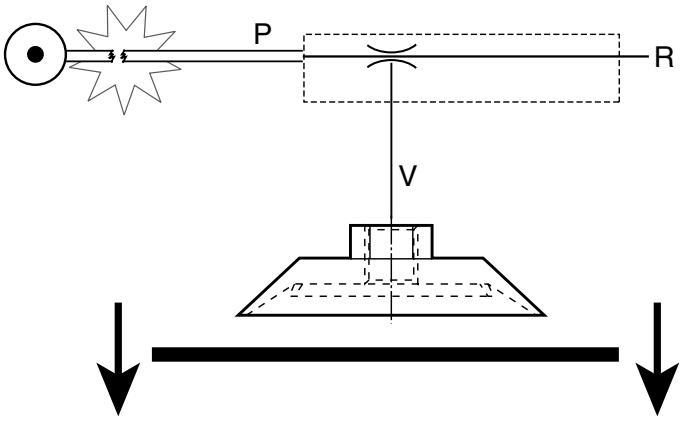
Temperature

Temperature range:	0 to +50 ˚C

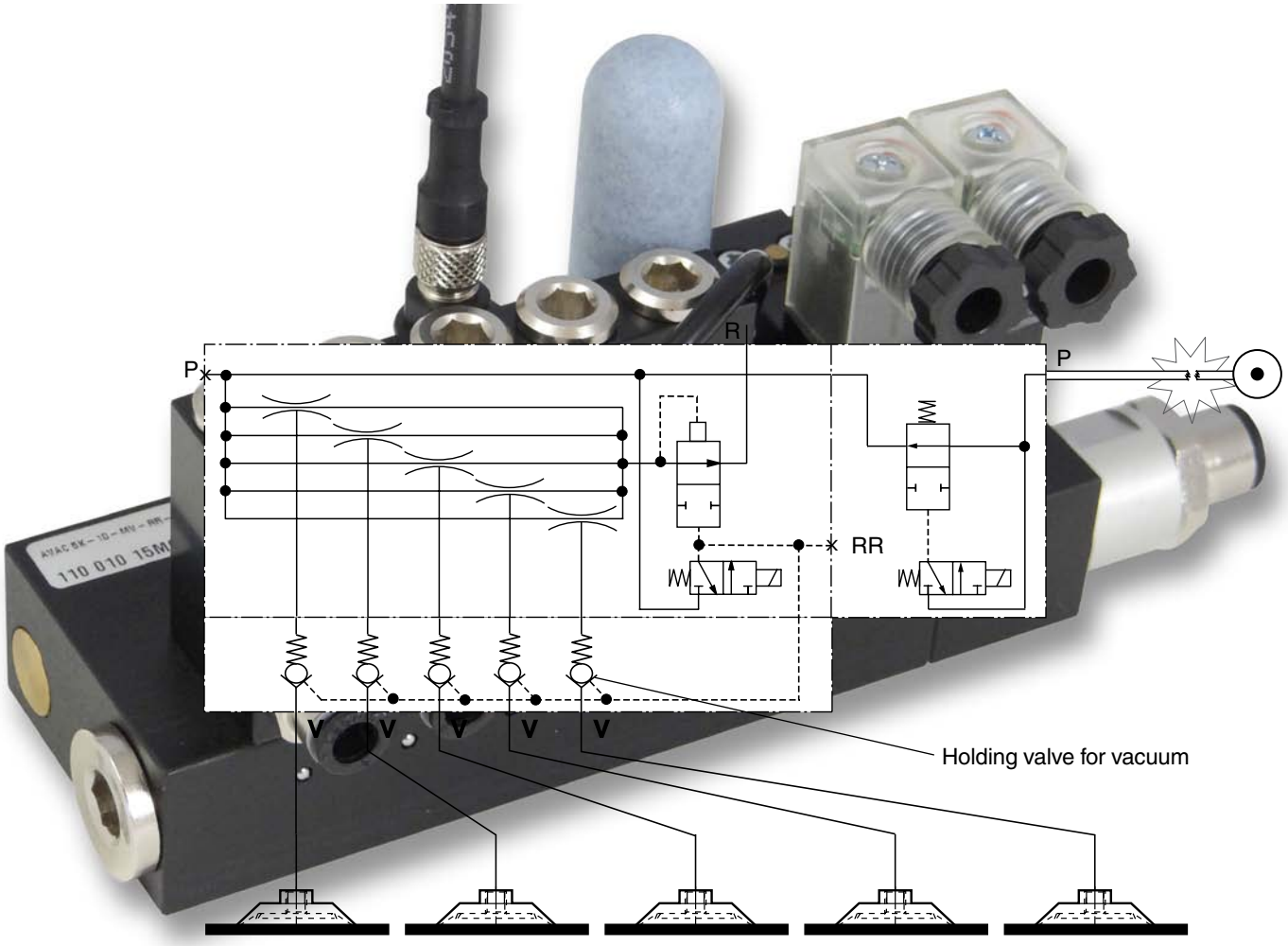
Compressed air

Max pressure:	8 bar
Optimal pressure:	4.5 to 5 bar

Holding valve means increased safety



Vacuum is generated when the ejector is supplied with air. If the air supply would be interrupted by e.g., a compressor failure, a malfunctioning valve or a loose connection, the vacuum will not be maintained as atmospheric pressure leaks into the suction cup, causing an unforeseen drop of the object.



An ejector equipped with a holding valve prevents the atmospheric pressure from leaking through the vacuum port into the vacuum area.

This is how the holding valve works:
When the ejector is operating, the holding valve is opens and air can be evacuated from the suction cup.

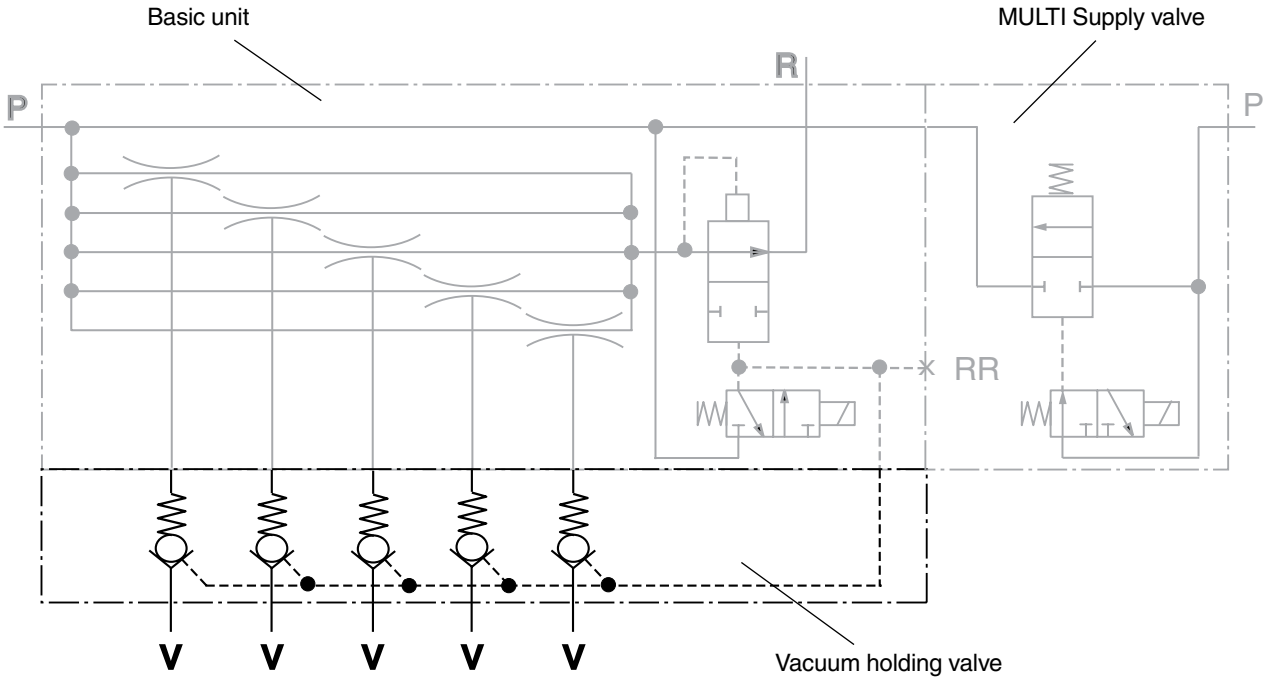
When vacuum is not created, the valve is closed. The leakage in the vacuum circuit, reduces the vacuum level gradually. How long it will take until the object is dropped depends on the leakage flow.

The holding valve is mainly used in applications where air tight materials are handled e.g. plastic, metal or glass.

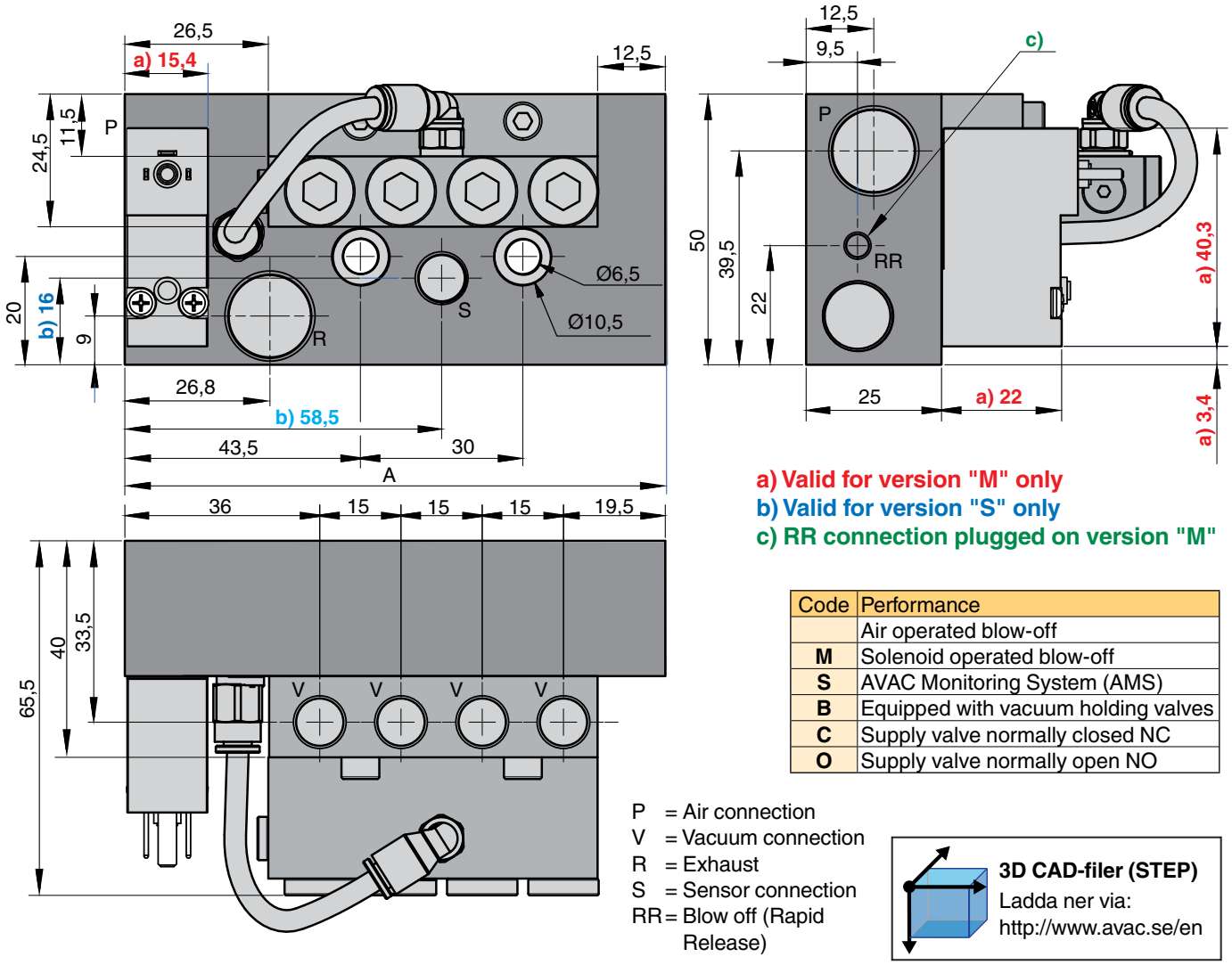
As the vacuum holding valve is maintaining the vacuum level, a blow-off function is required to release the object rapidly and with accuracy.

NOTE: The holding valve cannot be regarded as a safety product, but to be considered as a possibility to extend the time until the object is dropped.

MULTI-CIRCUIT Ejector with Vacuum holding valves



Dimension



a) Valid for version "M" only
b) Valid for version "S" only
c) RR connection plugged on version "M"

Code	Performance
	Air operated blow-off
M	Solenoid operated blow-off
S	AVAC Monitoring System (AMS)
B	Equipped with vacuum holding valves
C	Supply valve normally closed NC
O	Supply valve normally open NO

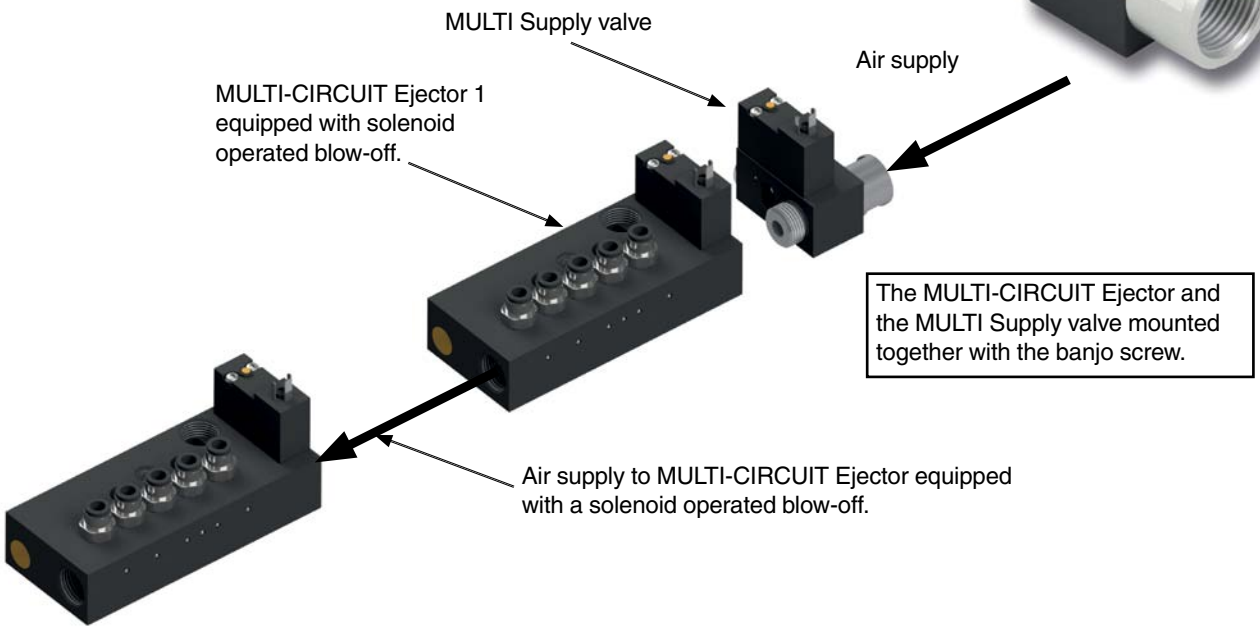
P = Air connection
V = Vacuum connection
R = Exhaust
S = Sensor connection
RR = Blow off (Rapid Release)

3D CAD-filer (STEP)
Ladda ner via:
http://www.avac.se/en

MULTI Supply valve NC or NO

Simplified assembly for a stand-alone MULTI-CIRCUIT Ejector or to feed a limited number of ejectors results in an improved overview.

