
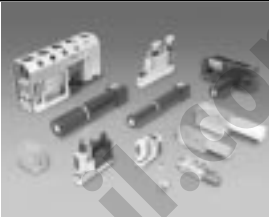







Vacuum Cups	www.parker.com/pneu/vaccup		A Vacuum Cups
Generators	www.parker.com/pneu/vacgen		B Generators
Sensors	www.parker.com/pneu/sensors		C Sensors
Control Valves			D Control Valves
Vacuum Accessories			E Vacuum Accessories
Mini Cylinders			F Mini Cylinders
Fittings & Tubing			G Fittings & Tubing
Safety Guide, Offer of Sale			H Safety Guide, Offer of Sale

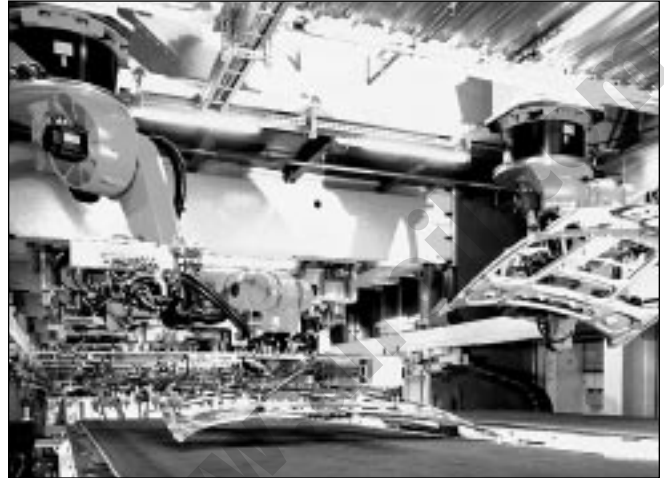
Notes

- Think systems – create technical solutions!

For paper handling...



For robotic handling...

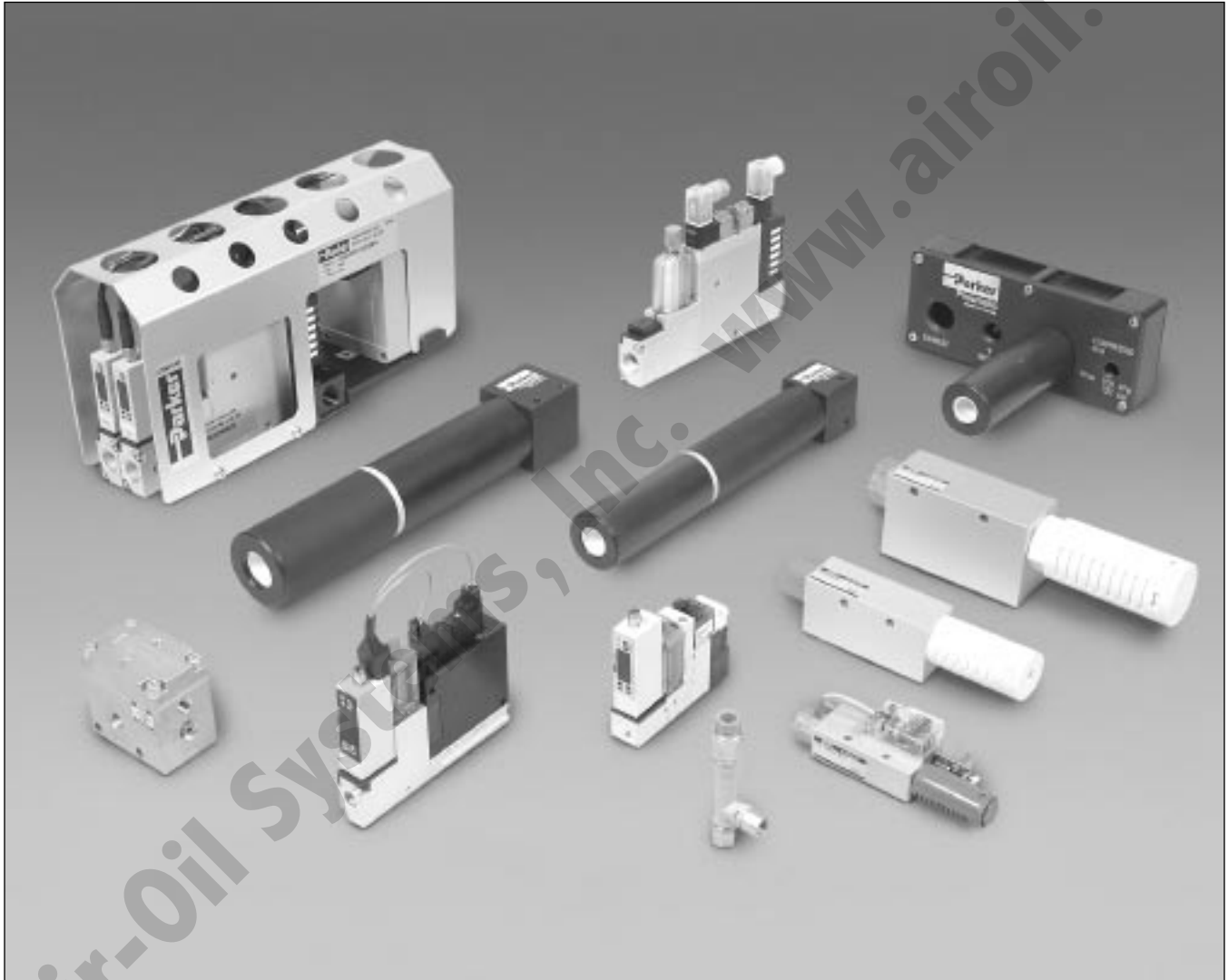


Section B

www.parker.com/pneu/vacgen



B











Generator Selection	How to Select a Generator	B4-B7
MCA 	<p>MCA is a Venturi Generator for inline Mounting. MCA is lightweight Generator that can be located directly on the cup fitting for space savings. Great for use with TYS level compensators. Additional Pneumatic Control Valve is required to create vacuum flow.</p>	B8-B11
CV 	<p>CV is a Venturi Generator for inline mounting, precision manufactured for long life. Aluminum basic body includes exhaust muffler. Stainless Steel and Teflon options are available for adverse environments. Additional Pneumatic Control Valve is required to create vacuum flow.</p>	B12-B15
CV-CK 	<p>CV-CK is a Venturi Generator with adjustable open contact mechanical switch for vacuum confirmation. Great for low cost vacuum confirmation. Additional Pneumatic Control Valve is required to create vacuum flow.</p>	B16-B19
CV-VR 	<p>CV-VR is a Venturi Generator for inline mounting with an automatic blow-off function. The CV-VR has an built in reservoir that automatically creates blow-off pressure when compressed air flow to the unit is stopped . Typical vacuum systems that use blow-off functions require two Pneumatic Control Valves. One to create vacuum flow and one for part blow-off. The CV-VR eliminates the need for a second Pneumatic Control Valve</p>	B20-B23
HF 	<p>HF - High Flow Series is a multistage vacuum generator. The HF Series is light weight for end of arm applications with a space saving low profile design. HF Series is intended for high flow vacuum applications that due to system porosity issues have a low application degree of vacuum. These units are ideal for porous applications. The HF Series comes standard with an integrated flow thru exhaust muffler. Additional Pneumatic Control Valve is required to create vacuum flow.</p>	B24-B25
CHF 	<p>CHF- High Flow Series is a multistage vacuum generator. CHF unit is intended for high flow vacuum applications that due to system porosity issues have a low application degree of vacuum. These units are ideal for porous applications. 4 bolt mounting pattern with gauge opposite of vacuum and pressure inlet ports enables this generator to be panel mounted. CHF Series comes standard with flow thru exhaust mufflers to reduce clogging in dirty environments. Additional Pneumatic Control Valve is required to create vacuum flow.</p>	B26-B27

B



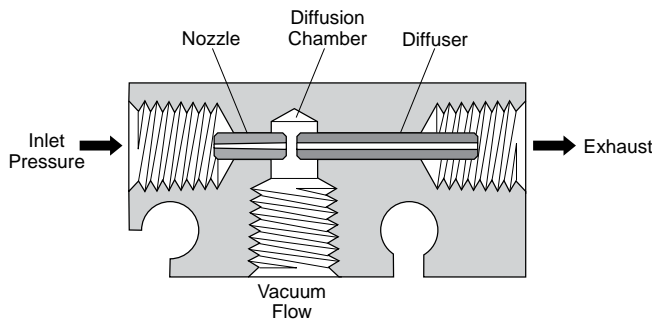
<p>MC2</p> 	<p>MC2 is a compact light weight 20mm wide Venturi generator with integrated components. Great for high speed automation processes. MC2 Generator integrated components include valves for vacuum and blow-off functions, blow-off flow regulating valve, exhaust and vacuum filters. Optional pressure sensors can reduce cycle time and provide for reduction of overall wiring with the MVS-201 Sensor. Additional Pneumatic Valves are not required to create vacuum and blow-off functions. Inline versions can be mounted in manifolds up to 8 stations.</p>	<p>B28-B35</p>
<p>MC3</p> 	<p>MC3 is a Sub Compact 10mm wide integrated Venturi generator for high speed pick and place applications. MC3 Generator integrated components include valves for vacuum and blow-off functions, exhaust and vacuum filters. Optional MPS-9 pressure sensors with a 1 msec response time reduces cycle time. Additional Pneumatic Valves are not required to create vacuum and blow-off functions. Inline versions can be mounting in manifolds up to 8 stations.</p>	<p>B36-B41</p>
<p>CVR2</p> 	<p>CVR-2 has a higher flow rate than the MC2. CVR2 Generator integrated components include valves for vacuum and blow-off functions, blow-off flow regulating valve, exhaust ,vacuum filters and a vacuum check valve. Optional pressure sensors reduce cycle time and can provide for reduction of overall wiring with the MVS-201 Sensor. Air economizing can be utilized with the vacuum check valve to conserve air consumption during part transfer. Single units and Generator Manifolds up to 10 stations are available.</p>	<p>B42-B49</p>
<p>CVK</p> 	<p>CVK Venturi Generator is for higher vacuum flow rates than the CVR2. This unit can be used for high-speed pick and place and material handling systems. CVK Generator integrated components include valves for vacuum and blow-off functions, blow-off flow regulating valve, exhaust ,vacuum filters and a vacuum check valve. Optional pressure sensors reduce cycle time and can provide for reduction of overall wiring with the MVS-201 Sensor. Air economized can be utilized with the vacuum check valve to conserve air during part transfer. Inline versions can be mounted in manifolds up to 5 stations.</p>	<p>B50-B57</p>
<p>CEK</p> 	<p>CEK Venturi Generator is a basic CVK Generator with the addition of a memory valve that maintains the last state of air during an emergency stop or power loss. The CEK Generator integrated components include valves for vacuum, air economizing, and blow-off functions, blow-off flow regulating valve, vacuum filters and a vacuum check valve. Optional pressure sensors reduce cycle time and can be used for air economizing to conserve air during part transfer. Inline versions can be mounted in manifolds up to 5 stations.</p>	<p>B58-B63</p>
<p>CVXCEK</p> 	<p>CVXCEK Venturi Generator is a basic 2 station CEK Generator Manifold with the addition of Emergency Stop Functions that maintains the last state of air during an emergency stop or power loss. This unit can be used for high-speed pick and place and material handling systems. CVXCEK Generator integrated components include valves for vacuum and blow-off functions, blow-off flow regulating valve, exhaust ,vacuum filters and an optional vacuum check valve. Air economizing can be utilized with the vacuum check valve to conserve air during part transfer. No additional PLC programming is required for Air Economizing Functions because this function is built into the electrical unit.</p>	<p>B64-B71</p>
<p>Glossary</p>		<p>B72-B73</p>
<p>Evacuation Time Chart - Basic Vacuum Generators</p>		<p>B74</p>
<p>Vacuum Flow Chart - Basic Vacuum Generators</p>		<p>B75</p>
<p>Evacuation Time Chart - Integrated Vacuum Generators</p>		<p>B76</p>
<p>Vacuum Flow Chart - Integrated Vacuum Generators</p>		<p>B77</p>

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.



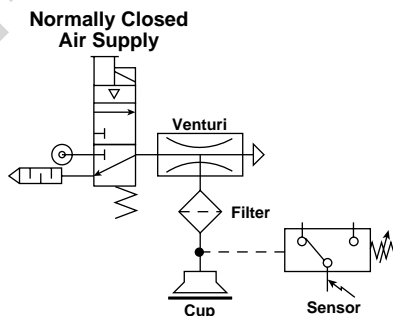
Additional Advantages to Venturi Generators

- No Moving Components
- Low Maintenance
- Long Life
- Responsive
- Physically Small
- Cost Effective

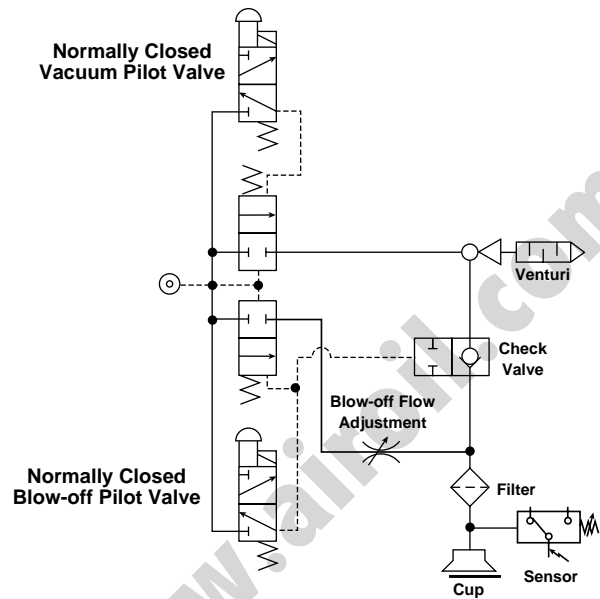
Applying the Venturi Generator

There are two basic approaches when designing a vacuum system with venturi generators.

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.

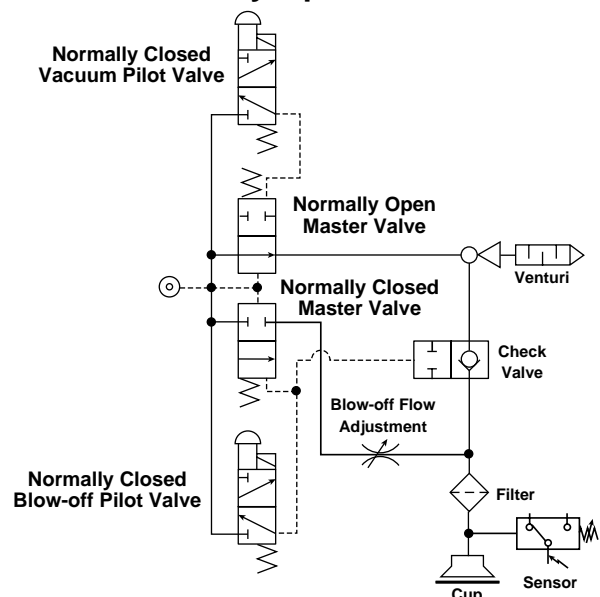


There are several advantages to an integrated venturi system. The response time of the vacuum and blow-off functions are greatly reduced compared to basic venturi generators, the installation time is also reduced which makes this a cost effective system and the compact size allows the integrated unit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

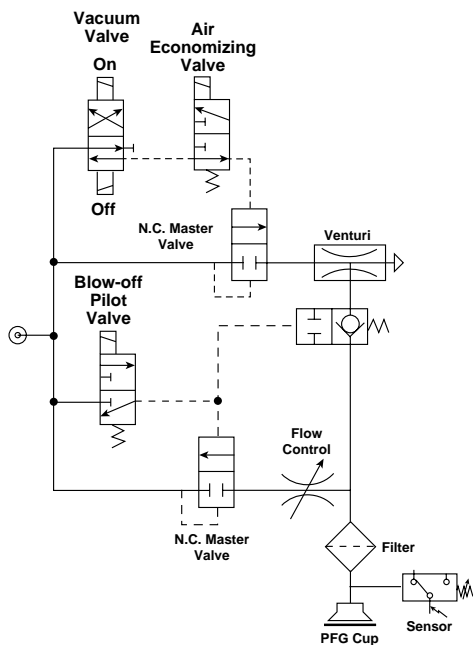
Venturi Generator with Power Loss Circuits

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

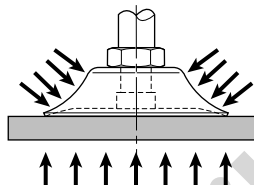


Valve Controlled Emergency Stop Circuit (See CEK Vacuum Generator)



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. inches (mm)	Flow (Cv)
0.5 mm	0.157 (4)	0.16
1.0 mm	0.157 (4)	0.16
1.5 mm	0.236 (6)	0.379
2.0 mm	0.315 (8)	0.65
2.5 mm	0.315 (8)	0.95
3.0 mm	0.393 (10)	1.35

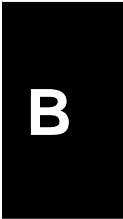
If pressure drops occur due to other pneumatic components or a manifold venturi system, it may be necessary to increase the valve and / or supply line tubing I.D..

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 inches (mm)
0.5 mm	.79 (20)
1.0 mm	1.97 (50)
1.5 mm	2.36 (60)
2.0 mm	4.72 (120)
2.5 mm	5.91 (150)
3.0 mm	7.87 (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.



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 ft³.

The evacuation time charts are given for a 1 cubic foot (ft³) volume. To use these charts, convert the time requirement of the system to an equivalent time for a 1 cubic foot (ft³) volume. In this example, 1 cubic foot (ft³) is 500 times the system volume of 0.002 ft³. Multiply the system time requirement by 500 (500 x 0.25 secs = 125 seconds). Any generator with an 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 PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ to reach different Vacuum Levels (inHg)								
			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 ft³ = 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 Dia.	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		Tubing Length (L)	
SAE	mm	In.	M
5/64	2	18	.457
3/32	2.38	24	.610
1/8	3.17	30	.762
5/32	4	36	.914
3/16	4.76	42	1.07
1/4	6.35	48	1.22
5/16	8	54	1.37
3/8	9.52	60	1.52
7/16	11.1	66	1.67

SAE x 25.4 =mm In. x 254 =M

Pad Volume Reference (P_v)

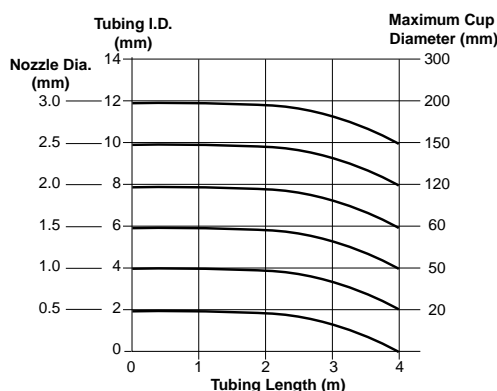
PFG			PBG			PCG		
Ø	Cu in.	L	Ø	Cu in.	L	Ø	Cu in.	L
2	.00004	.0000006	10	.013	.0002	5	.002	.00003
3.5	.0001	.000002	15	.045	.0007	7	.003	.00004
5	.0003	.000005	20	.070	.001	10	.010	.0001
6	.00048	.000008	30	.28	.004	15	.060	.0009
8	.002	.00003	40	.56	.009	18	.082	.001
10	.004	.00007	50	1.60	.026	20	.123	.002
15	.012	.0002	75	4.63	.076	30	.595	.009
20	.03	.0005	110	6.77	.111	40	1.15	.018
25	.067	.0011	150	15.86	.26	60	4.40	.072
30	.067	.0011				90	10.00	.1639
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						

1 ft³ = 28.31 liters
1 ft³ = 1728 in³

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.





