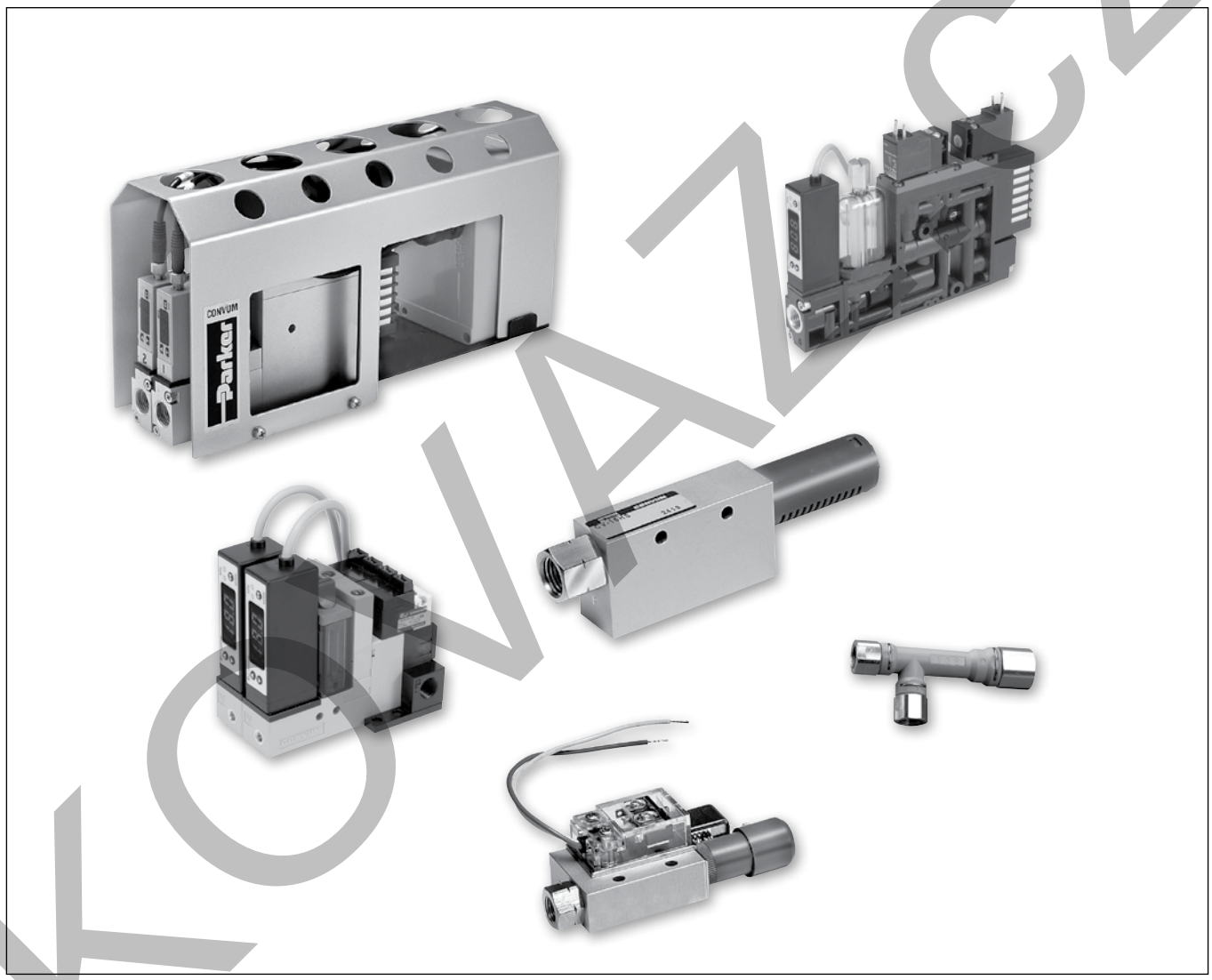
Vacuum Generators

Section B

www.parker.com/pneu/vacgen



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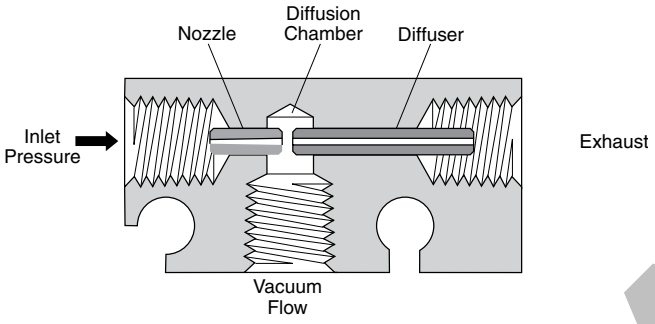
Principle of venturi vacuum

A vacuum generator is a single stage venturi that creates high vacuum with fast response using compressed air.

The ability to control this performance renders this technology as an excellent solution for factory automation.

In principle, compressed air is throttled as the air exits the nozzle and is discharged into the diffuser. This increased velocity of air lowers the pressure in the diffusion chamber. The volume of air within the closed vacuum system flows into the low pressure area of the diffusion chamber and is exhausted thru the diffuser. This effect increases the vacuum level and evacuates most of the air within the closed vacuum system at supersonic speeds.

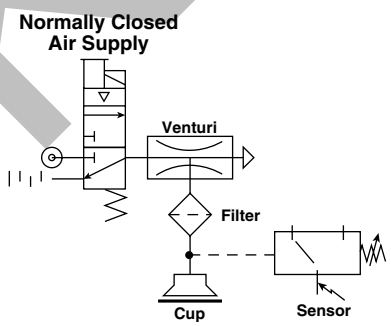


Additional advantages to venturi generators

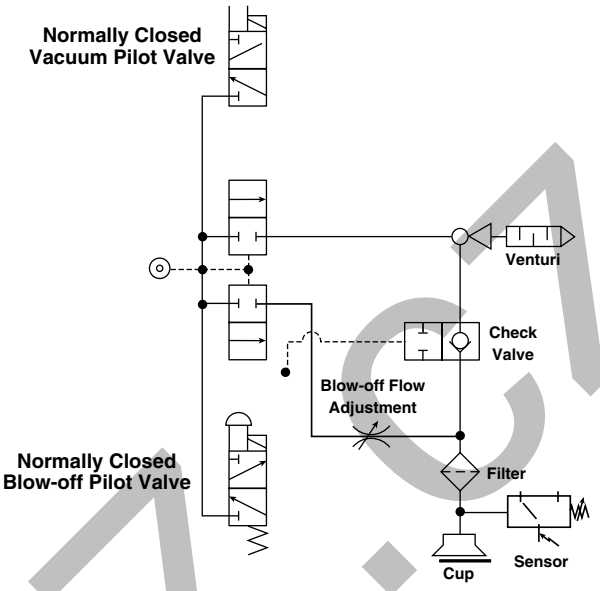
- No moving components
- Low maintenance
- Long life
- Responsive
- Physically small
- Cost effective

Applying the venturi generator

1. Design a system with basic venturi generators and individual components to support the vacuum circuit.



2. Design a system with all of the supporting components integrated into the venturi generator.

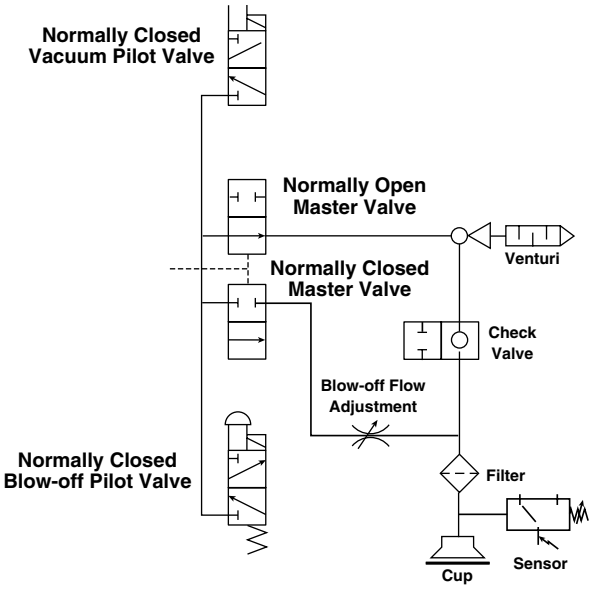


There are several advantages to an integrated venturi system. The response time of the vacuum and blow-off functions are greatly reduced compared to basic venturi generators, the installation time is also reduced which makes this a cost effective system and the compact size allows the integrated unit to be close to the suction cup.

Venturi generator with power loss circuits

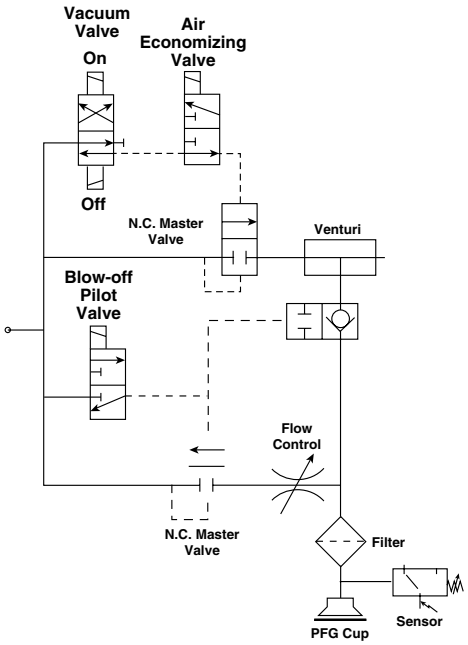
When designing a vacuum system that requires a Normally Open circuit or Emergency Stop circuits to avoid any hazard during a power failure, consider the circuits below and on the following page.

Normally open circuit



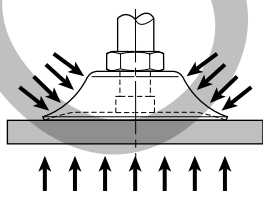
Valve controlled emergency stop circuit

(See CEK Vacuum Generator)



The venturi system

A closed vacuum system has a volume of air within all the components between the vacuum port of the venturi and the suction cup. The venturi's ability to evacuate this volume of air when the suction cup forms a seal on the surface, creates the pressure differential required to force the suction cup onto the product.



The evacuated air creates a lower air pressure within the closed vacuum system, causing the atmospheric pressure to apply a uniform force on the surface of the cup. This holding force is proportional to the difference in pressures and area of the suction cup.

Selecting the appropriate supply valve

If a basic venturi generator is selected, correct sizing of the air supply valve and supply line are critical to the performance of the unit.

Nozzle Diameter	Minimum Tube I.D. mm	Flow (Cv)
0.5 mm	4	0.16
1.0 mm	4	0.16
1.5 mm	6	0.379
2.0 mm	8	0.65
2.5 mm	8	0.95
3.0 mm	10	1.35

If pressure drops occur due to other pneumatic components or a manifold venturi system, it may be necessary to increase the valve and / or supply line tubing I.D..

Selecting the nozzle diameter with reference to suction cup diameter

As a general guide, for most non-porous vacuum applications, the nozzle diameter can be selected based on the suction cup diameter previously determined in Section A.

Nozzle diameter	Maximum suction cup diameter mm
0.5 mm	20
1.0 mm	50
1.5 mm	60
2.0 mm	120
2.5 mm	150
3.0 mm	200

Designing a system with a single suction cup dedicated to a single vacuum generator is ideal, however, it may not always be practical. It is recommended that the sum of the areas of multiple cups dedicated to a single venturi do not exceed the area of the diameter of the single suction cups shown above.

B

Selecting a generator size

The choice of Generator Series depends on the system requirements for components and overall performance for the application. Inline Generators offer the basic function for creating vacuum flow. Adding integrated components such as automatic blow off Controls, Vacuum and Blow-off Solenoids, Pressure Sensors, Check Valves and Filters are options that can reduce overall mounting space, reduce cycle time and can offer air conservation functions as well as emergency stop modes. For guidelines on selecting Vacuum Generators by features, consult the highlight features in the Generator Index section for each Series Section.

A vacuum source can only achieve and hold a degree of vacuum that sustains the amount of leakage into the vacuum system. In most cases, it is the leakage through the product and by of the cup seal that limits the system degree of vacuum. Products with high product leakage are Porous Applications. The degree of vacuum that can be obtained with this type of product can vary and tends to be below 10 inHg. Products with low or no leakage are called Non-Porous Applications. It can be assumed that the maximum degree of vacuum of the system is the maximum degree of the vacuum generator. Due to design cycle time and safety requirements, a lower degree of vacuum is generally chosen other than the maximum obtainable degree of vacuum. Chart 1 lists different units of measure for vacuum with typical application levels The system degree of vacuum must be determined by product testing.

Chart 1: Basic vacuum pressure measurements units

Negative gauge pressure PSIG	Absolute pressure PSIA	Inches of mercury inHg
0	14.7	0
Atmospheric pressure at sea level		
-1.5	13.2	3
-3.0	11.7	6
-4.5	10.2	9
Typical porous vacuum level		
-6.0	8.7	12
-7.5	7.2	15
-9.0	5.7	18
-10.5	4.2	21
Typical non-porous vacuum level		
-12.0	2.7	24
-13.5	1.2	27
-14.7	0	29.92
Perfect vacuum (zero reference pressure)		

Evacuation time

The size of the generator generally refers to either the Evacuation Time or the Vacuum Flow Rates of the generator and varies by the size of the nozzle / diffuser.

Evacuation Time is the time required to evacuate the air out of a vacuum system to specific degree of vacuum. Typically, this degree of vacuum is a value where it is safe to move a product in a pick and place application and is determined by the design engineer. Evacuation Time can also be considered response time of the system.

A typical Evacuation Time chart for a generator series is shown in Chart 2. The time to achieve a given degree of vacuum in a 1 cubic foot volume is listed in seconds for each Generator.

Example: A pick and place application requires a 0.25 secs for creation of 18 inHg of vacuum in the vacuum system. The vacuum system volume, which includes tubing and cups, is 0.002 ft^3.

The evacuation time charts are given for a 1 cubic foot (ft^3) volume. To use these charts, convert the time requirement of the system to an equivalent time for a 1 cubic foot (ft^3) volume. In this example, 1 cubic foot (ft^3) is 500 times the system volume of 0.002 ft^3. Multiply the system time requirement by 500 (500 x 0.25 secs = 125 seconds). Any generator with a evacuation time of less than 125 seconds to attain 18 inHg can be chosen for this application. A CV-15-HS will meet the requirements for this application. A (-) listed means the generator will not obtain a higher degree of vacuum than the level of the first (-).

Chart 2: evacuation time

Series / nozzle diameter	Air supply pressure	Air consumption	Evacuation time in sec / ft3 * to reach different vacuum levels (inHg)								
	PSI	SCFM	3	6	9	12	15	18	21	24	27
CV-05HS	70	0.46	24.3	57.3	101.0	160.5	231.1	305.1	433.1	597.7	—
CV-05LS	70	0.46	11.0	23.4	40.0	64.4	110.2	—	—	—	—
CV-10HS	70	1.55	4.8	9.9	16.0	24.9	35.9	51.4	77.4	117.5	226.0
CV-10LS	70	1.55	3.7	7.6	13.0	20.3	33.1	—	—	—	—
CV-15HS	70	3.53	2.5	4.8	7.0	11.0	15.5	22.0	31.9	46.6	112.1
CV-15LS	70	3.53	2.0	3.1	5.0	7.6	12.1	—	—	—	—
CV-20HS	70	6.36	1.7	2.8	5.0	6.5	9.0	13.0	18.9	27.4	60.7
CV-20LS	70	6.36	1.3	2.5	4.0	5.9	11.3	—	—	—	—

* 1 ft^3 = 28.31 liters

Vacuum flow

A typical Vacuum Flow chart for a generator series is listed in Chart 3. The vacuum flow rate at given degree of vacuum is listed in SCFM for each Generator. This chart is generally used to determine the change of degree of vacuum given a change in vacuum flow rate of a generator.

Example. A CV-15HS can only obtain 9 inHg. The vacuum flow rate at 9 inHg is 1.50 SCFM. This means that the cup seal and product leaks 1.50 SCFM of air. This generator can maintain the leak rate of 1.50 SCFM. Choosing a generator with more flow at 9 inHg will increase the degree of vacuum in the system because the generator can overcome more leakage. In this case,the vacuum flow rates are linear since this CV generator is a single stage venturi generator. Replacing a CV-15HS with CV-20HS will increase the
degree of vacuum in the system to approximately 16.2 inHg. The CV-20HS now maintains 16.2 inHg at a flow rate of 1.50 SCFM.