Varianten utrustad med Normalt Öppen (NO) magnetventil kan öka säkerheten då tryckluftmaningen av ejektorn alltid förekommer så länge som strömavbrott till magnetventil förekommer.



The MULTI-CIRCUIT Ejector and the MULTI Supply valve mounted together with the banjo screw.

The solenoid operated supply valve can easily be mounted with the banjo screw in the supply port of the ejector. The air flow of the valve is sufficient to supply an number of ejectors in serie and is only intended to be used in combination with solenoid operated blow-off

NOTE!
The MULTI Supply valve is only intended to use in combination with MULTI-CIRCUIT Ejectors with solenoid operated blow-off.

See Ordering key on page 37

Materials

Body:	Black anodized aluminium
Banjo screw:	Anodized aluminium
Piston:	Aluminium
Seals:	Nitril rubber NBR

Temperature

Temperature range:	0 to +50 ˚C

Compressed air

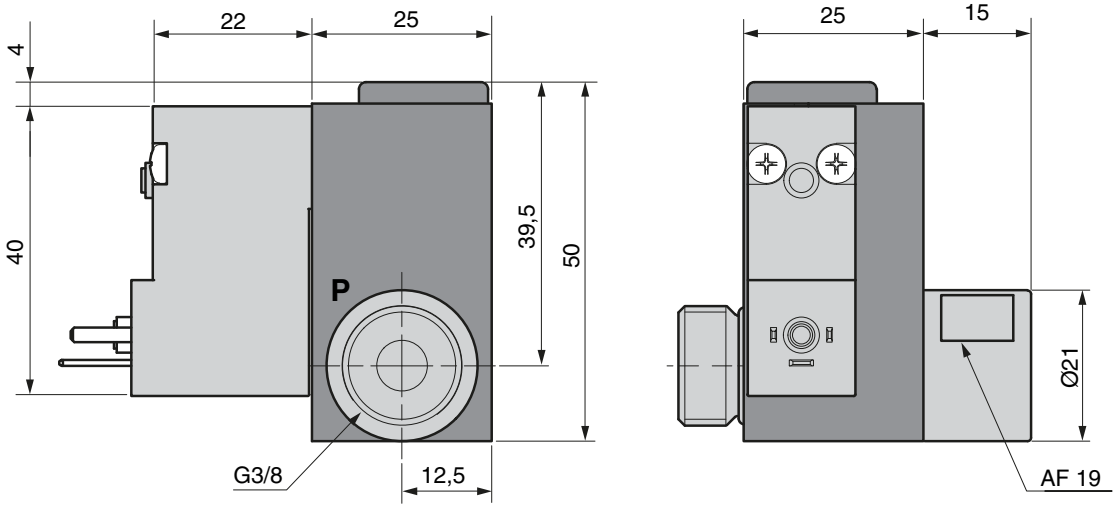
Max pressure:	8 bar
Optimal pressure:	5,5 bar

Flow capacity:

Flow capacity: 240 Nl/min at ΔP 1bar.
Sufficient to supply air to:
24 nozzles size 10,
12 nozzles size 20,
8 nozzles size 30,
Or a mix of nozzle sizes to a maximum of 240

Designation	Weight g	Order no.
MULTI Supply valve NC	**120**	**482 000 00**
MULTI Supply valve NO	**120**	**482 000 01**

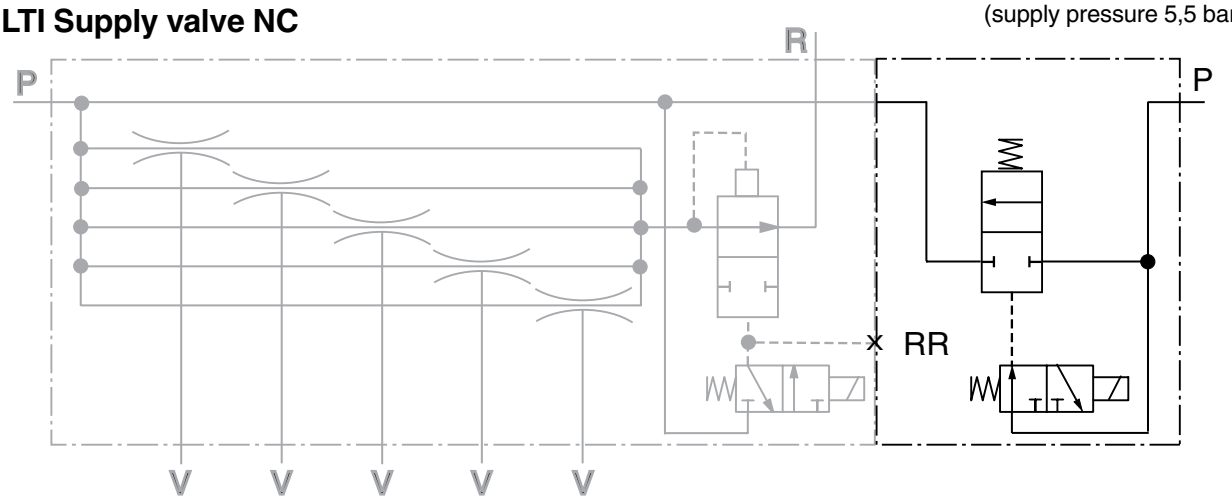
MULTI Supply valve



3D CAD FILES (STEP)
Download via:
http://www.avac.se/en

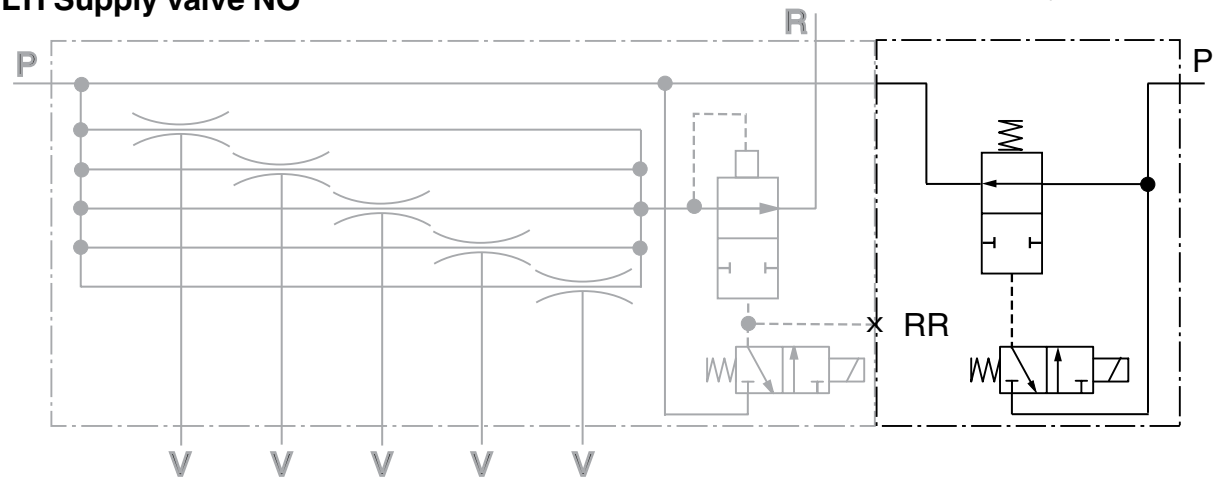
MULTI Supply valve NC

P=Main air supply connection (supply pressure 5,5 bar).



MULTI Supply valve NO

P=Main air supply connection (supply pressure 5,5 bar).



Evacuation and Blow-off time per circuit for suction cup volumes.

In practice

	Multi-Circuit-Ejectors with supply pressure 5 bar			
				
	Flat cup Ø30 mm Volume 1,7 cm³	Flat cup Ø50 mm Volume 7 cm³	Flat cup Ø80 mm Volume 36 cm³	Flat cup Ø100 mm Volume 58 cm³
Time to evacuate a suction cup from 0 to 70% vacuum in ms				
Size 10 Nozzle Ø0.5 mm	21	85	436	702
Size 20 Nozzle Ø0.7 mm	12	47	238	383
Size 30 Nozzle ø0,85 mm	8	32	159	255
Blow-off time from 70% vacuum to 0 in ms				
Size 10 Nozzle Ø0.5 mm	2	9	44	70
Size 20 Nozzle Ø0.7 mm	1	5	24	38
Size 30 Nozzle ø0,85 mm	<1	3	15	23

0 = atmospheric pressure

Tubings and connectors volumes not included.

Solenoid valve

Technical data

Voltage	24 VDC
Power	1,8 W
Max. pressure	10 bar
Protection class	IP65 (with cable connector mounted)

Function	Designatio	Order no.
Blow-off	Magnetventil 24 VDC NC	505 024 11

Function	Designatio	Order no.
Supply valve NC	Solenoid valve 24 VDC	505 024 12
Supply valve NO	Solenoid valve 24 VDC	505 024 11

Cable connector according to EN175301-803,

(former DIN 43650-B), ISO 6952, to be ordered separately

Designation	Order no.
Kabelhuvud med LED och gnistsläckare	590 024 02

We recommend using the cable connector equipped with LED indicators for an easy overview and troubleshooting, and equipped with surge protection in order to both protect and provide other electrical/electronic equipment a longer lifespan.

Part 5. BOOSTER RELEASE EJECTORS

Here we present our patented Booster Release ejector

BOOSTER RELEASE EJECTORS

AVAC 25 MV-BR and AVAC 60 MV-BR

Preferably the ejector can be mounted directly onto the suction cup. The patented blow-off function creates a rapid and gentle release of the object. If the suction capacity is sufficient, the ejector can also be connected to a group of suction cups.

See page 56

AVAC eco Ideas

AVAC 25 MV-BR

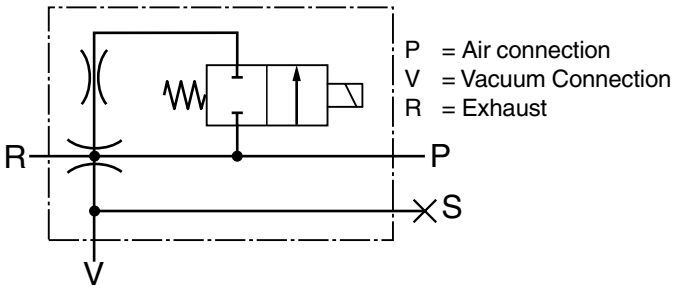
AVAC 60 MV-BR

BOOSTER RELEASE Ejectors

- >80 % Vacuum at 5 bar
- Extremely compact
- Reactive
- Solenoid valve for the Booster Effect. Flow 15 Nl/min transformed to 110 Nl/min (BRE 25) and 38 Nl/min transformed to 250 Nl/min (BRE 60)
- The total Blow-off is the flow from the ejector, the solenoid valve and air withdrawn from the exhaust.
- Perfect for robot applications with rapid movements.
- For extremely rapid cycles, continuous vacuum generation and Blow-off impulse.
- Connection M5 for vacuum sensor
- Robust
- Facile attachment
- The ejector might be used as suction cup holder
- Service life > 100 million actuations
- Patented by AVAC

The Booster Release Ejector is designed to generate vacuum with the lowest air consumption possible.
The integrated solenoid valve links off the air flow from the primary nozzle into the vacuum port. It results in an extremely fast Blow-off supported by the flow from the ejector, solenoid valve and air withdrawn from the exhaust. When the vacuum level in the suction cup approaches the atmospheric pressure, the Blow-off flow is successively reduced and releases the work piece gently and with accuracy. The invention is patented by AVAC.

The small dimensions and low weight makes the ejector suitable for robot applications.



It provides a simple, flexible and transparent installation with minimal risk of vacuum loss in the suction cups. The solenoid valve instantly creates a release signal for all ejectors. The risk that the work piece is thrown out uneven is thus eliminated. The detail is released gently and at the appropriate place.

Ejector placed in central position

A common solution is to place the ejector in a central position outside the vacuum tooling system with several suction cups. This makes it necessary to use relatively large dimensions on the tubes for the vacuum supply to the suction cups in order to avoid excessive resistance. The result is unnecessarily large volumes to evacuate causing increased energy costs and time delays.

With one common Blow-off signal, sent to all suction cups, it is a risk that one suction cup is released before which creates a pressure drop in all other suction cups. There is a risk that details can be thrown out uncontrolled.

Also a single Booster Release ejector can be used centrally mounted for several suction cups if the capacity to generate vacuum and Blow-off is sufficient.

Locally placed ejector

All Booster Release ejector releases the work piece equally and simultaneously and there is no risk that the work piece may be hanging on one end or being released uneven. Another advantage is that the ejector can be used as a suction cup holder. The small dimensions and the low weight of the ejector have very little impact on handling capacity.

From a centrally located solenoid valve outside the vacuum tooling system a tube of small dimension for the compressed air is installed to the vacuum tooling system and is distributed to the Booster Release ejectors. An electricity cable is drawn up centrally to vacuum tooling system where it is distributed to all solenoid valves of the ejectors.

Advantages with the Booster Release ejectors

1. Minimum volume to evacuate for reduced energy consumption
2. The low weight enables use as suction cup holder in the vacuum tooling system
3. Simple installation at lower cost with reduced pipe dimensions
4. Simple and transparent electrical installation of the solenoid valves
5. Blow-off with varying flow provides a safe and gentle release of the work piece
6. Instantaneous and controlled Blow-off of multiple mounted ejectors
7. Service life solenoid valve > 100 million actuations and the ejector without any moving parts.