MCA

B

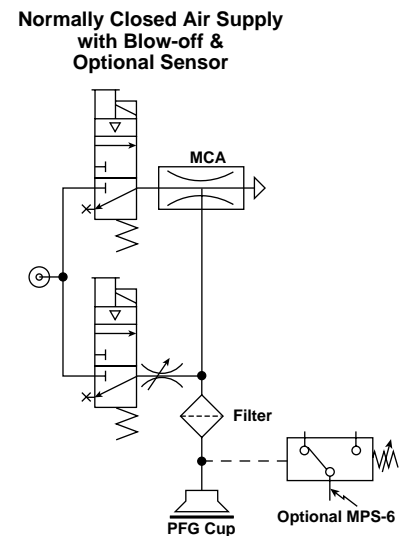
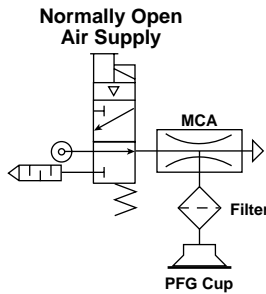
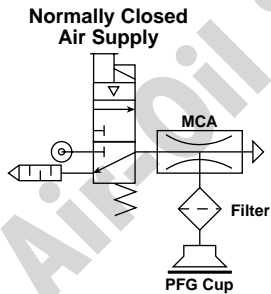
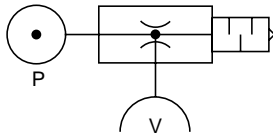


Features

- **Very Compact and Lightweight**
- **One-Touch Fittings for Threaded Connection**
- **Mount Directly to Level Compensators**
- **Short Response Time When Locating Near Cups**
- **Vacuum Flow Rates from 0.21 to 1.26 SCFM**

Characteristics

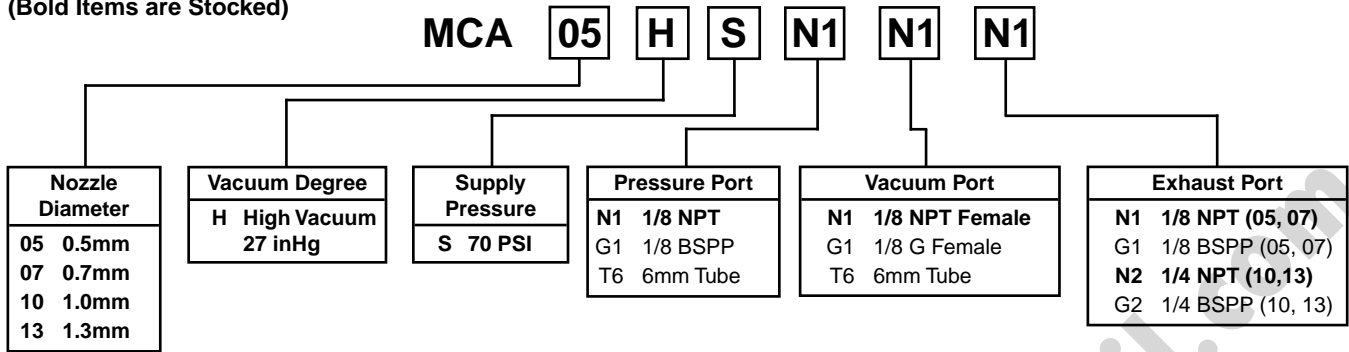
The MCA is the size of a normal push-lock tube fitting. It can be located in very restrictive areas close to the pick-and-place application to reduce the response time. The durable resin body makes the unit lightweight and friendly to end-of-arm tooling. The connections are easily interchangeable to accommodate tube fittings or female threads.





Model Number Index

(Bold Items are Stocked)



Specifications

Media	Non-Lubricated Air, Non-Corrosive Gases
Operating Pressure	14 to 114 PSI
Operating Temperature	32° to 120°F
Material	Polycarbonate, Aluminum Fittings
Generator Weight	05HS: 0.6 oz., 07HS, 07LS, 10HS, 10LS, 13HS: 0.8 oz.

Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure	Air Consumption	Evacuation Time in sec / ft ³ to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
MCA05HS	70	0.47	20.9	48.3	82.0	125.4	181.9	249.7	353.1	494.4	—
MCA07HS	70	0.80	9.6	21.2	35.0	55.9	87.6	130.5	182.2	262.4	—
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	—

* 1 ft³ = 28.31 liters

Vacuum Flow (SCFM)

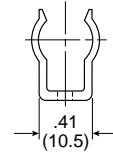
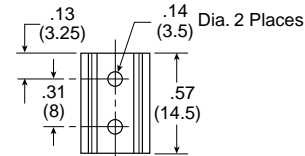
Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30
MCA05HS	.18	.16	.19	.12	.10	.08	.07	.05	.03	—	—
MCA07HS	.41	.37	.32	.27	.22	.18	.14	.10	.06	—	—
MCA10HS	.88	.78	.68	.58	.47	.37	.26	.16	.06	—	—
MCA13HS	1.26	1.11	.96	.81	.67	.53	.39	.25	.11	—	—



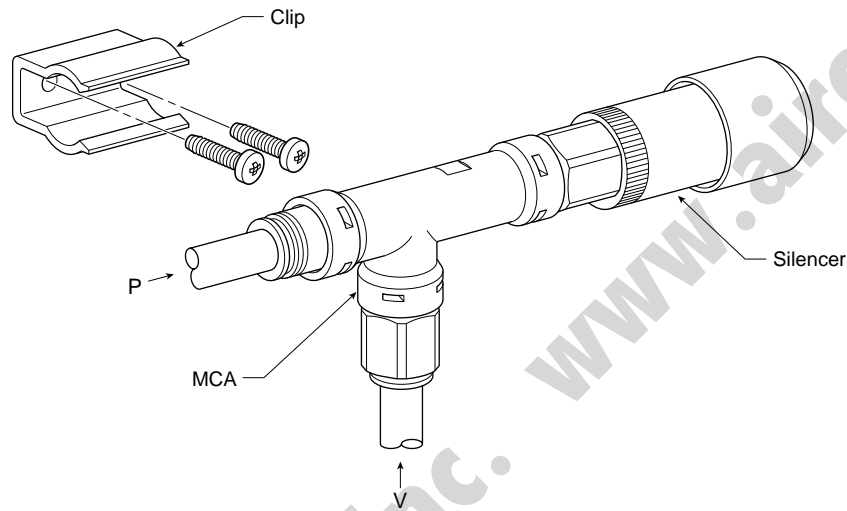


Replacement Components

Item	Model Number	Generator
Silencer	MSS-01	MCA05HS
		MCA07HS
Silencer	MSM-01	MCA10HS
		MCA13HS
Bracket	MCA-B	MCA05, 07, 10, 13



MCA-B



Installation

Install clip and secure MCA unit. Silencers are not included with the MCA generator series. Silencers or exhaust mufflers must be ordered separately and properly installed to manage the exhaust created by the venturi. If a tube connector is selected for the exhaust port option, plumb the exhaust to an appropriate collector.

⚠ Cautions

Do not operate MCA generators outside the temperature range and pressures listed in the specifications section of this catalog.

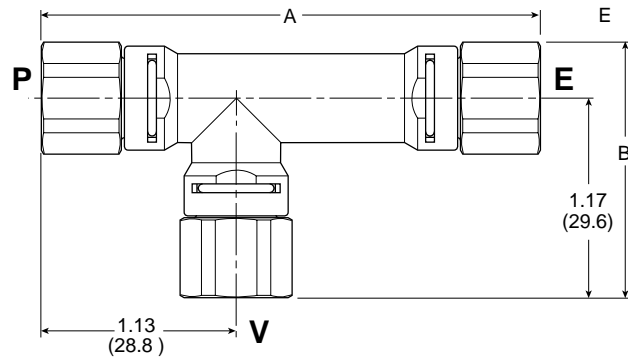
All normally closed valve supply circuits will interrupt the air supply to the venturi during a power failure or Emergency Stop condition. As a result, the product being transferred may be dropped, possibly creating a hazard to the surrounding environment. To avoid hazardous situations during a power loss or Emergency Stop condition, consider a normally open valve supply circuit or an Emergency Stop system.

It is always recommended to dedicate one suction cup to a single MCA generator for the best response and maximize the vacuum level per individual cup. If more than one cup is used per generator, the vacuum level of the pick-and-place system may drop to an unsafe level if one of the pads separates from the product.

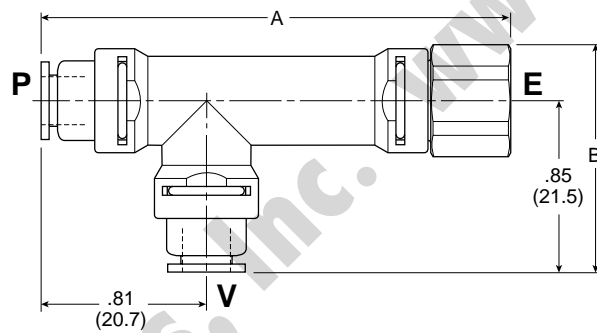
B



Dimensions



MCA**N1N1N1**
MCA**N1N1N2**



MCA**T6T6N1**
MCA**T6T6N2**

Item	A	B	P (Pressure Port)	V (Vacuum Port)	E (Exhaust Port)
MCA05HSN1N1N1	2.17 (55.2)	1.10 (28)	NPT-1/8" Female	NPT-1/8" Female	NPT-1/8" Female
MCA05HST6T6N1	2.17 (55.2)	1.10 (28)	One-touch Ø6mm	One-touch Ø6mm	NPT-1/8" Female
MCA07HSN1N1N1	2.17 (55.2)	1.10 (28)	NPT-1/8" Female	NPT-1/8" Female	NPT-1/8" Female
MCA07HST6T6N1	2.17 (55.2)	1.10 (28)	One-touch Ø6mm	One-touch Ø6mm	NPT-1/8" Female
MCA10HSN1N1N2	2.76 (70)	1.16 (29.5)	NPT-1/8" Female	NPT-1/8" Female	NPT-1/4" Female
MCA10HST6T6N2	2.76 (70)	1.16 (29.5)	One-touch Ø6mm	One-touch Ø6mm	NPT-1/4" Female
MCA13HSN1N1N2	2.76 (70)	1.16 (29.5)	NPT-1/8" Female	NPT-1/8" Female	NPT-1/4" Female
MCA13HST6T6N2	2.76 (70)	1.16 (29.5)	One-touch Ø6mm	One-touch Ø6mm	NPT-1/4" Female

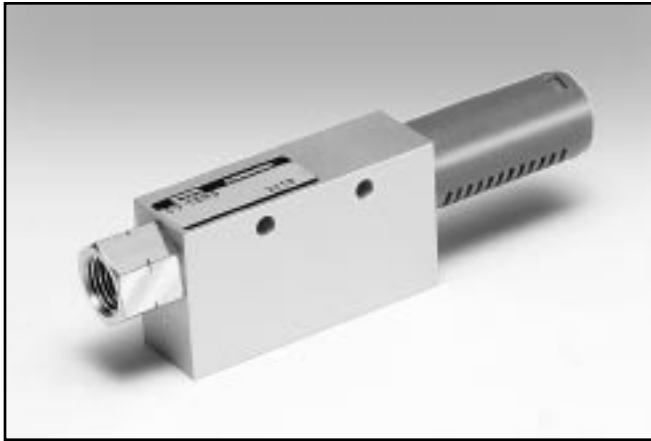
Inches (mm)





CV

B

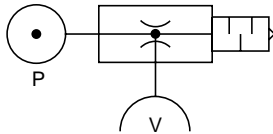


Features

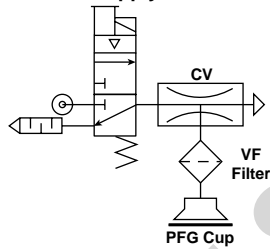
- Durable and Long Life
- Anodized Aluminum Body
- Aluminum Body Includes Exhaust Muffler
- Vacuum Levels - 17 inHg or 27 inHg
- Vacuum Flow Rates from 0.21 to 12.36 SCFM
- 303 SS and PTFE Materials Available

Characteristics

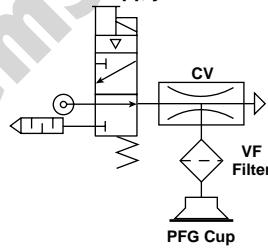
The CV is the original and most popular venturi. The basic CV unit is applicable to almost any application. The aluminum / brass nozzle construction is durable and virtually maintenance free over the long life of the unit.



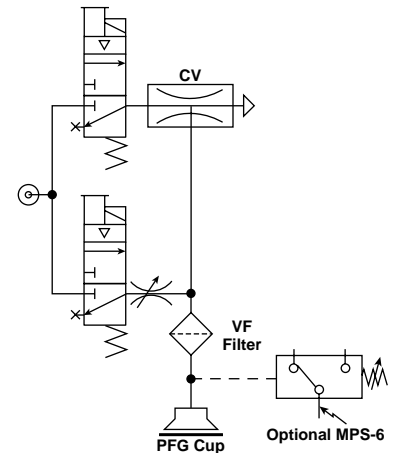
Normally Closed Air Supply



Normally Open Air Supply



Normally Closed Air Supply with Blow-off & Optional Sensor



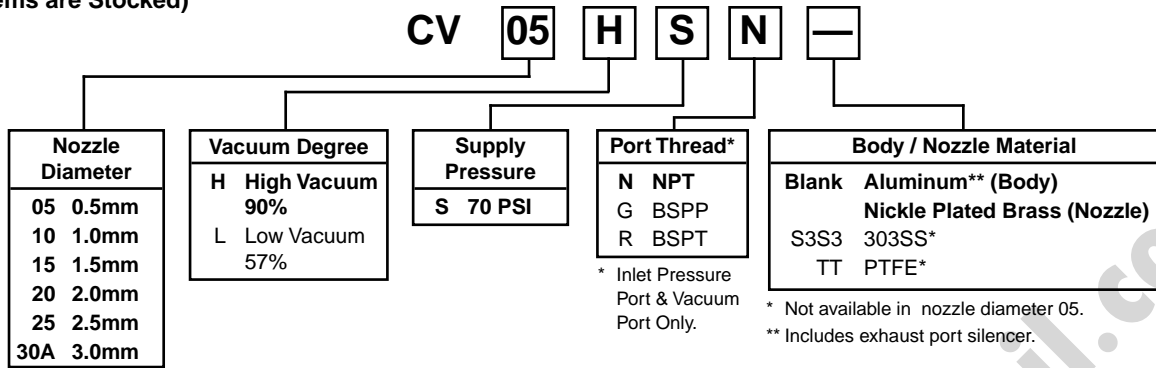
Specifications

Media	Non-Lubricated Air, Non-Corrosive Gases
Operating Pressure	14 to 114 PSI
Operating Temperature	32 to 120°F
Material	Body: Aluminum, 303 Stainless, or PTFE Nozzle: Nickel plated brass, 303 Stainless, PTFE
Generator Weight	05HS, 05LS, 10HS, 10LS: 2.8 oz., 15HS, 15LS: 4.9 oz., 20HS, 20LS: 12.3 oz., 25HS, 25LS: 25.6 oz., 30AHS, 30ALS: 29.8 oz.



Model Number Index

(Bold Items are Stocked)



Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ * to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
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	—	—	—	—

* 1 ft³ = 28.31 liters

Vacuum Flow (SCFM)

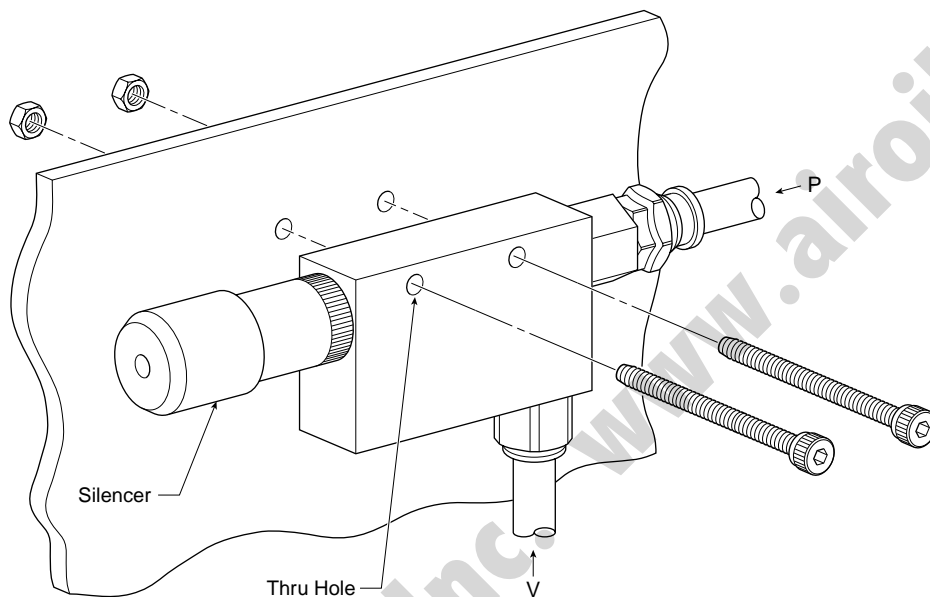
Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30Dia.
CV05HS	.21	.19	.17	.15	.13	.11	.09	.07	.05	.03	—
CV05LS	.32	.27	.22	.17	.12	.06	—	—	—	—	—
CV10HS	.95	.85	.75	.65	.55	.45	.35	.25	.15	.05	—
CV10LS	1.27	1.05	.83	.59	.38	.17	—	—	—	—	—
CV15HS	2.22	1.98	1.74	1.50	1.26	1.01	.76	.51	.26	.10	—
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	—	—	—	—	—





Replacement Components

Item	Model Number	Generator
Silencer	MSS-01	CV05HS/LS
		CV10HS/LS
Silencer	MSM-01	CV15HS/LS
Silencer	MSL-02	CV20HS/LS
Silencer	MS6-01	CV25HS/LS
		CV30AHS/LS



Installation

Secure CV unit. Silencers are included with the CV generator series. If a tube connector is selected by the user for the exhaust port as opposed to the silencer, plumb the exhaust to an appropriate collector.

⚠ Cautions

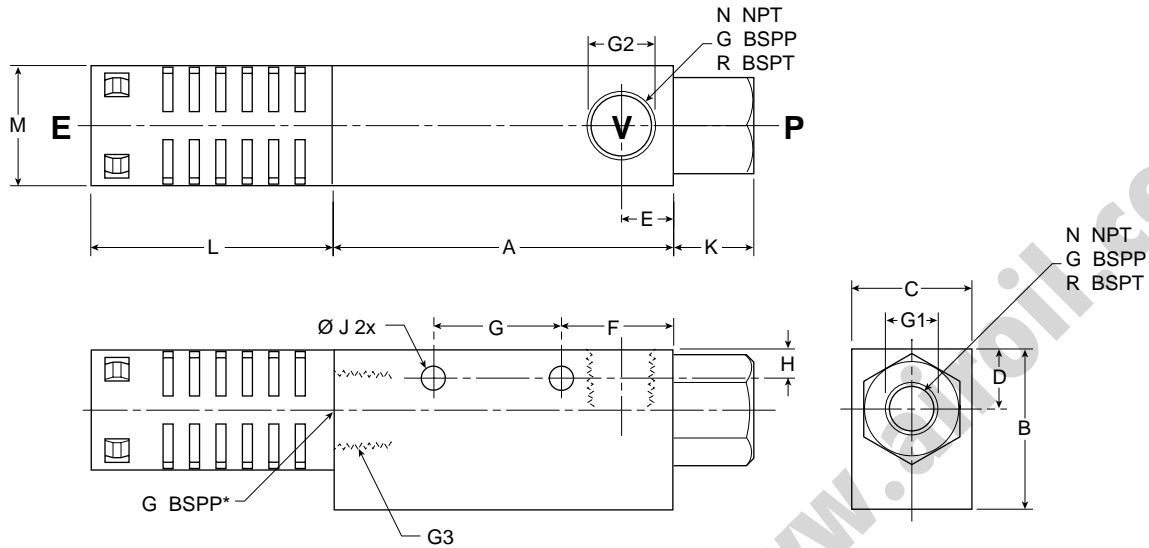
Do not operate CV generators outside the temperature range and pressures listed in the specifications section of this catalog.

All normally closed valve supply circuits will interrupt the air supply to the venturi during a power failure or Emergency Stop condition. As a result, the product being transferred may be dropped, possibly creating a hazard to the surrounding environment. To avoid hazardous situations during a power loss or Emergency Stop condition, consider a normally open valve supply circuit or an Emergency Stop system.

It is always recommended to dedicate one suction cup to a single CV generator for the best response and maximize the vacuum level per individual cup. If more than one cup is used per generator, the vacuum level of the pick-and-place system may drop to an unsafe level if one of the pads separates from the product.



Dimensions



***Note:** Stainless Steel and PTFE CV units do not include silencer and exhaust port "G3" utilizes NPT thread instead of the standard BSPP thread port used for Aluminum units. Omit the "L" dimension for Stainless Steel and PTFE units.