Chart 3: Vacuum flow (SCFM)

Nozzle diameter	inHg 0	3	6	9	12	15	18	21	24	27	30
CV-05HS	.21	.19	.17	.15	.13	.11	.09	.07	.05	.03	—
CV-05LS	.32	.27	.22	.17	.12	.06	—	—	—	—	—
CV-10HS	.95	.85	.75	.65	.55	.45	.35	.25	.15	.05	—
CV-10LS	1.27	1.05	.83	.59	.38	.17	—	—	—	—	—
CV-15HS	2.22	1.98	1.74	1.5	1.26	1.01	.76	.51	.25	.10	—
CV-15LS	3.35	2.79	2.23	1.67	1.10	.53	—	—	—	—	—
CV-20HS	3.88	3.45	3.02	2.59	2.16	1.73	1.30	.87	.44	.25	—
CV-20LS	5.85	5.09	4.03	2.97	1.91	.85	—	—	—	—	—

Tubing reference

Tubing ID SAE	mm
5/64	2
3/32	2.38
1/8	3.17
5/32	4
3/16	4.76
1/4	6.35
5/16	8
3/8	9.52
7/16	11.1

SAE x 25.4 = mm

Tubing length (L) In.	M
18	.457
24	.610
30	.762
36	.914
42	1.07
48	1.22
54	1.37
60	1.52
66	1.67

In. x 254 = M

Pad volume reference (p_V)

PFG Ø	in^3	L
2	.00004	.0000006
3.5	.0001	.000002
5	.0003	.000005
6	.00048	.000008
8	.002	.00003
10	.004	.00007
15	.012	.0002
20	.03	.0005
25	.067	.0011
30	.067	.0011
35	.14	.0023
40	.18	.003
50	.25	.0042
60	.57	.0094
80	1.28	.021
95	1.95	.032
110	5.00	.082
150	10.80	.177
200	23.24	.381

PBG Ø	in^3	L
10	.013	.0002
15	.045	.0007
20	.070	.001
30	.28	.004
40	.56	.009
50	1.60	.026
75	4.63	.076
110	6.77	.111
150	15.86	.26

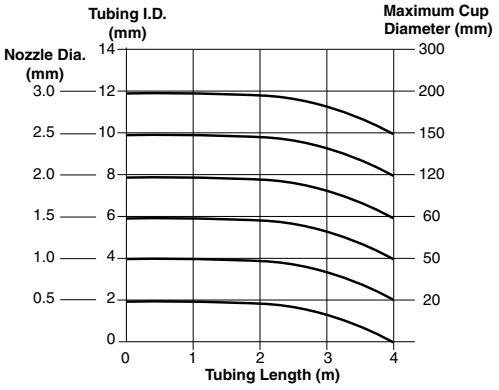
PCG Ø	in^3	L
5	.002	.00003
7	.003	.00004
10	.010	.0001
15	.060	.0009
18	.082	.001
20	.123	.002
30	.595	.009
40	1.15	.018
60	4.40	.072
90	10.00	.1639

1 ft^3 = 28.31 liters
1 ft^3 = 1728 in^3

Nozzle diameter to tubing diameter to cup diameter reference

For each application, the size of the nozzle diameter, vacuum tubing I.D., and maximum cup diameter must be practical in relationship to each other. The chart to the right is a quick reference to aid in selecting the vacuum tubing I.D. and nozzle diameter given the maximum cup diameter.

As an example, one 60mm cup with 2 meters in tubing length would require a minimum 6mm I.D. vacuum tube and a 1.5mm nozzle. The same 60mm cup with 3.5 meters in tubing length would require a minimum 8mm I.D. vacuum tube and a 2.0mm nozzle to achieve an equivalent performance.



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Evacuation time

Series / Nozzle diameter	Air supply pressure PSI	Air consumption SCFM	Evacuation time in sec / ft³* to reach different vacuum levels (inHg)								
			3	6	9	12	15	18	21	24	27
MCA10HS	70	1.68	5.1	11.0	18.0	28.2	41.0	58.2	83.1	123.2	—
MCA13HS	70	2.81	3.7	7.3	12.0	19.5	28.5	39.8	58.5	104.2	—
CV05HS	70	0.46	24.3	57.3	101.0	160.5	231.1	305.1	433.1	597.7	—
CV05LS	70	0.46	11.0	23.4	40.0	64.4	110.2	—	—	—	—
CV10HS	70	1.55	4.8	9.9	16.0	24.9	35.9	51.4	77.4	117.5	226.0
CV10LS	70	1.55	3.7	7.6	13.0	20.3	33.1	—	—	—	—
CV15HS	70	3.53	2.5	4.8	7.0	11.0	15.5	22.0	31.9	46.6	112.1
CV15LS	70	3.53	2.0	3.1	5.0	7.6	12.1	—	—	—	—
CV20HS	70	6.36	1.7	2.8	5.0	6.5	9.0	13.0	18.9	27.4	60.7
CV20LS	70	6.36	1.3	2.5	4.0	5.9	11.3	—	—	—	—
CV25HS	70	9.36	1.4	2.3	3.0	4.5	6.5	9.0	13.0	18.9	35.3
CV25LS	70	9.36	1.0	2.0	3.0	3.7	5.6	—	—	—	—
CV30AHS	70	13.60	1.1	2.0	2.8	3.5	4.8	6.8	9.6	16.7	29.1
CV30ALS	70	13.60	0.9	1.5	2.7	3.4	5.1	—	—	—	—
CV10HSCK	70	1.55	4.8	9.9	16.0	24.9	35.9	51.4	77.4	117.5	226.0
CV15HSCK	70	3.53	2.5	4.8	7.0	11.0	15.5	22.0	31.9	46.6	112.1
CV20HSCK	70	6.36	0.7	2.8	5.0	6.5	9.0	13.0	18.9	27.4	60.7
CHF20	80	6.5	0.21	0.64	1.70	4.03	7.63	11.65	19.28	33.48	94.50
CHF30	80	9.6	0.21	0.63	1.27	3.39	6.36	9.53	16.10	27.76	78.82
CHF40	80	14.0	0.17	0.42	1.27	2.33	4.03	5.93	9.75	16.95	47.67

* 1 ft³ = 28.31 liters

Vacuum flow (SCFM)

	nHg										
Nozzle diameter	**0**	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**
MCA10HS	.88	.78	.68	.58	.47	.37	.26	.16	.06	—	—
MCA13HS	1.26	1.11	.96	.81	.67	.53	.39	.25	.11	—	—
CV05HS	.21	.19	.17	.15	.13	.11	.09	.07	.05	.03	—
CV05LS	.32	.27	.22	.17	.12	.06	—	—	—	—	—
CV10HS	.95	.85	.75	.65	.55	.45	.35	.25	.15	.05	—
CV10LS	1.27	1.05	.83	.59	.38	.17	—	—	—	—	—
CV15HS	2.22	1.98	1.74	1.50	1.26	1.01	.76	.51	.26	.10	—
CV15LS	3.35	2.79	2.23	1.67	1.10	.53	—	—	—	—	—
CV20HS	3.88	3.45	3.02	2.59	2.16	1.73	1.30	.87	.44	.25	—
CV20LS	5.85	5.09	4.03	2.97	1.91	.85	—	—	—	—	—
CV25HS	5.65	5.11	4.57	4.03	3.49	2.94	2.39	1.85	1.31	.77	—
CV25LS	8.83	7.29	5.75	4.21	2.67	1.13	—	—	—	—	—
CV30AHS	7.94	7.16	6.38	5.62	4.84	4.06	3.28	2.50	1.17	.92	—
CV30ALS	12.36	10.24	8.12	6.00	3.89	1.48	—	—	—	—	—
CV10HSCK	.95	.85	.75	.65	.55	.45	.35	.25	.15	.05	—
CV15HSCK	2.22	1.98	1.74	1.5	1.26	1.01	.76	.51	.25	.10	—
CV20HSCK	3.88	3.45	3.02	2.59	2.16	1.73	1.30	.87	.44	.25	—
CHF20	20.90	12.12	7.88	3.85	2.76	2.12	1.45	0.81	0.35	0.04	—
CHF30	26.30	15.27	9.89	4.84	3.46	2.68	1.83	1.02	0.42	0.05	—
CHF40	31.80	18.50	12.00	5.90	4.20	3.30	2.30	1.30	0.60	0.06	—

Evacuation time

Series / Nozzle diameter	Air supply pressure PSI	Air consumption SCFM	Evacuation time in sec / ft³ * to reach different vacuum levels (inHg)								
			3	6	9	12	15	18	21	24	27
MC2210HS	70	1.55	5.4	12.1	20.0	32.2	52.0	85.0	120.1	183.9	—
MC7215HS	70	3.53	2.59	5.39	8.99	13.89	20.66	29.36	45.16	69.6	208.23
MC7220HS	70	6.36	1.13	2.6	5.21	7.91	12.56	19.26	30.84	54.65	129.9
MC7225HS	70	10.42	0.66	2.19	3.29	6.14	9.3	14.55	23.21	46.13	—
CEK15HS	70	3.53	2.3	4.8	8.0	12.4	18.4	26.3	40.4	62.1	189.3
CEK20HS	70	6.36	1.1	2.5	5.0	7.6	12.1	18.6	29.9	53.4	129.9
CEK27HS	70	10.42	0.6	2.0	3.0	5.6	8.5	13.3	21.2	42.1	—
CVXCEK	70	10.42	0.6	2.0	3.0	5.6	8.5	13.3	21.2	42.1	—

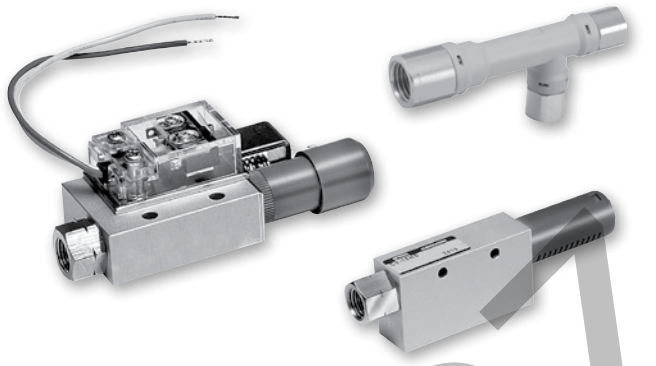
* 1 ft³ = 28.31 liters

Vacuum flow (SCFM)

	nHg										
Nozzle diameter	0	3	6	9	12	15	18	21	24	27	30
MC2210HS	0.71	0.64	0.57	0.49	0.42	0.34	0.25	0.17	0.10	—	—
MC7215HS	2.2	1.96	1.71	1.47	1.22	0.99	0.75	0.51	0.27	—	—
MC7220HS	3.67	3.21	2.81	2.4	2.04	1.64	1.24	0.84	0.44	—	—
MC7225HS	5.2	4.61	4.01	3.41	2.82	2.22	1.63	1.04	0.46	—	—
CEK15HS	2.51	2.23	1.95	1.67	1.39	1.12	0.85	0.58	0.30	—	—
CEK20HS	3.75	3.34	2.93	2.50	2.12	1.70	1.28	0.86	0.44	—	—
CEK27HS	5.75	5.09	4.43	3.77	3.11	2.45	1.80	1.15	0.50	—	—
CVXCEK	5.75	5.09	4.43	3.77	3.11	2.45	1.80	1.15	0.50	—	—

B

Parker Inline Single Stage Vacuum Generators is a compact design offering multiple vacuum flow ranges in 3 styles. These Generators are meant to be mounted near the vacuum application for improved vacuum response time. A Normally Open or Normally Closed 3 way valve can be used to control the supply pressure to obtain up to a 0.91 bar degree of vacuum.



B

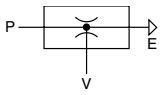
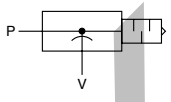
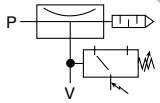
Features

- **MCA:**
  - light weight vacuum generator
  - vacuum flow rates to 35 l/mn
- **CV:**
  - basic aluminum body generator with exhaust muffler
  - vacuum flow rates to 350 l/mn
  - degree of vacuum to 0.91 bar
- **CV-CK**
  - basic aluminum body generator with mechanical vacuum switch
  - vacuum flow rates to 165 l/mn
  - degree of vacuum to 0.91 bar

Specifications

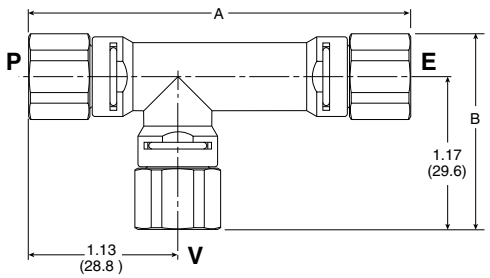
Media	Non-lubricated air, non-corrosive gases
Operating pressure	1 to 8 bar (14 to 114 PSI)
Operating temperature	0° to 50°C (MCA, CV) - 0° to 60°C (CV, CK)
Material	Polycarbonate, Aluminum fittings (MCA)
	Body: Aluminum (CV, CV-CK) Nozzle: Nickel plated brass (CV, CV-CK)
CV-CK Switch	Setting range: 0,2 to 0,5 bar, accuracy ± 0,05 bar
	Hysteresis: 37 to 132 mbar
	Switch output: N.O., AC125V; 5A, AC250V: 3A, DC250V: 0.2A

Model numbers

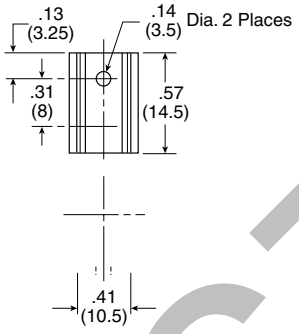
Symbol	Port size Pressure	Vacuum	Exhaust	Max. vacuum flow l/mn	Air consumption l/mn	Max. degree of vacuum inHg	Part number BSPP	Part number NPT
MCA Series 	1/8	1/8	1/4	47.6	47.6	24	MCA10HSG1G1G2	MCA10HSN1N1N2
	1/4	1/4	1/4	79.6	79.6	24	MCA13HSG1G1G2	MCA13HSN1N1N2
CV Series 	1/8	1/8	Muffler	6	13	27	CV05HSG	CV05HSN
	1/8	1/8	Muffler	9	13	17	CV05LSG	CV05LSN
	1/8	1/8	Muffler	27	43.9	27	CV10HSG	CV10HSN
	1/8	1/8	Muffler	36	43.9	17	CV10LSG	CV10LSN
	1/4	3/8	Muffler	63	100	27	CV15HSG	CV15HSN
	1/4	3/8	Muffler	95	100	17	CV15LSG	CV15LSN
	1/4	3/8	Muffler	110	180	27	CV20HSG	CV20HSN
	1/4	1/2	Muffler	165	180	17	CV20LSG	CV20LSN
	3/8	1/2	Muffler	160	265	27	CV25HSG	CV25HSN
	3/8	1/2	Muffler	250	265	17	CV25LSG	CV25LSN
	1/2	3/4	Muffler	225	385	27	CV30AHSG	CV30AHSN
	1/2	3/4	Muffler	350	385	17	CV30ALSG	CV30ALSN
CV-CK Series 	1/8	1/8	—	27	44	27	CV10HSCKG	CV10HSCKN
	1/4	1/4	—	63	100	27	CV15HSCKG	CV15HSCKN
	1/4	3/8	—	110	180	27	CV20HSCKG	CV20HSCKN

Dimensions

MCA



MCA Mounting bracket: MCA-B

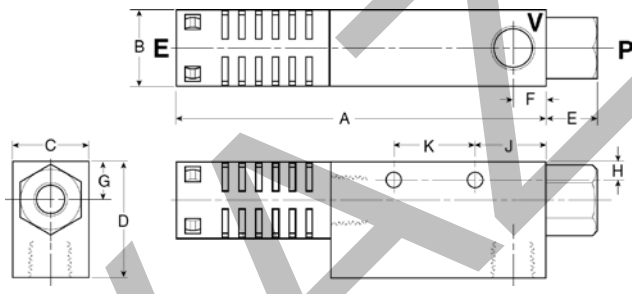


MCA**N1N1N2**

Dimensions (mm)