Materials

Housing:	aluminium black anodized
Nozzles:	Brass

Temperature

Temperature range	-10 to +50 ˚C

Compressed air

Pressure	max 8 bar
Optimum supply pressure	5 bar

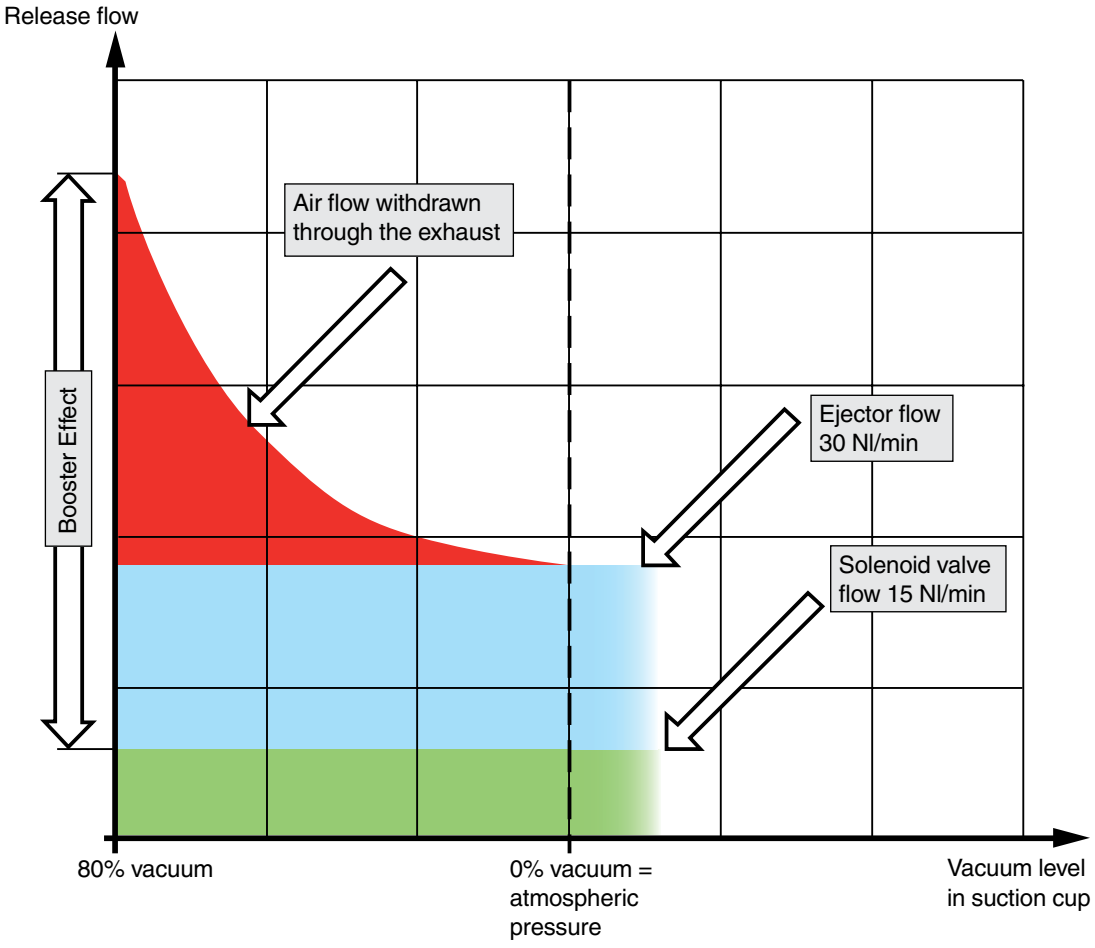
Vacuum Lifter with the ejector in central position

Vacuum Lifter with the Booster Release ejectors placed locally

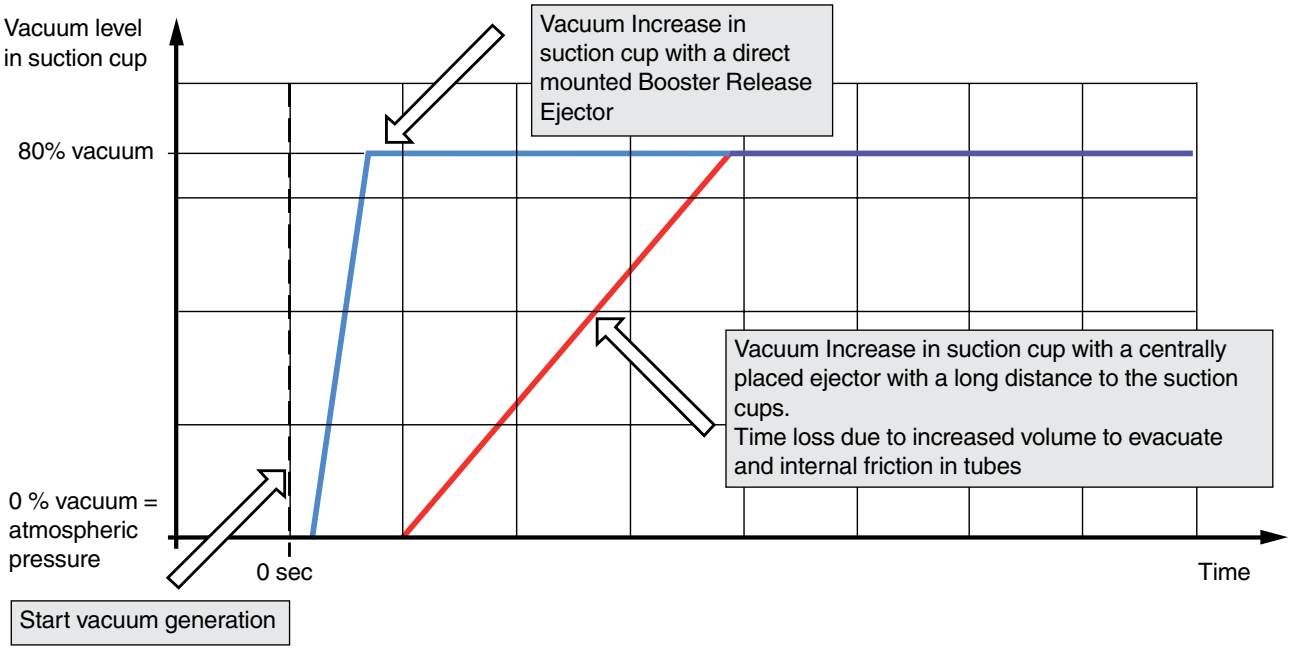
The Booster Release Ejector offers you as user:

- Blow-off with Booster Effect
- Solenoid valve flow of 15 Nl/min (BRE 25) and 38 Nl/min (BRE 60)
- The Booster Effect creates a Blow-off of 110 Nl/min at start and 45 Nl/min at the end (BRE 25) and blow-off of 250 Nl/min at start and 75 Nl/min at the end (BRE 60).
- Minimizes the time of Blow-off and releases the work piece gentle and with accuracy.

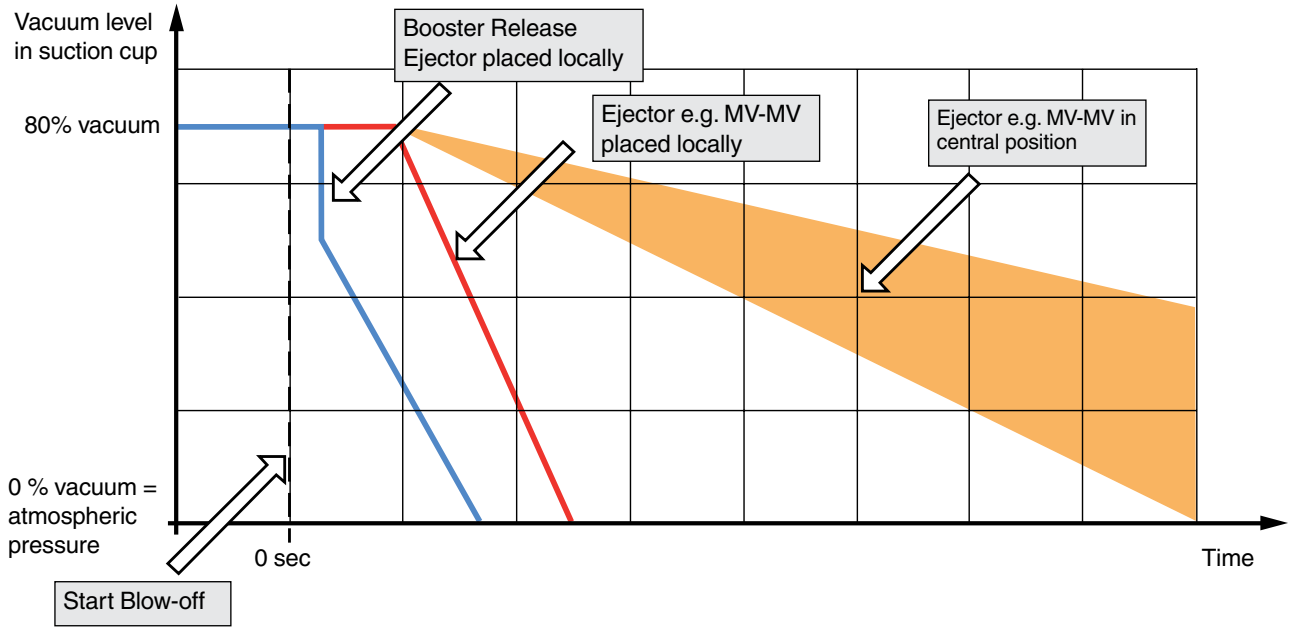
Blow-off with Booster Effect



Time savings vacuum generation



Time savings Blow-off



Takes advantage of the characteristics of the media

Advantage compressed air signal

A compressed air signal is significantly faster than a vacuum signal, therefore it is beneficial to place the ejector near the suction cups. The tube dimensions can be reduced considerably.

Advantage electrical signal

At Blow-off an electrical signal is given to all ejectors which will release the work piece instantaneously. The sensor to Blow-off mode takes approximately 5 ms and with a flat 50 mm suction cup it releases in 3.5 ms.

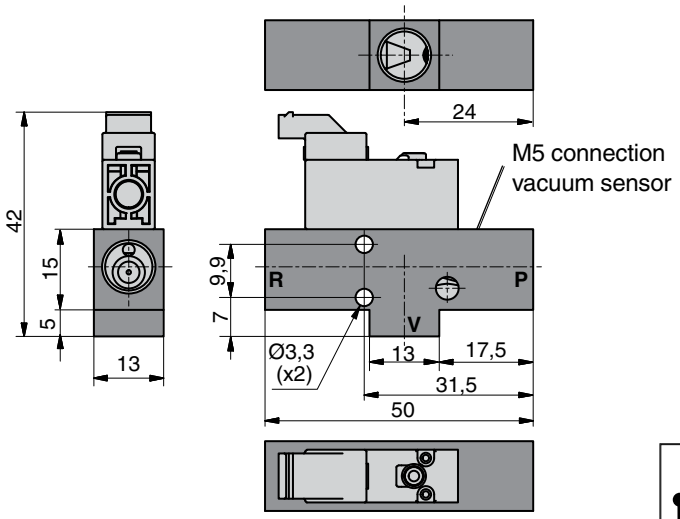
Reduced air consumption

The tubing don´t need to alternate between overpressure and vacuum and can be kept relatively thin which results in a reduced air consumption. In addition, the atmosphere contributes with approximately half of the booster release effect which increases with further compressed air savings.

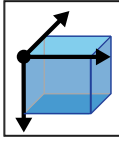
Conclusion

The response time for achieving vacuum and for Blow-off is considerably shorter and is done with higher accuracy compared to an ejector remotely located from the suction cup. The low weight of the ejector makes it able to handle heavier loads. A life of >100 million actuations will ensure a reliable function and a long service life with reduced air consumption.

AVAC 25 MV-BR



P = Air connection
V = Vacuum Connection
R = Exhaust

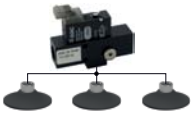


3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AVAC 25 MV-BR	26.0	21.0	18.3	15.5	13.3	10.3	7.3	2.5	0.4	0.8

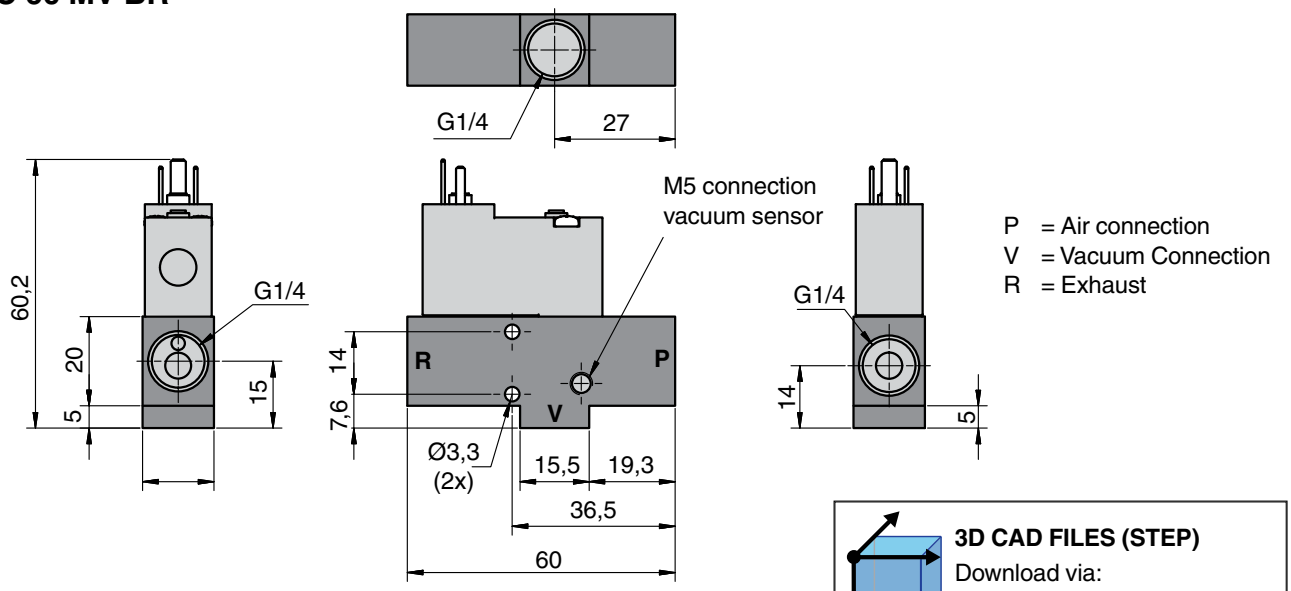
In practice

	Booster Release ejector placed locally				Booster Release ejector in central position
					
	Flat cup Ø30 mm Volume 1,7 cm³	Flat cup Ø50 mm Volume 7 cm³	Flat cup Ø80 mm Volume 36 cm³	Flat cup Ø100 mm Volume 58 cm³	Unit with 3 flat cups with Ø30 mm, connected to ejector with totally 30 cm tube Ø8/6 mm. Total volume 3 x 1.7 + 10 = 15.1 cm³
Evacuation time in ms					
0 ⇒ 50% vacuum	3	12	65	104	27
0 ⇒ 60% vacuum	4	17	90	145	38
0 ⇒ 70% vacuum	7	27	140	226	59
Blow-off time in ms					
50% vacuum ⇒ 0	<1	3,5	18	29	7
60% vacuum ⇒ 0	<1	4,0	20	32	8
70% vacuum ⇒ 0	1	4,3	22	35	9

0 = atmospheric pressure

Designation	Connecting threads P,V and R	Air consumption Nl/min	Solenoid valve flow Nl/min	Flow blow off Nl/min	Evacuation- / Blow-off time for 1 liter volume to % vacuum / atmospheric pressure			Weight g	Order no.
					0 ⇒ 50% / 50% ⇒ 0 (s)	0 ⇒ 60% / 60% ⇒ 0 (s)	0 ⇒ 70% / 70% ⇒ 0 (s)		
AVAC 25 MV-BR	G1/8	30	15	110 - 45	1.80 / 0.50	2.50 / 0.56	3.90 / 0.61	35	**112 025 09**

AVAC 60 MV-BR



3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AVAC 60 MV-BR	65	52	40	35	31	24	18	11	1	1,2

In practice

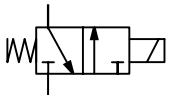
	Booster Release ejector placed locally				Booster Release ejector in central position
					
	Flat cup **Ø50 mm** Volume7 cm³	Flat cup **Ø80 mm** Volume 36 cm³	Flat cup **Ø100 mm** Volume 58 cm³	Flat cup **Ø125 mm** Volume 120 cm³	Unit with 3 flat cups with **Ø50 mm**, connected to ejector with totally 30 cm tube Ø8/6 mm. Total volume 3 x 7 + 14 = 35 cm³
Evacuation time in ms					
0 ⇒ 50% vacuum	4,7	24	39	81	24
0 ⇒ 60% vacuum	7,0	36	58	120	35
0 ⇒ 70% vacuum	10,3	53	85	176	51
Blow-off time in ms					
50% vacuum ⇒ 0	1,2	6	10	20	6
60% vacuum ⇒ 0	1,3	7	11	23	7
70% vacuum ⇒ 0	1,5	8	13	26	8

0 = atmospheric pressure

Designation	Connecting threads P,V and R	Air consumption Nl/min	Solenoid valve flow Nl/min	Flow blow off Nl/min	Evacuation- / Blow-off time for 1 liter volume to % vacuum / atmospheric pressure			Weight g	Order no.
					0 ⇒ 50% / 50% ⇒ 0 (s)	0 ⇒ 60% / 60% ⇒ 0 (s)	0 ⇒ 70% / 70% ⇒ 0 (s)		
AVAC 60 MV-BR	G1/4	60	40	200 - 120	0,84 / 0,16	1,02 / 0,19	1,72 / 0,22	85	**112 060 09**

Specifications

Solenoid Valve for AVAC 25 MV-BR:

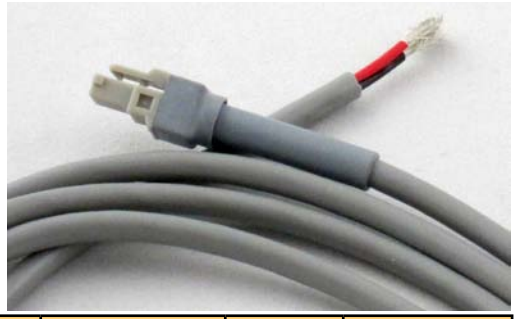


NC

Manual override

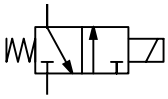
Voltage:	24 VDC +/-10 %
Power:	0,9 Watt
Ambient temperature:	-10 °C to +50 °C
Duty cycle:	100 %
Activation/deactivation time:	5ms / 5ms
Protection class:	IP 40 (with cable connector mounted)
Service life:	>100 million sensors under normal conditions.
Max pressure:	8 bar
Air flow 1 – 2:	10 Nl/min (Qn)

Cable



Designation	Cable Length m	Weight g	Order no.
Cable	1.5	34	590 001 30

Solenoid Valve for AVAC 60 MV-BR



NC

Technical data

Voltage	24 VDC
Power	1,8 W
Max. pressure	10 bar
Protection class	IP65 (with cable connector mounted)

Designatio	Order no.
Solenoid valve 24 VDC NC	505 024 11

Cable connector according to EN175301-803,

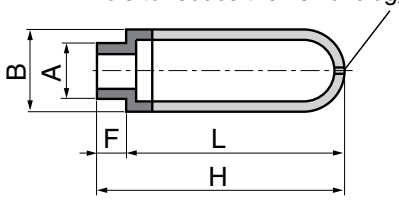
(former DIN 43650-B), ISO 6952, to be ordered separately

Designation	Order no.
Cable connector with LED and surge protection	590 024 02

We recommend using the cable connector equipped with LED indicators for an easy overview and troubleshooting, and equipped with surge protection in order to both protect and provide other electrical/electronic equipment a longer lifespan.