Item	A	B	C	D	E	F	G	H	J	K	L	M	G1	G2	G3
CV05HS/LS	1.77 (45)	1.30 (33)	.63 (16)	.39 (10)	.31 (8)	.55 (14)	.79 (20)	.18 (4.5)	.17 (4.2)	.39 (10)	1.42 (36)	.73 (18.5)	1/8 NPT	1/8 NPT	1/8 BSPP
													1/8 BSPP	1/8 BSPP	
													1/8 BSPT	1/8 BSPT	
CV10HS/LS	1.77 (45)	1.30 (33)	.63 (16)	.39 (10)	.31 (8)	.55 (14)	.79 (20)	.18 (4.5)	.17 (4.2)	.39 (10)	1.42 (36)	.73 (18.5)	1/8 NPT	1/8 NPT	1/8 BSPP
													1/8 BSPP	1/8 BSPP	
													1/8 BSPT	1/8 BSPT	
CV15HS/LS	2.48 (63)	1.38 (35)	.79 (20)	.43 (11)	.39 (10)	.79 (20)	.98 (25)	.20 (5)	.18 (4.5)	.59 (15)	1.79 (45.5)	.79 (20)	1/4 NPT	1/4 NPT	1/4 BSPP
													1/4 BSPP	1/4 BSPP	
													1/4 BSPT	1/4 BSPT	
CV20HS/LS	3.35 (85)	1.57 (40)	1.18 (30)	.59 (15)	.51 (13)	1.10 (28)	1.26 (32)	.28 (7)	.24 (6)	.79 (20)	2.38 (60.5)	1.18 (30)	1/4 NPT	3/8 NPT	1/2 BSPP
													1/4 BSPP	3/8 BSPP	
													1/4 BSPT	3/8 BSPT	
CV25HS/LS	3.94 100	2.36 (60)	1.57 (40)	.79 (20)	.63 (16)	.79 (20)	1.97 (50)	.22 (5.5)	.24 (6)	.67 (17)	3.78 (96)	1.57 (40)	3/8 NPT	1/2 NPT	3/4 BSPP
													3/8 BSPP	1/2 BSPP	
													3/8 BSPT	1/2 BSPT	
CV30AHS/ALS	4.65 (118)	2.36 (60)	1.57 (40)	.79 (20)	.79 (20)	1.30 (33)	1.97 (50)	.22 (5.5)	.24 (6)	.79 (20)	3.78 (96)	1.57 (40)	1/2 NPT	3/4 NPT	3/4 BSPP
													1/2 BSPP	3/4 BSPP	
													1/2 BSPT	3/4 BSPT	

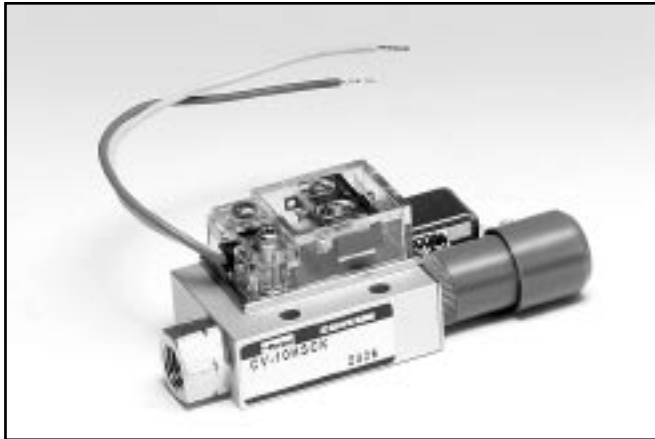
Inches (mm)





CV-CK

B

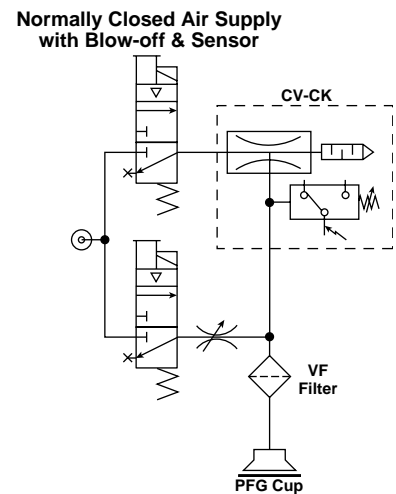
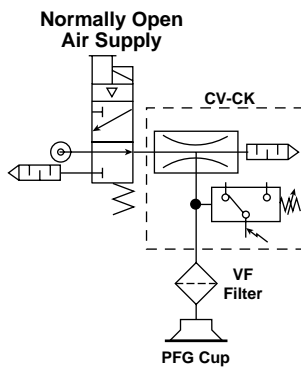
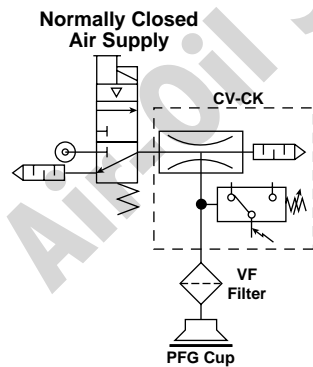


Features

- Adjustable Switch Between 5.9 and 15.74 inHg
- Standard Anodized Aluminum Body
- Aluminum Body Includes Exhaust Muffler
- Vacuum Levels - 17 inHg or 27 inHg
- Vacuum Flow Rates from 0.95 to 5.85 SCFM
- Exhaust Muffler Included with Aluminum Body

Characteristics

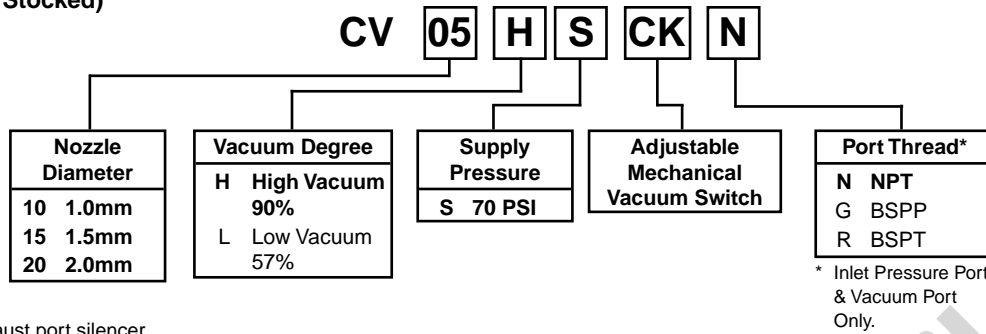
The CV-CK Series venturi is supplied with an adjustable open contact switch for vacuum confirmation. The switch point ranges between 5.9 and 15.74 inHg with a hysteresis of 1 to 3.9 inHg. The mechanical switch option is a cost effective method to confirm part presence.





Model Number Index

(Bold Items are Stocked)



Note: Includes exhaust port silencer.

Specifications

Media	Non-Lubricated Compressed Air, Non-Corrosive Gases
Operating Pressure	14 to 114 PSI
Operating Temperature	32 to 140°F
Material	Body: Aluminum Nozzle: Nickel Plated Brass
Setting Range	5.9 to 15.74 inHg
Accuracy	± 1.574 inHg
Hysteresis	1.08 to 3.93 inHg
Air Circuit	Normally Open
Switch Output	AC125V: 5A, AC250V: 3A, DC250V: 0.2A
Generator Weight	05HS, 05LS, 10HS, 10LS: 4.2 oz., 15HS, 15LS: 6.7 oz., 20HS, 20LS: 16.1 oz.

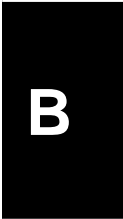
Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ * to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
CV10HSCK	70	1.55	4.8	9.9	16.0	24.9	35.9	51.4	77.4	117.5	226.0
CV10LSCK	70	1.55	3.7	7.6	13.0	20.3	33.1	—	—	—	—
CV15HSCK	70	3.53	2.5	4.8	7.0	11.0	15.5	22.0	31.9	46.6	112.1
CV15LSCK	70	3.53	2.0	3.1	5.0	7.6	12.1	—	—	—	—
CV20HSCK	70	6.36	0.7	2.8	5.0	6.5	9.0	13.0	18.9	27.4	60.7
CV20LSCK	70	6.36	1.1	2.0	3.0	3.7	5.6	—	—	—	—

* 1 ft³ = 28.31 liters

Vacuum Flow (SCFM)

Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30
CV10HSCK	.95	.85	.75	.65	.55	.45	.35	.25	.15	.05	—
CV10LSCK	1.27	1.05	.83	.59	.38	.17	—	—	—	—	—
CV15HSCK	2.22	1.98	1.74	1.5	1.26	1.01	.76	.51	.25	.10	—
CV15LSCK	3.35	2.79	2.23	1.67	1.10	.53	—	—	—	—	—
CV20HSCK	3.88	3.45	3.02	2.59	2.16	1.73	1.30	.87	.44	.25	—
CV20LSCK	5.85	5.09	4.03	2.97	1.91	.85	—	—	—	—	—

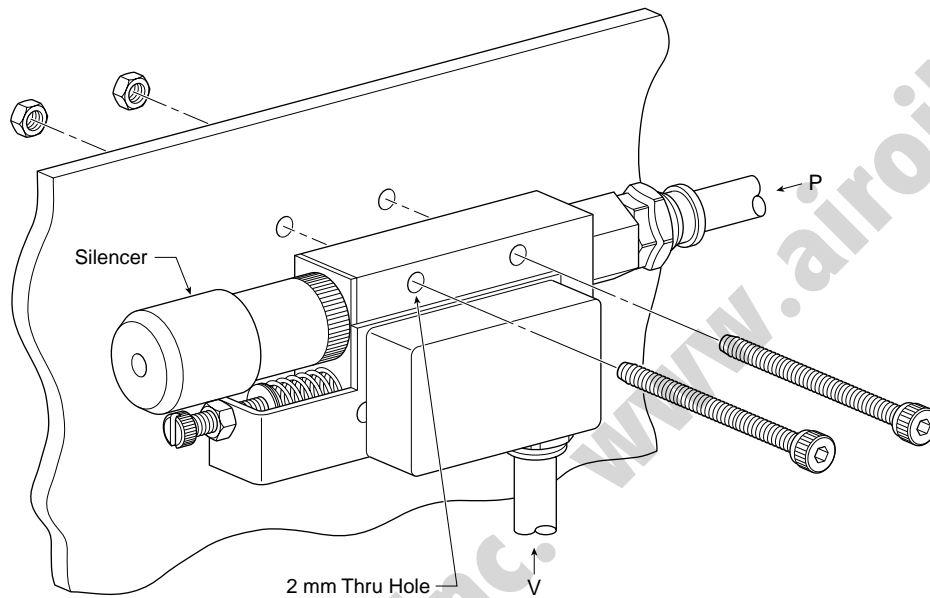




Replacement Components

Item	Model Number	Generator
Silencer	MSS-01	CV10HS/LSCK
Silencer	MSM-01	CV15HS/LSCK
Silencer	MSL-02	CV20HS/LSCK
Mechanical Switch	CV-CK	CV10 thru 20

B



Installation

Install clip and secure CV-CK unit. Silencers are included with the CV-CK generator series. If a tube connector is selected for the exhaust port option, plumb the exhaust to an appropriate collector.

⚠ Cautions

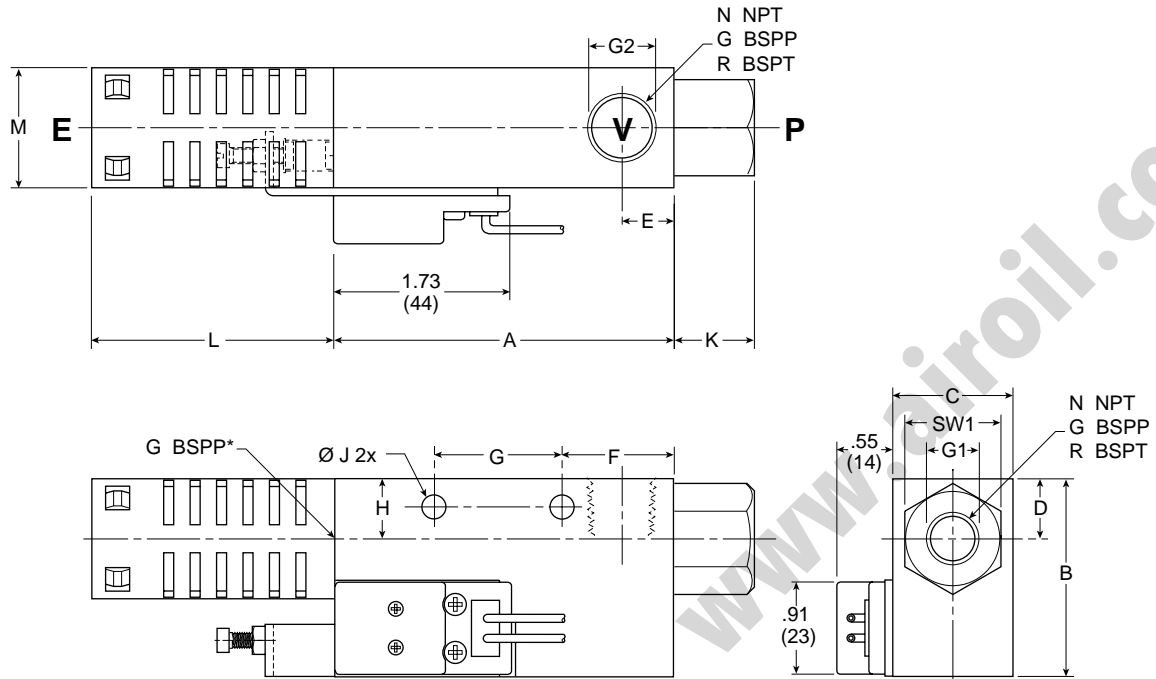
Do not operate CV-CK generators outside the temperature range and pressures listed in the specifications section of this catalog.

All normally closed valve supply circuits will interrupt the air supply to the venturi during a power failure or Emergency Stop condition. As a result, the product being transferred may be dropped, possibly creating a hazard to the surrounding environment. To avoid hazardous situations during a power loss or Emergency Stop condition, consider a normally open valve supply circuit or an Emergency Stop system.

It is always recommended to dedicate one suction cup to a single CV-CK generator for the best response and maximize the vacuum level per individual cup. If more than one cup is used per generator, the vacuum level of the pick-and-place system may drop to an unsafe level if one of the pads separates from the product.



Dimensions



Item	A	B	C	D	E	F	G	H	J	K	L	M	G1	G2	SW1
CV10HS/LSCK	1.77 (45)	1.30 (33)	.63 (16)	.39 (10)	.31 (8)	.55 (14)	.79 (20)	.18 (4.5)	17 (4.2)	.39 (10)	1.42 (36)	.73 (18.5)	NPS1/8	NPS1/8	.55 (14)
													BSPP1/8	BSPP1/8	
													BSPT1/8	BSPT1/8	
CV15HS/LSCK	2.48 (63)	1.38 (35)	.79 (20)	.43 (11)	.39 (10)	.79 (20)	.98 (25)	.20 (5)	.18 (4.5)	.59 (15)	1.79 (45.5)	.79 (20)	NPS1/4	NPS1/4	.67 (17)
													BSPP1/4	BSPP1/4	
													BSPT1/4	BSPT1/4	
CV20HS/LSCK	3.35 (85)	1.57 (40)	1.18 (30)	.59 (15)	.51 (13)	1.10 (28)	1.26 (32)	.28 (7)	.24 (6)	.79 (20)	2.38 (60.5)	1.18 (30)	NPS1/4	NPS3/8	.94 (24)
													BSPP1/4	BSPP3/8	
													BSPT1/4	BSPT3/8	

Inches (mm)





CV-VR

B

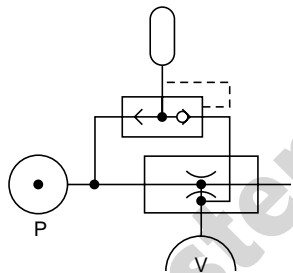


Features

- Auto Blow-off After Vacuum Cycle
- Rugged Aluminum Die Cast Construction
- Porting for Vacuum Sensor
- Porting for Additional Blow-off Flow Rate
- All Mechanical and Pneumatic
- Vacuum Flow Rate 2.22 SCFM

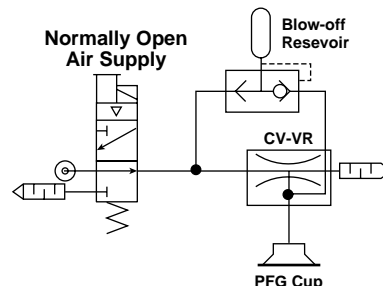
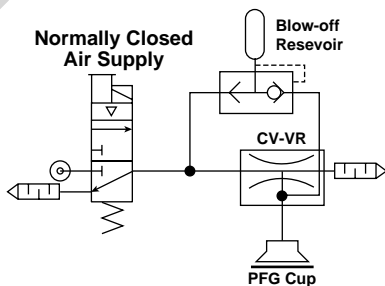
Characteristics

The CV-VR series venturi is perfect for applications that may require automatic blow-off capabilities for a totally pneumatic circuit; such as end of arm tooling or packaging applications. The CV-VR has a built-in reservoir that accumulates the blow-off release during the vacuum cycle. The blow-off release is immediate and automatic when the vacuum operation is discontinued.



Energize the Normally Closed valve to initiate vacuum. When De-energized, accumulated blow-off pressure automatically releases the product.

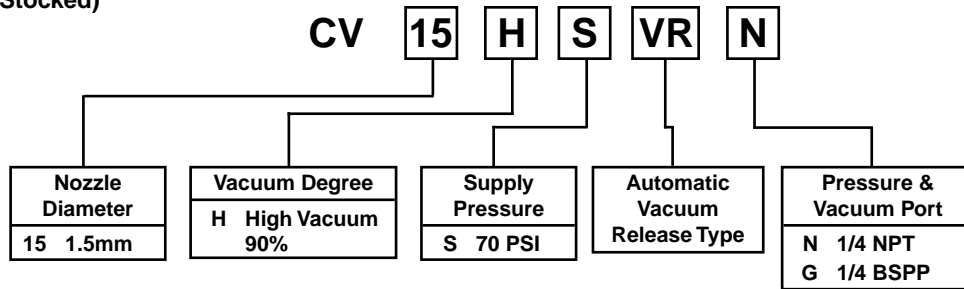
Energize the Normally Open valve to Deactivate vacuum. When Energized, accumulated blow-off pressure automatically releases the product.





Model Number Index

(Bold Items are Stocked)



Specifications

Media	Non-Lubricated Compressed Air, Non-Corrosive Gases
Operating Pressure	21 to 103 PSI
Operating Temperature	32 to 120°F
Material	Body: Die-Cast Aluminum Packing: NBR
Generator Weight	8.9 oz.

Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ * to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
CV15HSVR	70	3.53	2.5	4.8	7.0	11.0	15.5	22.0	31.9	46.6	112.1

* 1 ft³ = 28.31 liters

Vacuum Flow (SCFM)

Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30
CV15HSVR	2.22	1.98	1.74	1.5	1.26	1.01	.76	.51	.25	.10	—

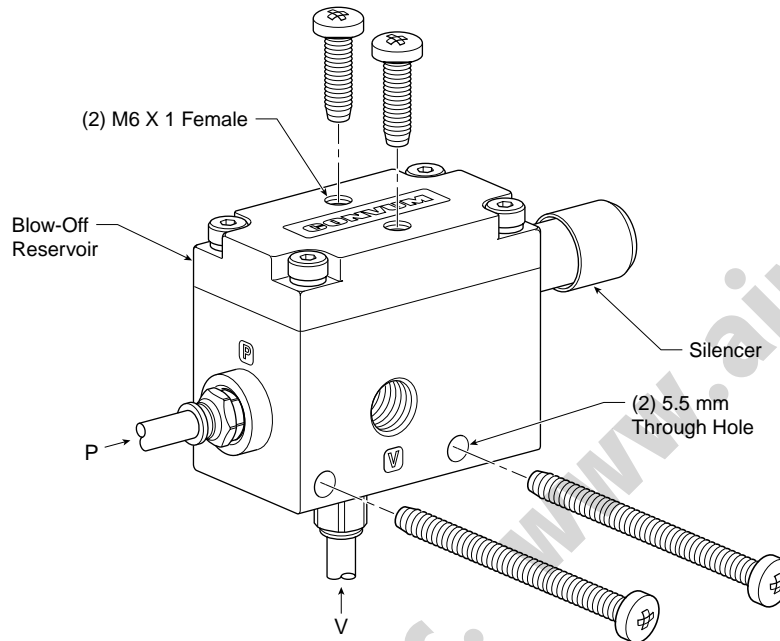




Accessories

Item	Model Number	Generator
Silencer	MSM-01	CV15HSVR*

* N (NPT) or G (BSPP)



Installation

Secure the CV-VR unit. Silencers are not included with the CV-VR generator series. Silencers or exhaust mufflers must be ordered separately and properly installed to manage the exhaust created by the venturi. If a tube connector is selected for the exhaust port option, plumb the exhaust to an appropriate collector.

Note:
 Plug Auxilliary Air Reservoir Port if not used.

Cautions

Do not operate CV-VR generators outside the temperature range and pressures listed in the specifications section of this catalog.