Item	A	B
MCA10HS******	70	29.5
MCA13HS******	70	29.5

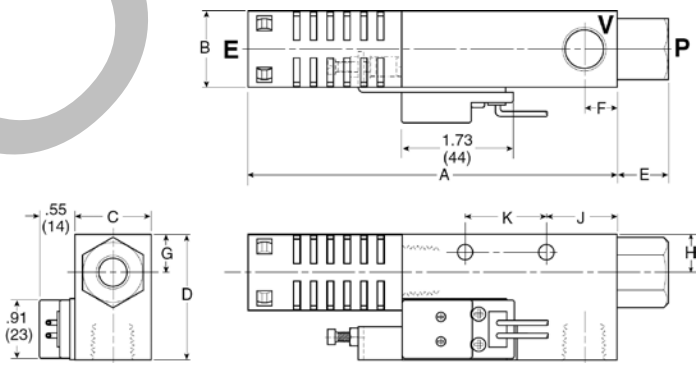
CV



Dimensions (mm)

Item	A	B	C	D	E	F	G	H	J	K
CV05HS/LS	81	18.5	16	33	10	8	10	4.5	14	20
CV10HS/LS	81	18.5	16	33	10	8	10	4.5	14	20
CV15HS/LS	108.5	20	20	35	15	10	11	5	20	25
CV20HS/LS	145.5	30	30	40	20	13	15	7	28	32
CV25HS/LS	196	40	40	60	17	16	20	5.5	20	50
CV30AHS/ALS	214	40	40	60	20	20	20	5.5	33	50

CV-CK

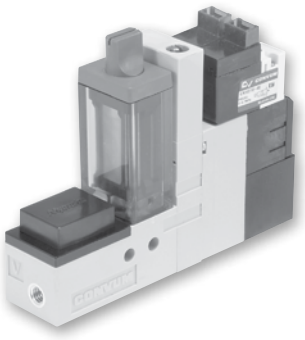


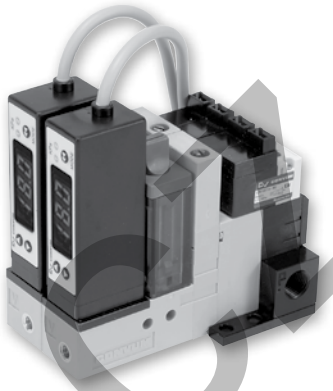
Dimensions (mm)

Item	A	B	C	D	E	F	G	H	J	K
CV10HS/LSCK	81	18.5	16	33	10	8	10	4.5	4.2	20
CV15HS/LSCK	108.5	20	20	35	15	10	11	5	4.5	25
CV20HS/LSCK	145.5	30	30	40	20	13	15	7	6	32

B

The MC22 is a complete package for factory automation. The MC22 has integrated vacuum generating and blow-off release pilot valves to minimize the response time to achieve vacuum. The small foot print and lightweight body allows the unit to be located close to the suction cup for maximum performance. The MC22 has additional features; regulating blow-off needle, 37 micron mesh filter, and a sensor platform for vacuum confirmation. The MC22 can be assembled into a maximum 8 station manifold. The unit can be ordered normally open or normally closed, with or without MPS-23 or MVS-201 pressure sensors.

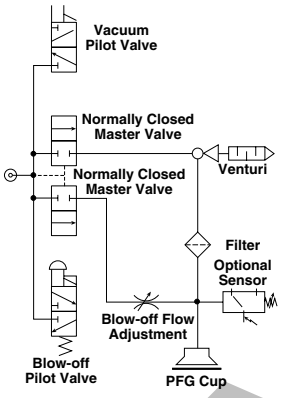




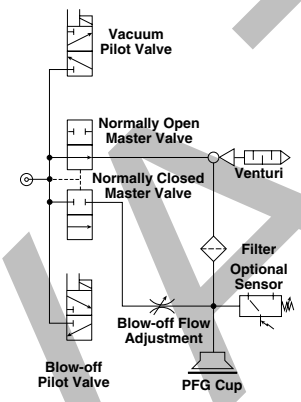
Add-A-Fold Manifold

Features

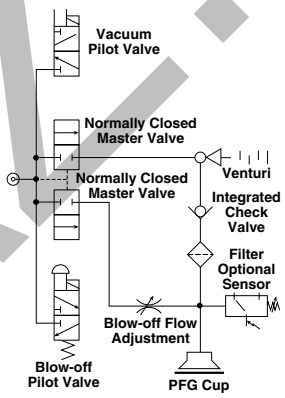
- Vacuum generating pilot valve
- Vacuum blow-off pilot valve
- Vacuum sensor - filter - silencer available
- Regulating blow-off adjustment
- Manifold system
- Short cycle times for high speed pick and place
- Vacuum flow rates to 44 l/mn



MC2, Normally Closed Vacuum Valve



MC2, Normally Open Vacuum Valve



MC2, Normally Closed Vacuum Valve with Integrated Check Valve

Specifications

Media	Non-lubricated compressed air, non-corrosive gases
Operating pressure	1.5 to 5.8 bar (21 to 84 PSI)
Optimum operating pressure	4.8 bar (70 PSI)
Humidity	35 to 85%
Pressure port	G: 1/8 BSPP female, N: 1/8 NPT female
Vacuum port	M5 female
Operating temperature	5°C to 50°C
Material	Aluminum, Polyamide, NBR
Vacuum generating and blow-off release pilot	
Type of control valve	Pilot valve, includes 300mm clip wire connector
Manual operation	Non-locking manual override
Electrical connection	Clip type connector with LED and surge protection
Power supply	24VDC ± 10%
Power consumption	1W
Pressure range	1.5 to 5.8 bar (21 to 84 PSI)
Pilot valve air supply	Normally closed
Generator weight	117g without sensor
Manifold weight	2-Station: 40g, 3-Station: 54g, 4-Station: 68g, 5-Station: 82g 6-Station: 96g, 7-Station: 110g, 8-Station: 124g

MC2 unit without integrated check valve, normally closed vacuum valve

Port size			Max. vacuum flow l/mn	Max. degree of vacuum inHg		Part number
Pressure	Vacuum	Exhaust			Sensor option	NPT
1/8	M5	Muffler	44	24	None	MC22S10HSZL4BLN
1/8	M5	Muffler	44	24	MPS-V23C-PC. PNP	MC22S10HS42L4BLN
1/8	M5	Muffler	44	24	MVS-201-PCP, PNP	MC22S10HS06L4BLN
1/8	M5	Muffler	44	24	MPS-V23C-NC, NPN	MC22S10HS41L4BLN
1/8	M5	Muffler	44	24	MVS-201-NC, NPN	MC22S10HS01L4BLN

MC2 unit without integrated check valve, normally open vacuum valve

Port size			Max. vacuum flow l/mn	Max. degree of vacuum inHg		Part number
Pressure	Vacuum	Exhaust			Sensor option	NPT
1/8	M5	Muffler	44	24	None	MC22S10HSZL4ALN
1/8	M5	Muffler	44	24	MPS-V23C-PC. PNP	MC22S10HS42L4ALN
1/8	M5	Muffler	44	24	MPS-V23C-NC, NPN	MC22S10HS41L4ALN

MC2 unit with integrated check valve, normally closed vacuum valve

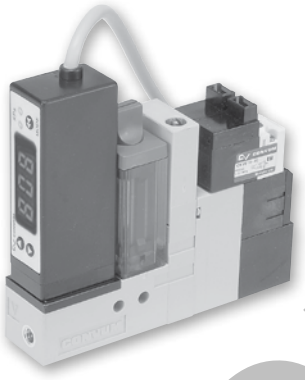
Port size			Max. vacuum flow l/mn	Max. degree of vacuum inHg		Part number
Pressure	Vacuum	Exhaust			Sensor option	NPT
1/8	M5	Muffler	44	24	None	MC22S10HSZLC4BLN
1/8	M5	Muffler	44	24	MPS-V23C-PC. PNP	MC22S10HS42LC4BLN
1/8	M5	Muffler	44	24	MVS-201-PCP, PNP	MC22S10HS06LC4BLN
1/8	M5	Muffler	44	24	MPS-V23C-NC, NPN	MC22S10HS41LC4BLN
1/8	M5	Muffler	44	24	MVS-201-NC, NPN	MC22S10HS01LC4BLN

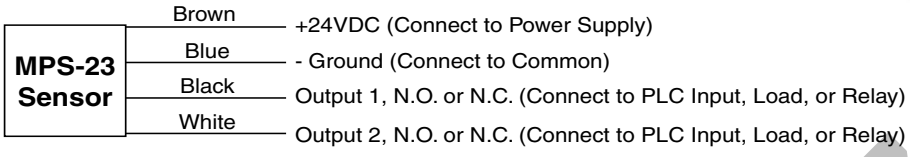
B

MC22 with MPS-23 series

The “V23” sensor has 2 independent NPN or PNP outputs available for vacuum confirmation. The output response time of this sensor is less than 2 msec.

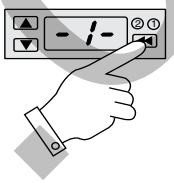
The “V23” sensor is available with an M8, 4 Pin Connector, on 1M Cable. The mating M8, 4-Pin cable must be ordered separately.



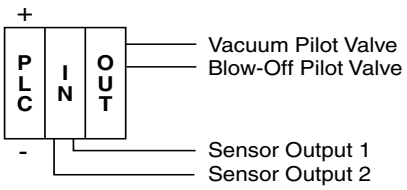


Output Adjustment

Sensor functions and outputs are programmed by touch panel.

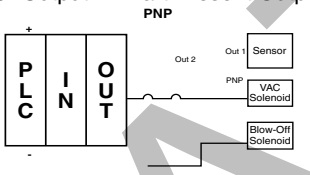


Basic System

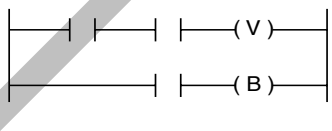


Air-Economizing System

N.C. Output 1 - Air Economizing
N.O. Output 2 - Part Present Output



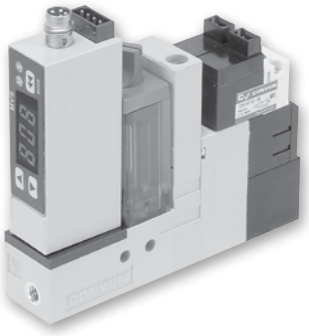
Vacuum System Programming

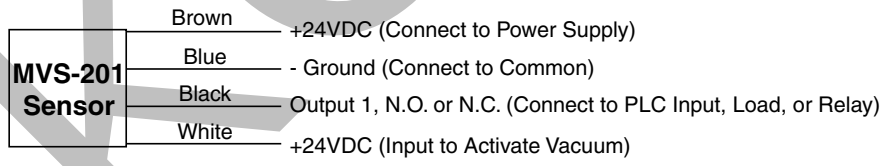


MC22 with MVS-201 series

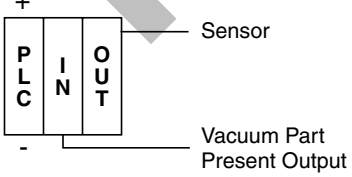
The “201” sensor has one output NPN or PNP for vacuum confirmation and a control output that interfaces directly with the blow-off release pilot valve. With programmable time control features and a special chip driver, the sensor automatically activates the blow-off release when the NPN or PNP input vacuum signal from the PLC is discontinued. This eliminates a PLC output to activate the blow-off release. This new technology reduces PLC output requirements by 50% and reduces installation to a simple 4 wire system. The output response of the sensor is less than 2 msec.

The “201” sensor is available with an M8, 4-Pin electrical connector. The MC22-201 valve cable is included with the MVS-201 Sensor Option. The mating M8, 4-Pin cable must be ordered separately.

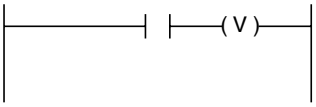




Basic System with 201 Sensor

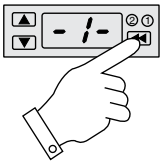


Vacuum System Programming



Output Adjustment

Sensor functions and outputs are programmed by touch panel.



Station 1 Station 2

Manifold part number

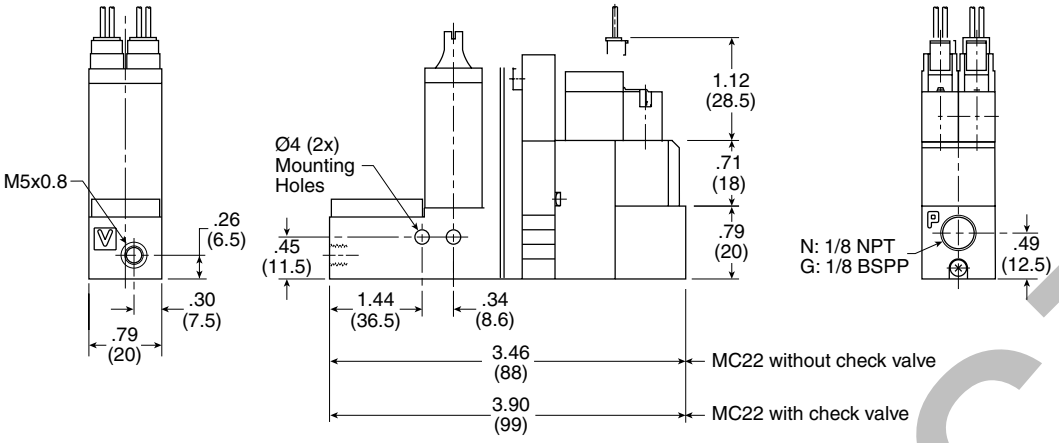
MC2 - M 08 N

Manifold	Stations	Port Size
	02	**N 1/8 NPT**
	03	G 1/8 BSPP
	04	R 1/8 BSPT
	05	
	06	
	07	
	08	

B

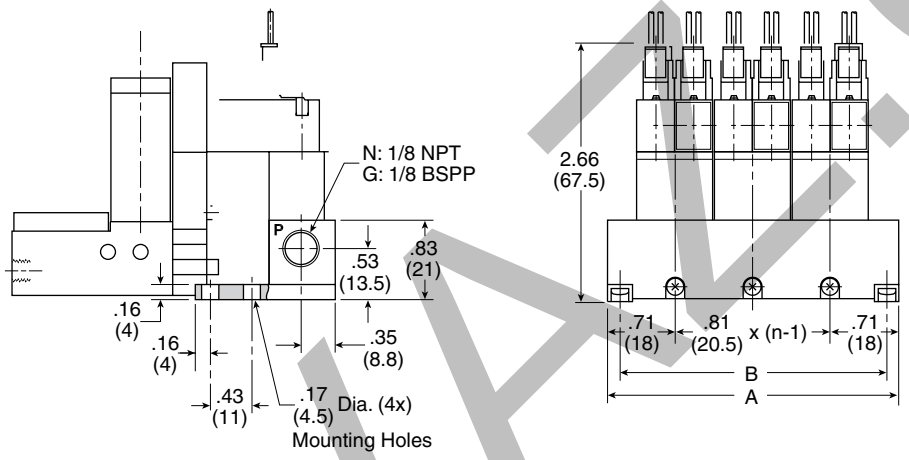
B

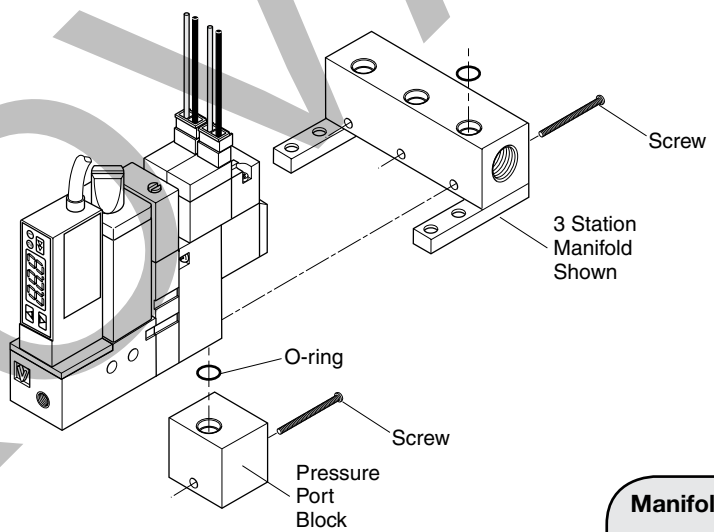
Generator



Manifold

3-Station manifold without check valve shown





Manifold assembly

Remove Pressure Port Block and use existing o-ring and screw to secure the MC22 unit to the MC2 manifold.