Silencer

Hole to reduce the risk of clogging.



Designation	Weight g	Order no.
Silencer G1/8	2	620 018 10
Silencer G1/4	3	620 014 10

A	B	F	L	H
G1/8	12,5	5,5	28,5	34
G1/4	15,5	7	35,5	42,5

Operating Instructions
http://www.avac.se/pdfi/I-BRE.pdf

Part 6: EJECTORS WITH VACUUM HOLDING VALVE

Ejectors equipped with a vacuum holding valve in combination with a suitable control system and a pressure sensor interrupts the air supply when the preset vacuum level is reached. In a completely air tight system, the vacuum level would be maintained during a long period of time without any support of the ejector. This makes considerable air savings possible.

AVAC eco Ideas

2BV Ejectors

Pneumatic operated ejectors with integrated vacuum holding valve

See page 64

AUTOVAC Ejectors

Solenoid valve operated ejectors with integrated vacuum holding valve

See page 66

Ejectors AVAC 2BV 20-150

- > 85% vacuum at 4 bar
- Very compact
- Low weight
- Quick response
- Controlled Rapid Release (RR)
- Connection for vacuum sensor
- Robust
- Easy mounting
- > 95% air-saving potential
- Increased safety

Our series 2BV EJECTORS is suited best for lifting of glass, metal and other air tight materials.

The vacuum holding valve in the vacuum port and the Blow Off Valve in the Rapid Release port, delays the loss of vacuum in the suction cup in case of a broken tube. This means that personnel can get to safety and the load can be moved to a safe place before the leakage between the object being lifted and the suction cup makes the level of vacuum to hold the object too low.

The blow off (Rapid Release) Blow Off Valve opens at 0.5 bar, which allows several 2BV EJECTORS to be attached to the same Rapid Release signal.

DOUBLE SAFETY

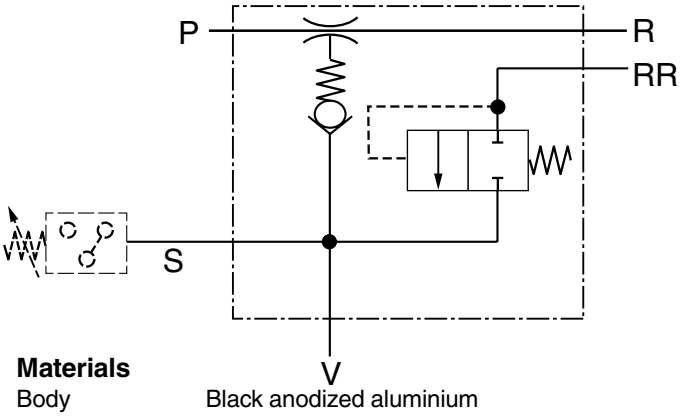
The holding valve in the vacuum port prolongs time before the load is dropped due to pressure loss. The blow off valve blocks, in case of broken signal tube in the blow off port.

The Blow Off Valve opens at 0.5 bar and gives a distinct release signal.

A vacuum sensor connected to the device can monitor the vacuum level and ensure the alarm is triggered at too low vacuum level.

AIR SAVING AUTOMATIC FUNCTION

Dense material allows air savings> 95% in combination with appropriate control system and a vacuum sensor.



Materials

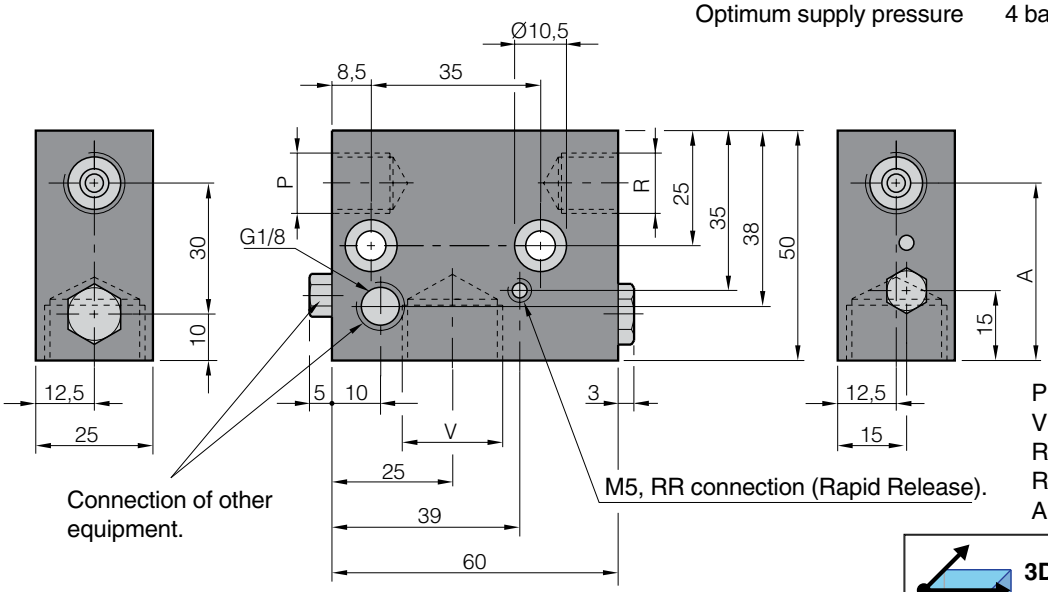
Body	Black anodized aluminium
Nozzle	Brass

Temperature

Temperature range	-10 to +70 ˚C

Compressed air

Pressure	max 8 bar
Optimum supply pressure	4 bar



P = Air connection
V = Vacuum Connection
R = Exhaust
RR = Blow off (Rapid Release)
A see table page 51

3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AVAC 2BV-20	12,8	11,3	8,8	5,9	3,6	2,7	1,8	0,8	0,3	0,7
AVAC 2BV-30	17,3	15,5	13,3	11,5	9,0	6,3	3,8	1,3	0,6	0,95
AVAC 2BV-40	27,6	23,2	19,5	17,0	14,0	10,3	6,0	3,2	0,9	1,1
AVAC 2BV-60	42,6	37,6	32,0	27,0	20,1	15,3	10,3	3,3	1,5	1,25
AVAC 2BV-100	64,0	56,4	47,6	39,0	32,6	26,6	19,0	9,0	3,0	2 x 1,1
AVAC 2BV-150	96,0	84,6	71,4	58,5	48,9	39,9	28,5	13,5	4,5	3 x 1,1

Designation	Connection threads				Measure A mm	Air consumption Nl/min.	Evacuation time (s)*	Weight g	Order no.
	P	V	R	RR					
AVAC 2BV-20	G1/4	G1/2	G1/4	M5	40	20	9	180	**110 020 06**
AVAC 2BV-30	G1/4	G1/2	G1/4	M5	40	30	6	185	**110 030 06**
AVAC 2BV-40	G1/4	G1/2	G1/4	M5	40	40	4,5	190	**110 040 06**
AVAC 2BV-60	G1/4	G1/2	G1/4	M5	40	60	3	195	**110 060 06**
AVAC 2BV-100	G1/4	G1/2	G1/2	M5	38,5	100	2	200	**110 100 06**
AVAC 2BV-150	G1/4	G1/2	G1/2	M5	38,5	150	1,2	200	**110 150 06**

* Time to evacuate 1 litre air from atmospheric pressure to 75% vacuum.

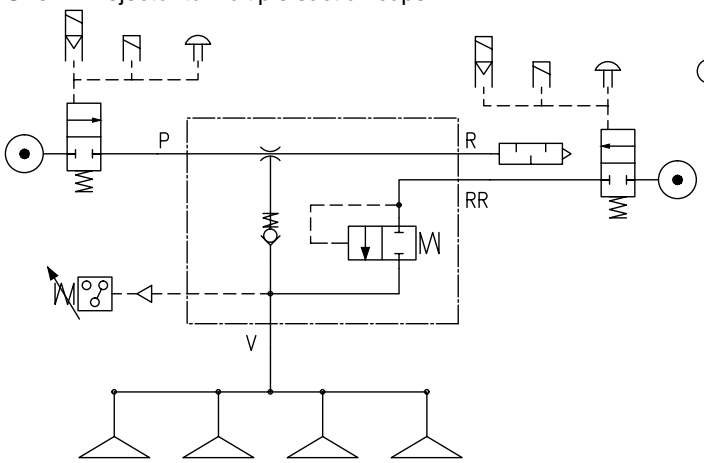
AVAC 2BV 20-60

Air Saving Automatic Function and increased safety

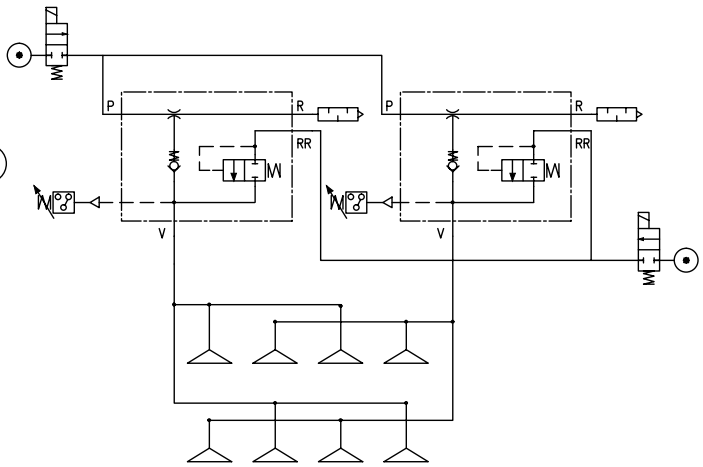
The safest option is to have one 2BV-ejector per suction cup thus minimizing the risk of leakage in connections, hose and the suction cups and the retained object. Nevertheless, there are sometimes reasons to deviate from this.

Safer lifting with one or two circuits

One 2BV-ejector to multiple suction cups



Double safety with two circuits



As an alternative to the 2/2 valves 3/2 valves can be used for Rapid Release (RR) due to the Blow Off Valve built into 2BV Ejector

Ejector 2BV is also available with integrated air saving device

2BV AIR SAVE. See page 68.

Operating Instructions
http://www.avac.se/pdfi/I-2BV.pdf

AUTOVAC 60, 180 and 360

- > 85% vacuum at 5 bar
- The holding valve in the vacuum port reduces time before the load is dropped due to pressure loss
- Solenoid valve for vacuum
- Solenoid valve for Rapid Release (RR)
- Protection: IP65

Options

Vacuum sensor (see separate page)

- MICRO Digital
- ATTO Digital
- FEMTO Analog / Digital
- PICO Digital / Display

Air Saving Automatic Function and increased safety

Complete vacuum units with an air consumption between 60-360 l / min. By connecting a vacuum sensor to the external control system, the air consumption may be shut off when the set vacuum level is reached. Vacuum holding valve shuts and the vacuum sensor monitors the maximum and minimum level. Compressed air consumption is reduced to a minimum. To release the load a signal is given to the solenoid valve for blow off, and the vacuum-side is pressurized to release the load.

Materials

Ejector housing	Black anodized aluminium
Nozzle	Brass

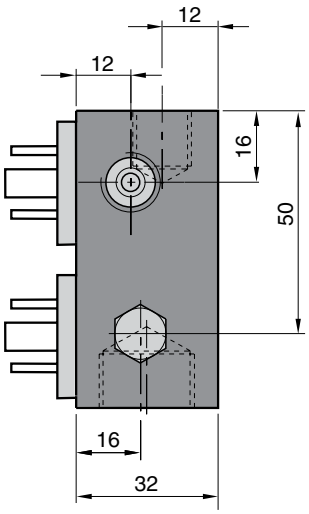
Temperature

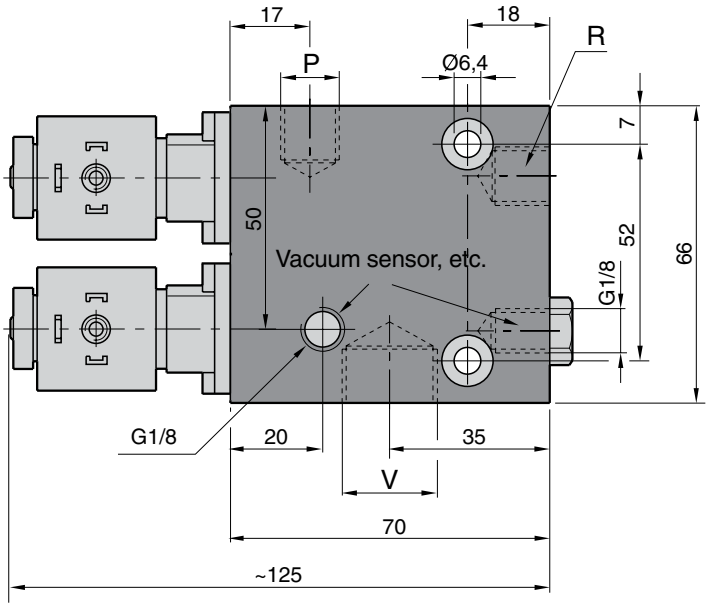
Temperature range	-10 to +50 ˚C

Compressed air

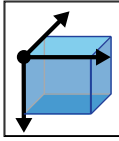
Pressure	max 7 bar	
Optimum supply pressure	5,2 bar	Size 60
Optimum supply pressure	5,6 bar	Size 180
Optimum supply pressure	6,4 bar	Size 360