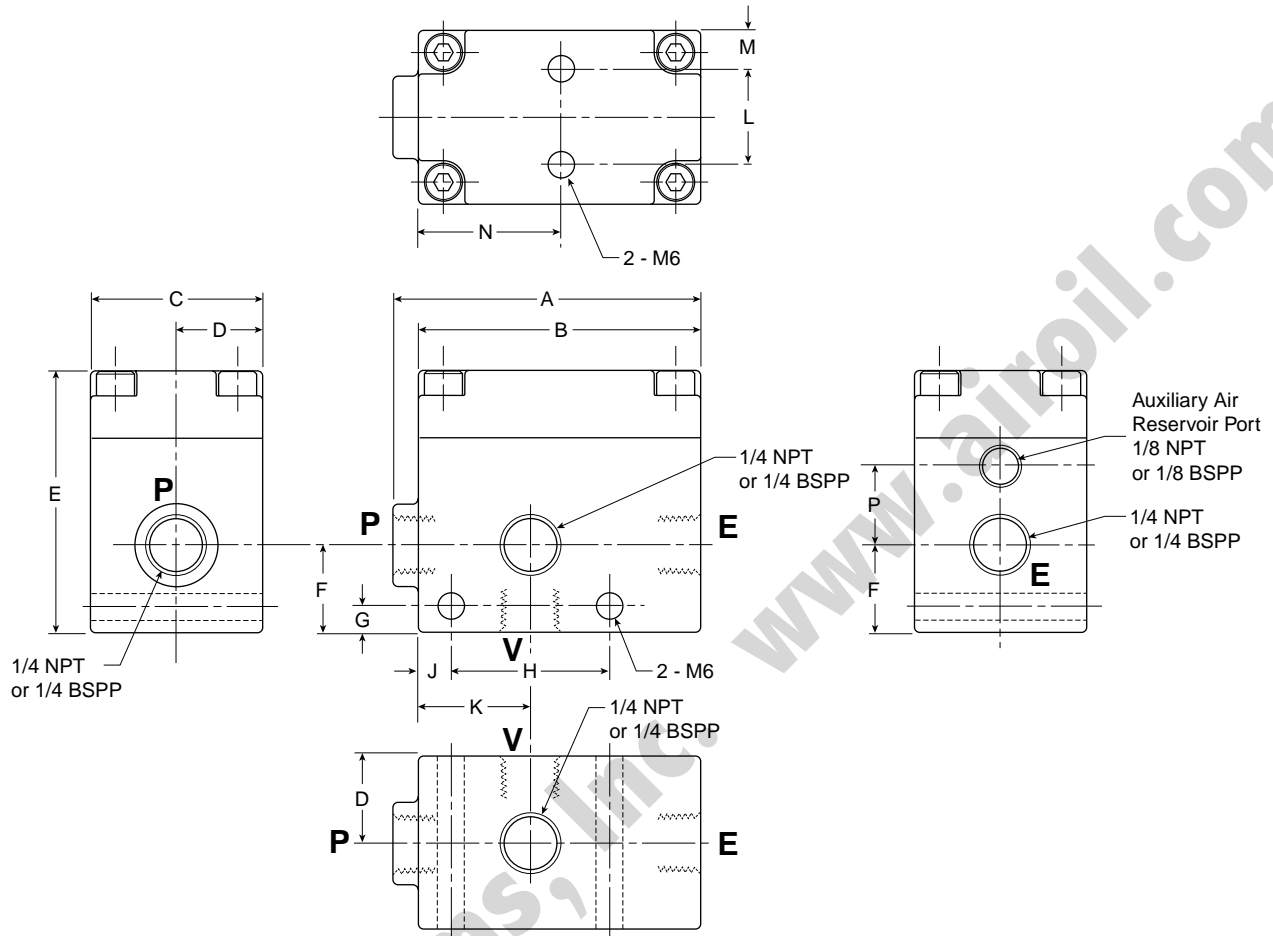
All normally closed valve supply circuits will interrupt the air supply to the venturi during a power failure or Emergency Stop condition. As a result, the product being transferred may be dropped, possibly creating a hazard to the surrounding environment. To avoid hazardous situations during a power loss or Emergency Stop condition, consider a normally open valve supply circuit or an Emergency Stop system.

It is always recommended to dedicate one suction cup to a single CV-CR generator for the best response and maximize the vacuum level per individual cup. If more than one cup is used per generator, the vacuum level of the pick-and-place system may drop to an unsafe level if one of the pads separates from the product.

B



Dimensions



Item	A	B	C	D	E	F	G	H	J	K	L	M	N	P
CV15HSVR	2.76 (70)	2.52 (64)	1.57 (40)	.79 (20)	2.36 (60)	.79 (20)	.24 (6)	1.42 (36)	28 (7)	.98 (25)	.87 (22)	.35 (9)	1.26 (32)	.69 (17.5)

Inches (mm)





HF



Features

- Multi-stage Venturi
- Anodized Aluminum Body
- Aluminum Body Includes Exhaust Muffler
- Maximum Vacuum Level, 27.3 inHg
- Vacuum Flow Rates from 22 to 91 SCFM
- New Low Profile Design
- Mounting Brackets Included

Model Number Index

(Bold Items are Stocked)

HF - **50** **Z** **N**

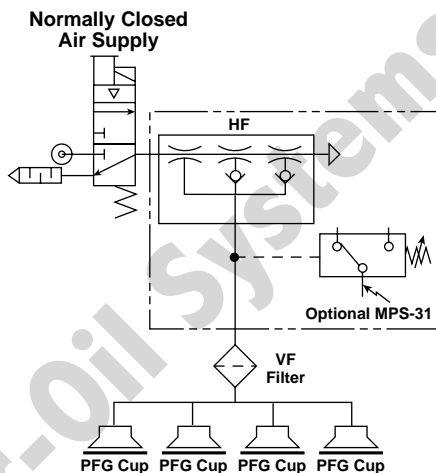
Vacuum Flow	Gauge Port Options	Port Thread
50* 22 SCFM	Z No Gauge	N NPT
100 42 SCFM	30 Gauge, 0 to 30 inHg, 1/8 NPT Back Mount	G BSPP
200 91 SCFM	31 Vacuum Sensor MPS-V31N-NC, NPN, with 2 Meter Cable	
	32 Vacuum Sensor MPS-V31N-PC, PNP, with 2 Meter Cable	
	33 Vacuum Sensor MPS-V31N-NG, NPN, Grommet	
	34 Vacuum Sensor MPS-V31N-PG, PNP, Grommet	

* Available with Gauge Port Option Z Only.

Note: Includes Brackets and Muffler.

Characteristics

HF - High Flow Series is a multistage vacuum generator. The HF Series is light weight for end of arm applications with a space saving low profile design. HF Series is ideal for porous applications. The HF Series comes standard with an integrated flow thru exhaust muffler. Additional Pneumatic Control Valve is required to create vacuum flow.



Replacement Components

Part Number	Description
SFHF50N	HF50- Repair Kit
SFHF100N	HF100- Repair Kit
SFHF200N	HF200- Repair Kit
266298A	0 to 30 inHg Gauge
SFBR10	Bracket Kit (Includes 4 Brackets & 4 M5 x 10 Screws)

Specifications

Media	Non-Lubricated Air, Non-Corrosive Gases
Operating Pressure	80 PSI
Operating Temperature	32°F to 120°F
Material	Body: Aluminum Nozzle & Diffuser: Polymer Seals: BUNA N





Performance

Item	Vacuum Degree at 80 PSI	Vacuum Flow (SCFM)	Air Consumption (SCFM Max.)	Weight (grams)
HF-50	27.3	22	6.6	310
HF-100	27.3	42	13.2	540
HF-200	27.3	91	26.9	690

Evacuation Time (SEC)

Series	Air Supply Pressure (PSI)	Air Consumption (SCFM)	Evacuation time in sec / ft ³ to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
HF-50	80	6.64	0.32	1.06	2.54	6.14	11.44	17.37	29.03	50.22	141.75
HF-100	80	13.20	0.13	0.21	0.85	1.91	3.81	5.72	9.53	16.74	47.25
HF-200	80	26.90	0.04	0.19	0.42	1.06	1.91	2.97	5.09	8.69	24.79

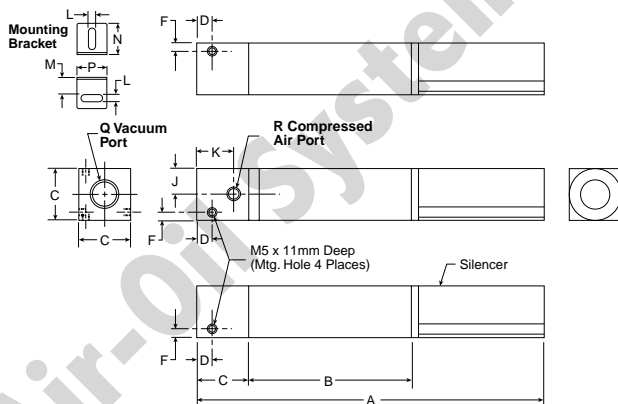
* 1 ft³ = 28.31 liters

Vacuum Flow (SCFM)

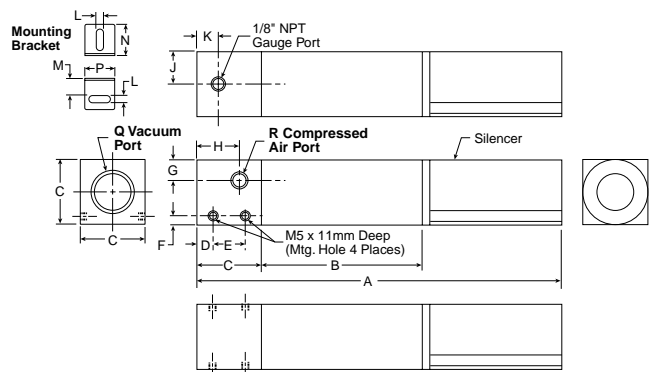
Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30
HF-50	22.00	12.12	7.87	3.85	2.76	2.12	1.45	0.81	0.35	0.03	—
HF-100	42.00	24.59	14.48	8.02	5.47	4.24	2.93	1.66	0.67	0.04	—
HF-200	91.00	52.86	34.38	16.78	12.00	9.29	6.36	3.64	1.52	0.05	—

Dimensions

HF-50



HF-100 & HF-200



Item	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
HF-50	10.62 (270)	4.92 (125)	1.57 (40)	.47 (12)	—	.28 (7)	.79 (20)	—	.79 (20)	1.10 (28)	.23 (5.5)	.94 (24)	.91 (23)	.51 (13)	1/2"	1/8"
HF-100	11.02 (280)	4.92 (125)	1.96 (50)	.43 (11)	1.10 (28)	.28 (7)	1.38 (35)	1.30 (33)	.98 (25)	.67 (17)	.23 (5.5)	.94 (24)	.91 (23)	.51 (13)	1"	1/4"
HF-200	11.42 (290)	4.92 (125)	2.36 (60)	.47 (12)	1.50 (38)	.28 (7)	1.57 (40)	1.61 (41)	1.18 (30)	.76 (20)	.23 (5.5)	.94 (24)	.91 (23)	.51 (13)	1-1/2"	3/8"

Inches (mm)





CHF



Features

- Classic Multi-stage Venturi
- Anodized Aluminum Body
- Aluminum Body Includes Exhaust Muffler
- Maximum Vacuum Level, 27.3 inHg
- Vacuum Flow Rates from 12.5 to 31.8 SCFM
- Mounting Brackets Included

Model Number Index

(Bold Items are Stocked)

Characteristics

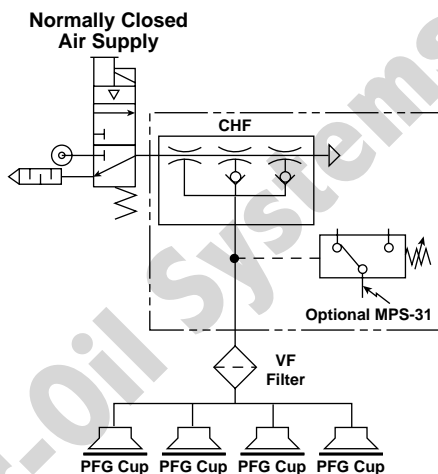
CHF- High Flow Series is a multistage vacuum generator. CHF unit is ideal for porous applications. 4 bolt mounting pattern with gauge opposite of vacuum and pressure inlet ports enables this generator to be panel mounted.

CHF Series comes standard with flow thru exhaust mufflers to reduce clogging in dirty environments. Additional Pneumatic Control Valve is required to create vacuum flow.

CHF - 10 Z N E

Vacuum Flow	Gauge Port Options	Port Thread
10 12.5 SCFM	Z No Gauge	N NPT
20 20.9 SCFM	30 Gauge, 0 to 30 inHg, 1/8 NPT Back Mount	G BSPP
30 26.3 SCFM	31 Vacuum Sensor MPS-V31N-NC, NPN, with 2 Meter Cable	
40 31.8 SCFM	32 Vacuum Sensor MPS-V31N-PC, PNP, with 2 Meter Cable	
	33 Vacuum Sensor MPS-V31N-NG, NPN, Grommet	
	34 Vacuum Sensor MPS-V31N-PG, PNP, Grommet	

Note: Includes Brackets and Muffler.



Replacement Components

Part Number	Description
SFCHF90NN	CHF- Repair Kit
266298A	0 to 30 inHg Gauge
SFBW15	Bracket Kit (Includes 4 Brackets & 4 M5 x 15 Screws)
SIS001	Silencer (Flow Thru)

Specifications

Media	Non-Lubricated Air, Non-Corrosive Gases
Operating Pressure	80 PSI
Operating Temperature	32°F to 120°F
Material	Body: Aluminum Nozzle & Diffuser: Polymer Seals: BUNA N





Performance

Item	Vacuum Degree at 80 PSI	Vacuum Flow (SCFM)	Air Consumption (SCFM Max.)	Weight (grams)
CHF-10	27.3	12.5	3.3	865
CHF-20	27.3	20.9	6.5	875
CHF-30	27.3	26.3	9.6	885
CHF-40	27.3	31.8	14	965

Evacuation Time (SEC)

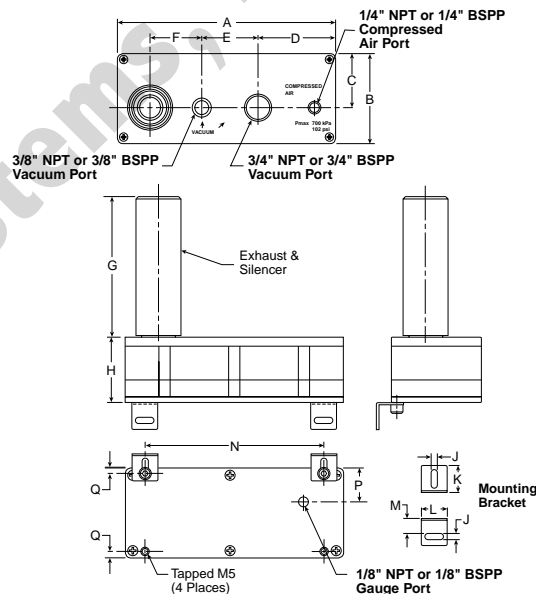
Series	Air Supply Pressure (PSI)	Air Consumption (SCFM)	Evacuation time in sec / ft ³ to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
CHF-10	80	3.3	0.45	1.48	3.39	8.26	15.47	23.31	38.78	66.96	189.22
CHF-20	80	6.5	0.21	0.64	1.70	4.03	7.63	11.65	19.28	33.48	94.50
CHF-30	80	9.6	0.21	0.63	1.27	3.39	6.36	9.53	16.10	27.76	78.82
CHF-40	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)

Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30
CHF-10	12.50	7.24	4.69	2.29	1.63	1.27	0.85	0.49	0.21	0.03	—
CHF-20	20.90	12.12	7.88	3.85	2.76	2.12	1.45	0.81	0.35	0.04	—
CHF-30	26.30	15.27	9.89	4.84	3.46	2.68	1.83	1.02	0.42	0.05	—
CHF-40	31.80	18.50	12.00	5.90	4.20	3.30	2.30	1.30	0.60	0.06	—

Dimensions



Item	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
CHF-10, 20, 30	7.64 (194)	3.15 (80)	1.89 (48)	2.72 (69)	1.97 (50)	1.81 (46)	4.84 (123)	1.69 (43)	.22 (5.5)	.94 (24)	.91 (23)	.51 (13)	6.26 (159)	1.26 (32)	.20 (5)
CHF-40	7.64 (194)	3.15 (80)	1.89 (48)	2.72 (69)	1.97 (50)	1.81 (46)	4.84 (123)	2.28 (58)	.22 (5.5)	.94 (24)	.91 (23)	.51 (13)	6.26 (159)	1.26 (32)	.20 (5)

Inches (mm)





MC2



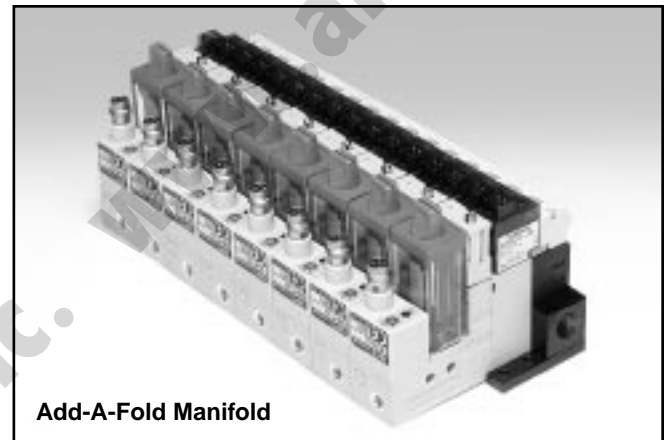
Features

- 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 from 0.2 to .71 SCFM

B

Characteristics

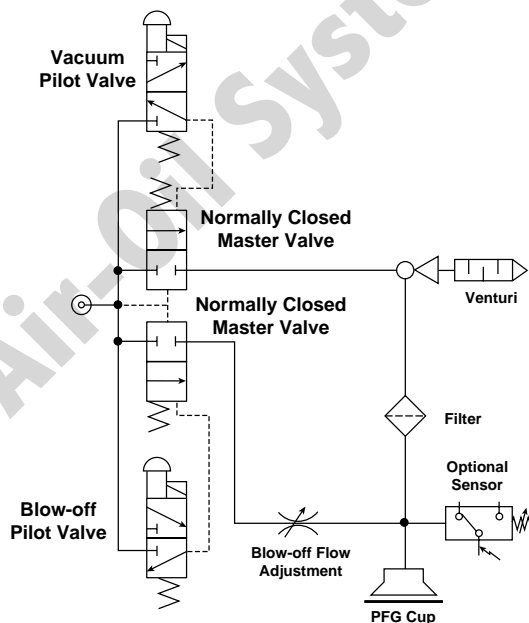
The MC2 is a complete package for factory automation. The MC2 has integrated vacuum generating and blow-off release pilot valves to minimize the response time to achieve vacuum. The small foot print and lightweight body allows the unit to be located close to the suction cup for maximum performance. The MC2 has additional features; regulating blow-off needle, 37 micron mesh filter, and a sensor platform for vacuum confirmation. The MC2 can be assembled into a maximum 8 station manifold. The unit can be ordered normally open or normally closed.