Dimensions (mm)

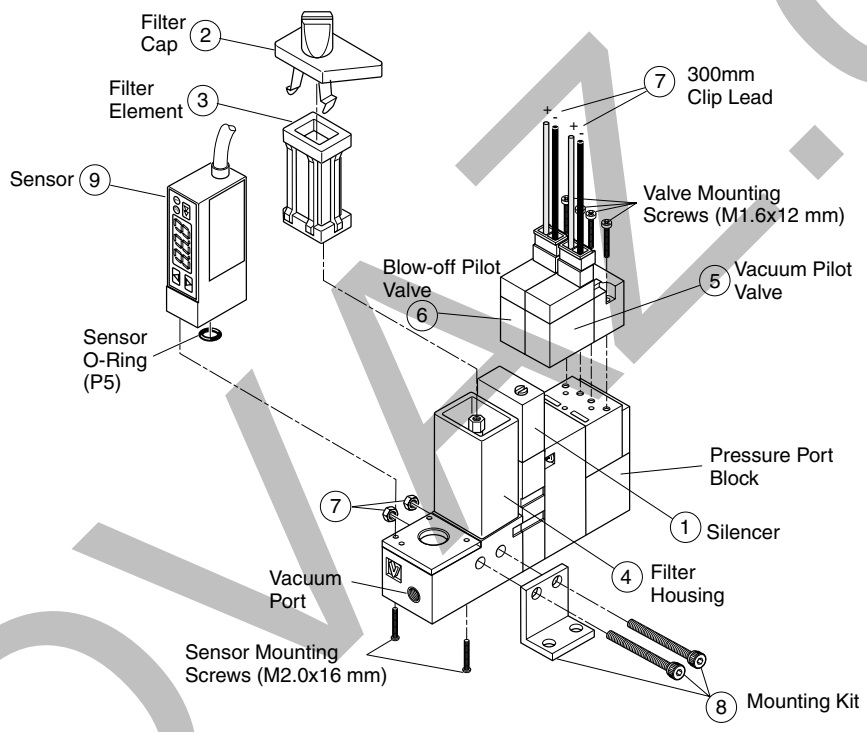
n	2	3	4	5	6	7	8
A	56.5	77	97.5	118	138.5	159	179.5
B	48.5	69.0	89.5	110	130.5	151	171.5

n = Number of Stations

B

Replacement components

Item	Part number	Description
1	MC2-S	Silencer
2, 3, 4	MC2-F	Filter kit
3	MC2-E	Filter element
5, 7	CKV010-4E	Vacuum pilot valve
6, 7	CKV010-4E	Blow-off pilot valve
7	N/A	300mm clip lead
8	MC2-B	Mounting kit
9	MPS-V23C-NC	MPS-V23 (NPN) option
	MPS-V23C-PC	MPS-V23 (PNP) option
	MVS-201-NC	MVS-201 (NPN) option
	MVS-201-PCP	MVS-201 (PNP) option



MC22 Accessories

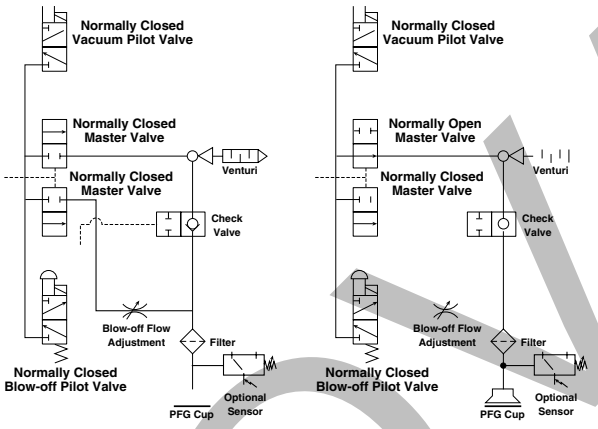
Description	Part number
MC22 - C201G sensor / valve connector* (connects sensor to vacuum & blow-off release pilot valves) * Included with MVS-201 sensor option 01 & 06.	MC22-C201G
MC2-MM manifold blank plate kit* * includes blank plate, screws & gasket	MC2-M
Clip electrical connector, 600mm lead length	CA2-V4-6
Clip electrical connector, 1500mm lead length	CA2-V4-15

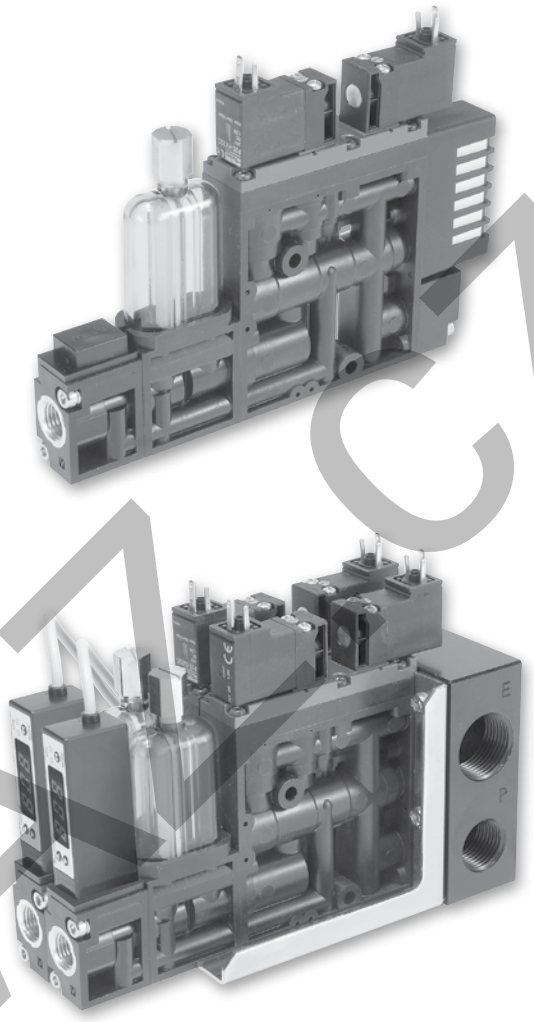
B

The MC72 Series vacuum generator provides a complete solution for factory automation. The MC72 is perfect for non-porous applications such as material handling, critical applications involving glass, or general transfer applications. The MC72 has integrated vacuum pilot and blow-off release pilot valves to minimize response times. The MC72 has additional features; regulating blow-off needle, 130 micron filter, optional check valve, and a sensor platform for vacuum confirmation. The MC72 can be assembled into a maximum 5 station manifold. The unit can be ordered normally open or normally closed.

Features

- Vacuum generating pilot valve
- Vacuum release pilot valve option
- Vacuum sensor - filter - silencer available
- Regulating blow-off
- Check valve option
- Air-economizing controls
- Manifold system
- Vacuum flow rates from 60 to 155 l/mn
- 3-Pin, EN175301-803, 15mm, 8mm 3-Pin





Add-A-Fold assembly (Silencer included)

Specifications

Media	Non-lubricated compressed air, non-corrosive gases
Optimum operating pressure	4.8 bar (70 PSI)
Humidity	35 to 85%
Pressure port	G: 1/4 BSPP female N: 1/4 NPT female
Vacuum port	G: 1/4 BSPP female N: 1/4 NPT female
Operating temperature	5°C to 50°C
Material	Body (PA and PBT) with other internal components (Brass, Al.NBR, SUS, FKM), filter elements (PVF)
Manual operation	Non-locking manual override
Electrical connection	DIN connector with LED and surge protection
Power supply	24VDC ± 10%
Power consumption	1.8W
Operating pressure	4.8 bar (70 PSI)
Pilot valve air supply	Normally closed
Generator weight	750g
Manifold weight	2-Station: 680g, 3-Station: 880g, 4-Station: 1080g, 5-Station: 1280g

MC72 unit with integrated check valve, normally closed vacuum valve

Port size			Max. vacuum flow	Max. degree of vacuum		Part number	Part number
Pressure	Vacuum	Exhaust	l/mn	inHg	Sensor option	BSPP	NPT
1/4	3/8	Muffler	62	24	No sensor	MC72S15HSZSC4BPG	MC72S15HSZSC4BPN
1/4	3/8	Muffler	62	24	MPS-V23C-PC, PNP	MC72S15HS42C4BPG	MC72S15HS42C4BPN
1/4	3/8	Muffler	62	24	MVS-201-PCP, PNP	MC72S15HS06C4BPG	MC72S15HS06C4BPN
1/4	3/8	Muffler	62	24	MPS-V23C-NC, NPN	MC72S15HS41C4BPG	MC72S15HS41C4BPN
1/4	3/8	Muffler	62	24	MVS-201-NC, NPN	MC72S15HS01C4BPG	MC72S15HS01C4BPN
1/4	3/8	Muffler	104	24	No sensor	MC72S20HSZSC4BPG	MC72S20HSZSC4BPN
1/4	3/8	Muffler	104	24	MPS-V23C-PC, PNP	MC72S20HS42C4BPG	MC72S20HS42C4BPN
1/4	3/8	Muffler	104	24	MVS-201-PCP, PNP	MC72S20HS06C4BPG	MC72S20HS06C4BPN
1/4	3/8	Muffler	104	24	MPS-V23C-NC, NPN	MC72S20HS41C4BPG	MC72S20HS41C4BPN
1/4	3/8	Muffler	104	24	MVS-201-NC, NPN	MC72S20HS01C4BPG	MC72S20HS01C4BPN
1/4	3/8	Muffler	147	24	No sensor	MC72S25HSZSC4BPG	MC72S25HSZSC4BPN
1/4	3/8	Muffler	147	24	MPS-V23C-PC, PNP	MC72S25HS42C4BPG	MC72S25HS42C4BPN
1/4	3/8	Muffler	147	24	MVS-201-PCP, PNP	MC72S25HS06C4BPG	MC72S25HS06C4BPN
1/4	3/8	Muffler	147	24	MPS-V23C-NC, NPN	MC72S25HS41C4BPG	MC72S25HS41C4BPN
1/4	3/8	Muffler	147	24	MVS-201-NC, NPN	MC72S25HS01C4BPG	MC72S25HS01C4BPN

MC72 unit with integrated check valve, normally open vacuum valve

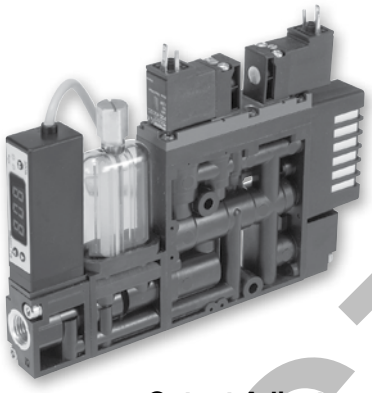
Port size			Max. vacuum flow	Max. degree of vacuum		Part number	Part number
Pressure	Vacuum	Exhaust	l/mn	inHg	Sensor option	BSPP	NPT
1/4	3/8	Muffler	62	24	No sensor	MC72S15HSZSC4APG	MC72S15HSZSC4APN
1/4	3/8	Muffler	62	24	MPS-V23C-PC, PNP	MC72S15HS42C4APG	MC72S15HS42C4APN
1/4	3/8	Muffler	62	24	MPS-V23C-NC, NPN	MC72S15HS41C4APG	MC72S15HS41C4APN
1/4	3/8	Muffler	104	24	No sensor	MC72S20HSZSC4APG	MC72S20HSZSC4APN
1/4	3/8	Muffler	104	24	MPS-V23C-PC, PNP	MC72S20HS42C4APG	MC72S20HS42C4APN
1/4	3/8	Muffler	104	24	MPS-V23C-NC, NPN	MC72S20HS41C4APG	MC72S20HS41C4APN
1/4	3/8	Muffler	147	24	No sensor	MC72S25HSZSC4APG	MC72S25HSZSC4APN
1/4	3/8	Muffler	147	24	MPS-V23C-PC, PNP	MC72S25HS42C4APG	MC72S25HS42C4APN
1/4	3/8	Muffler	147	24	MPS-V23C-NC, NPN	MC72S25HS41C4APG	MC72S25HS41C4APN

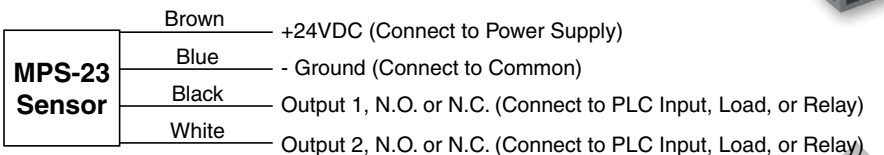
B

MC72 with MPS-23 series

The “V23” sensor has 2 independent NPN or PNP outputs available for vacuum confirmation. The output response time of this sensor is less than 2 msec.

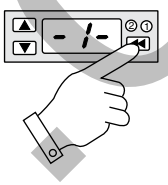
The “V23” sensor is available with an M8, 4-Pin or grommeted (2M) electrical connector. The mating M8, 4-Pin cable is not included with the MPS-23 Sensor and must be ordered separately.



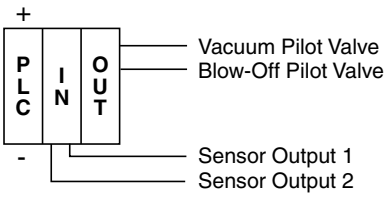


Output Adjustment

Sensor functions and outputs are programmed by touch panel.

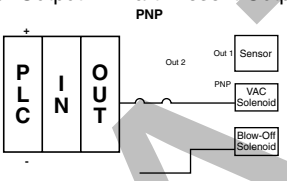


Basic System

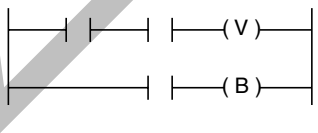


Air-Economizing System

N.C. Output 1 - Air Economizing
N.O. Output 2 - Part Present Output



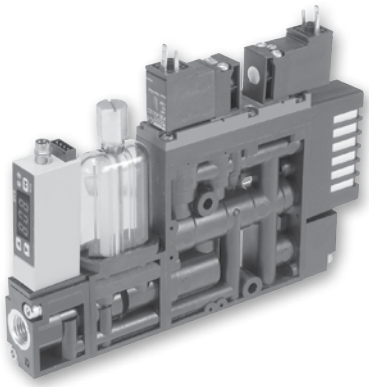
Vacuum System Programming

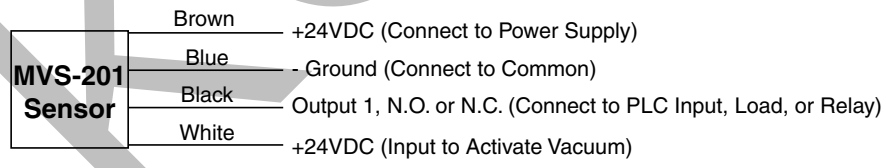


MC72 with MVS-201 series

The “201” sensor has one output NPN or PNP for vacuum confirmation and a control output that interfaces directly with the blow-off release pilot valve. With programmable time control features and a special chip driver, the sensor automatically activates the blow-off release when the NPN or PNP input vacuum signal from the PLC is discontinued. This eliminates a PLC output to activate the blow-off release. This new technology reduces PLC output requirements by 50% and reduces installation to a simple 4 wire system. The output response of the sensor is less than 2 msec.

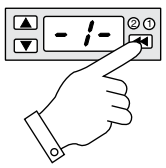
The “201” sensor is available with an M8, 4-Pin electrical connector. The CVK-D201G valve cable is included with the MVS-201 Sensor Option. The mating M8, 4-Pin cable must be ordered separately.



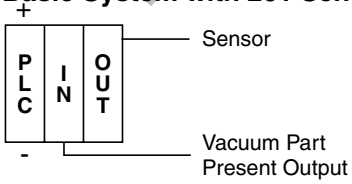


Output Adjustment

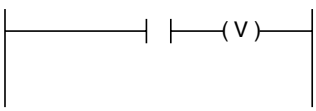
Sensor functions and outputs are programmed by touch panel.