AUTOVAC 60





P = Air connection
V = Vacuum Connection
R = Exhaust



3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

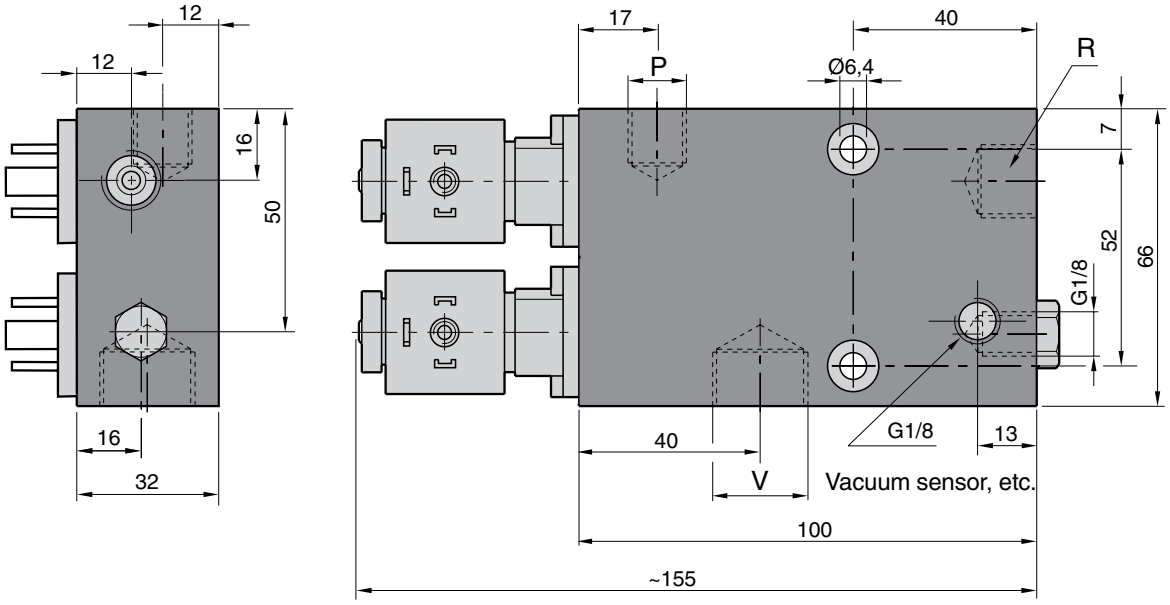
Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AUTOVAC 60	42.6	37.6	32.0	27.0	20.1	15.3	10.3	3.3	1.5	1.25

Designation	Connecting threads			Air consumption Nl/min.	Evacuation time (s)*	Weight g	Order no.
	P	V	R				
AUTOVAC 60, 24VDC, 4,5 W	G1/4	G1/2	G1/4	60	3	650	**112 060 07**

* Time to evacuate 1litre air from atmospheric pressure to 75% vacuum.

AUTOVAC 180 and 360

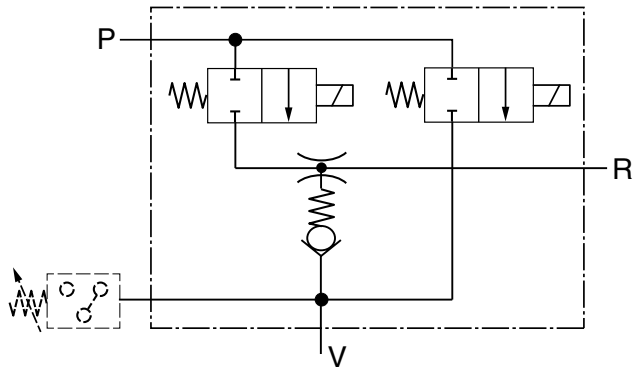


Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AUTOVAC 180	105.0	86.0	75.3	64.6	52.0	40.8	24.5	10.0	4.5	2.1
AUTOVAC 360	168.0	136.0	120.0	102.0	85.0	56.2	41.0	22.0	11.0	3.1

Designation	Connecting threads			Air consumption Nl/min.	Evacuation time (s)*	Weight g	Order no.
	P	V	R				
AUTOVAC 180, 24VDC, 4,5 W	G1/4	G1/2	G3/8	180	1	820	**112 181 07**
AUTOVAC 360, 24VDC, 4,5 W	G1/4	G1/2	G1/2	360	0.5	900	**112 364 07**

* Time to evacuate 1litre air from atmospheric pressure to 75% vacuum.



P = Air connection
V = Vacuum Connection
R = Exhaust

Solenoid valve for Ejector AUTOVAC

Voltage	24 VDC
Power	4.5 W
Max. pressure	10 bar
Protection class	IP65 (with cable connector mounted)

Cable connector according to EN175301-803 Type A, (former DIN 43650-A), ISO 4400 to be ordered separately

Designation	Order no.
Cable connector Type A with LED and surge protection	**590 024 00**

We recommend using the cable connector equipped with LED indicators for an easy overview and troubleshooting, and equipped with surge protection in order to both protect and provide other electrical/electronic equipment a longer lifespan.

Operating Instructions
http://www.avac.se/pdfi/I-AUTOVAC.pdf

Part 7: EJECTORS WITH AIR SAVING DEVICE

Ejectors with an integrated pneumatic (2BV AIR SAVE) or electronic (MFE) control circuit that shuts off the air supply when the high set point is reached and restarts when reaching the low level. This enables considerable air savings in handling of dense materials.
To release the object from the suction cup a blow-off signal is required.

AVAC eco Ideas

2BV-AS ejectors

Air operated ejectors with integrated air saving device
See page 70

2BV-AS Ejector

AUTOVAC MFE Ejectors

Solenoid valve operated ejectors with integrated vacuum holding valve

See page 73

AUTOVAC MFE Ejector

2BV AIR SAVE 20-150 EJECTOR

- >85% vacuum at 4,5 bar
- Integrated full pneumatic air saving device
- >95% air-saving potential
- Preset 60% on
- Adjustable low set point +/- 10%
- Hysteresis ~10%
- Very compact
- Low weight
- Quick response
- Controlled Blow-off (RR)
- Connection for vacuum sensor
- Robust
- Easy mounting
- Increased safety

2 BV AIR SAVE Ejector with pneumatic air saving

The ejector is equipped with an integrated full pneumatic control circuit which shuts off the air supply when the preset max vacuum level is reached and restarts when reaching the min level. This enables compressed air savings of more than 95 %.

The preset vacuum level can be changed +/- 10 % with the adjusting screw on the unit.

By connecting compressed air to the unit, the air saving is controlled internally independent of any external control system.

A blow-off signal is required to release the object from the suction cup. The valve in the release signal port opens at 0.5 bar, which results in a very quick and controlled blow-off.

A vacuum sensor connected to the unit can give feedback to an external control system that the ongoing sequence can continue.

Simple installation

The 2BV AIR SAVE EJECTOR simplifies the installation as no external control system is required. The internal control circuit monitors the vacuum level and shuts of the air consumption when the max vacuum level is reached and restarts when reaching the min level.

The min level is preset on just over 60 % vacuum and can be changed +/- 10% with the adjusting screw on the unit. The hysteresis is ~10%. This means that the air supply is shut off at approx. 75 % and restarts at just over 60% vacuum.

In case a feedback signal to an external control system is required, a vacuum sensor can be connected which can indicate that e.g. the required vacuum level has been reached.

Blow-off connection (RR)

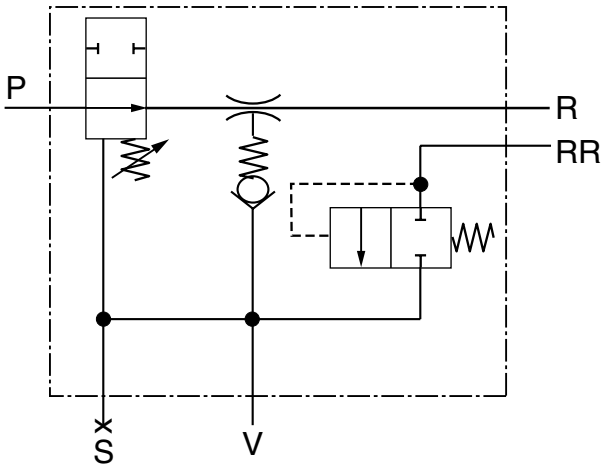
The 2BV AIR SAVE EJECTOR has a connection for a blow-off signal which is required to ensure a quick and controlled blow-off.

Double safety

The holding valve in the vacuum port prolongs the time until the object will drop due to pressure loss.

The blow-off valve blocks in case of a broken signal tube. The valve opens at a signal pressure of 0.5 bar witch gives a distinct release signal.

A vacuum sensor connected to the device can monitor the vacuum level and ensures the alarm is triggered at too low vacuum level.



P = Air connection
V = Vacuum Connection
R = Exhaust
RR = Blow off (Rapid Release)

Materials

Body	Black anodized aluminium
Nozzle	Brass

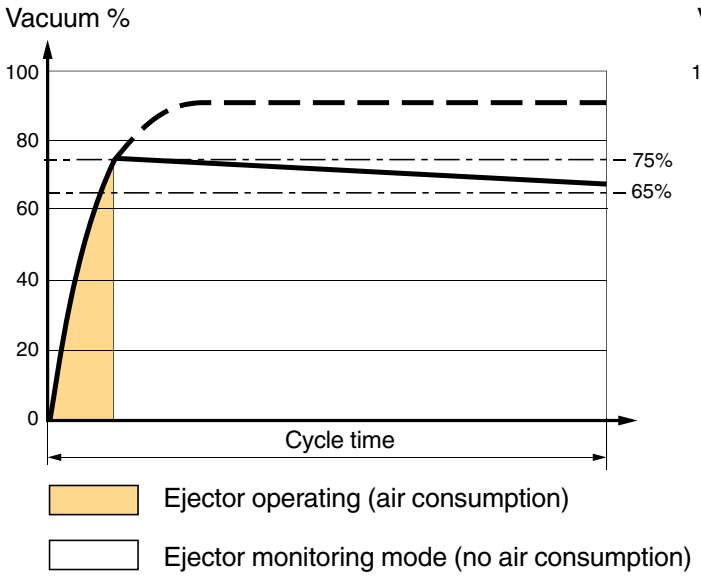
Temperature

Temperature range	-10 to +70 ˚C

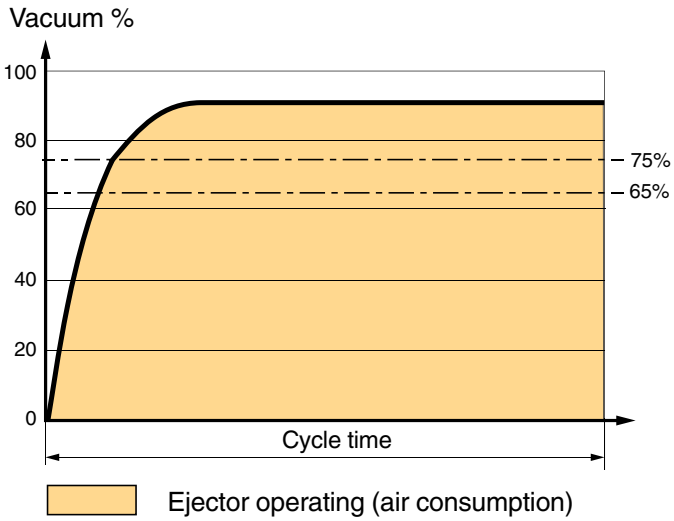
Compressed air

Pressure	max 8 bar
Optimum supply pressure	4,5 bar

Air saving potential with 2BV AIR SAVE Ejector



Air consumption with a traditional ejector



Case 1

1. A 0,1 litre volume shall be evacuated to 75% vacuum in 0,3 seconds. An ejector size 60 has been chosen.
2. A cycle time is 120 seconds.
3. By using an ejector without air saving, the total air consumption is 120 litre per cycle.
4. With a 2BV 60 AIR SAVE EJECTOR the air consumption is 0.3 litre under the same conditions.
5. This results in an air saving of more than 99 %.

Case 2

1. A 0,05 litre volume shall be evacuated to 75% vacuum in 0,36 seconds. An ejector size 30 has been chosen.
2. A cycle time is 10 seconds.
3. By using an ejector without air saving, the total air consumption is 5 litre per cycle.
4. With a 2BV 30 AIR SAVE EJECTOR the air consumption is 0.18 litre under the same conditions.
5. This results in an air saving of more than 96 %.

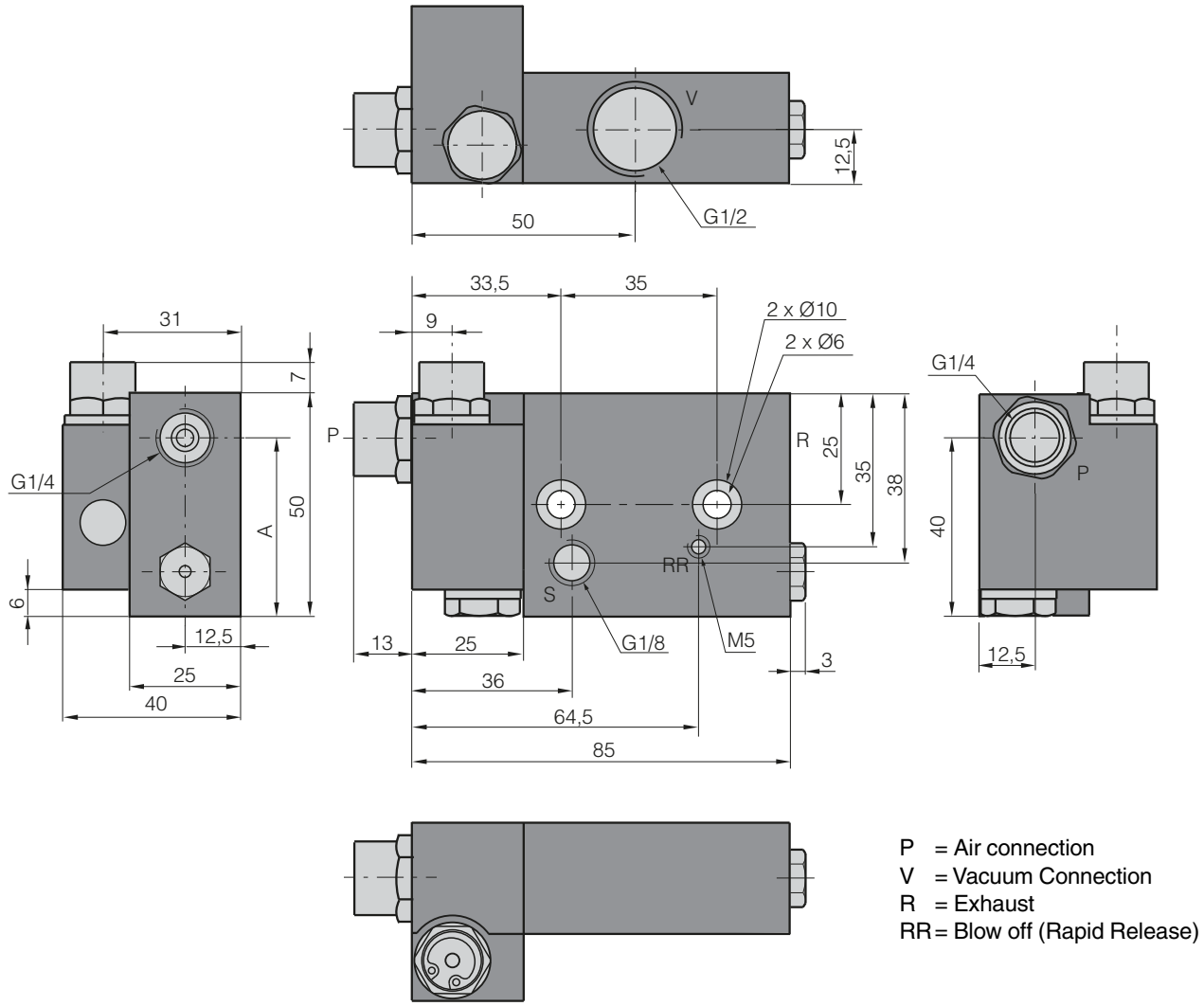
Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]									Primary nozzle(s) Ø mm
	0%	10%	20%	30%	40%	50%	60%	70%	80%	
AVAC 2BV-AS-20	12,8	11,3	8,8	5,9	3,6	2,7	1,8	0,8	0,3	0,70
AVAC 2BV-AS-30	17,3	15,5	13,3	11,5	9,0	6,3	3,8	1,3	0,6	0,95
AVAC 2BV-AS-40	27,6	23,2	19,5	17,0	14,0	10,3	6,0	3,2	0,9	1,10
AVAC 2BV-AS-60	42,6	37,6	32,0	27,0	20,1	15,3	10,3	3,3	1,5	1,25
AVAC 2BV-AS-100	64,0	56,4	47,6	39,0	32,6	26,6	19,0	9,0	3,0	2 x 1,1
AVAC 2BV-AS-150	96,0	84,6	71,4	58,5	48,9	39,9	28,5	13,5	4,5	3 x 1,1

Ejectors AVAC 2BV-AS (AIR SAVE)

Designation	Connection threads				Measure A mm	Air consumption Nl/min.	Evacuation time (s)*	Weight g	Order no
	P	V	R	RR					
AVAC 2BV-AS-20	G1/4	G1/2	G1/4	M5	40	0 to 20	9	310	**300 020 07**
AVAC 2BV-AS-30	G1/4	G1/2	G1/4	M5	40	0 to 30	6	315	**300 030 07**
AVAC 2BV-AS-40	G1/4	G1/2	G1/4	M5	40	0 to 40	4,5	320	**300 040 07**
AVAC 2BV-AS-60	G1/4	G1/2	G1/4	M5	40	0 to 60	3	325	**300 060 07**
AVAC 2BV-AS-100	G1/4	G1/2	G1/2	M5	38,5	0 to 100	2	325	**300 100 07**
AVAC 2BV-AS-150	G1/4	G1/2	G1/2	M5	38,5	0 to 150	1,2	325	**300 150 07**

* Time to evacuate 1 litre air from atmospheric pressure to 75% vacuum.