Add-A-Fold Manifold

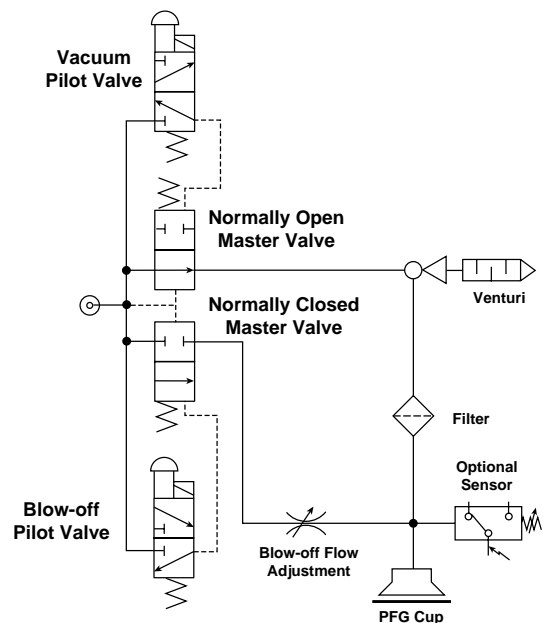
Normally Closed Vacuum Circuit

The Vacuum Pilot is Energized to Activate Vacuum



Normally Open Vacuum Circuit

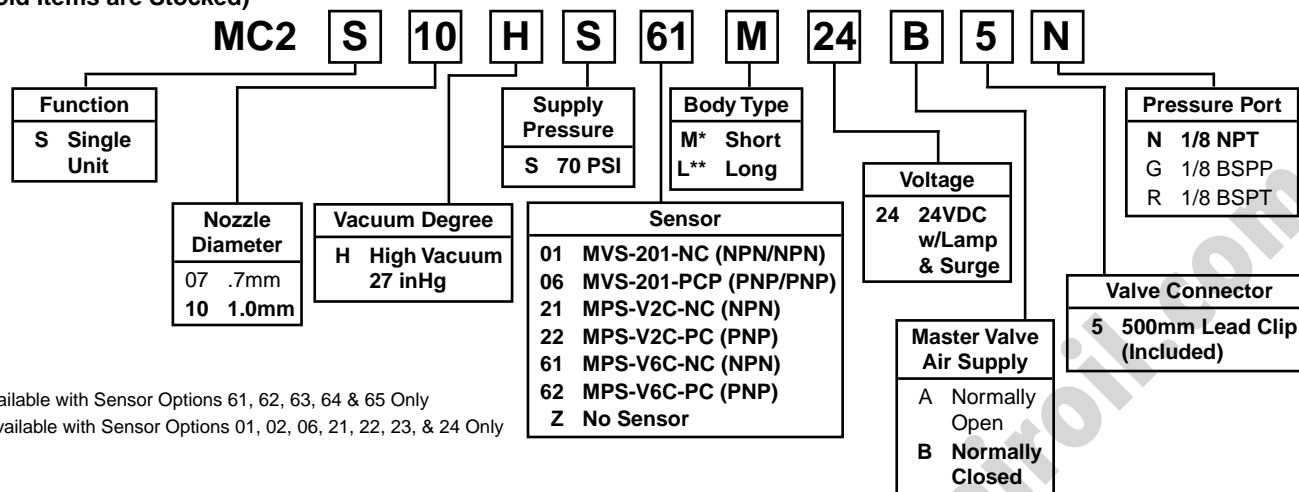
The Vacuum Pilot is Energized to Deactivate Vacuum





Model Number Index

(Bold Items are Stocked)



*Available with Sensor Options 61, 62, 63, 64 & 65 Only

**Available with Sensor Options 01, 02, 06, 21, 22, 23, & 24 Only

Specifications

Media	Non-Lubricated Compressed Air, Non-Corrosive Gases
Operating Pressure	21 to 84 PSI (1.5 to 6 kgf/cm ²)
Optimum Operating Pressure	70 PSI (5 kgf/cm ²)
Humidity	35 to 85%
Pressure Port	N: 1/8 NPT Female, G: 1/8 BSPP Female, R: 1/8 BSPT Female
Vacuum Port	M5 Female
Operating Temperature	41 to 132°F (5 to 50°C)
Material	Aluminum, Polyamide, NBR

Vacuum Generating and Blow-off Release Pilot

Type of Control Valve	Pilot Valve
Manual Operation	Non-Locking Manual Override
Electrical Connection	Clip Type Connector with LED and Surge Protection
Power Supply	24VDC ± 10%
Power Consumption	0.6W (0.7W for Lamp Surge Killer Type)
Pressure Range	21 to 84 PSI (1.5 to 6 kgf/cm ²)
Pilot Valve Air Supply	Normally Closed
Generator Weight	M: Body Type 3.6 oz. (100G), L: Body Type 4.1 oz. (117G)
Manifold Weight	2-Station: 1.4 oz. (40g), 3-Station: 2 oz. (54g), 4-Station: 2.4 oz. (68g), 5-Station: 2.8 oz. (82g) 6-Station: 3.4 oz. (96g), 7-Station: 3.8 oz. (110g), 8-Station: 4.4 oz. (124g)

Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
MC207HS	70	0.79	11.0	25.1	42.0	66.4	96.3	135.6	187.3	275.4	—
MC210HS	70	1.55	5.4	12.1	20.0	32.2	52.0	85.0	120.1	183.9	—

* 1 ft³ = 28.31 liters

Vacuum Flow (SCFM)

Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30
MC207HS	.40	.36	.32	.28	.24	.20	.15	.11	.07	—	—
MC210HS	.71	.64	.57	.49	.42	.34	.25	.17	.10	—	—





MC2 with MPS-6 Series



The "V6" sensor has one normally open and one normally closed NPN or PNP output available for vacuum confirmation. The MPS-6 sensor is a cost effective performer with an output response time less than 1 msec. and a nice adjustable 220 degree output range.

The "V6" sensor is available with an M8, 4-Pin or grommated (2M) electrical connector. The mating M8, 4-Pin cable is not included with the MPS-6 Sensor and must be ordered separately. See MC2 Accessories for cable options.

For more information on MPS-6 Series Sensor, see Section C.

MC2 with MPS-2 Series



The "V2" 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 "V2" sensor is available with an M8, 4-Pin or grommated (2M) electrical connector. The mating M8, 4-Pin cable is not included with the MPS-2 Sensor and must be ordered separately. See MC2 Accessories for cable options.

For more information on MPS-2 Series Sensor, see Section C.

MC2 with MVS-201 Series



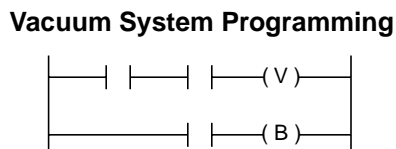
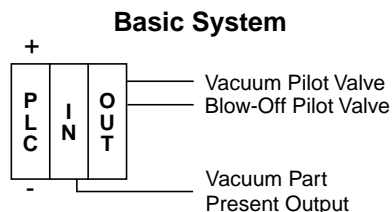
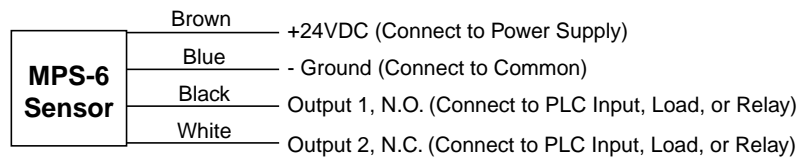
The "201" sensor has one output NPN or PNP for vacuum confirmation and a control output that interfaces directly with the blow-off release pilot valve. With programmable time control features and a special chip driver, the sensor automatically activates the blow-off release when the NPN or PNP input 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 MC2-201 valve cable is included with the MVS-201 Sensor Option. The mating M8, 4-Pin cable must be ordered separately. See MC2 Accessories for cable options.

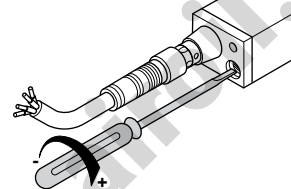
For more information on MVS-201 Series Sensor, see Section C.



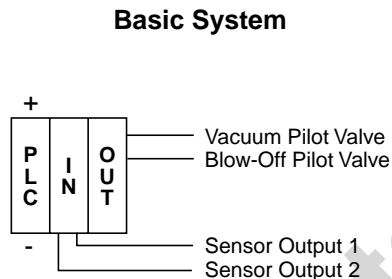
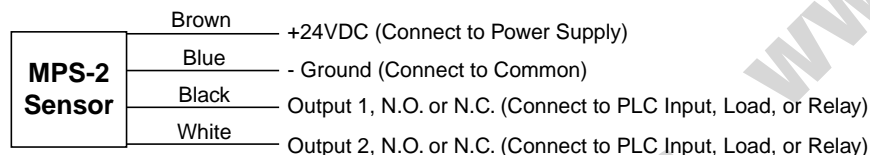
MC2 with MPS-6 Series



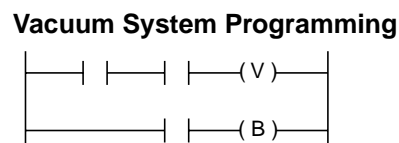
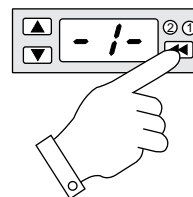
Output Adjustment
 Rotate the potentiometer trimmer to increase or decrease pressure switch point output. Excessive force or exceeding the limits of the trimmers may cause damage.



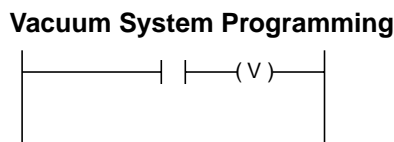
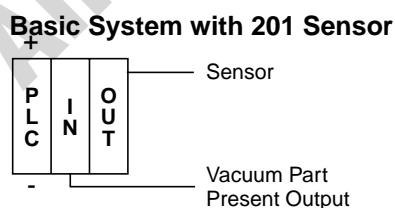
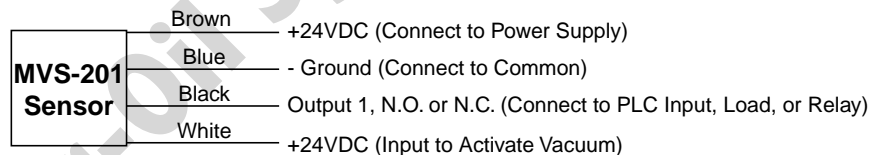
MC2 with MPS-2 Series



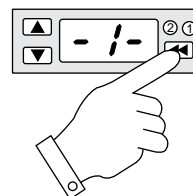
Output Adjustment
 Sensor functions and outputs are programmed by touch panel.



MC2 with MVS-201 Series

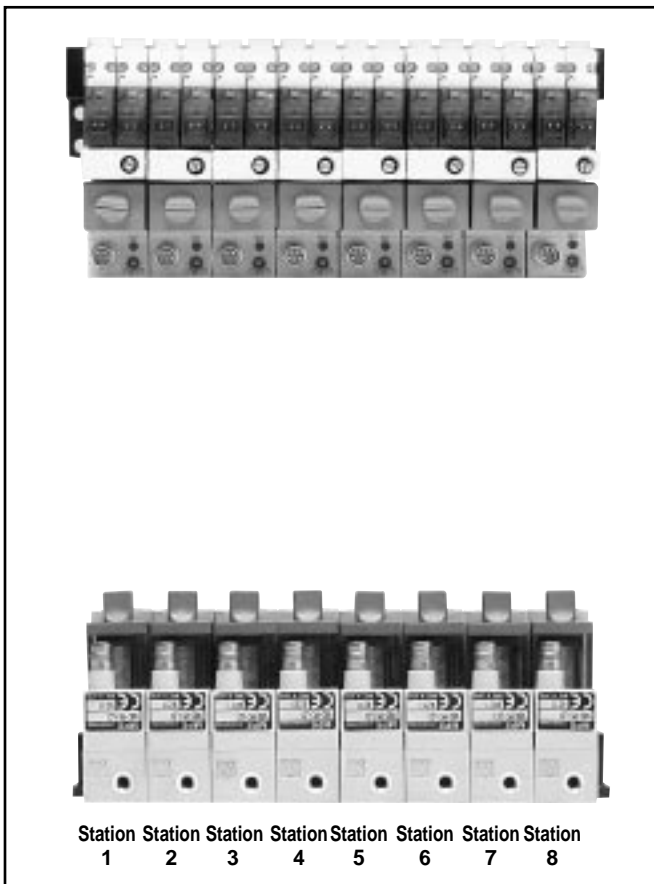


Output Adjustment
 Sensor functions and outputs are programmed by touch panel.





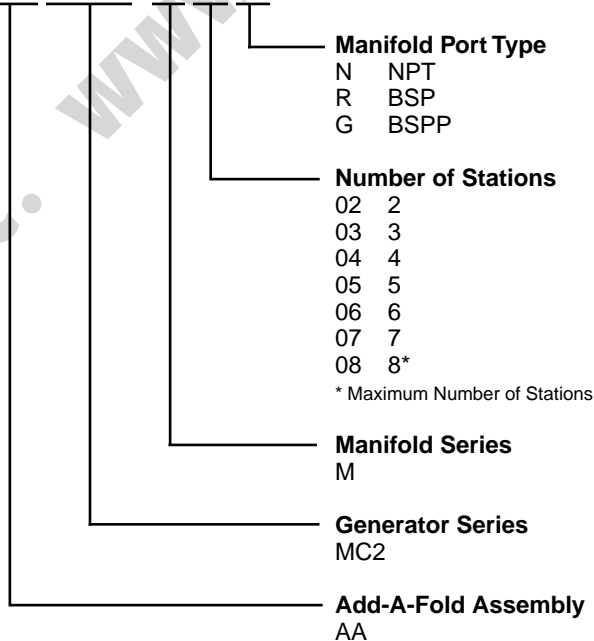
B



How To Order Add-A-Fold Assemblies

1. Manifold assemblies are multiple line item listings.
2. First line item must be the Add-A-Fold assembly part number.
3. Subsequent line items listed identify each station in the Manifold starting with Station Number 1.
4. Station Number 1 is the left most Generator when looking at the Manifold Generator Ports.
5. List either a part number of the MC2 Generator or a Blank Plate for each station of the Manifold.
6. See Model Number Index Code for MC2 Generator number and MC2 Accessories for Blank Plate Part numbers.

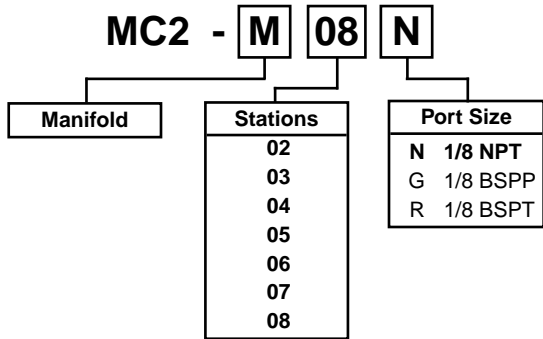
AAMC2-M08N



Example 1: Application requires an 8-Station MC2 Manifold with NPT supply ports.

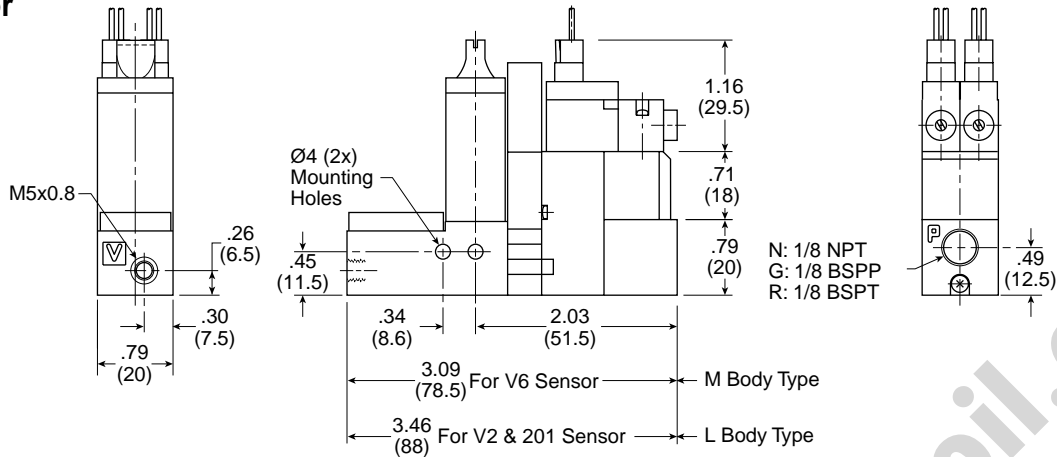
Qty.	Part No.	Comment
1	AAMC2-M08N	Add-A-Fold
1	MC2S05HS62M24B5N.....	Station #1
1	MC2S05HS62M24B5N.....	Station #2
1	MC2S10HS62M24B5N.....	Station #3
1	MC2S10HS62M24B5N.....	Station #4
1	MC2S10HS62M24B5N.....	Station #5
1	MC2S10HS62M24B5N.....	Station #6
1	MC2S07LS62M24B5N	Station #7
1	MC2S07LS62M24B5N	Station #8
<i>Alternative Method</i>		
1	AAMC2-M08N	Add-A-Fold
2	MC2S05HS62M24B5N.....	Station #1-2
4	MC2S10HS62M24B5N.....	Station #3-6
2	MC2S07LS62M24B5N	Station #7-8

Manifold Part Number



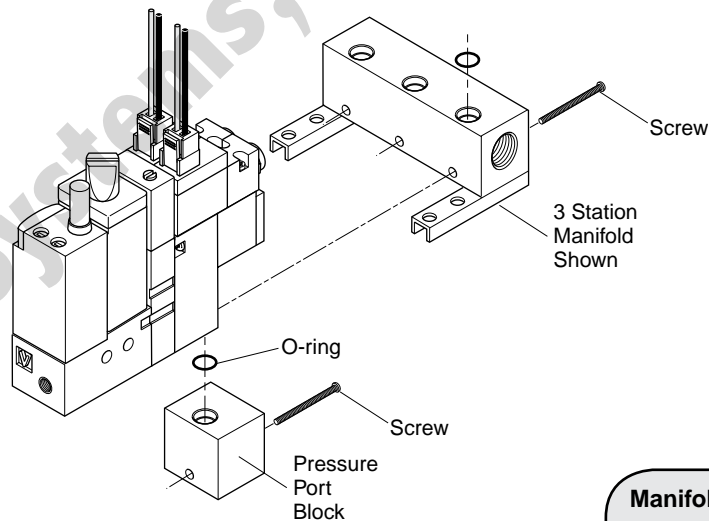
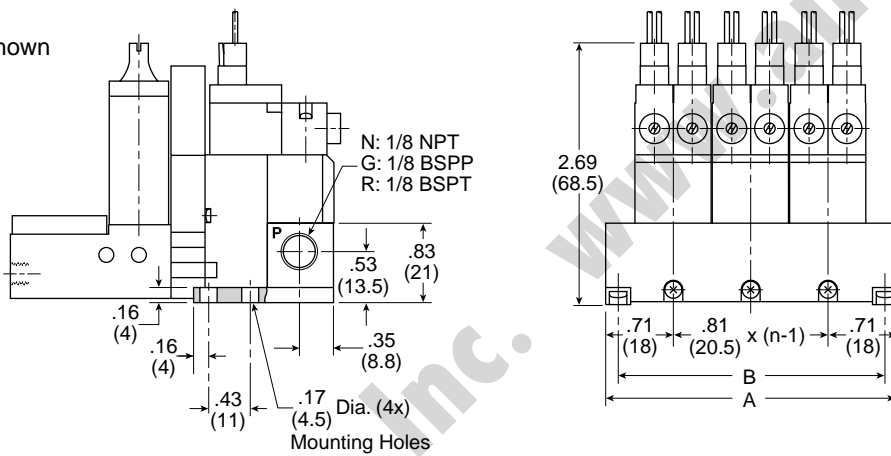


Generator



Manifold

3-Station Manifold Shown



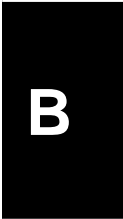
Manifold Assembly

Remove Pressure Port Block and use existing O-ring and Screw to secure the MC2 unit to the Manifold.

n	2	3	4	5	6	7	8
A	2.22 (56.5)	3.03 (77)	3.84 (97.5)	4.65 (118)	5.45 (138.5)	6.26 (159)	7.07 (179.5)

Inches (mm)

n = Number of Stations

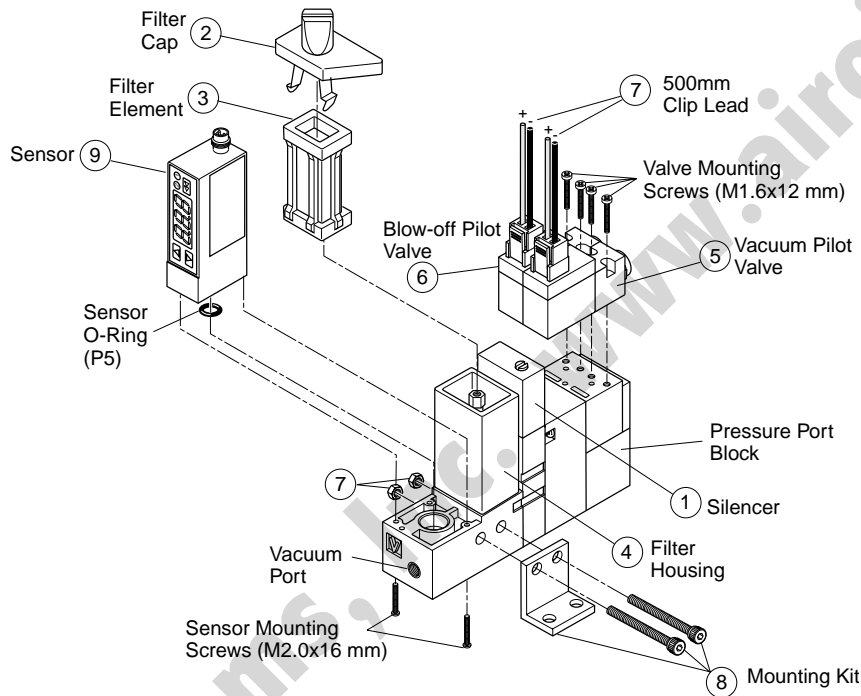




Replacement Components

Item	Part Number	Description
1	MC2-S	Silencer
2, 3, 4	MC2-F	Filter Kit
3	MC2-E	Filter Element
5, 7	MC2-24-A-10-V	Vacuum Pilot Valve
6, 7	MC2-24-B-10-D	Blow-off Pilot Valve
7	MC2-5L	500mm Clip Lead
8	MC2-B	Mounting Kit

Item	Part Number	Replacement Sensor
9	MPS-V6C-NC	MPS-V6 (NPN) Option
	MPS-V6C-PC	MPS-V6 (PNP) Option
	MPS-V2C-NC	MPS-V2 (NPN) Option
	MPS-V2C-PC	MPS-V2 (PNP) Option
	MVS-201-NC	MVS-201 (NPN) Option
	MVS-201-PCP	MVS-201 (PNP) Option



⚠ Cautions

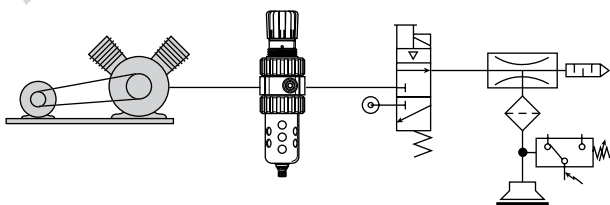
Do not use or expose the MC2 with fluids or corrosive gases. Vacuum Venturi's are designed to be used with non-lubricated, non-corrosive, compressed air.