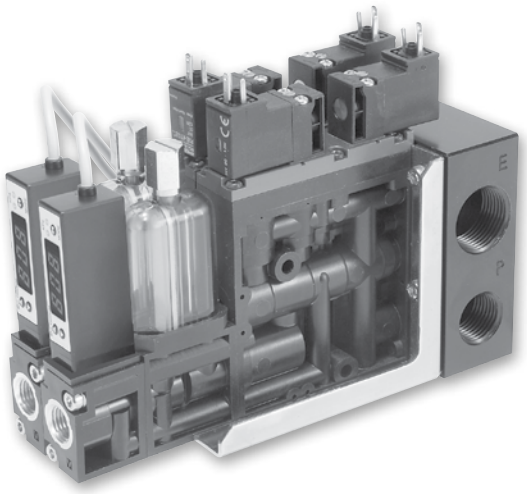


Basic System with 201 Sensor

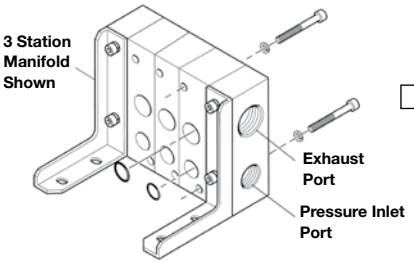


Vacuum System Programming





Manifold part number (without MC72 vacuum generator)

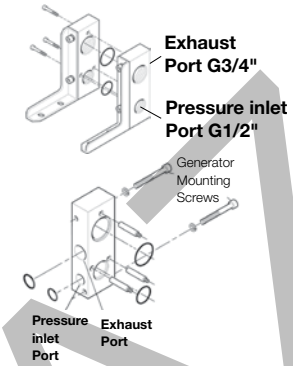


MC72 - M 05 G

Manifold	Stations	Port Size
	02 03 04 05	G 1/2 BSPP

Note) for complete Manifold including MC72 vacuum generators,please contact us.

Separated elements

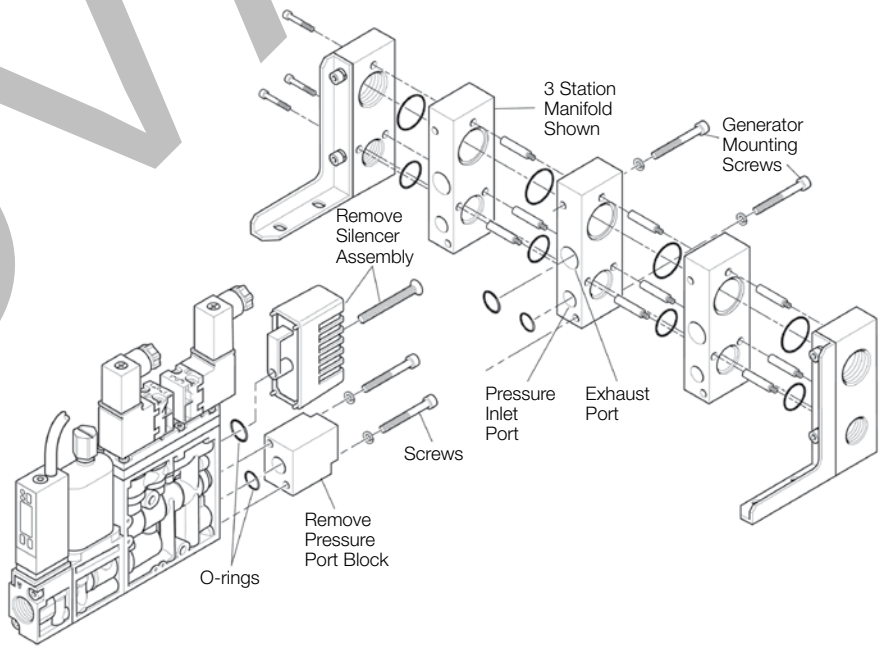


Description	Order code
End plate	MC7-MB-G
Vacuum Generator Sub-base	MC7-MB

Manifold Assembly

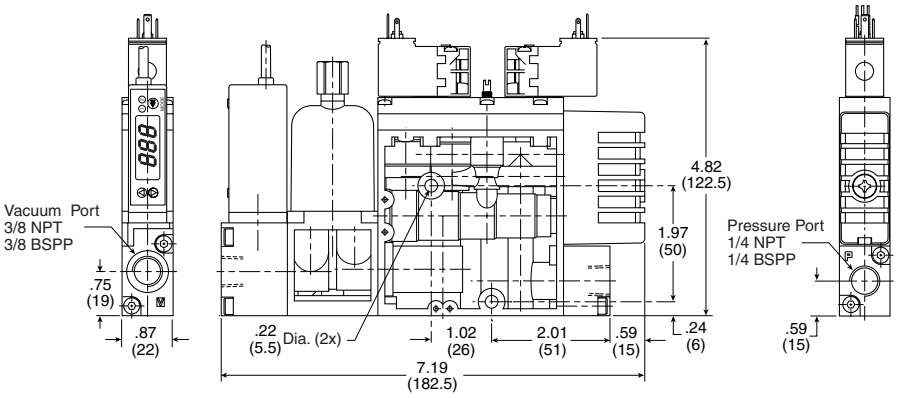
Manifold assembly

1. Assemble manifold sections to manifold end plates as shown.
2. Assemble vacuum generator by removing pressure block and exhaust muffler. Then install using screws from manifold kit and existing O rings on MC72 unit.



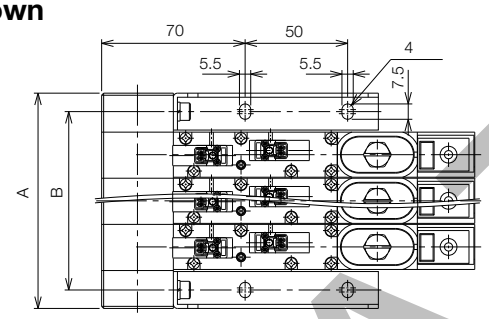
B

Generator

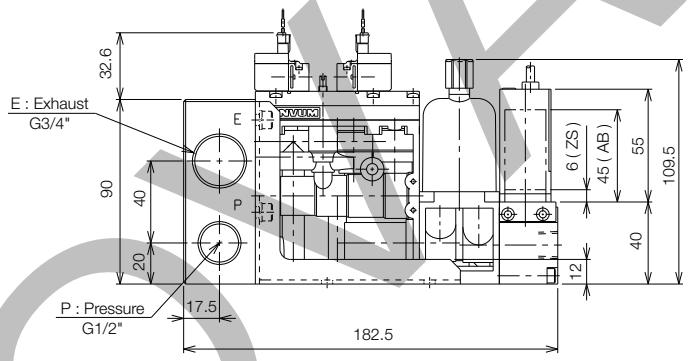


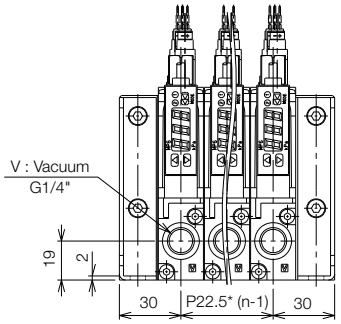
Manifold

3-Station manifold shown

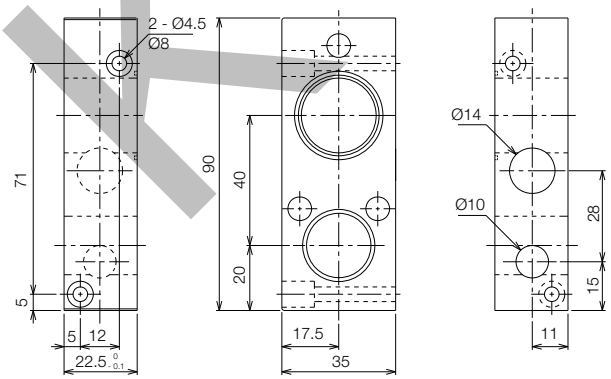


n	2	3	4	5
A	82,5	105	127,5	150
B	64,5	87	109,5	132

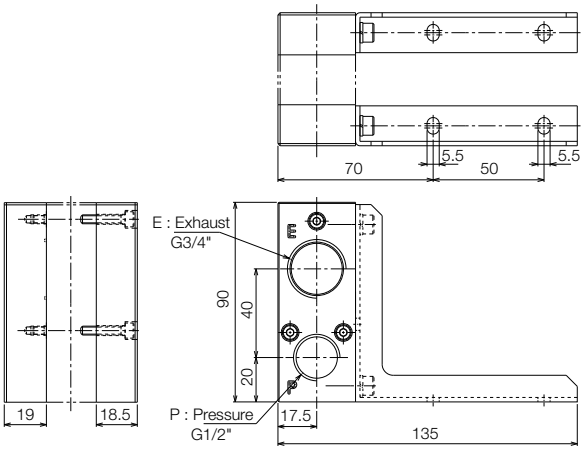




Vacuum Generator Sub-base



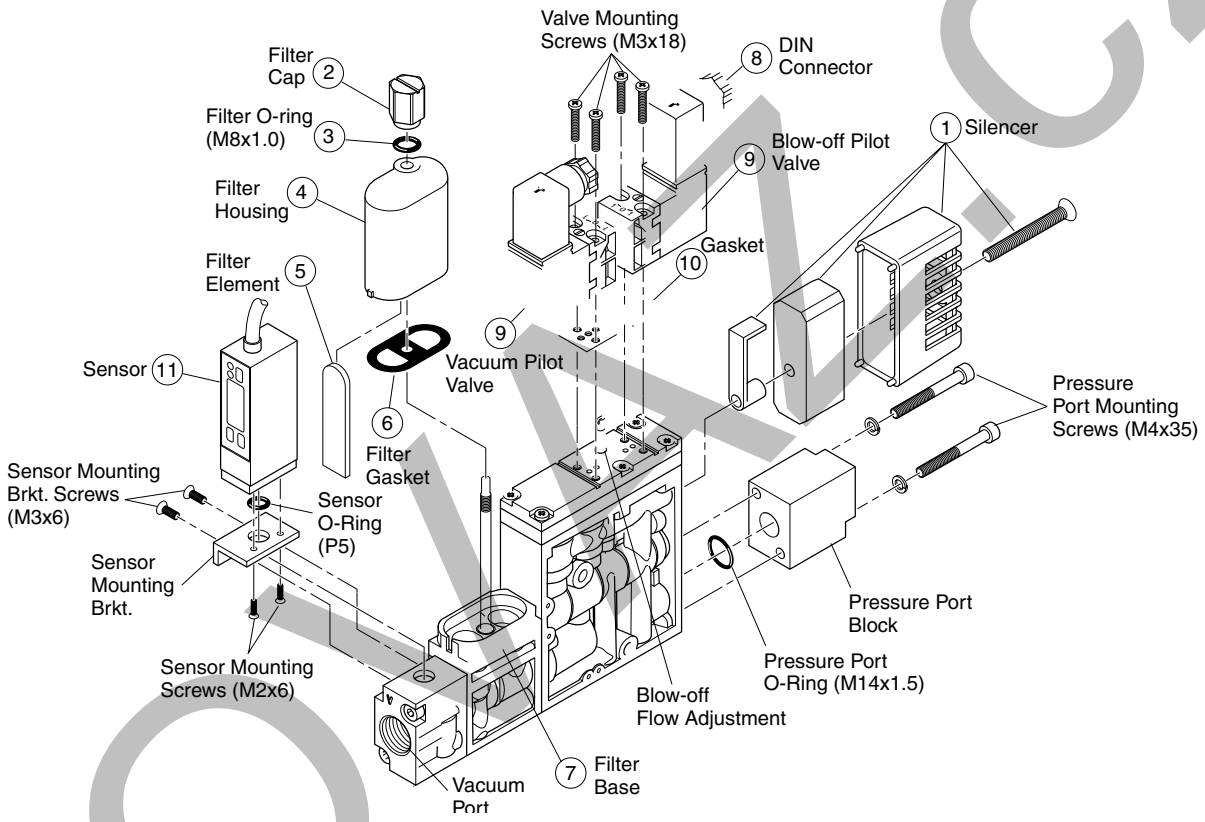
End Plates



B

Replacement components

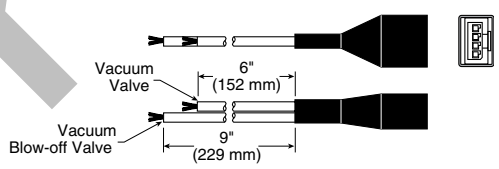
Item	Part number	Description
1	CVK-S	Silencer
2 thru 7	CVK-F	Filter kit
5	CVK-E	Filter element
8	P8C-D26C	DIN connector with LED
8, 9, 10	MC72-4PD	Pilot valve kit
11	MPS-V23C-NC	MPS-V23 (NPN) option
	MPS-V23C-PC	MPS-V23 (PNP) option
	MVS-201-NC	MVS-201 (NPN) option
	MVS-201-PCP	MVS-201 (PNP) option



CVK-D201G Valve Cable*

(Connects Sensor to Vacuum & Blow-off Release Pilot Valves)

CVK-D201G

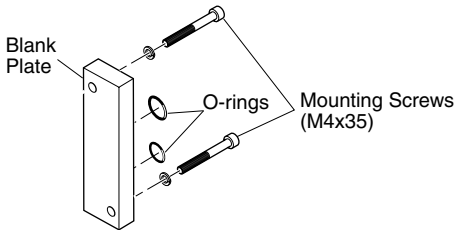


* Included with MVS-201 Sensor Option 01 & 06.

Generator Blank Plate Kit

CVK-BLK

Kit includes: Blank plate, screws & o-rings

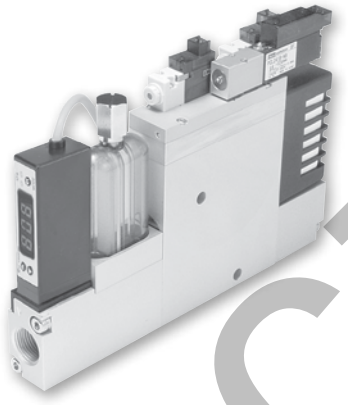


B

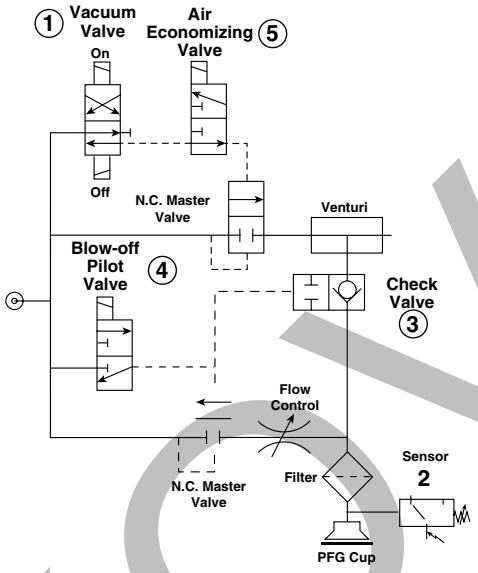
The CEK is a Normally Closed Vacuum On / Off valve that maintains the last state of air during an emergency stop or power loss. In addition to this, an air-economizing valve has been added to interrupt the air supply by connecting the output signal from the sensor to minimize air consumption.

This unit is ideal for non-porous applications that require fast response of large vacuum and blow-off release flow.

Typically, with a normally closed air circuit, the user controls vacuum with a command signal. During an Emergency Stop Event or power failure event, the vacuum command signal is lost, but, the Vacuum valve (1) remains in the current operating position due to the construction of the valve. The air-economizing valve (5), in a Normally Open configuration, passes the air supply from the Vacuum On / Off valve (1). The Sensor (2) output activates the air-economizing valve (5) closing the air supply to the Normally Closed master valve. The Check Valve (3) maintains the achieved vacuum level until the hysteresis value of the Sensor (2) is reached or when the Vacuum valve (1) has been returned to the closed position to stop the vacuum operation.