P = Air connection
V = Vacuum Connection
R = Exhaust
RR = Blow off (Rapid Release)

3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Operating Instructions
http://www.avac.se/pdfi/I-2BVAS.pdf

AUTOVAC MFE (Multi Function Ejector)

AUTOVAC MFE has the following basic features:

- > 85 % vacuum at 5 bar
- Built-in vacuum holding valve to delay vacuum drop in case of pressure loss
- Solenoid valves for vacuum generation / blow-off
- Large Adjustable blow-off
- Built-in silencer alternative G1/2 connection
- Compact design
- Robust design with ejector body in aluminum
- Stackable on Multiple manifolds
- Protection class IP65

Control system characteristics:

- Programmable vacuum range and safety level
- Programmable alternatively self-teaching blow-off
- Indication of predictive maintenance
- Simple communication via a standard M12 connector

Simple interaction man-machine
The Autovac MFE is equipped with a display which shows the current vacuum level and gives visual feed-back at programming.
The device has push buttons and LEDs for visual indication and programming.
Electrical communication is made via an M12 connector.

Predictive Maintenance
The machine operator can choose between different monitoring options of the work process and thereby take action to prevent production interruptions.

Integrated air saving system and increased safety
The external start signal initiates vacuum generation.
The vacuum generation is maintained for as long as the start signal is enabled.
The internal control system switches off the vacuum generation when the set upper limit (70%) is reached and restarts if the lower limit (65%) is reached. This process continues until the start signal is disconnected, resulting in an air saving potential of >95%.
A feedback signal is given when the vacuum level reaches the preset security level (60%) and is interrupted when the vacuum level falls below this level. The signal may be used to e.g. start or stop a process.

Time set blow-off
When the external start signal for vacuum generation is disconnected, the blow-off automatically starts for a preset period (0.5 s). The blow-off time is programmable.

Adaptive blow-off
When the external start signal for vacuum generation is disconnected, the ejector automatically blows-off for a preset period (0.5 s). The blow-off time is programmable. If any vacuum would remain, additional blow-off pulses will be given until the blow-off has been completed.
The blow-off time of the previous cycle also adjusts the time in the following cycle.
Adaptive blow-off is primarily intended for dynamic applications where this self-learning function contributes to minimize blow-out time and thus air consumption.

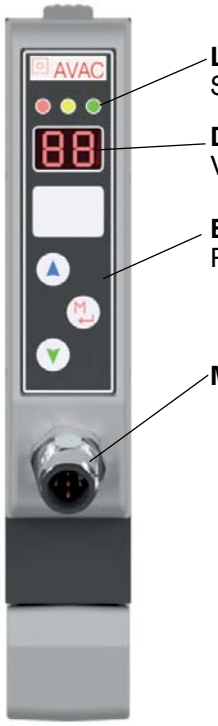
Manual / External blow-off
The blow-off is initiated by an external signal and continues as long as this signal is active.

Adjustable blow-off
The adjustable blow-off makes it possible to release the object smooth and gentle or the time for blow-off can be optimized.

Silencing
The ejector is equipped with a built-in silencer. If required, the exhaust air can be diverted via the G1/2 exhaust port.

The given values in brackets are example values

Controlling/ Programming / Overview



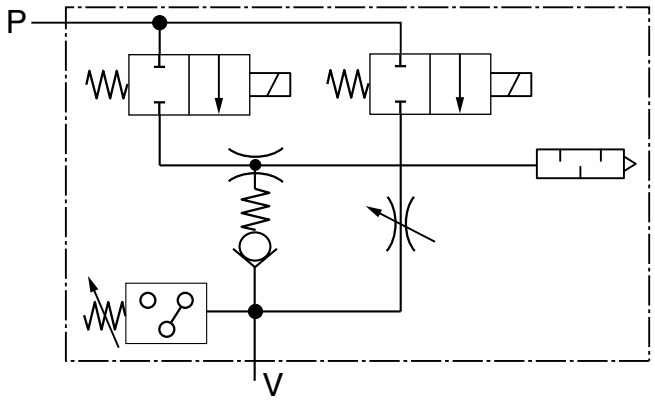
LED indications
Status/programming feedback

Display
Vacuum/programming feedback

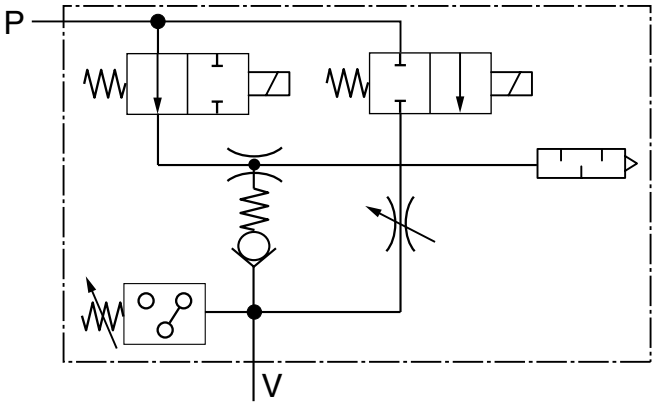
Buttons
Programming/parameter settings

M12 male connector

AUTOVAC MFE NC ejector



AUTOVAC MFE NO ejector



Electrical specification

Supply voltage	24 VDC
Outputs	24 VDC (PNP) max. 100 mA
Inputs	24 VDC (PNP)

Materials

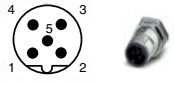
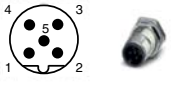
Ejector housing	Black anodized aluminium
Nozzle	Brass
Cover and silencer:	PC/ABS

Temperature

Temperature range	0 to +50 ˚C

Compressed air

Pressure	max 8 bar
Optimum supply pressure	5 bar

	Version C, M12 5-pin	Version D, M12 5-pin	Version S, M12 8-pin
			
Time set blow-off	x	x	x
Adaptive blow-off	x	x	x
Manual / External blow-off	-	x	x
Feedback, Vacuum OK/Blow-off OK	x	x	x
Feedback, Predictive Maintenance*	x	-	x

* Feedback when deviations in vacuum generation, e.g. when leakage occur.

Ordering key

M	F	E		2	0	0	H		A	C	1

Product series	
MFE	AUTOVAC MFE ejector

Size
100
200
300
400

Function	
A	NC
B	NO

Silencer	
0	Without
1	With

Vacuum level	
H	High

Electrical connection*	
C	5-pin
D	5-pin
S	8-pin

*See table page 74

Vacuum flow of the ejector and the primary nozzle diameter

Designation	Vacuum flow at different vacuum level [Nl/min]								
	0%	10%	20%	30%	40%	50%	60%	70%	80%
AUTOVAC MFE 100H	65	60	54	47	35	28	22	12	3
AUTOVAC MFE 200H	105	96	87	72	56	45	34	19	5
AUTOVAC MFE 300H	155	140	126	109	81	66	50	28	8
AUTOVAC MFE 400H	230	207	187	162	121	97	75	42	11

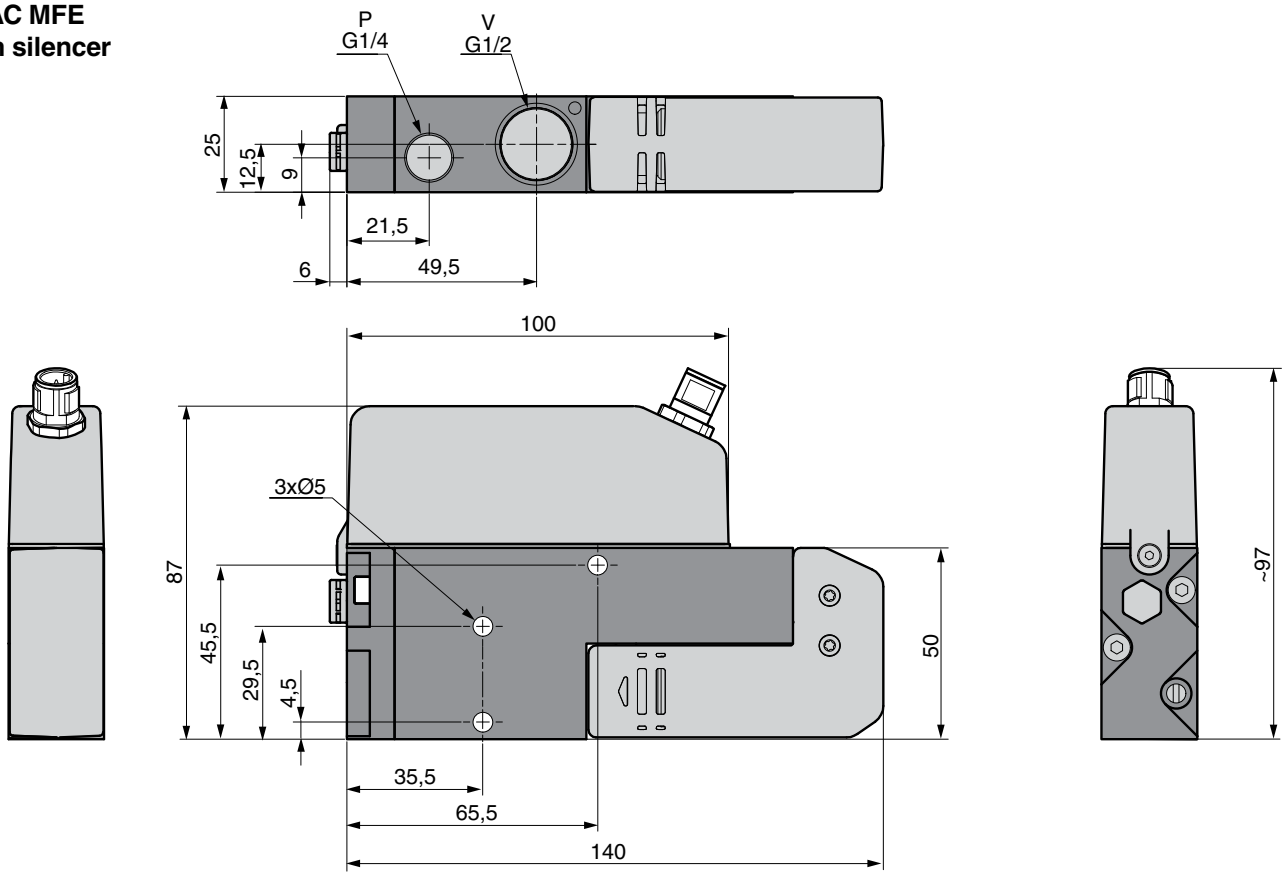
Ejectors AVAC AUTOVAC MFE

Designation	Primary nozzle(s) Ø mm	Max Vacuum flow Nl/min	Connecting threads			Air consumption Nl/min.	Evacuation time (s)*	Weight g	Air consumption Blow-off l/min
			P	V	R				
AUTOVAC MFE 100H	1,5	65	G1/4	G1/2	G1/2	105	1,40	360	25-400
AUTOVAC MFE 200H	2,0	105	G1/4	G1/2	G1/2	205	0,75	360	25-400
AUTOVAC MFE 300H	2,5	155	G1/4	G1/2	G1/2	325	0,60	360	25-400
AUTOVAC MFE 400H	3,0	230	G1/4	G1/2	G1/2	445	0,40	360	25-400

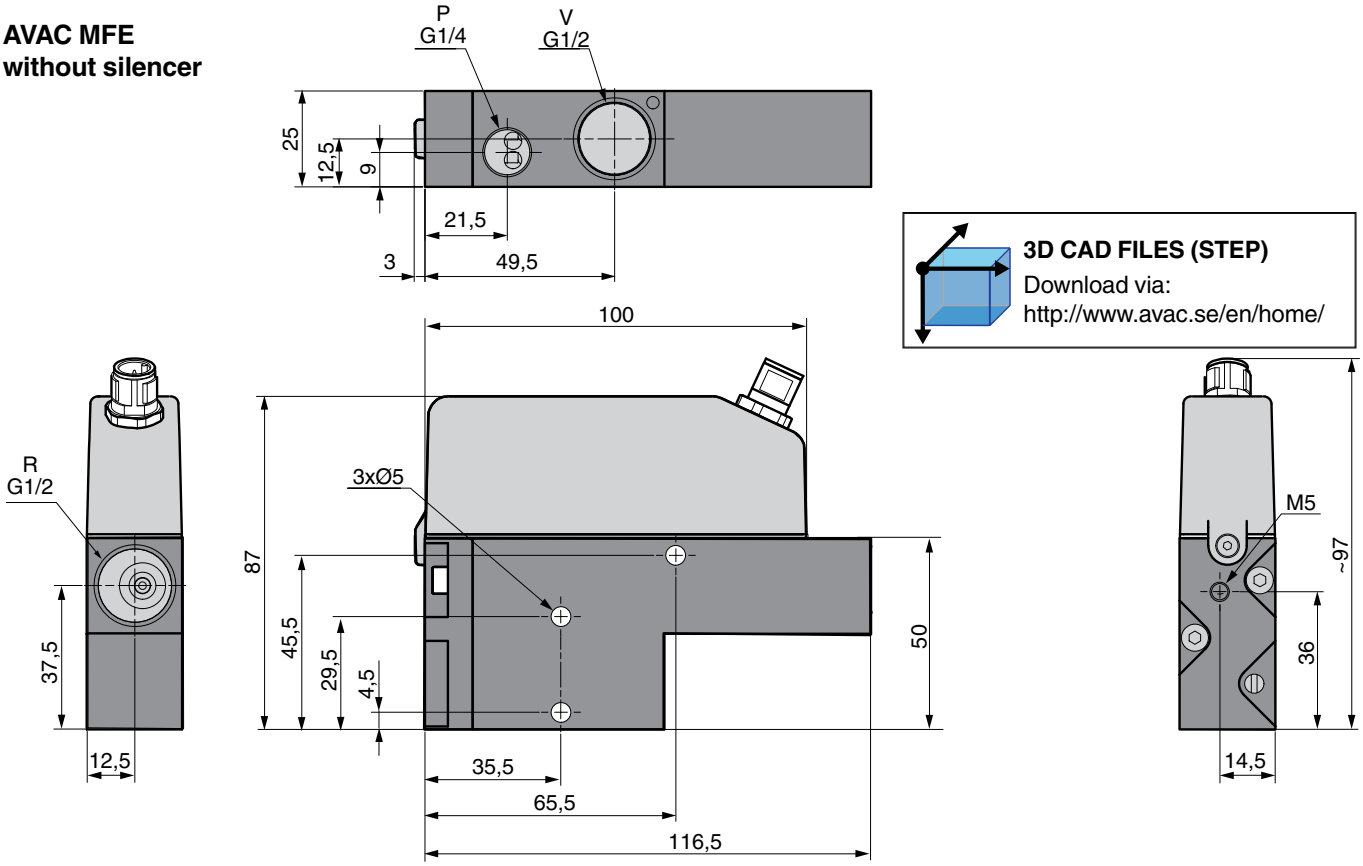
All measurements are made at a supply pressure of 5 bar and without silencer.
* Time to evacuate 1litre air from atmospheric pressure to 70% vacuum.