Do not operate MC2 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.

All normally closed vacuum circuits will interrupt the air supply to the venturi during a power failure or Emergency Stop condition. As a result, the product being transferred may be dropped, possibly creating a hazard to the surrounding environment. To avoid hazardous situations during a power loss or Emergency Stop condition, consider a normally open vacuum circuit.

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.

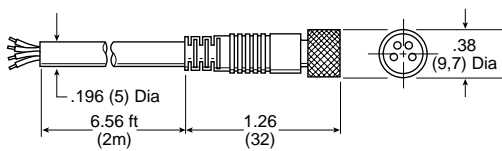




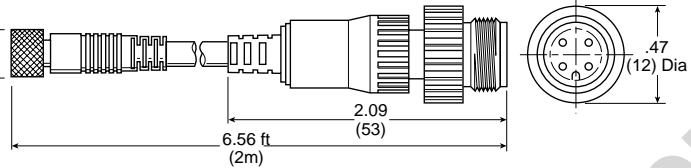
Accessories

Sensor Cables

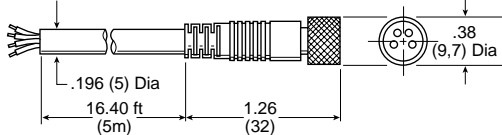
CB-M8-4P-2M, Female to Open Lead



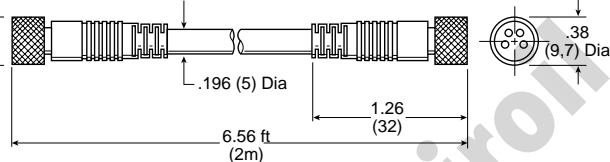
CB-M8-4P-M12-2M, M8 Female to M12 Male



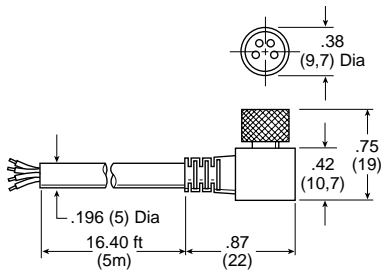
CB-M8-4P-5M, Female to Open Lead



CB-M8-4P-M8-2M, M8 Female to M8 Male



CB-M8-4P-5M-90, Female to Open Lead



Pin Out Connection

Female Interface
 4-Pin, M8



Male Interface
 4-Pin, M8



Male Interface
 4-Pin, M12



Cable Pin	Color
1	Brown
2	White
3	Blue
4	Black

Pilot Valve Cables

MC2-5L (500mm) Lead*

MC2-10L (1000mm) Lead

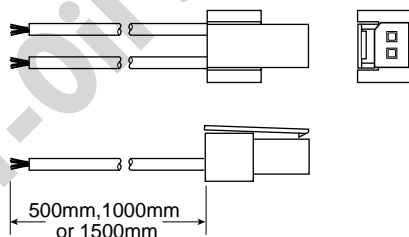
MC2-30L (3000mm) Lead

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

Positive "+" (Red Wire)

Negative "-" (Black Wire)

* Included with Generator

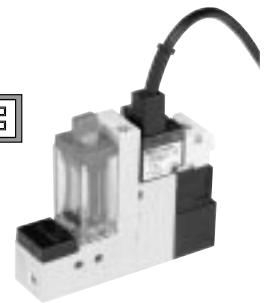
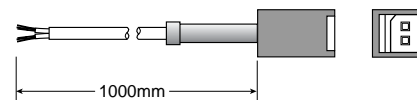


MC2-CB10 Valve Cable

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

Positive "+" (Red Wire)

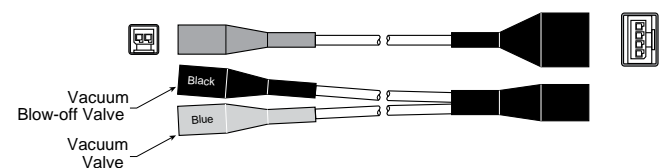
Negative "-" (Black Wire)



MC2-201G Sensor / Valve Connector*

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

MC2-C201G



* Included with Generator Option 01 & 06.

Manifold Blank Plate Kit

MC2-MM

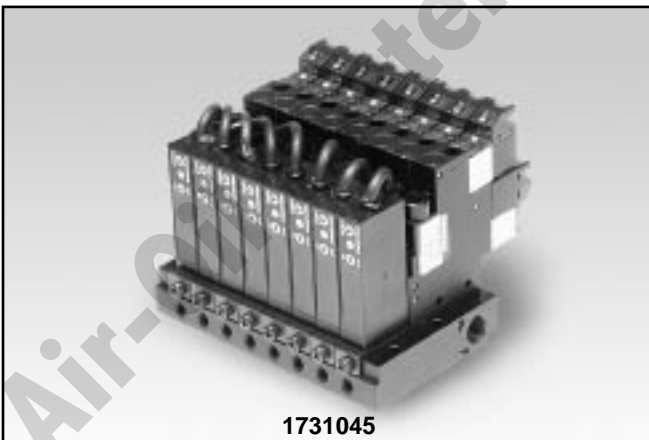
Kit Includes: Blank Plate, Screws & Gasket





MC3

B



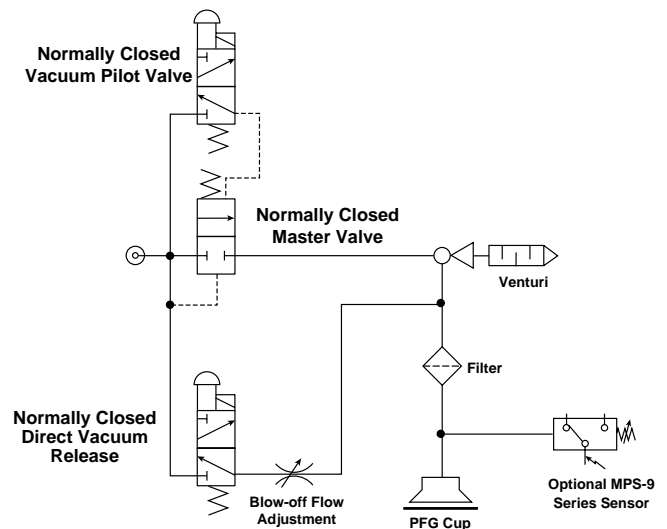
Features

- **New Vacuum Generating Pilot Valve**
- **New Direct Vacuum Blow-off Valve**
- **Vacuum Sensor - Filter - Silencer Available**
- **Regulating Blow-off Adjustment**
- **Manifold System**
- **20 Millisecond Vacuum Response Time**
- **Compact and Lightweight for Pick-up Head Assembly**
- **10mm Width**

Characteristics

The MC3 is perfect for high speed pick-and-place for circuit board assembly, chip mounting, chip testing, or chip bonding. The MC3 has a new high speed integrated vacuum generating pilot valves and direct blow-off valves to minimize response times. The small foot print and lightweight body allows the unit to be located close to the suction cup for maximum performance. The MC3 has additional features; regulating blow-off needle, 37 micron mesh filter, and a sensor platform for vacuum confirmation. The MC3 can be assembled into a maximum 8 station manifold. The vacuum flow rate response time is as little as 20 milliseconds from 0 to 25 inHg. The unit can be ordered normally closed.

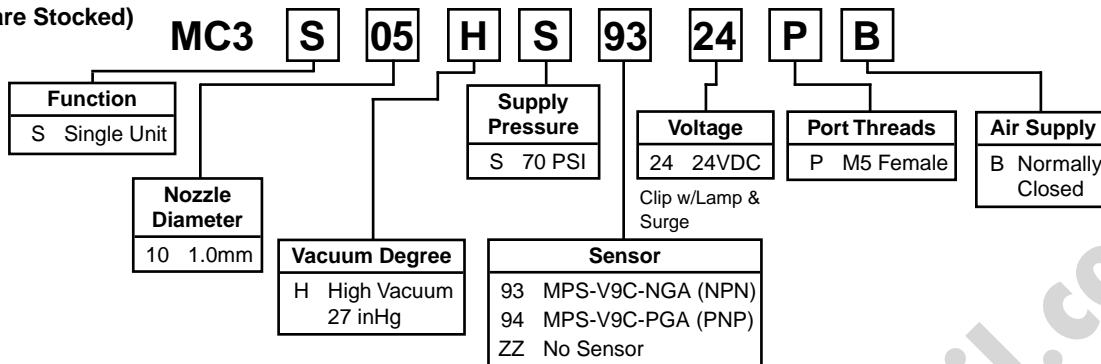
Normally Closed Vacuum Circuit The Vacuum Pilot is Energized to Activate Vacuum





Model Number Index

(Bold Items are Stocked)



Specifications

Media	Non-Lubricated Compressed Air, Non-Corrosive Gases
Operating Pressure	21 to 84 PSI (1.5 to 6 kgf/cm ²)
Optimum Operating Pressure	70 PSI (5 kgf/cm ²) or 50 PSI (3.5 kgf/cm ²)
Humidity	35 to 85%
Pressure Port	M5 Female
Vacuum Port	M5 Female
Operating Temperature	32 to 140°F (0 to 60°C)
Material	Aluminum, Polyamide, NBR

Vacuum Pilot Valve & Blow-off Release Valve

Type of Control Valve	Direct & Pilot Valve
Manual Operation	Manual Override Operation Non-Locking
Electrical Connection	Clip Type Connector with LED and Surge Protection, 500mm Lead Length
Power Supply	24VDC ± 10%
Power Consumption	0.9W
Pressure Range	21 to 84 PSI (1.5 to 6 kgf/cm ²)
Air Supply	Normally Closed
Generator Weight	2.04 oz. (58g)

Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ * to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
MC310HS	70	1.55	6.5	15.5	27.0	42.7	64.4	96.9	154.0	263.3	—

* 1 ft³ = 28.31 liters

Vacuum Flow (SCFM)

Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30
MC310HS	.71	.63	.55	.47	.39	.31	.23	.16	.08	—	—



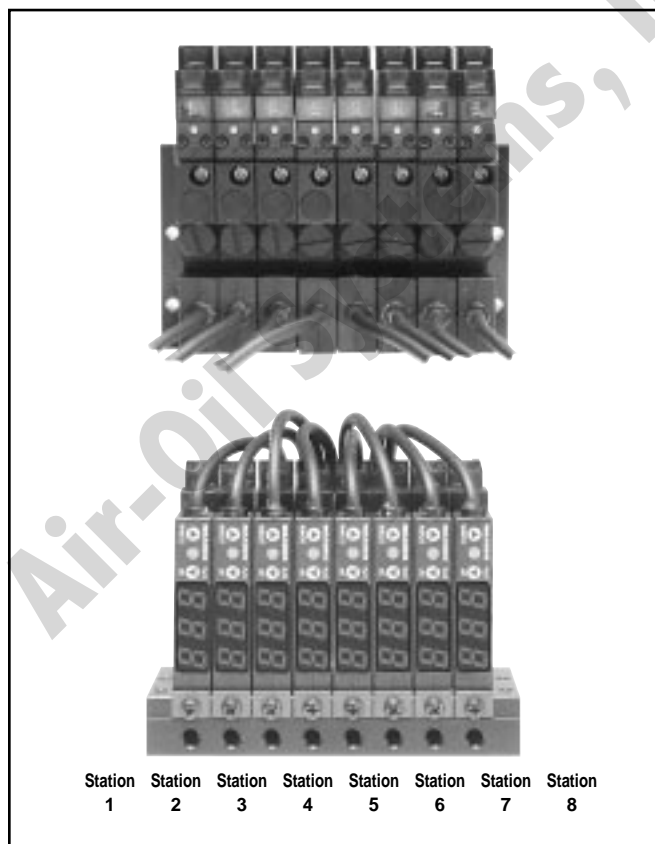


How To Order Manifold Assemblies

1. Manifold assemblies are ordered by a specific part number only. Choose the appropriate Part Number needed for number of stations and sensor type required for the application. For specialized manifolds, consult factory.

Part Number	Description	Number of Stations	Sensor Type
1731030	MC3M10HS93P24B101RN	1	MPS-V9 (NPN), Analog
1731031	MC3M10HS93P24B202RN	2	
1731032	MC3M10HS93P24B303RN	3	
1731033	MC3M10HS93P24B404RN	4	
1731034	MC3M10HS93P24B505RN	5	
1731035	MC3M10HS93P24B606RN	6	
1731036	MC3M10HS93P24B707RN	7	
1731037	MC3M10HS93P24B808RN	8	
1731038	MC3M10HS94P24B101RN	1	MPS-V9 (PNP), Analog
1731039	MC3M10HS94P24B202RN	2	
1731040	MC3M10HS94P24B303RN	3	
1731041	MC3M10HS94P24B404RN	4	
1731042	MC3M10HS94P24B505RN	5	
1731043	MC3M10HS94P24B606RN	6	
1731044	MC3M10HS94P24B707RN	7	
1731045	MC3M10HS94P24B808RN	8	

B



Example 1: Application requires an 8-Station MC3 Manifold with PNP Sensors.

Qty.	Part No.	Description
1	1731045.....	MC3M10HS94P24B808RN



MC3 with MPS-9 Sensor



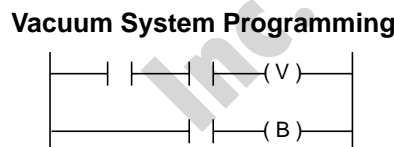
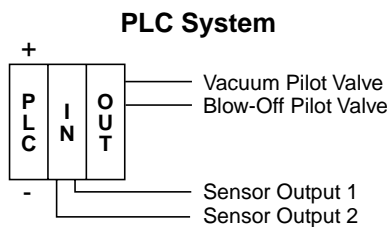
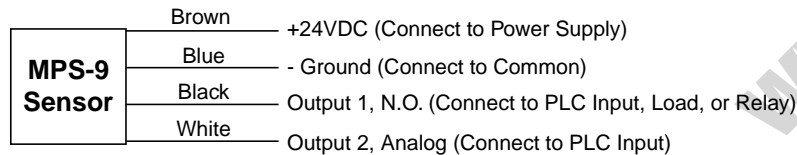
The "V9" sensor has 1 NPN or PNP output available for vacuum confirmation and a 1 to 5VDC analog output. The Switch Output Mode has a switch point programmed by the user at a specific pressure.

The Hysteresis Range adjustment controls the output signal 0 to 100% below the switch point. The output response time of this sensor is less than 1.5 msec.

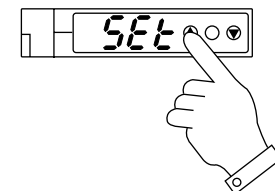
The "V9" sensor is available with a grommited (2M) electrical connector.

B

MC3 with MPS-9 Sensor



Output Adjustment
 Sensor functions and outputs are programmed by touch panel.

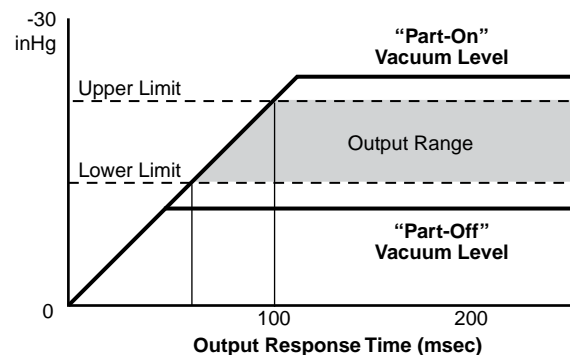


Output Setting

Maximize the difference between the "Part -Off" and "Part-On" vacuum levels by selecting the appropriate tubing I.D. and length from the generator to the cup. The part present output must be set between the "Part -Off" and "Part-On" vacuum levels. If the difference between the "Part -Off" and "Part-On" vacuum levels is minimal, remote sensing at the suction cup is recommended with MPS-6 or MPS-8 sensors.

For most material handling applications, the part present output can be set near the upper limit of the output range.

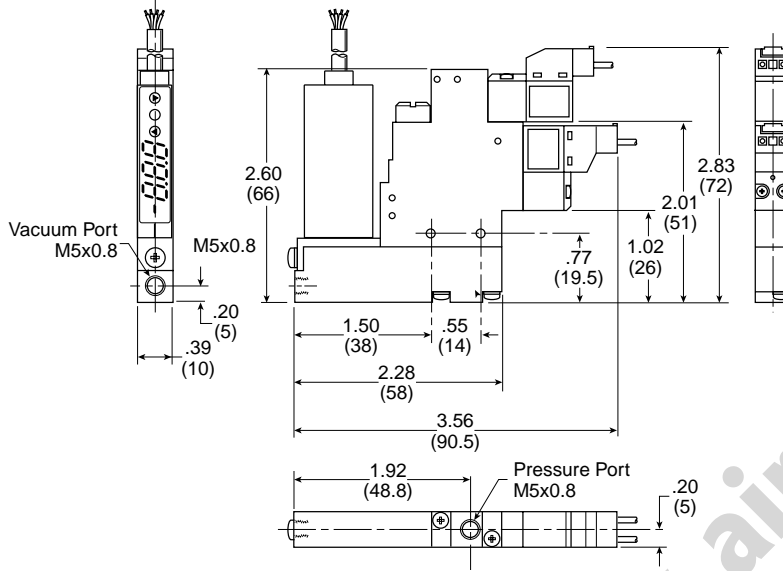
For high speed pick and place applications, the part present output can be set near the lower limit of the output range. This reduces the output response time of the sensor. Output response and accuracy are critical to the overall performance of the system. Remote sensing is recommended here.