Valve controlled emergency stop circuit



Features

- Integrated double solenoid for last state
- Integrated vacuum pilot
- Integrated blow-off pilot
- Integrated filter, silencer
- Air economizing capabilities
- Manifolds for up to 5 units

Model numbers

Nozzle size	Maximum degree of vacuum	Sensor option	Valve option	Part number
1.5mm	27 inHg	No Sensor	24 VDC, PNP	CEK15HSZC24PBLN
		MPS-V23 (NPN)	24 VDC, NPN	CEK15HS41C24NBLN
		MPS-V23 (PNP)	24 VDC, PNP	CEK15HS42C24PBLN
2.0mm	27 inHg	No Sensor	24 VDC, PNP	CEK20HSZC24PBLN
		MPS-V23 (NPN)	24 VDC, NPN	CEK20HS41C24NBLN
		MPS-V23 (PNP)	24 VDC, PNP	CEK20HS42C24PBLN
2.7mm	27 inHg	No Sensor	24 VDC, PNP	CEK27HSZC24PBLN
		MPS-V23 (NPN)	24 VDC, NPN	CEK27HS41C24NBLN
		MPS-V23 (PNP)	24 VDC, PNP	CEK27HS42C24PBLN

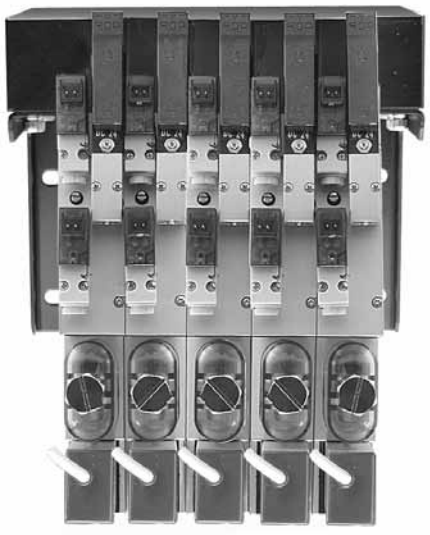
☐ **Most popular.**

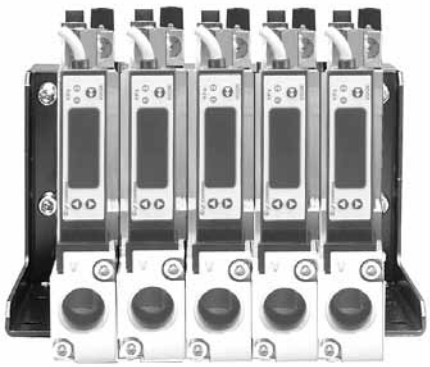
Specifications

Media	Non-lubricated compressed air, non-corrosive gases	
Operating pressure	4.8 bar (70 PSI)	
Humidity	35 to 85%	
Pressure port	G: 1/4 BSPP female, N: 1/4 NPT female	
Vacuum port	G: 3/8 BSPP female, N: 3/8 NPT female	
Operating temperature	5°C to 50°C	
Material	Aluminum, Brass, NBR	
Air-economizing valve and blow-off release pilot		**Emergency stop valve**
Type of control valve	Pilot valve	Double solenoid
Manual operation	Manual override	Manual overrides
Electrical connection	Clip connector with LED and surge	Clip connector with LED and surge
Power supply	24VDC ± 10%	24VDC ± 10%
Power consumption	0.9W	0.9W
Operating pressure	4.8 bar (70 PSI)	4.8 bar (70 PSI)
Air supply	Normally closed	Normally closed
Generator weight	750g	
Manifold weight	2-Station: 680g, 3-Station: 880g, 4-Station: 1080g, 5-Station: 1280g	

B

B





Station 1 | Station 2 | Station 3 | Station 4 | Station 5

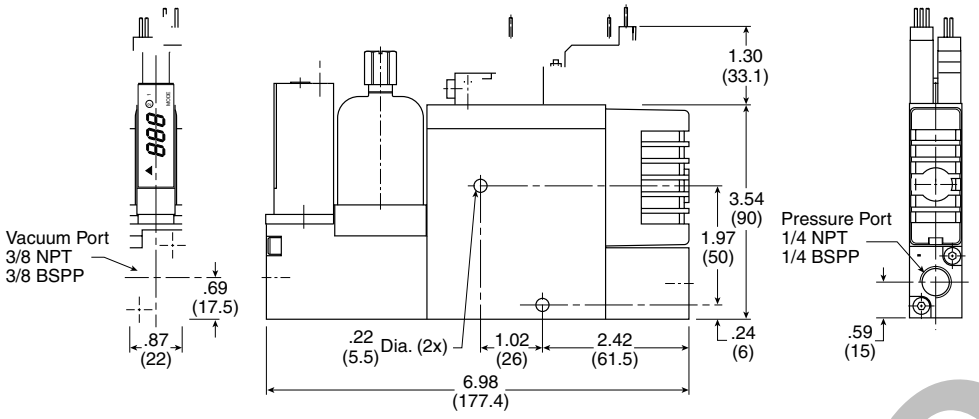
Manifold part number (without CEK vacuum generator)

CVK - M 05 G

Manifold	Stations	Port Size
	02	G 1/8 BSPP
	03	R 1/8 BSPT
	04	N 1/8 NPT
	05	

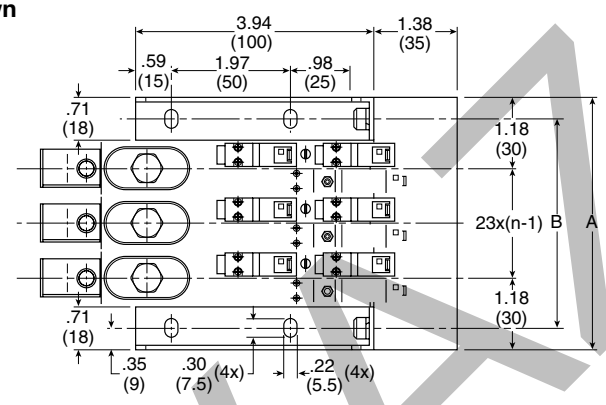
B

Generator



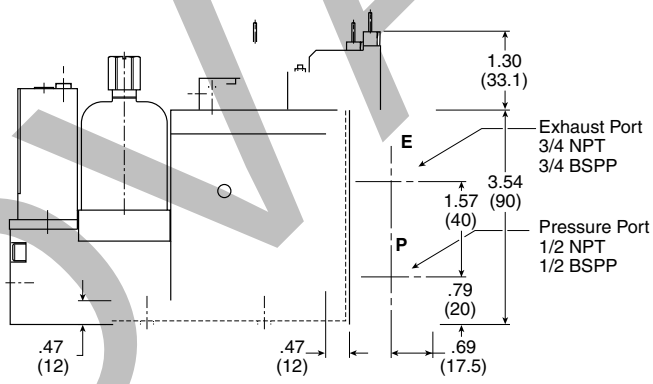
Manifold

3-Station manifold shown



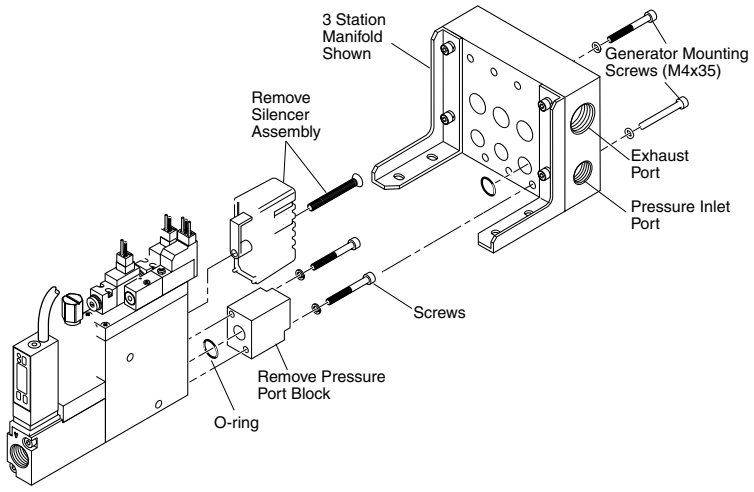
n	2	3	4	5
A	83	106	129	152
B	65	88	111	134

n = Number of Stations



Manifold assembly

Remove Pressure Port Block and Silencer Assembly. Use existing o-rings and manifold mounting screws to secure the CEK unit to the manifold.



B

Replacement components

Item	Part number	Description
1	CVK-S	Silencer
2 thru 7	CVK-F	Filter kit
5	CVK-E	Filter element
8, 10	MC2-24-B-10-D	Blow-off Pilot Valve
9, 10	MC2-24-B-10-V	Air-Economizing Valve
10	MC2-5L	500mm clip lead
11,13	VA01PLC241PE	Vacuum on / off valve, NPN
12,13	PCL241B-NB-D24UM	Vacuum on / off valve, PNP
13	PCL2-D24-CL5	500mm clip lead
Item	**Part number**	**Replacement sensor**
14	MPS-V23C-NC	MPS-V23 (NPN) option
	MPS-V23C-PC	MPS-V23 (PNP) option

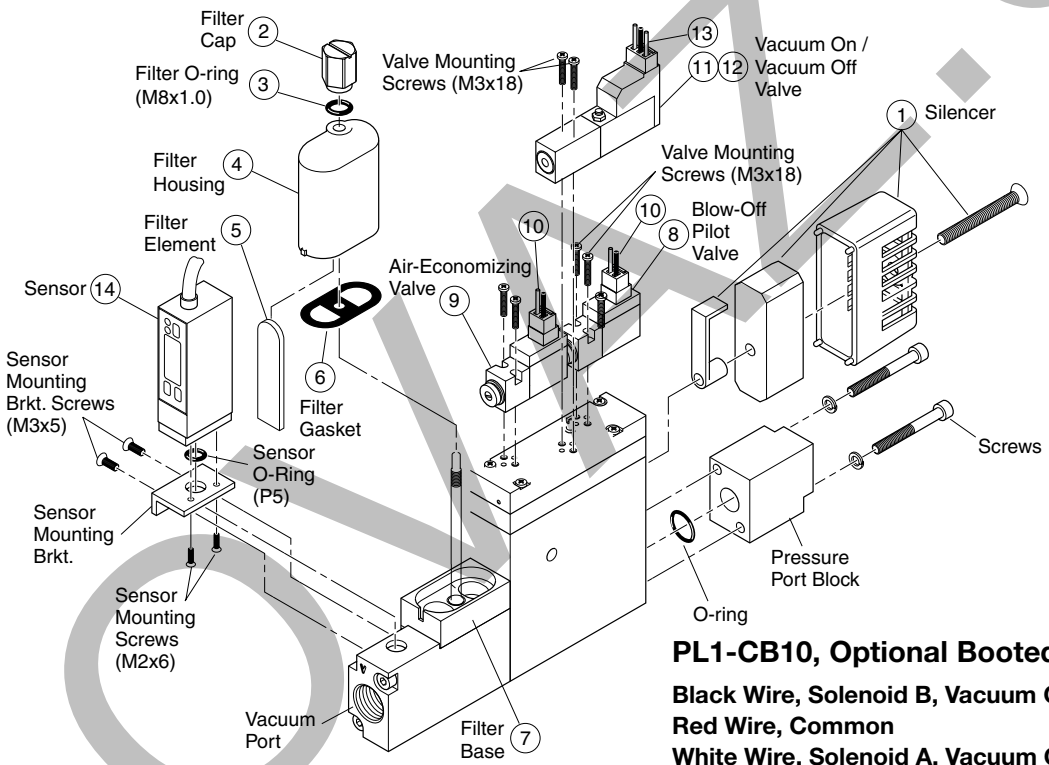
⚠ Cautions

Do not use or expose the CEK with fluids or corrosive gases. Vacuum Venturi's are designed to be used with non-lubricated, non-corrosive, compressed air.

Do not operate CEK generators outside the temperature range and pressures listed in the specifications section of this catalog. Regulate the compressed air to 70PSI and filtrate with a maximum 40 micron filter. Non-lubricated compressed air will maintain the life and vacuum level of the generator.

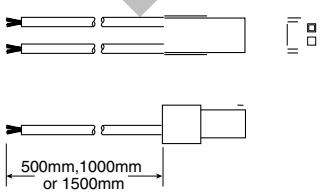
Check the insulation of all lead wires after installation to avoid shorts. Properly secure all lead wires to avoid stress or repeated movement that may fray lead wires.

Some electrical components are diode or zener diode protected. When installing solenoids and sensors, check the polarity of the component before applying power. Apply the appropriate voltage to the solenoids and sensors. Inappropriate voltage, shorts, or surges may damage the circuitry.



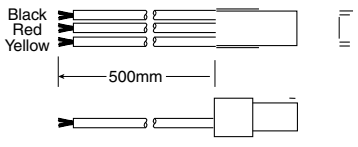
Pilot Valve Cable

MC2-5L (500mm) Lead*
(Connects Power Source to Vacuum & Blow-off Release Pilot Valves)
Positive "+" (Red Wire)
Negative "-" (Black Wire)
* Included with Generator



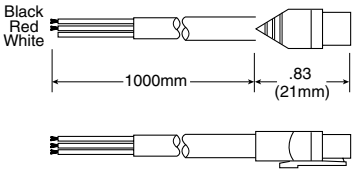
PCL2-D24-CL5* Cable

Black Wire, Solenoid B, Vacuum On
Red Wire, Common
Yellow Wire, Solenoid A, Vacuum Off
*Included with Generator



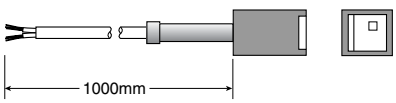
PL1-CB10, Optional Booted Cable

Black Wire, Solenoid B, Vacuum Off
Red Wire, Common
White Wire, Solenoid A, Vacuum On



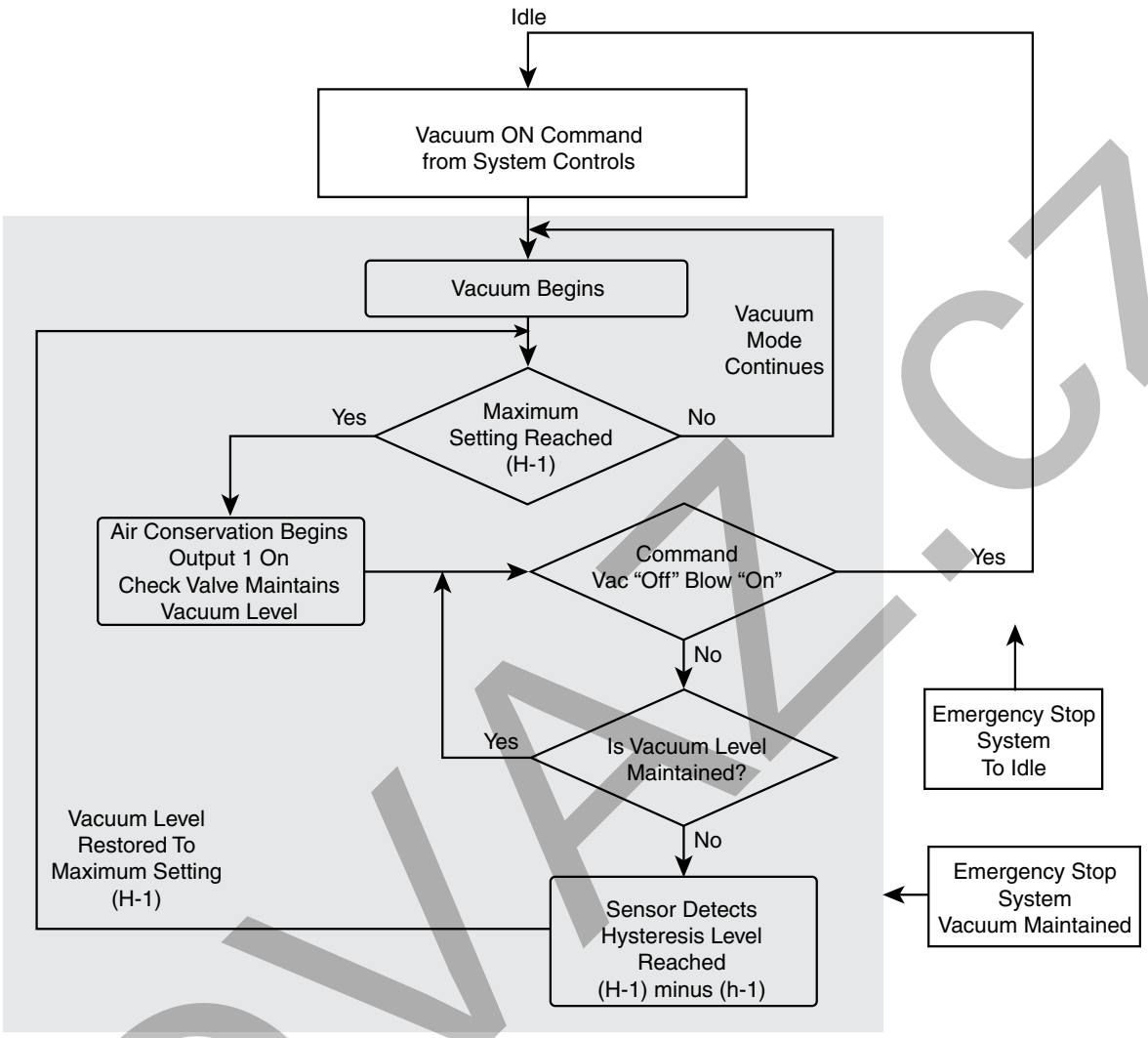
MC2-CB10 Valve Cable

(Connects Power Source to Vacuum & Blow-off Release Pilot Valves)
Positive "+" (Red Wire)
Negative "-" (Black Wire)



B

CEK - System logic



CEK - Emergency Stop Operating System (EOS)

The Emergency Stop Operating System is designed to maintain the last state of operation when an emergency stop or power failure occurs.