Operating Instructions
http://www.avac.se/pdfi/I-MFE.pdf

AVAC MFE
with silencer



AVAC MFE
without silencer

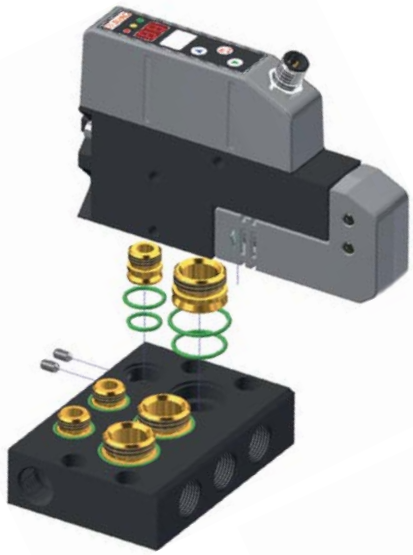


3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Multiple manifolds

for AUTOVAC MFE

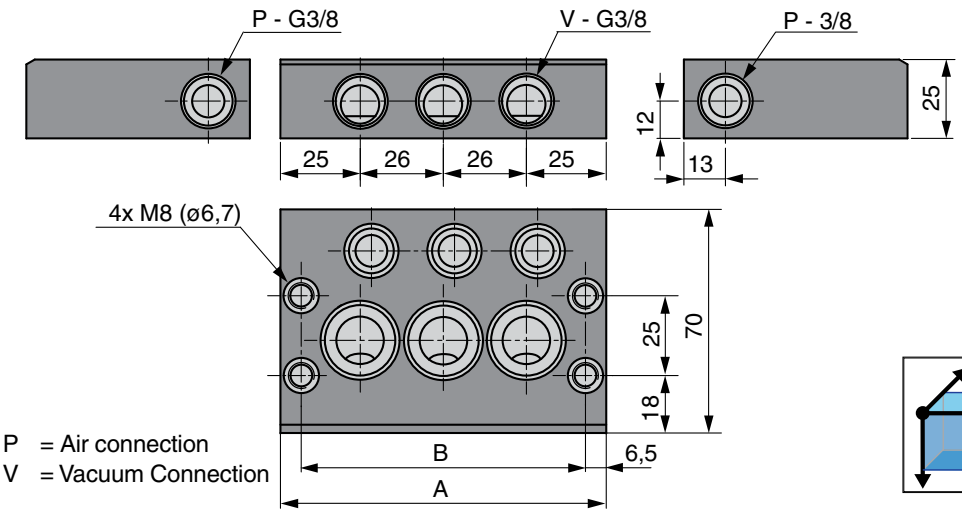
- Compact block mounting
- For all AUTOVAC MFE sizes
- Excellent overview
- Easy exchange of units
- Easy installation
- To prepare for a potential increase in the number of ejectors on the multiple manifolds, a blind plate is available to reserve one position for this purpose.



The units can also be supplied manifold mounted with two to five ejectors in any size.

1. The ejector is easily mounted onto the manifold by first fastening the brass nipples gently into the ejector or blind plate connections.
2. Then place the attached O-rings in the manifold carefully and push the ejector/blind plate gently together with manifold without damaging the O-rings.
3. Thereafter, tighten the set screws are step by step to fix the ejector to the manifold.

The manifold can be connected to the air supply (G3/8) on either side.



P = Air connection
V = Vacuum Connection

3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Multiple manifold for quantity of AUTOVAC MFE	A (mm)	B (mm)	Vacuum - connection (V)	Weight g	Order no.
2	76	63	G3/8 (x2)	325	**410 000 02***
3	102	89	G3/8 (x3)	445	**410 000 03***
4	128	115	G3/8 (x4)	560	**410 000 04***
5	154	141	G3/8 (x5)	680	**410 000 05***
Blind plate				40	**410 000 00**

* Screws and O-rings supplied

Equipped

Operating Instructions
http://www.avac.se/pdfi/I-MFE.pdf

Part 8: ACCESSORIES VACUUM

Accessories to simplify the installation

Blow Off Valves (RR)

Available in two versions:

- Strong blow-off
- Restricted blow-off

See page 80

Blow Off Valve

Silencers SILPO, G1/8 to G1

Available in two versions:

- Standard
- Drilled hole in rear end to avoid clogging

See page 81

SILPO

BLOW OFF Valves

Increased safety with Rapid Release ports (RR)

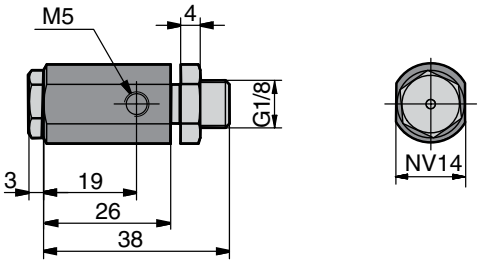
- Increases safety for RR-ejectors
- Shortens response time
- Blocks at leakage of blow off tube
- Low opening pressure 0.5 bar
- 3/2 valve can be used as blow off signal (Rapid Release)
- Restricted performance when connecting multiple Blow Off Valves to the common blow off valve

By connecting the Blow Off Valve to the Rapid Release port of the ejector, it prevents vacuum leakage if tubing is damaged or if using a 3/2 valve.

In addition, it reduces the response time, as the tube does not need to be evacuated when creating vacuum. Since the Blow Off Valve opens at a signal pressure of 0.5 bar, several devices can be connected to the same blow off signal.

Materials:

Body	Brass
Seals	FPM

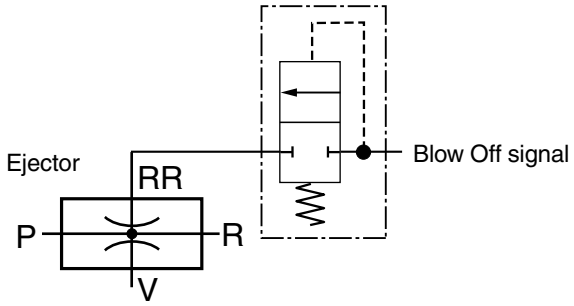


3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

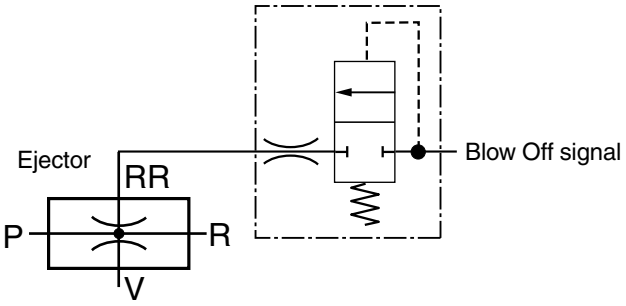
G1/8 = to the generator´s RR-connection
M5 = Connection blow-off signal

Designation	Execution	Weight g	Order no.
Blow Off Valve	Powerful blow off	45	**210 018 00**
Blow Off Valve	Restricted blow off	45	**210 018 01**

Powerful blow off



Restricted blow off



Operating Instructions
http://avac.se/pdfi/I-BLOWOFF.pdf

Silencers SILPO, G1/8 to G1

- Effective sound attenuation
- Light weight

Sinter plastic execution
Silencer with a very good sound dampening effect. Appropriate use for vacuum ejectors when the intake air concentration of particles which are liable to clog the silencer is low.

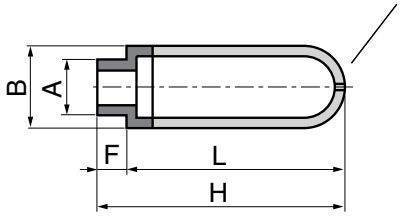
Materials:
Polyethylene/Sintered polyethylene

Designation	Weight g	Order no.
Silencer SILPO G1/8	2	620 018 00
Silencer SILPO G1/4	3	620 014 00
Silencer SILPO G3/8	5	620 038 00
Silencer SILPO G1/2	10	620 012 00
Silencer SILPO G1	50	620 100 00

Sinter plastic execution with a drilled hole
Silencer with a very good sound dampening effect. Appropriate use for vacuum ejectors when the intake air concentration of particles which are liable to clog the silencer is high.

Designation	Weight g	Order no.
Silencer SILPO G1/8 (drilled hole)	2	620 018 10
Silencer SILPO G1/4 (drilled hole)	3	620 014 10
Silencer SILPO G3/8 (drilled hole)	5	620 038 10
Silencer SILPO G1/2 (drilled hole)	10	620 012 10
Silencer SILPO G1 (drilled hole)	50	620 100 10

Hole to reduce the risk of clogging



A	B	F	L	H
G1/8	12.5	5.5	28.5	34
G1/4	15.5	7	35.5	42.5
G3/8	18.5	11.5	56	67.5
G1/2	23.3	11	66.5	77.5
G1	49	21	140	161

Part 9: VACUUM-/PRESSURE SENSORS

Four models of vacuum/pressure sensors are available for monitoring and controlling in a variety of applications.

Serie MICRO
Small – low weight – simple

See page 84

MICRO

Serie ATTO
Programmable settings

See Page 86

ATTO

Serie FEMTO
Programmed with help of teach buttons

See page 88

FEMTO

Serie PICO
Programmed with help of buttons and the LED-display.

See page 90

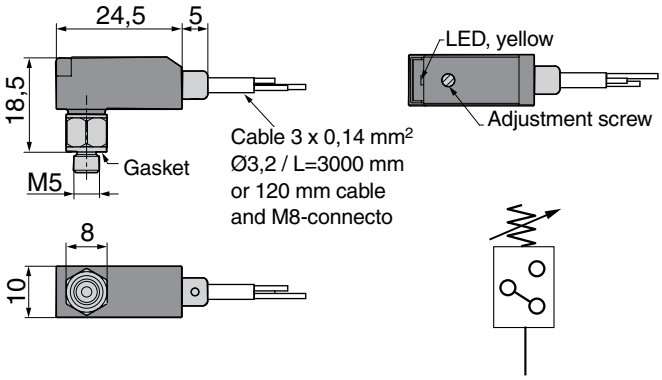
PICO

Vacuum/Pressure Sensors MICRO

- Open collector PNP
- Easy access adjustment screw
- Miniature Design
- Metal M5 connection
- LED indicator
- Robust design in IP40
- Rotatable housing 360 °
- With 3 m cable or 120 mm cable and M8-connecto

The miniature design and the low weight make MICRO suitable for e.g. grippers in robot applications. The switching point is adjustable.

Available in pressure ranges between -1 bar to +1 bar.
See next page.



Technical Data

Electrical Characteristics

Operating voltage, Ub	9 to 30 VDC, polarity protected
Current consumption	20 mA without load
Output	1 x PNP, NO
Max load	100 mA (overload protected)
Output voltage PNP	approx. Ub -1,5 V
Hysteresis	0,05 bar (5 % vacuum)
Accuracy	±3% FS (0 to +50 °C)
EMC	According to EU-directive 2004/108/EG*

Mechanical specifications

Material Housing	ABS/PC plastic
Size of body	approx 23 x 10 x 30 mm (H x B x L)
Fluid connection	M5 externally, nickel plated brass
Protection class.	IP40
Electrical connection	3 m cable or 120 mm cable with 3-pin M8, nickel plated brass

Environment

Operating temp.	-10 to 60 °C
Chock	1000 m/s², XYZ each 3 times
Vibration	10 to 55 Hz, 1,5 mm, XYZ, 2 hours
Humidity	10 to 90% RH

Indication

LED	yellow signal at active output

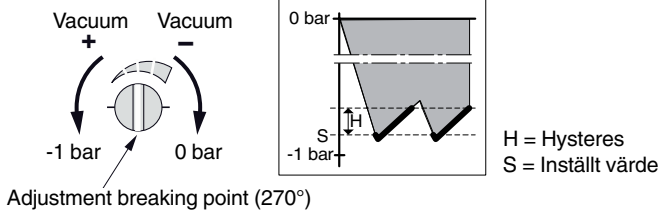
Media

Media	Filtered, dried lubricated or non lubricated compressed air neutral gases

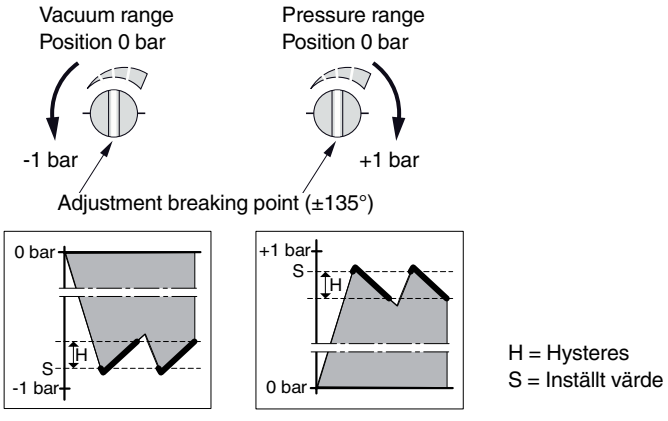
* shielded cable recommended

3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Vacuum sensor



Vacuum/pressure sensor



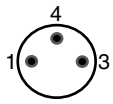
Vacuum/Pressure Sensors MICRO, PNP with 3 m cable

Function	Cable Colour
Feed Voltage, Ub +	Brown
0 V	Blue
OUT1	Black

Designation	Breakpoint factory setting	Overpressure safe (Intermittent)	Weight g	Order no.
Vacuum Sensor MICRO, PNP, -1 to 0 bar	65% vacuum/ - 0,65 bar	Max 3 bar	**38**	**520 018 05**
Vacuum/Pressure Sensor MICRO, PNP, -1 to +1 bar	no factory setting	Max 3 bar	**38**	**520 018 06**

Vacuum/Pressure Sensors MICRO, PNP with 120 mm cable and M8 connector

Pin	Function	Cable Colour
1	Ub+	Brown
3	0 V (GND)	Blue
4	OUT	Black



Designation	Breakpoint factory setting	Overpressure safe (Intermittent)	Weight g	Order no.
Vacuum Sensor MICRO, PNP, -1 to 0 bar	65% vacuum/ - 0,65 bar	Max 3 bar	**20**	**520 018 15**
Vacuum/Pressure Sensor MICRO, PNP, -1 to +1 bar	no factory setting	Max 3 bar	**20**	**520 018 16**

Type NPN

Pressure ranges on request: -1 to 0 bar
-1 to +1 bar

Male threaded adaptor

Used to connect Vacuum/Pressure Sensor MICRO to all ejectors with G1/8 thread of connection port.