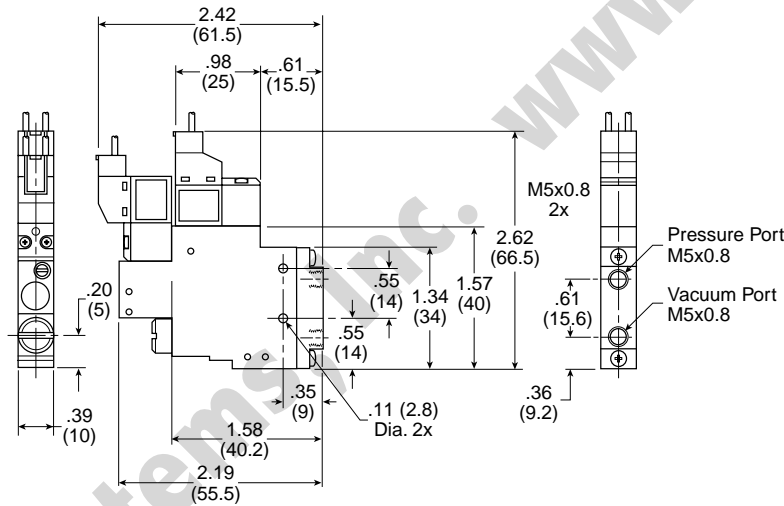


Generator

MC3 with Sensor Base

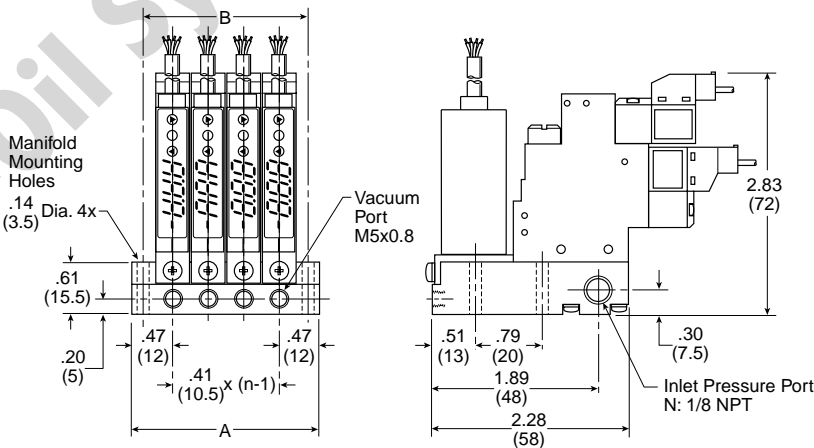


MC3 without Sensor Base



Manifolds

4-Station Manifold with Sensor Base Shown



n	A	B
2	1.08 (27.5)	1.36 (34.5)
3	1.50 (38)	1.77 (45)
4	1.91 (48.5)	2.19 (55.5)
5	2.32 (59)	2.60 (66)
6	2.74 (69.5)	3.01 (76.5)
7	3.15 (80)	3.43 (87)
8	3.56 (90.5)	3.84 (97.5)

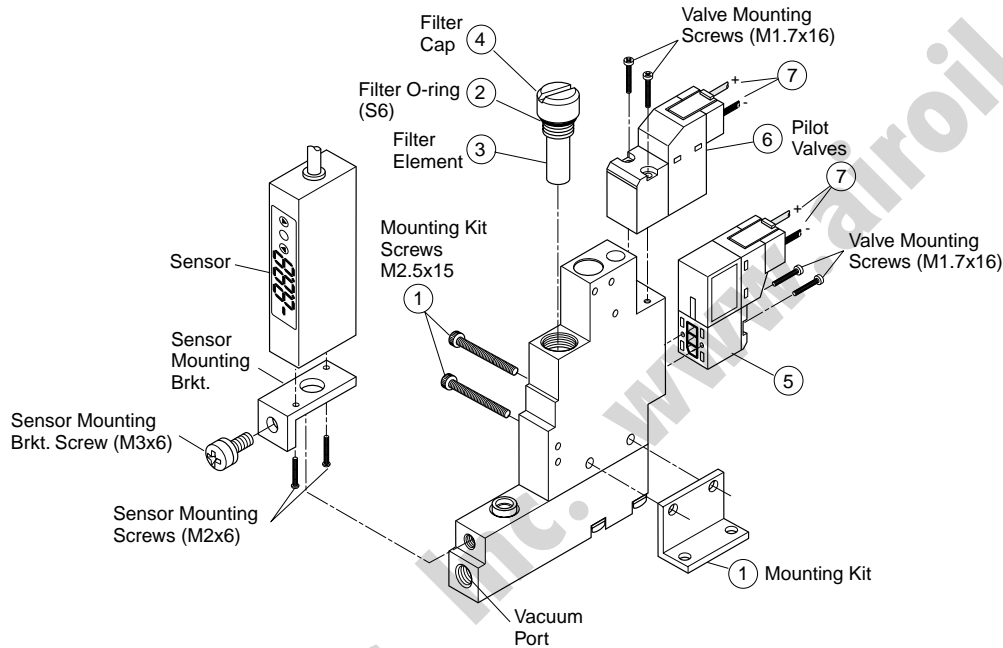
Inches (mm)
 n = Number of
 Stations

B



Replacement Components

Item	Part Number	Description
1	MC3-B	Mounting Kit
2, 3, 4	MC3-F	Filter Kit
3	MC3-E	Filter Element
5	D2-270428-3	Vacuum Pilot Valve
6	C2-284177-3	Blow-off Valve
7	MC3-5L	500mm Clip Lead



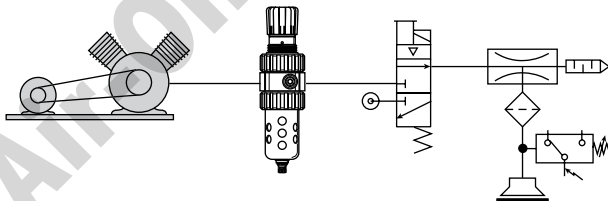
⚠ Cautions

Do not use or expose the MC3 with fluids or corrosive gases. Vacuum Venturi's are designed to be used with non-lubricated, non-corrosive, compressed air.

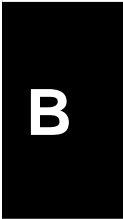
Do not operate MC3 generators outside the temperature range and pressures listed in the specifications section of this catalog. Regulate the compressed air to 70PSI and filtrate with a maximum 40 micron filter. Non-lubricated compressed air will maintain the life and vacuum level of the generator.

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.



All normally closed vacuum circuits will interrupt the air supply to the venturi during a power failure Emergency Stop condition. As a result, the product being transferred may be dropped, possibly creating a hazard to the surrounding environment. To avoid hazardous situations during a power loss or Emergency Stop condition, consider a normally open vacuum circuit.





CVR2

B

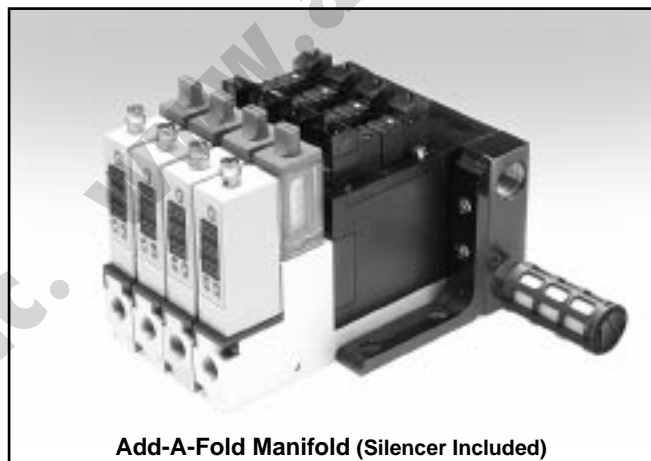


Features

- Vacuum Generating Pilot Valve
- Vacuum Release Pilot Valve Option
- Vacuum Sensor - Filter - Silencer Available
- Regulating Blow-off Adjustment
- Check Valve Option
- Manifold System
- Vacuum Flow Rates from 0.56 to 1.27 SCFM

Characteristics

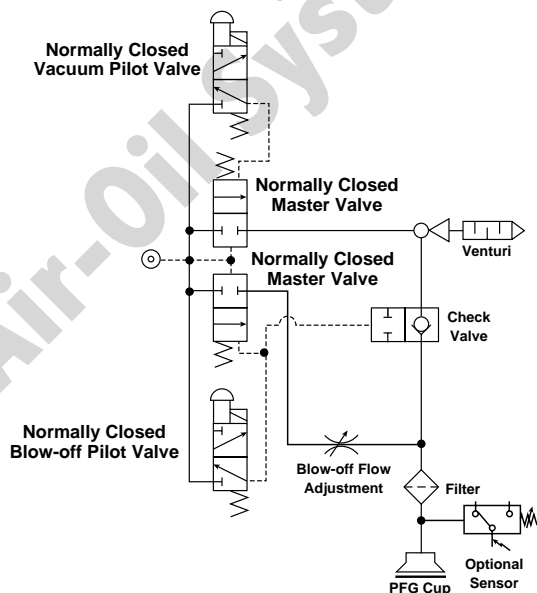
The CVR2 Series vacuum generator is a complete package for factory automation. The CVR2 has integrated vacuum pilot and blow-off release pilot valves to minimize response times. The CVR2 has additional features; regulating blow-off needle, 37 micron mesh filter, optional check valve, and a sensor platform for vacuum confirmation. The CVR2 can be assembled into a maximum 10 station manifold. The unit can be ordered normally open or normally closed.



Add-A-Fold Manifold (Silencer Included)

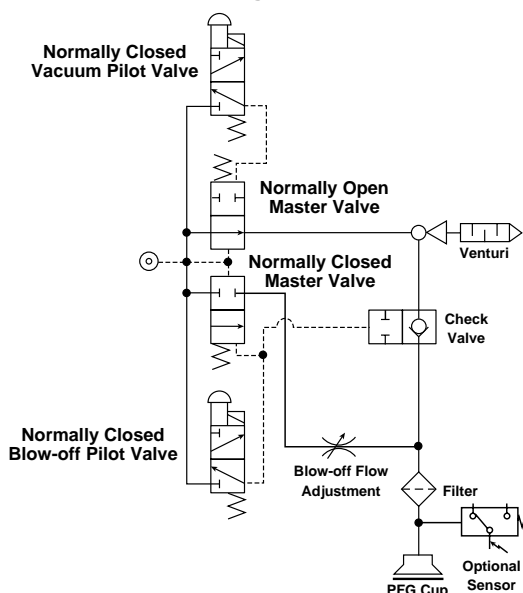
Normally Closed Vacuum Circuit

The Vacuum Pilot is Energized to Activate Vacuum



Normally Open Vacuum Circuit

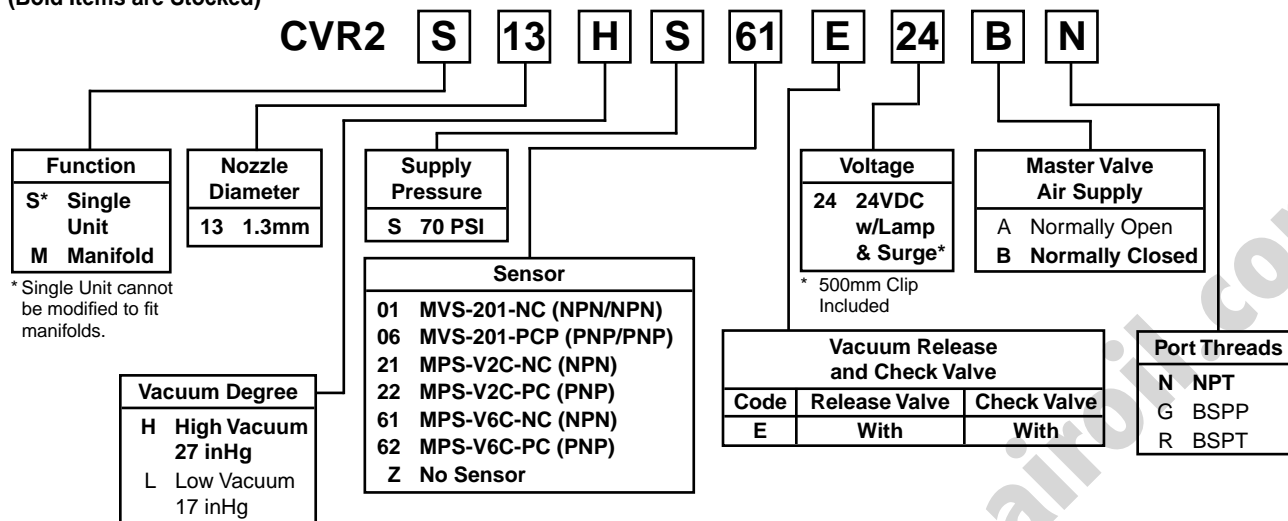
The Vacuum Pilot is Energized to Deactivate Vacuum





Model Number Index

(Bold Items are Stocked)



Specifications

Media	Non-Lubricated Compressed Air, Non-Corrosive Gases
Optimum Operating Pressure	70 PSI (5 kgf/cm ²)
Humidity	35 to 85%
Pressure Port	N: 1/8 NPT Female, G: 1/8 BSPP Female, R: 1/8 BSPT Female
Vacuum Port	N: 1/8 NPT Female, G: 1/8 BSPP Female, R: 1/8 BSPT Female
Operating Temperature	41 to 132°F (5 to 50°C)
Material	Aluminum, Brass, NBR

Vacuum Generating and Blow-off Release Pilot

Type of Control Valve	Pilot Valve
Manual Operation	Non-Locking Manual Override
Electrical Connection	Clip Type Connector with LED and Surge Protection
Power Supply	24VDC ± 10%
Power Consumption	0.7W
Operating Pressure	70 PSI (5 kgf/cm ²)
Pilot Valve Air Supply	Normally Closed
Generator Weight	13.75 oz. (385g)
Manifold Weight	2-Station: 24 oz. (680g), 3-Station: 31 oz. (880g), 4-Station: 38 oz. (1080g), 5-Station: 45 oz. (1280g)

Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
CVR213HS	70	2.65	3.1	7.3	12.0	18.1	26.8	39.5	57.6	84.5	174.0

* 1 ft³ = 28.31 liters

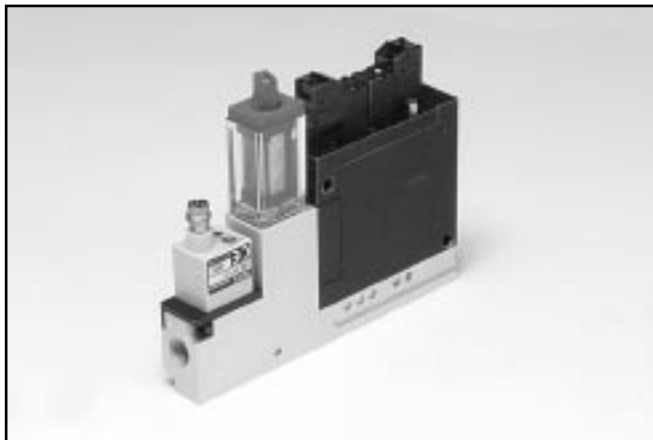
Vacuum Flow (SCFM)

Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30
CVR213HS	1.30	1.15	1.00	0.87	0.72	0.57	0.43	0.29	0.15	—	—





CVR2 with V6 Sensor



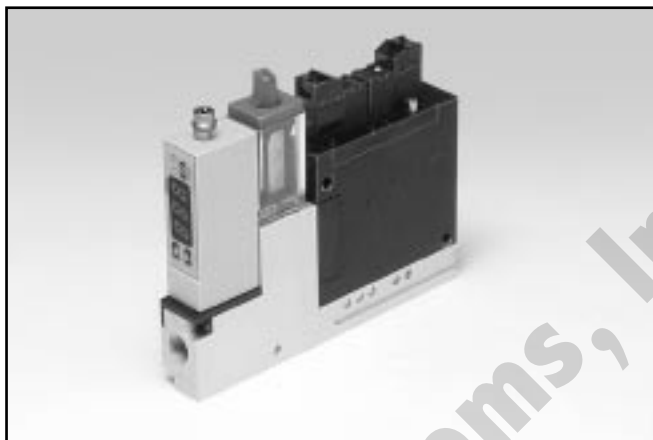
The "V6" sensor has one normally open and one normally closed NPN or PNP output available for vacuum confirmation. The MPS-6 sensor is a cost effective performer with an output response time less than 1 msec. and a nice adjustable 220 degree output range.

The "V6" sensor is available with an M8, 4-Pin or grommated (2M) electrical connector. The mating M8, 4-Pin cable is not included with the MPS-6 Sensor and must be ordered separately. See CVR2 Accessories for cable options.

For more information on MPS-6 Series Sensor, see Section C.

B

CVR2 with V2 Sensor

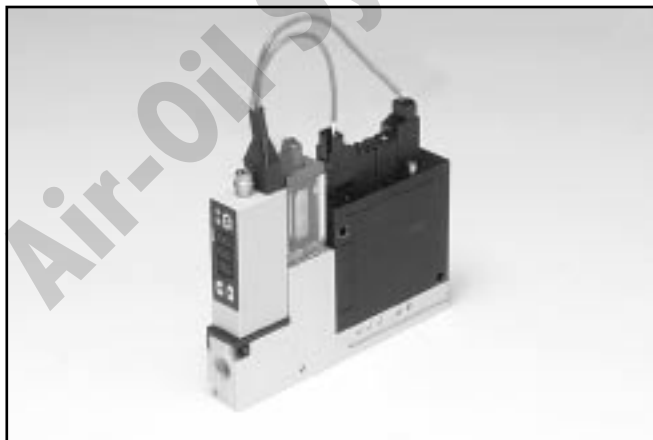


The "V2" sensor has 2 independent NPN or PNP outputs available for vacuum confirmation. The output response time of this sensor is less than 2 msec.

The "V2" sensor is available with an M8, 4-Pin or grommated (2M) electrical connector. The mating M8, 4-Pin cable is not included with the MPS-2 Sensor and must be ordered separately. See CVR2 Accessories for cable options.

For more information on MPS-2 Series Sensor, see Section C.

CVR2 with 201 Sensor



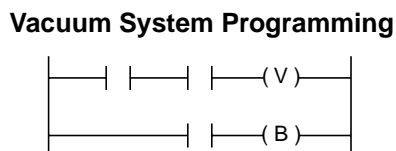
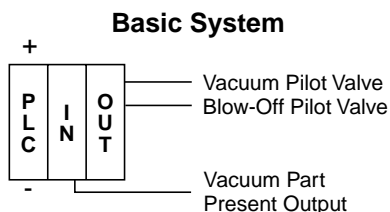
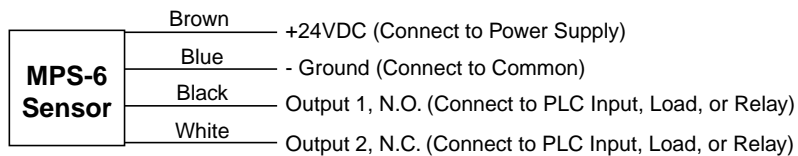
The "201" sensor has one output NPN or PNP for vacuum confirmation and a control output that interfaces directly with the blow-off release pilot valve. With programmable time control features and a special chip driver, the sensor automatically activates the blow-off release when the NPN or PNP input 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 CVR2-201G valve cable is included with the MVS-201 Sensor Option. The mating M8, 4-Pin cable must be ordered separately. See CVR2 Accessories for cable options.

For more information on MVS-201 Series Sensor, see Section C.

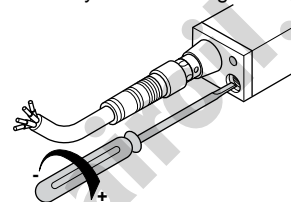


CVR2 with V6 Sensor

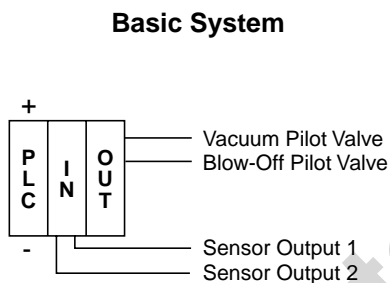
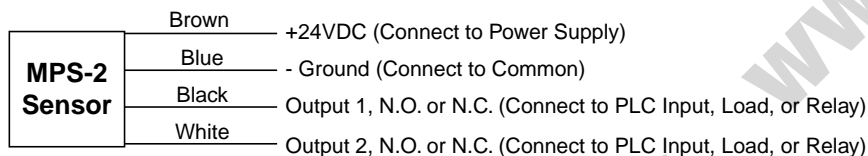


Output Adjustment

Rotate the potentiometer trimmer to increase or decrease pressure switch point output. Excessive force or exceeding the limits of the trimmers may cause damage.

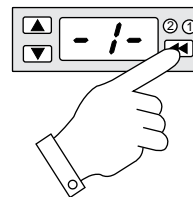


CVR2 with V2 Sensor

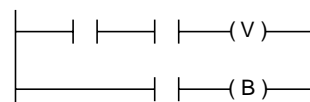


Output Adjustment

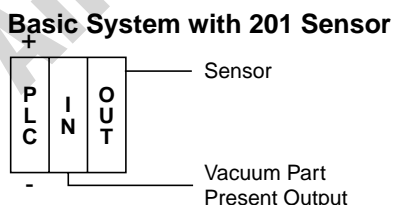
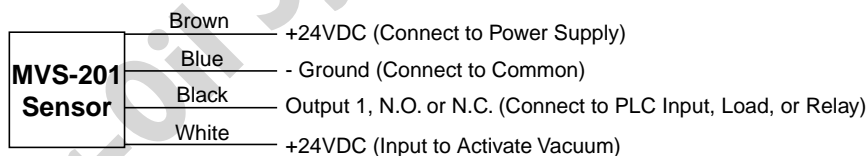
Sensor functions and outputs are programmed by touch panel.