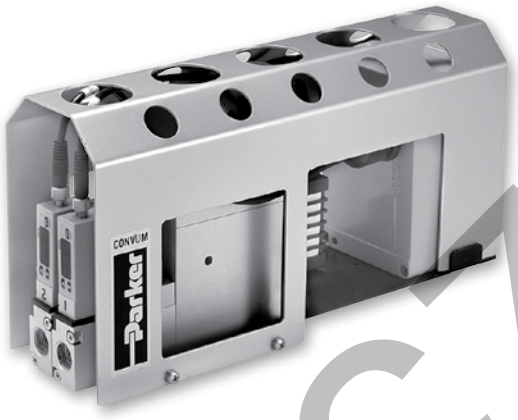
The chart below illustrates the state of operation in different modes.

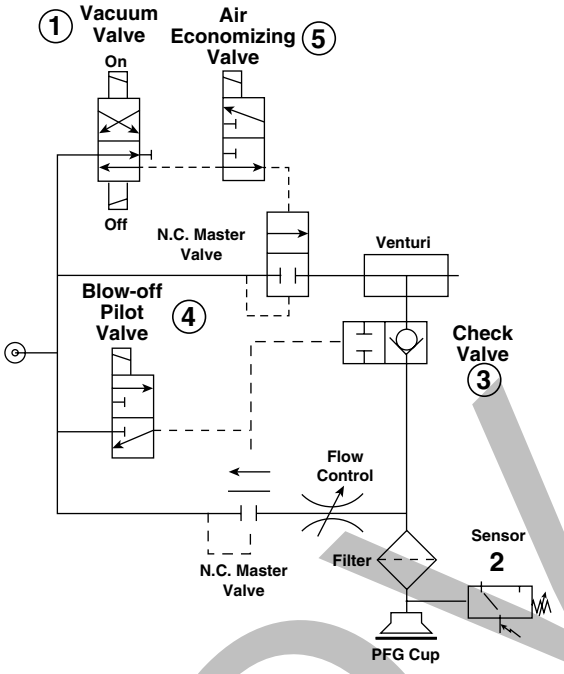
Modes	Vacuum On	Vacuum Off	Blow-Off	EOS
Normal Conditions	Air-Economizing between 18-16 inHg	Idle	Blow-Off On Blow-Off Idle	EOS Off
Emergency Stop, Power Failure	Vacuum On ↓ Vacuum On	Idle	Blow-Off On or Idle ↓ Idle	EOS On
Restore Power	Vacuum On Air-Economizing Function Resumes	Idle	Idle	EOS Off

B

The CVXCEK vacuum generator creates vacuum and blow-off pressure in a vacuum system and has additional Air-economizing and emergency operating system functions.

Each CVXCEK unit consists of 2 independent vacuum generators labeled channel 1 and channel 2. Each vacuum generator has a vacuum ON / OFF solenoid pilot valve, blow-off solenoid pilot valve, Air-Economizing valve, blow-off needle control valve, pressure sensor, vacuum check valve, vacuum filter, and exhaust filter. Each Vacuum Generator is mounted to a 2-Station bar manifold with an optional electrical mounting kit. The pressure provided to inlet port of the bar manifold is common to both vacuum generators.





Features

- Integrated double solenoid for hold last state conditions
- Integrated vacuum pilot
- Integrated blow-off pilot
- Integrated filter, silencer
- Air economizing capabilities
- Manifolds for up to 5 units

General operation of CVXCEK vacuum units

A vacuum generator is a single stage Venturi that creates vacuum pressure using compressed air. In principle, compressed air is throttled as the air exits the nozzle and is discharged into the diffuser. This increased velocity of air lowers the pressure in the diffusion chamber. The volume of air within the closed vacuum system flows into the low-pressure area of the diffusion chamber and is exhausted thru the diffuser. This effect increases the vacuum level and evacuates most of the air within the closed vacuum. The vacuum generator will produce the specified degrees of vacuum as cataloged if the vacuum system is closed, inlet pressure is to design pressure, and there are no major restrictions in the exhaust flow.

Vacuum is created when the unit receives a momentary or maintained command vacuum “ON” signal, (high signal is sent to Vacuum Pilot Valve (1). Once a preset vacuum degree (H-1) of the pressure sensor (2) is achieved, the Air-Economizing Valve is enabled to conserve compressed air. The vacuum level will be maintained by the Check Valve (3) until the hysteresis switch point (H-1 minus h-1) of Sensor (2). At this point vacuum is turned back “ON” until the switch point (H-1) is achieved again. This cycle, which is called Air-economizing, will repeat until a blow-off signal is sent to the unit. When the Blow-off Pilot Valve (4) is activated to decay the vacuum pressure, the unit will release the part. Command vacuum “ON” should be turned “OFF” when command blow-off is turned “ON”. The Emergency Stop operating system provides Air-Economizing or maximum degree of vacuum at the time of disruption of Input and Output Power.

Model Number Index

CVXCEK 27 D3 2 49 N A

Nozzle Diameter
27 27HS 2.7mm

Electrical Enclosure
D1 M12, 110VAC
D3 M12, 24VDC, PNP
D4 M12, 110VAC, w/ Mtg. Plate
D6 M12, 24VDC, PNP w/ Mtg. Plate
N1 M18, 110VAC
N3 M18, 24VDC, PNP
N4 M18, 110VAC, w/ Mtg. Plate
N6 M18, 24VDC, PNP w/ Mtg. Plate

Number of Channels
1 Generator w/ Blanking Plate
2 Generators

Voltage
49 24VDC
53 110VAC

Port Threads
N NPT
G BSPP

Engineering Level
A Current

B

Specifications

Media	Non-lubricated compressed air, non-corrosive gases		
Operating pressure	4.8 bar (70 PSI)		
Humidity	35 to 85%		
Pressure port	G: 1/4 BSPP female, R: 1/4 BSPT female, N: 1/4 NPT female		
Vacuum port	G: 3/8 BSPP female, R: 3/8 BSPT female, N: 3/8 NPT female		
Operating temperature	5°C to 50°C		
Material	Aluminum, Brass, NBR		
Air-economizing valve and blow-off release pilot		**Vacuum pilot valve**	**Sensors**
Type of control	Single solenoid	Double solenoid	MPS-2 Pressure sensor
Manual operation	Manual override	Manual overrides	N/A
Electrical connection	Clip connector	Clip connector	M8, 4-pin
Power supply*	24VDC ± 10%	24VDC ± 10%	10.8 to 30VDC
Solenoid power consumption	0.6W with LED and surge	2.0W with LED and surge	125mA
Operating pressure	4.8 bar (70 PSI)	4.8 bar (70 PSI)	-1 to 5 bar (-14.7 to 72.5 PSI)
Air supply	Normally closed	Normally closed	N/A
Manifold weight	1-Station: 1758g, 2-Station: 2495g		

* 110VAC units use 24VDC solenoids and sensors.

Performance

Series / nozzle diameter	Nozzle diameter (mm)	Vacuum degree At 70 PSI (inHg)	Vacuum flow per channel l/mn	Air consumption per channel l/mn
CVXCEK27	2.7	27	160	295

Evacuation time

Series / nozzle diameter	Air supply pressure bar	Air consumption per channel l/mn	Evacuation time per channel in sec / ft³ * to reach different vacuum levels (inHg)								
			3	6	9	12	15	18	21	24	27
CVXCEK27	4.8	295	0.02	0.07	0.11	0.2	0.3	0.47	21.2	1.49	—

Vacuum flow (l/mn)

	mbar										
Nozzle Dia.	**0**	**100**	**200**	**300**	**400**	**500**	**600**	**700**	**800**	**900**	**1000**
27HS	162	144	125	106	88	70	50	32	14	—	—

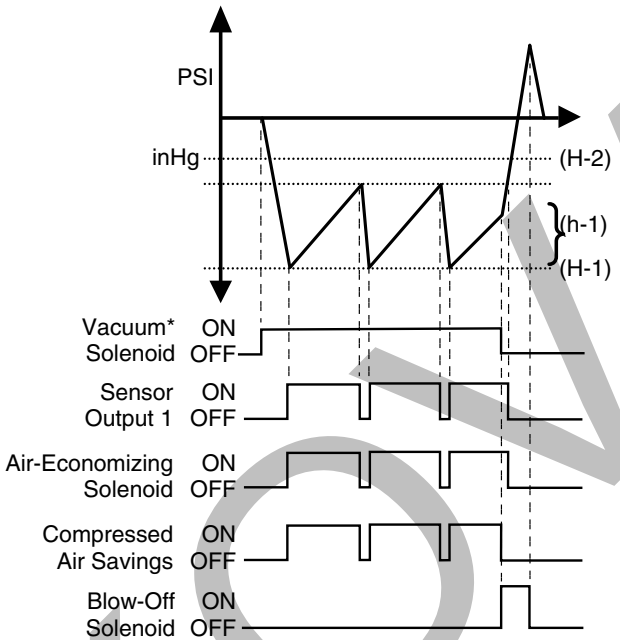
B

Sensor output function

Sensor outputs are open collector transistor type. Replacement Sensor MPS-V2C-NC is an NPN Sinking Sensor. When installed on the CVXCEK, the onboard electronics converts this sensor to a PNP circuit. Wiring circuit of the CVXCEK units is PNP, Sourcing. Each vacuum generator sensor has 2 outputs. Output 1 and Output 2 are independent of each other and have different factory set conditions. These settings can be changed with the touch pad programming.

Air economizing

Minimizes air consumption by utilizing the built in check valve. Once a predetermined vacuum level has been achieved (H-1), the Air-Economizing valve is enabled and the check valve maintains the vacuum level within the system. The Air-Economizing valve is disabled at a vacuum level H-1 minus h-1. The hysteresis feature of the vacuum sensor can maintain the vacuum level of the system indefinitely when properly wired to the Air-Economizing valve and operating pressure is present.



* Vacuum Solenoid can be a maintained or momentary signal. Maintained shown.

Sensor Output 1 - Air economizing

This sensor output does not interface with the input table of the PLC/PC. This sensor output interfaces with the Air-Economizing Valve on the CVXCEK Unit. The Vacuum Pilot Valve Solenoid is connected to the PLC/PC output table. The switch point setting, (H-1) on Output 1 of the sensor, enables the Air-Economizing Valve. No external PLC programming is required for Air-Economizing functions because this function is built into the CVXCEK Electrical Unit. The vacuum pilot signal from the vacuum ON/OFF valve is connected to the Air-Economizing Valve. It is this valve that toggles the vacuum pilot signal to the Vacuum Poppet Valve on and off. The toggling of the vacuum pilot signal on and off creates the air-economizing mode. When the vacuum level in system achieves the preset valve of H-1, the sensor output switches to a Closed, Passing, state. This activates the Air-Economzing valve which inhibits the vacuum pilot signal from creating vacuum. In nonporous applications, the internal check valve maintains the vacuum level till the level drops through the Hysterisis Range (h-1) to the hysteresis switch point setting vacuum (H-1) minus (h-1). At this point, the sensor output switches to a open position, Non-passing state and de-activates the Air-Economzing Valve. This cycle will continue depending on the vacuum system and until blow-off function is enabled.

Sensor Output 2 - Vacuum confirmation – part presence signal

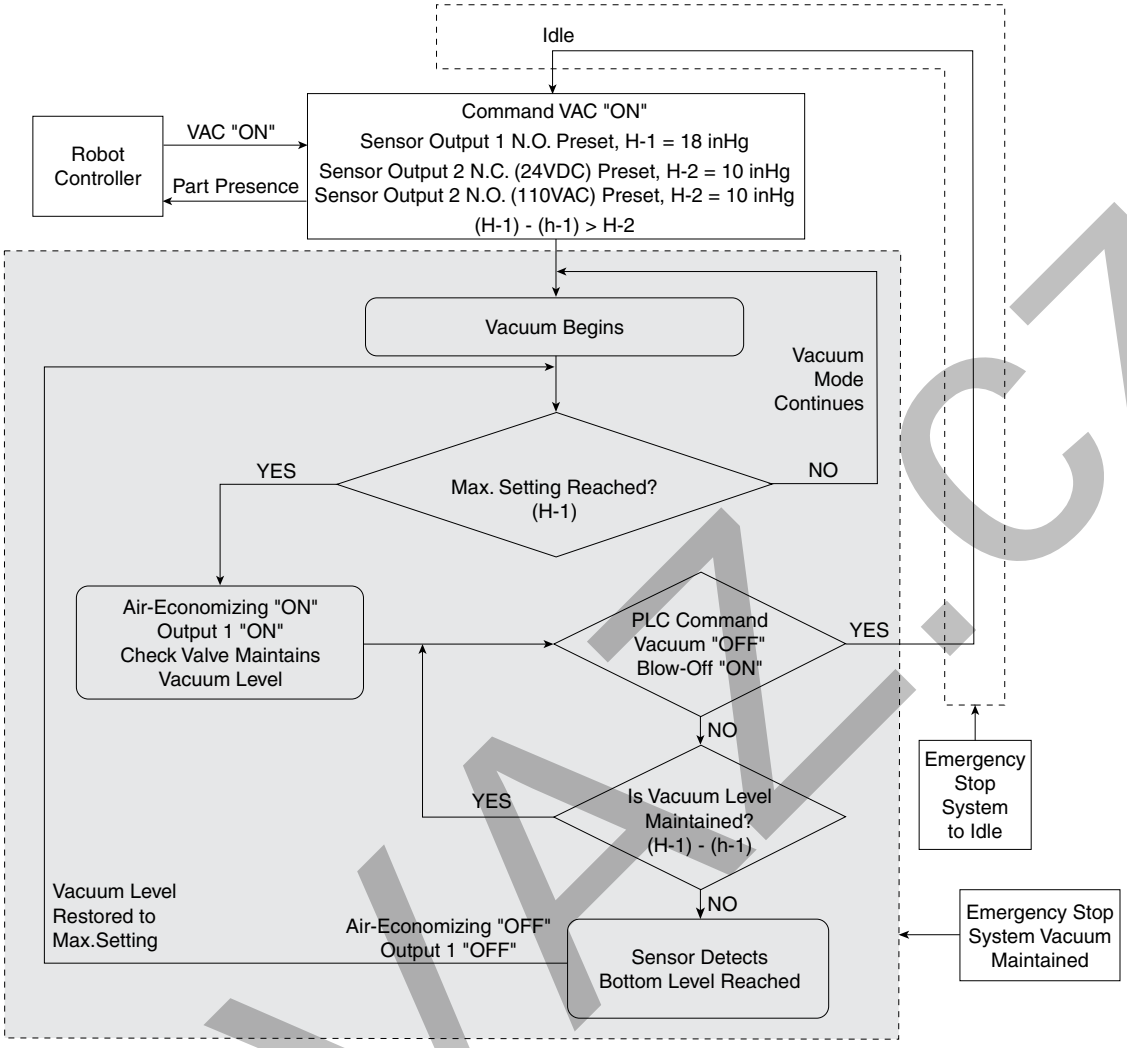
Operates as an Output from the Sensor to provide a Part Presence Signal. This sensor output interfaces with the Input table on the PLC/PC. When the cup is adhered to the part, vacuum level increases and at the Switch Point Setting (H-2), the sensor changes state to indicate a part presence Signal.

Emergency stop condition

An emergency stop condition for factory automation is an external override condition that is usually activated by the machine operator to temporarily shut down the equipment. It is the Loss of Output Power or the Loss of Output Power and Input Power to the CVXCEK Vacuum Generator. The relevance to vacuum is the ability of the vacuum equipment to maintain the last output state of the control circuit.

The Emergency Operating System (EOS) on the CVXCEK unit is designed to maintain and continue the current operation mode of the vacuum generator. The detent Vacuum Pilot Valve will maintain the last command of the PLC/PC. The Air-economizing Valve will still operate during loss of output power. The current operation mode of the vacuum generator will be maintained when operating pressure is present.

If an emergency event or power failure occurs any time the system is in the shaded area, vacuum will be maintained to hold the work piece. If an emergency event or power failure occurs any time the system operations are at idle or during blow-off “ON”, the system will remain or return to the idle state.