Designation	External thread	Internal thread	Weight g	Order no.
Male threaded adaptor	**G1/8**	**M5**	**8**	**241 118 05**

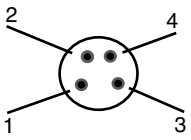
Operating Instructions
http://www.avac.se/pdfi/I-MICRO.pdf

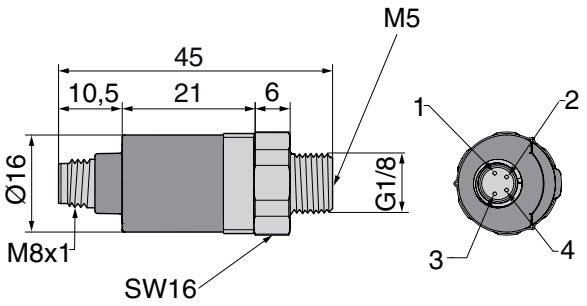
Vacuum/Pressure Sensors ATTO

- Transistor output
- Programmable
- Small lightweight
- Hysteris / Window operation
- LED operating and status display
- Settings NO/NC

The compact size and the low weight makes ATTO useful in various automation processes and also e.g. to monitor the supply pressure in a machine.
The programming by teach-in (NO/NC, pressure etc.) is made via the M8-contact. The ATTO sensor can also be delivered preset.
Available in pressure ranges between -1 bar to +12 bar.
See next page.

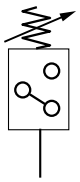
Pin	Function	Cable
1	Ub+	Brown
2	Prog	White
3	0 V (GND)	Blue
4	OUT	Black

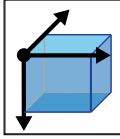




Programming possibilities:

- Factory preset
- Customised settings
- Teach-in function (with connection cable)





3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Technical data

Electrical Data

Operating voltage	9 to 30 VDC, polarity protected
Current consumption	≤ 20 mA without load
Output	1 x PNP, NO
Output voltage PNP	approx. Ub -1,5 V
Max load	250 mA, overload protected
Hysteresis	0 to 100 % (adjustable)
Accuracy	+/- 3 % FS (0 to +50 °C)
Response Time	≤ 2 ms
Switching Frequency	max. 250 Hz
Repeatability	0,2 % FS
EMC	according to EU-directive 2004/108/EG*

Mechanical specifications

Material Housing	PC Plastic
Size of body	approx Ø18 x 45 mm (D x L)
Fluid connection	G1/8 externally/M5 internally, nickel plated brass
Protection class.	IP65
Electrical connection	4-pin M8, nickel plated brass

* shielded cable recommended

Environment

Operating temp.	-10 to +60 °C
Storage temp	-20 to +85 °C
Chock	10G XYZ
Vibration	10 to 55 Hz 1,5 mm, XYZ 2 hours
Humidity	10 to 90 % RH

Indication

LED	yellow at active output
LED	green for programming/operation display

Media

Media	Filtered dried lubricated or non lubricated compressed air neutral gases

Designation	Breakpoint Factory setting	Hysteresis Factory setting	Overpressure safe (Intermittent)	Weight g	Order no.
Vacuum Sensor ATTO, -1 to 0 bar	70% vacuum/-0,7 bar	5% vacuum/-0,05 bar	Max 5 bar	**20**	**520 018 07**
Vacuum/Pressure Sensor ATTO, -1 to +1 bar	70% vacuum/-0,7 bar	5% vacuum/-0,05 bar	Max 5 bar	**20**	**520 018 08**
Vacuum/Pressure Sensor ATTO, -1 to +3 bar	2 bar	0,5 bar	Max 5 bar	**20**	**520 018 09**
Vacuum/Pressure Sensor ATTO, -1 to +10 bar	6 bar	0,5 bar	Max 16 bar	**20**	**520 018 10**
Pressure Sensor ATTO, 0 to +12 bar	6 bar	0,5 bar	Max 16 bar	**20**	**520 018 11**

Accesories

3 m cable fitted with a 4-pin M8 connector on one end and bare wire on the other end. It can be used both for programming or connecting ATTO

Designation	Weight	Order no.
Connection cable 3 m	**90**	**590 001 04**

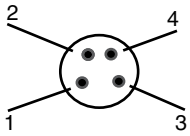
Operating Instructions
http://avac.se/pdfi/I-ATTO.pdf

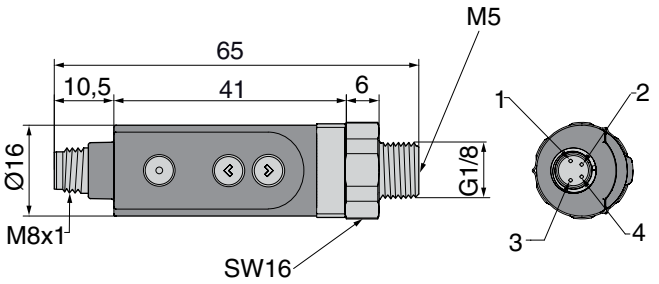
Vacuum/Pressure Sensors FEMTO

- Intelligent Sensor
- Teach in function
- Analog output 1-5 VDC
- 1 x digital output PNP
  - o NO or NC
  - o Freely programmable
- Easy key assignment
- Robust design in IP65
- Infinitely rotatable house 360°

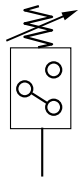
Analog / Digital

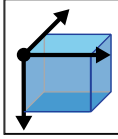
FEMTO is developed for use in material handling/robot applications and in the pharmaceutical industry.
One digital output (NO/NC, hysteresis etc.) and one analogue output 1 to 5 V is available.
The programing is made with the push buttons.
Available in pressure ranges between -1 bar to +10 bar.
See next page.





Pin	Function	Cable Colour
1	Feed Voltage, Ub +	Brown
2	Analog output 1 - 5 V	White
3	0 V	Blue
4	OUT1	Black





3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Technical Data

Electrical Characteristics

Operating voltage	10,8 to 30 VDC, polarity protected
Current consumption	< 35mA without load
Outputs	1 x PNP, NO or NC, and one analog
Output voltage PNP	approx. Ub -1,5 V
Max load	250 mA, overload protected)
Output impedance	≥500Ω
Output voltage Analog	1 to 5 VDC
Offset	1 V, +/- 0,1 V
Hysteresis	0 - 100% (adjustable)
Response Time	≤2,5 ms
On/Off delay	0 to 180 s
Switching Frequency	200Hz
Repeatability	0,2 % FS
EMC	according to EU-directive 2004/108/EG*

Mechanical specifications

Material Housing	ABS and PC plastic
Size of body	approx Ø18 x 79 mm (D x L)
Fluid connection	G1/8 externally/M5 internally, nickel plated brass
Protection class.	IP65
Electrical connection	4-pin M8, nickel plated brass

* shielded cable recommended

Environment

Operating temp.	-10 to +50 °C
Storage temp.	-20 to +85 °C
Chock	10G, XYZ
Vibration	10 to 55 Hz, 1,5 mm, XYZ, 2h
Humidity	10 to 90% RH

Indication

LED	Multicoloured (yellow/green)

Media

Media	Filtered, dried lubricated or non lubricated compressed air neutral gases

Designation	OUT1		OUT2	Overpressure safe (Intermittent)	Weight g	Order no.
	Breakpoint Factory setting	Hysteresis Factory setting				
Vacuum Sensor FEMTO, -1 to 0 bar	46% vacuum/-0,46 bar	3% av FS	1 - 5 V	Max 5 bar	20	**520 018 01**
Vacuum/Pressure Sensor FEMTO, -1 to +1 bar	0 bar	3% av FS	1 - 5 V	Max 5 bar	20	**520 018 21**
Vacuum/Pressure Sensor FEMTO, -1 to +10 bar	5 bar	3% av FS	1 - 5 V	Max 16 bar	20	**520 018 22**

Accesories

3 m cable fitted with a 4-pin M8 connector on one end and bare wire on the other end.

Designation	Weight	Order no.
Connection cable 3 m	**90**	**590 001 04**

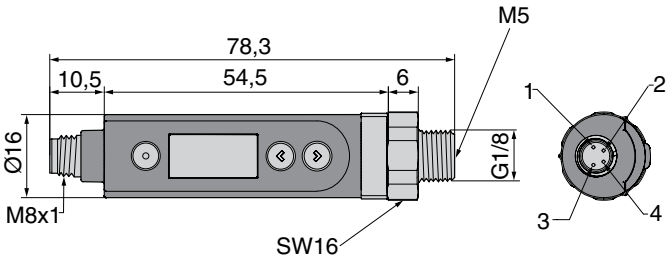
Operating Instructions
http://www.avac.se/pdfi/I-FEMTO.pdf

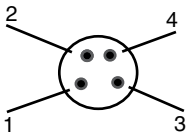
Vacuum/Pressure Sensors PICO

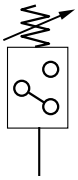
- Intelligent Sensor
- Display
- Freely programmable
  - o 2 x Digital Output PNP
  - o Hysteresis/comparator mode
  - o NO/NC
  - o Special Features
- Easy setting of values
- Small dimensions
- Robust design in IP65
- Infinitely rotatable house 360°

Digital

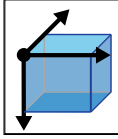
PICO is developed for use in material handling/robot applications and in the pharmaceutical industry.
Double individually programmable outputs (NC/NO, hysteresis etc.).
The programing is made with the push buttons and the display.
Available in pressure ranges between -1 bar to +10 bar.
See next page.







Pin	Function	Cable Colour
1	Feed Voltage, Ub +	Brown
2	OUT2	White
3	0 V	Blue
4	OUT1	Black



3D CAD FILES (STEP)
Download via:
http://www.avac.se/en/home/

Technical Data

Electrical Characteristics

Operating voltage,Ub	10,8 to 30 VDC, polarity protected
Current consumption	≤ 35 mA without load
Current consumption, when programming	≤ 55 mA
Outputs	2 x PNP , NO or NC
Output voltage PNP	approx. Ub -1,5 V
Max load	250 mA/output, overload protected
Output impedance	≥500Ω
Offset	1V± 0,1Volt
Hysteresis	0 to 100% (adjustable)
On/Off delay	0 to180 s
Switching Frequency	200Hz
Repeatability	±0,2% FS
EMC	according to EU-directive 2004/108/EG*
Response Time	≤2,5 ms

Mechanical specifications

Material Housing	ABS and PC plastic
Size of body	approx Ø18 x 65mm (D x L)
Fluid connection	G1/8 externally/M5 internally, nickel plated brass
Protection class.	IP65
Electrical connection	4-pin M8, nickel plated brass

* shielded cable recommended

Environment

Operating temp.	-10 to +60 °C
Storage temp.	-20 to +85 °C
Chock	10G, XYZ
Vibration	10 to 55 Hz, 1,5 mm, XYZ, 2h
Humidity	10 to 90% RH

Indication

LED	Yellow at active output
Display	via 7 segment display

Media

Media	Filtered, dried lubricated or non lubricated compressed air neutral gases

Designation	Overpressure safe (Intermittent)	Weight g	Order no.
Vacuum Sensor PICO, -1 to 0 bar	Max 5 bar	25	**520 018 02**
Vacuum/Pressure Sensor PICO, -1 to +1 bar	Max 5 bar	25	**520 018 25**
Vacuum/Pressure Sensor PICO, -1 to +10 bar	Max 16 bar	25	**520 018 26**
Pressure Sensor PICO, 0 to +10 bar	Max 16 bar	25	**520 018 12**

Designation	OUT 1		OUT 2	
	Breakpoint Factory setting	Hysteresis Factory setting	Breakpoint Factory setting	Hysteresis Factory setting
PICO, -1 to 0 bar	46% vacuum/-0,46 bar	7 % vacuum/-0,07 bar	79% vacuum/-0,79 bar	7 % vacuum/-0,07 bar
PICO, -1 to +1 bar	47% vacuum/-0,47 bar	7 % vacuum/-0,07 bar	0.47 bar	0.07 bar
PICO, -1 to +10 bar	47% vacuum/-0,47 bar	7 % vacuum/-0,07 bar	4.7 bar	0.7 bar
PICO, 0 to +10 bar	4,6 bar	0,7 bar	7.9 bar	0.7 bar

Accesories

3 m cable fitted with a 4-pin M8 connector on one end and bare wire on the other end.

Designation	Weight	Order no.
Connection cable 3 m	**90**	**590 001 04**

PICO with M12 connector on request

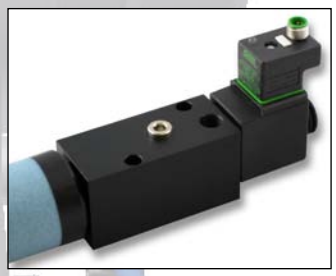
The PICO series is also available with a 4-pin M12 connector.

Operating Instructions
http://www.avac.se/pdfi/I-PICO.pdf

Part 10: APPLICATION

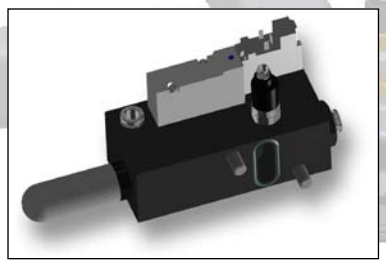
Here you will find some customized technical solutions.

Solenoid operated ejector with high suction capacity.



Ejector with high suction capacity and maximum vacuum level -0.3 bar.

Ejector with several integrated functions



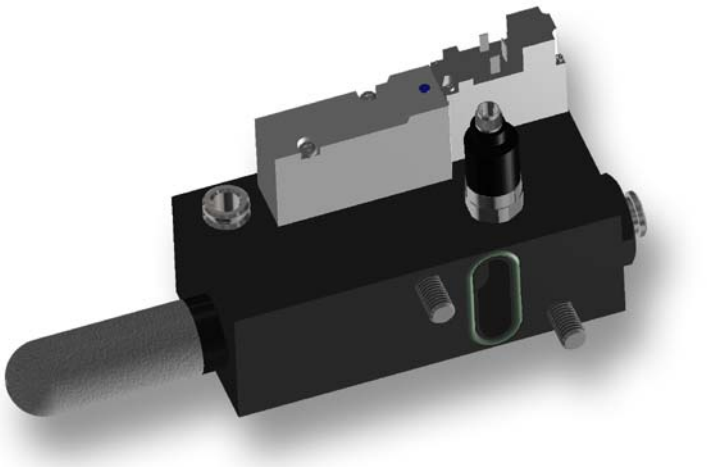
Customized technical solutions from AVAC

AVAC can offer complete solutions based on our optimized ejectors in combination with integrated valve functions and control of vacuum and overpressure level. Alternative ejector body and nozzle materials.

A vacuum level of -0.4 bar at 5 bar supply pressure
Ejector house and nozzles: Acetal.

Includes ejector, vacuum holding valve and Rapid Release valve.
Ejector house and nozzles: Acetal.

Ejector with several integrated functions



and with a built-on vacuum sensor.
Maximum vacuum level >85% at 5 bar supply pressure
Body: Aluminum anodized
Nozzles: Brass

2019.02

AVAC Vakuumteknik AB
Nykyrkevägen 54
Box 25
SE-565 21 Mullsjö
Phone: +46(0)392-497 85
Fax: +46(0)392-364 80
info@avac.se
www.avac.se