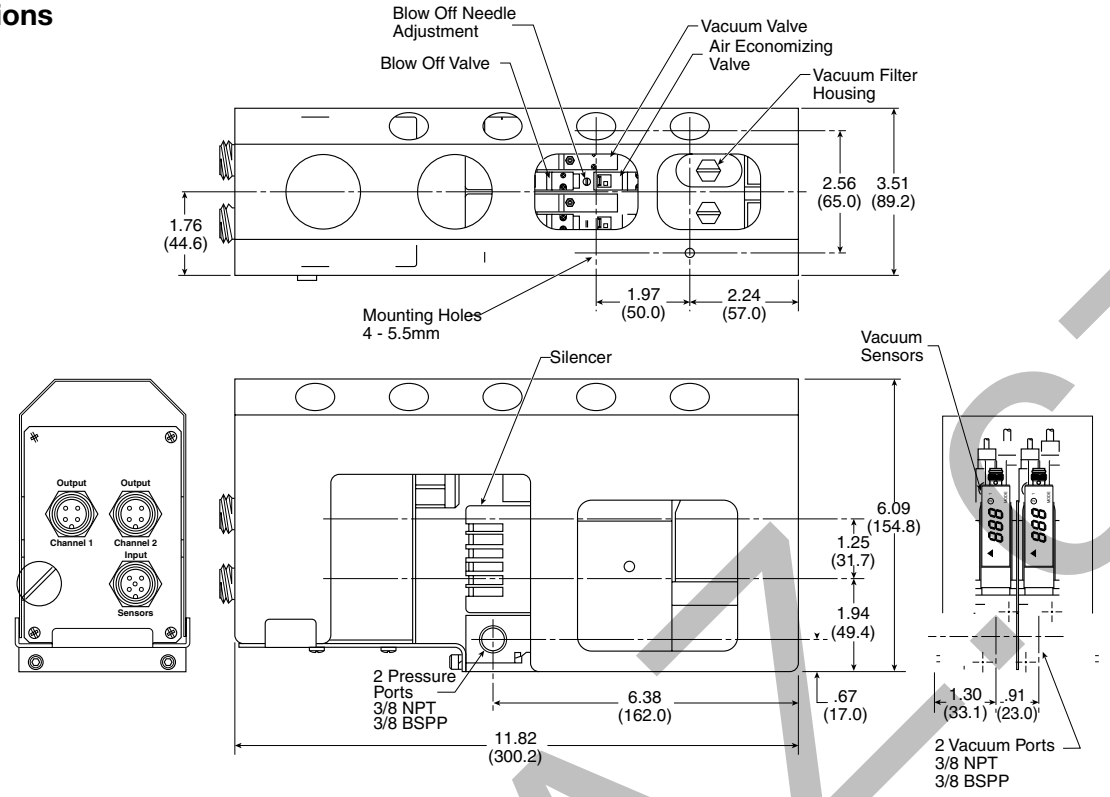
The Emergency Stop Operating System is designed to maintain the last state of operation when an emergency stop or power failure occurs.

The chart below illustrates the state of operation in different modes.

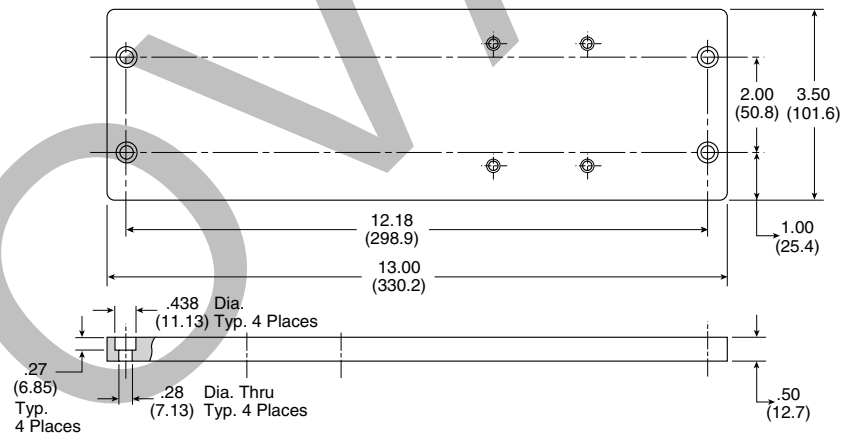
Modes	Vacuum on	Vacuum off	Blow-off
Normal Conditions	Air economizing 600 to 520 mbar	Idle	Blow-off on Blow-off idle
Emergency stop event			
Input power on **Output power off**	Air economizing 600 to 520 mbar	Idle	On → Idle Idle → Idle
Input power off **Output power on**	Vacuum on ↓ Max. vacuum on	Idle	On → Idle Idle → Idle
Input power off **Output power off**	Vacuum on ↓ Max. vacuum on	Idle	On → Idle Idle → Idle
Restore power **Input power on** **Output power on**	Vacuum on Air economizing 600 to 520 mbar	Idle	Idle

B

Dimensions



Optional mounting plate

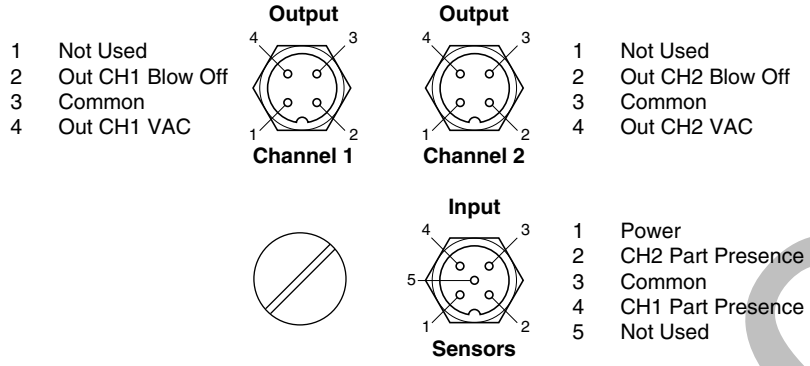


B

M12, 24VDC

Output - 4-Pin, M12, Keyed male

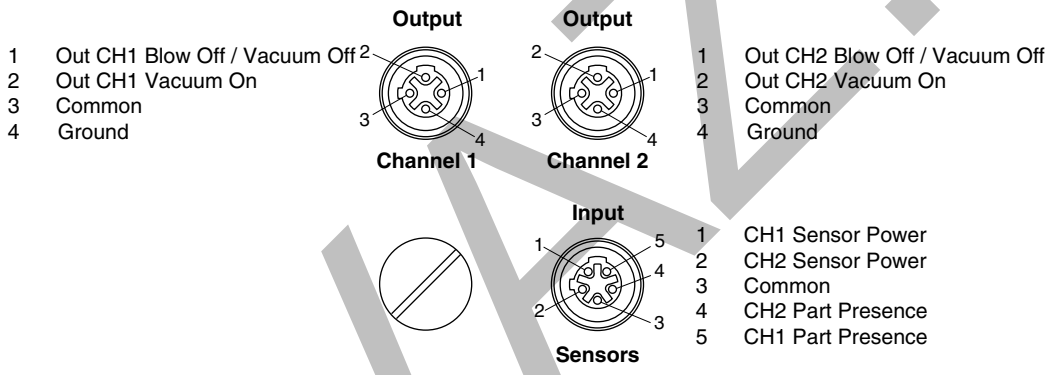
Input - 5-Pin, M12, Keyed male



M12, 110VAC

Output - 4-Pin, M12, Double keyed male

Input - 5-Pin, M12, Double keyed male

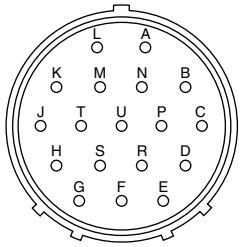


M18, 24VDC & 110VAC

18-Pin connector

24VDC

A	CH2 Blow Off
B	CH2 Sensor Power
C	CH2 Part Presence
D	CH2 VAC Control
E	CH1 Blow Off
F	CH1 Sensor Power
G	CH1 Part Presence
H	CH1 VAC Control
J	DC Voltage Monitor
K	Common
L	Ground
M	Not Used
N	Not Used
P	Output Power
R	Not Used
S	Not Used
T	Not Used
U	Not Used



Face View - Male 18-Pin Connector

110VAC

A	CH2 Blow Off
B	CH2 Sensor Power
C	CH2 Part Presence
D	CH2 VAC Control
E	CH1 Blow Off
F	CH1 Sensor Power
G	CH1 Part Presence
H	CH1 VAC Control
J	AC Voltage Monitor
K	Common
L	Ground
M	Not Used
N	Not Used
P	Not Used
R	Not Used
S	Not Used
T	Output Power
U	Not Used

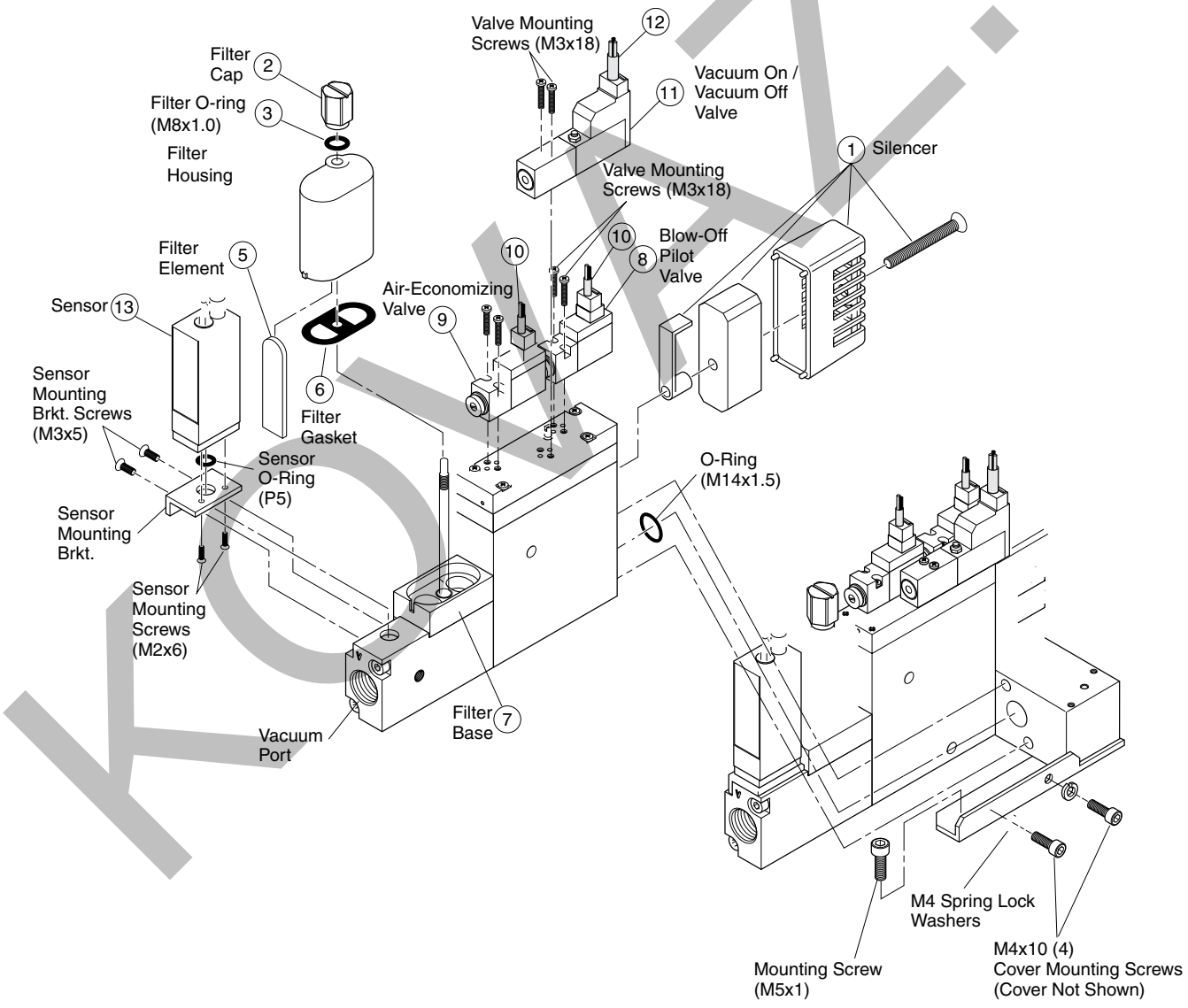
Notes: Pin B & F are jumpered inside unit.
Either pin can connect power to both sensors.

Pin P / T & J are jumpered inside unit.
This is for monitoring power only. Pin P / T is not necessary for operation of the unit.

B

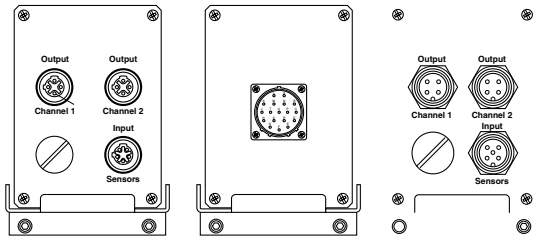
Replacement components

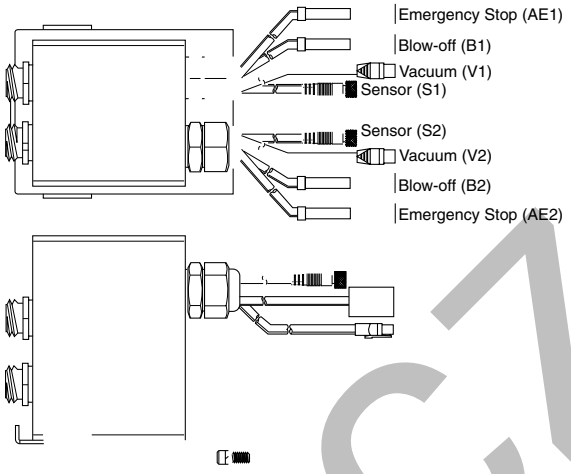
Item	Part number	Description
1	CVK-S	Silencer
2 thru 7	CVK-F	Filter kit
5	CVK-E	Filter element
8	MC2-24-B-10-D	Blow-off pilot valve
9	MC2-24-A-10-V	Air-economizing valve
10	MC2-CB10	1000mm clip lead
11	PCL241B-NB-D24UM	Vacuum on / off valve, PNP
	VAO1PLC241PE	Vacuum on / off valve, NPN
12	PL1-CB10	1000mm clip lead
13	MPS-V2C-NC	Pressure sensor
14	CB-M8-4P-2M	4-Pin, M8, sensor cable
1 thru 9	CEK27HSZC24PBLN	CEK generator only
1 thru 9, 13	CEK27HS21C24PBLN	CEK generator & sensor



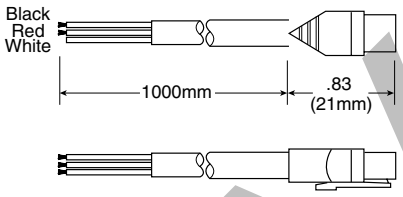
Discrete kits

PSCEKD1A - M12, 110VAC
PSCEKN1A - M18, 110VAC
PSCEKN3A - M18, 24VDC
PSCEKD3A - M12, 24VDC

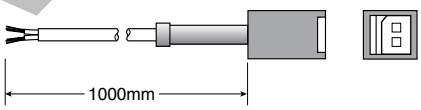




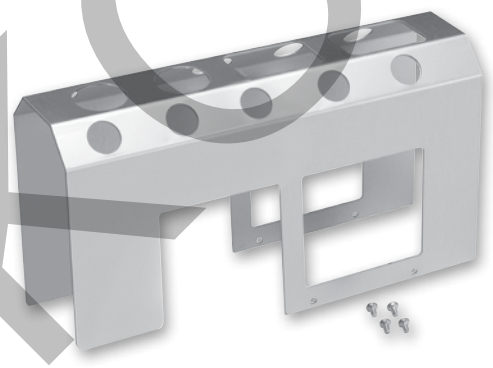
PL1-CB10, Valve cable
Black Wire, Solenoid B, vacuum off
Red Wire, Common
White Wire, Solenoid A, Vvacuum on



MC22-CB10 Valve Cable
(Connects Power Source to the Air-Economizing & Blow-off Release Pilot Valves)
Positive "+" (Red Wire)
Negative "-" (Black Wire)



ENC244
Cover



⚠ Cautions

Do not use or expose the CEK with fluids or corrosive gases. Vacuum Venturi's are designed to be used with non-lubricated, non-corrosive, compressed air.

Do not operate CEK generators outside the temperature range and pressures listed in the specifications section of this catalog. Regulate the compressed air to 70PSI and filtrate with a maximum 40 micron filter. Non-lubricated compressed air will maintain the life and vacuum level of the generator.

Check the insulation of all lead wires after installation to avoid shorts. Properly secure all lead wires to avoid stress or repeated movement that may fray lead wires.

Some electrical components are diode or zener diode protected. When installing solenoids and sensors, check the polarity of the component before applying power. Apply the appropriate voltage to the solenoids and sensors. Inappropriate voltage, shorts, or surges may damage the circuitry.