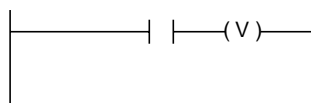
Vacuum System Programming



CVR2 with 201 Sensor

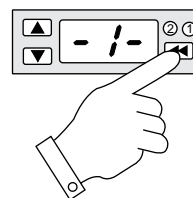


Vacuum System Programming



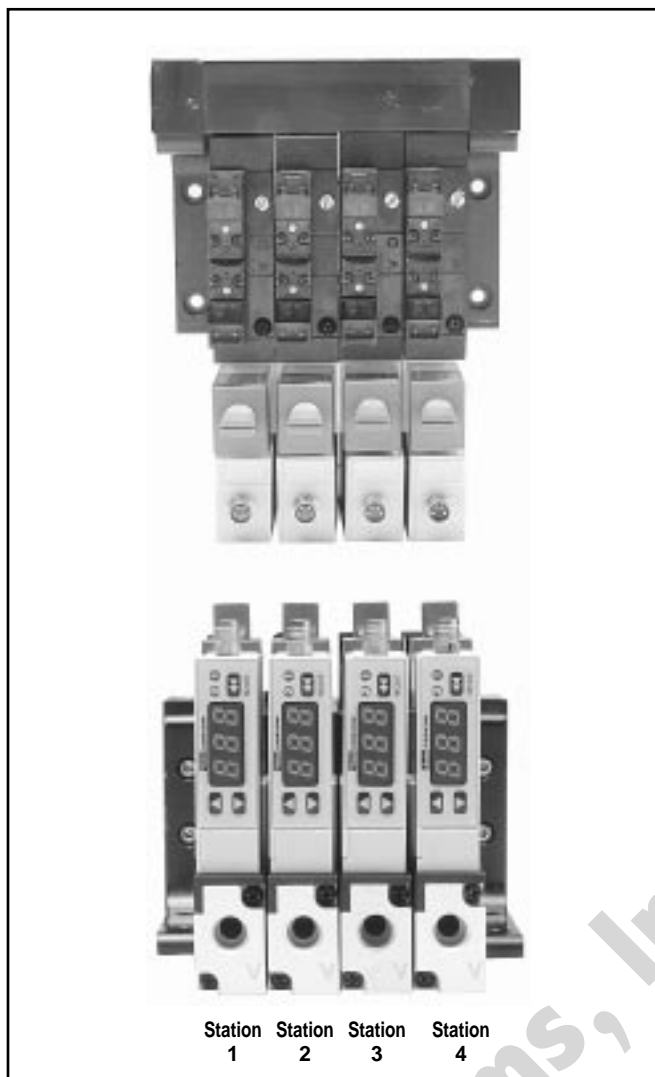
Output Adjustment

Sensor functions and outputs are programmed by touch panel.





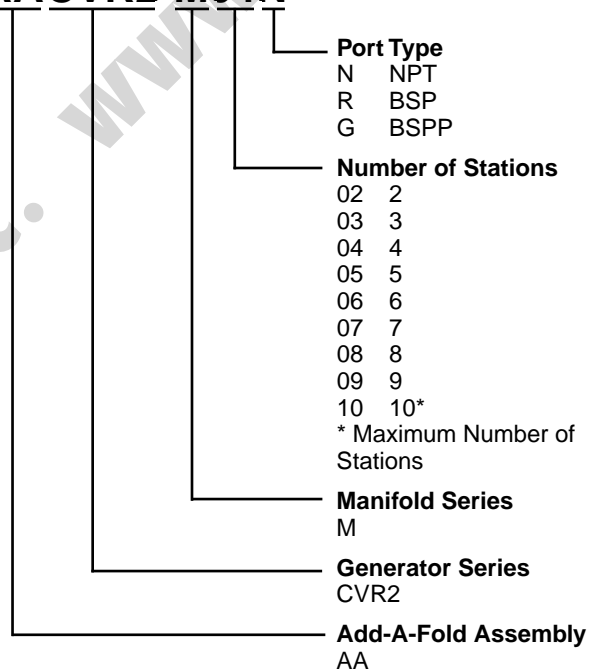
B



How To Order Add-A-Fold Assemblies

1. Manifold assemblies are multiple line item listings.
2. First line item must be the Add-A-Fold assembly part number.
3. Subsequent line items listed identify each station in the Manifold starting with Station Number 1.
4. Station Number 1 is the left most Generator when looking at the Manifold Generator Ports.
5. List either a part number of the Manifold Type Generator or a Blank Plate for each station of the Manifold.
6. See Model Number Index Code for CVR2 Generator number and Accessories for Blank Plate Part numbers.

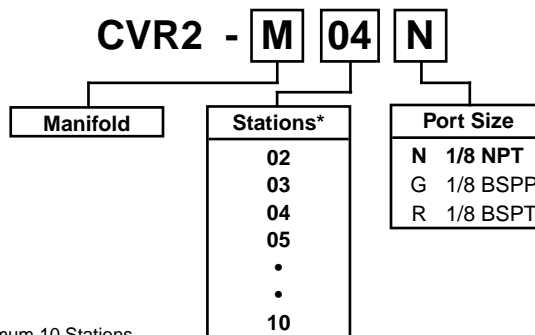
AACVR2-M04N



Example 1: Application requires a 4-Station CVR2 Manifold, NPT ports with 1 Blank Plate at Station Number 4.

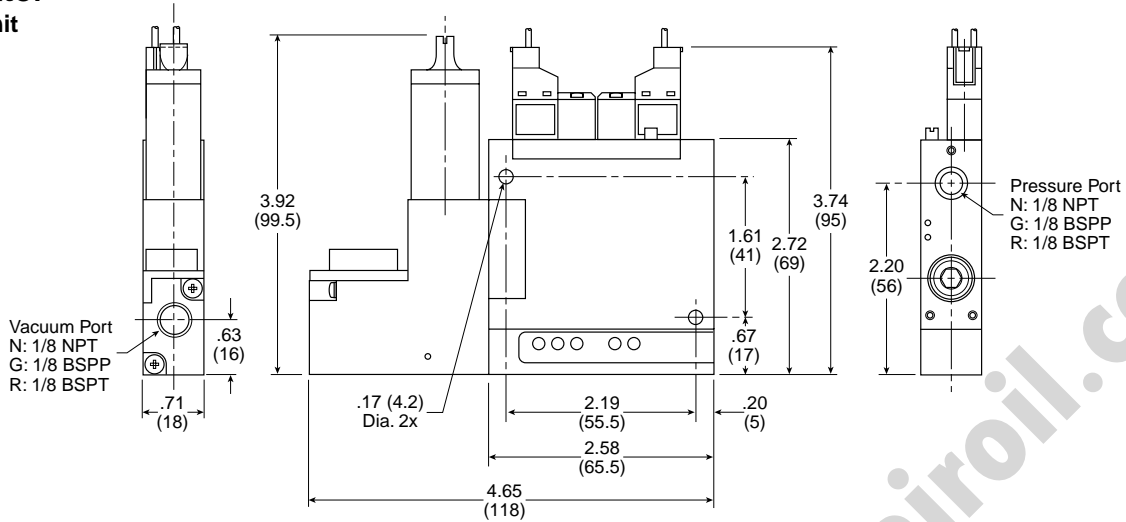
Qty.	Part No.	Comment
1	AACVR2-M04N	Add-A-Fold
1	CVR2M10HS22E24BLN.....	Station #1
1	CVR2M10HS22E24BLN.....	Station #2
1	CVR2M13HS22E24BLN.....	Station #3
1	CVR2M13HS22E24BLN.....	Station #4
<i>Alternative Method</i>		
1	AACVR2-M04N	Add-A-Fold
2	CVR2M10HS22E24BLN.....	Station #1-2
2	CVR2M13HS22E24BLN.....	Station #3-4

Manifold Part Number

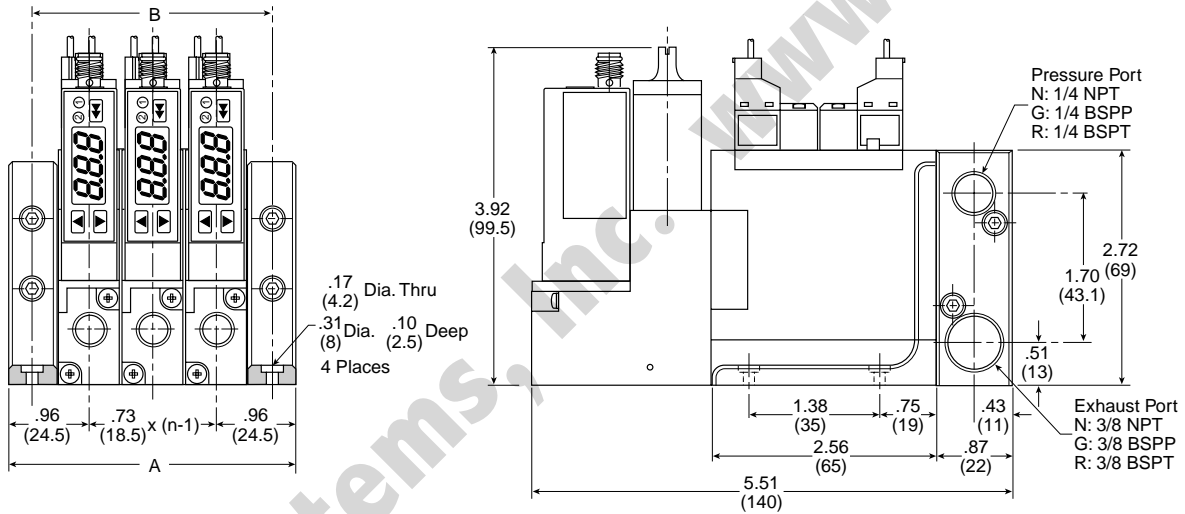




**Generator
Single Unit**



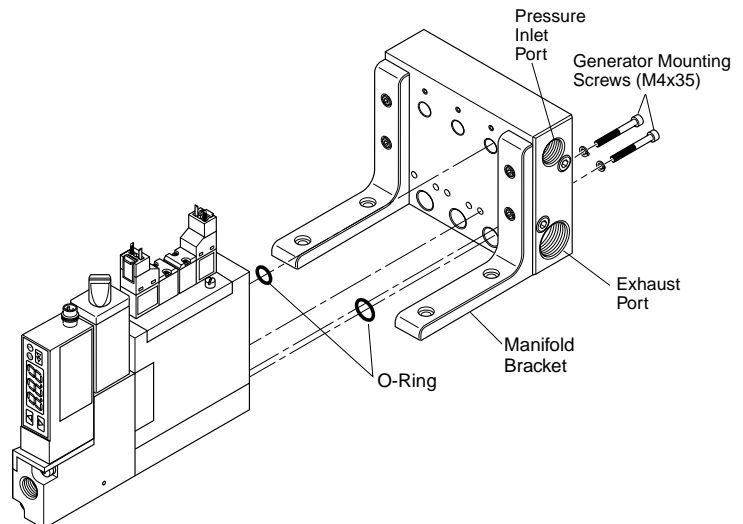
**Manifold
3-Station Manifold Shown**



Manifold Assembly
Generator Function must be ordered for Manifold Mounting.

n	2	3	4	5	6
A	3.27 (83)	4.17 (106)	5.08 (129)	5.98 (152)	6.89 (175)
B	2.56 (65)	3.46 (88)	4.37 (111)	5.28 (134)	6.18 (157)
n	7	8	9	10	
A	7.80 (198)	8.70 (221)	9.61 (244)	10.51 (267)	
B	7.09 (180)	7.99 (203)	8.90 (226)	9.80 (249)	

Inches (mm)
n = Number of Stations



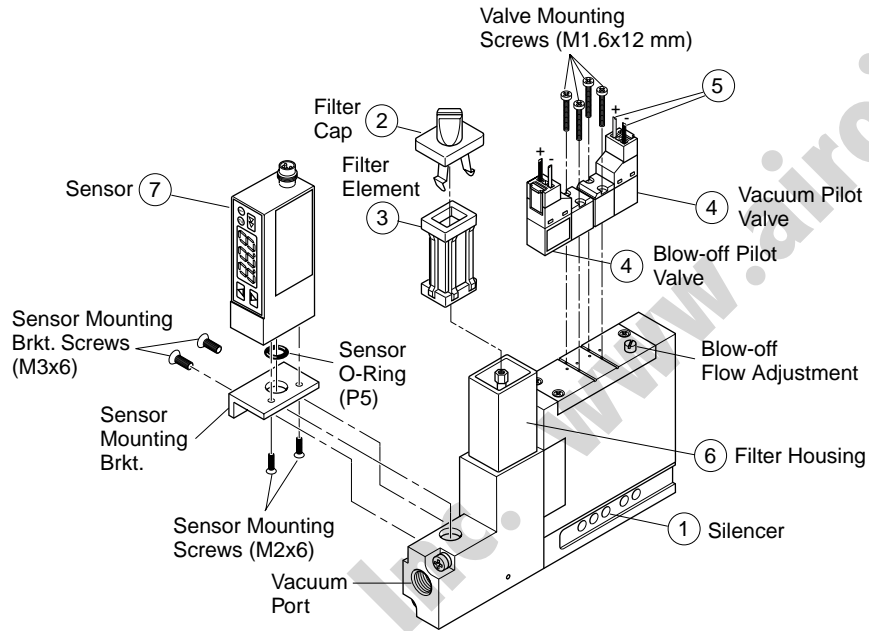


Replacement Components

Item	Part Number	Description
1	CVR2-S	Silencer
2, 3, 6	MC2-F	Filter Kit
3	MC2-E	Filter Element
4, 5	3MB01900D2-3	Pilot Valve
5	CVR2-5L	500mm Clip Lead

Item	Part Number	Replacement Sensor
7	MPS-V6C-NC	MPS-V6 (NPN) Option
	MPS-V6C-PC	MPS-V6 (PNP) Option
	MPS-V2C-NC	MPS-V2 (NPN) Option
	MPS-V2C-PC	MPS-V2 (PNP) Option
	MVS-201-NC	MVS-201 (NPN) Option
	MVS-201-PCP	MVS-201 (PNP) Option

B



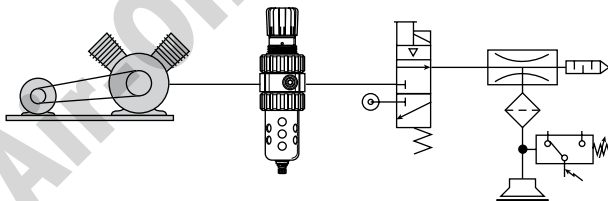
⚠ Cautions

Do not use or expose the CVR2 with fluids or corrosive gases. Vacuum Venturi's are designed to be used with non-lubricated, non-corrosive, compressed air.

Do not operate CVR2 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.



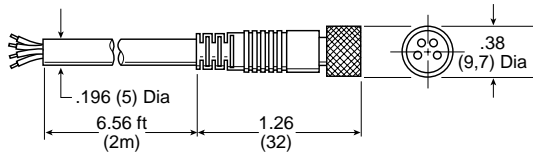
All normally closed vacuum circuits will interrupt the air supply to the venturi during a power failure or Emergency Stop condition. As a result, the product being transferred may be dropped, possibly creating a hazard to the surrounding environment. To avoid hazardous situations during a power loss or Emergency Stop condition, consider a normally open vacuum circuit.



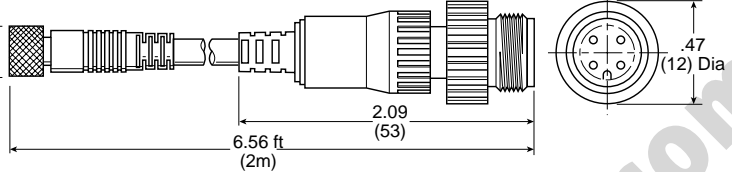
Accessories

Sensor Cables

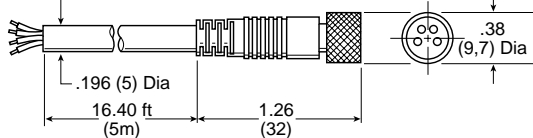
CB-M8-4P-2M, Female to Open Lead



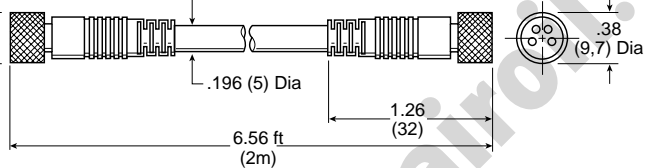
CB-M8-4P-M12-2M, M8 Female to M12 Male



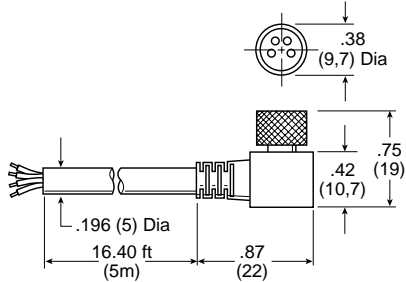
CB-M8-4P-5M, Female to Open Lead



CB-M8-4P-M8-2M, M8 Female to M8 Male



CB-M8-4P-5M-90, Female to Open Lead

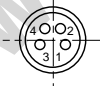


Pin Out Connection

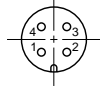
**Female Interface
4-Pin, M8**



**Male Interface
4-Pin, M8**



**Male Interface
4-Pin, M12**



Cable Pin	Color
1	Brown
2	White
3	Blue
4	Black

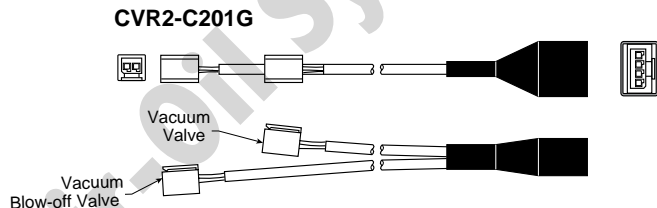
Pilot Valve Cables

CVR2-201G Sensor / Valve Connector*
 (Connects Sensor to Vacuum & Blow-off Release Pilot Valves)

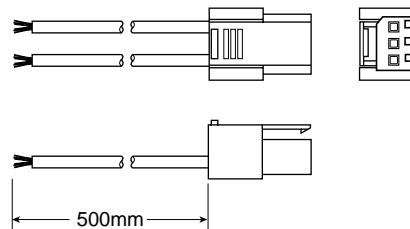
CVR2-5L (500mm) Lead*
 (Connects Power Source to Vacuum & Blow-off Release Pilot Valves)

Positive "+" (Red Wire)
 Negative "-" (Black Wire)

* Included with Generator



* Included with Generator Option 01 & 06.



Manifold Blank Plate Kit

CVR2-BLK

Kit Includes: Blank Plate, Screws & Gasket





CVK

B

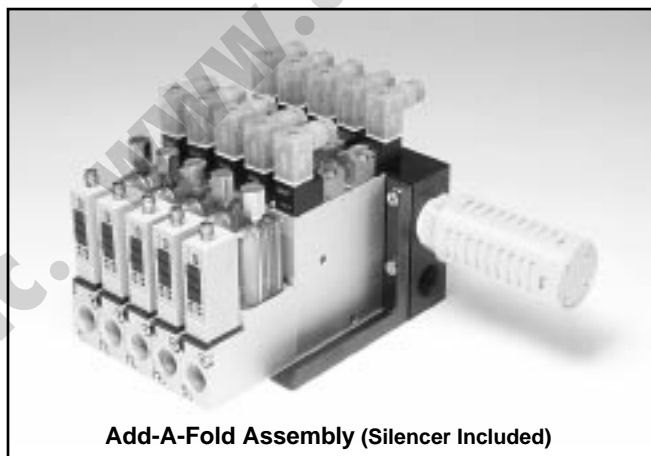


Features

- 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 2.1 to 5.75 SCFM

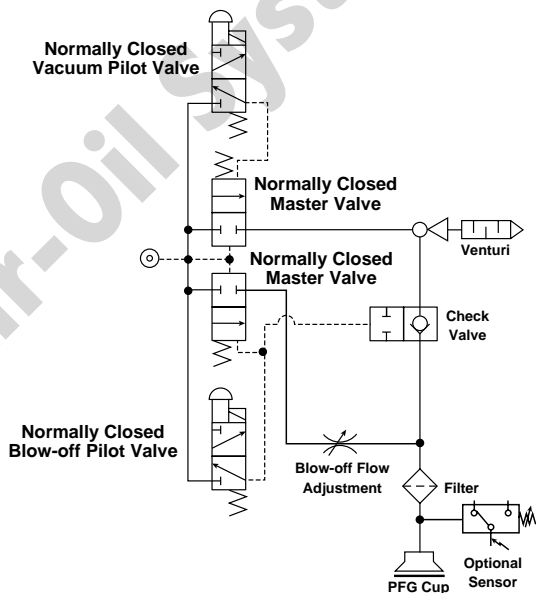
Characteristics

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

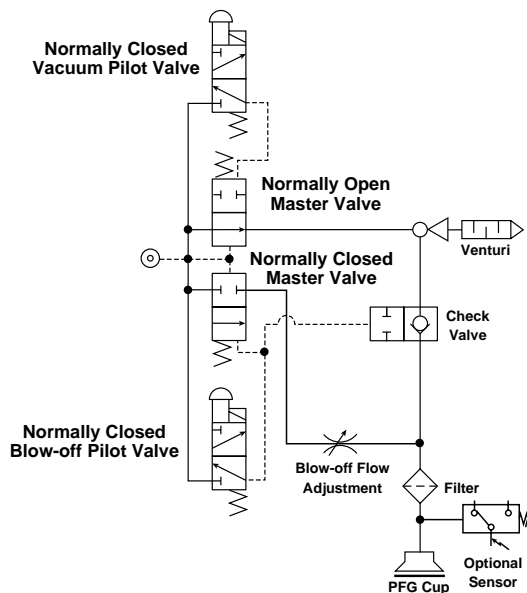


Add-A-Fold Assembly (Silencer Included)

Normally Closed Vacuum Circuit The Vacuum Pilot is Energized to Activate Vacuum



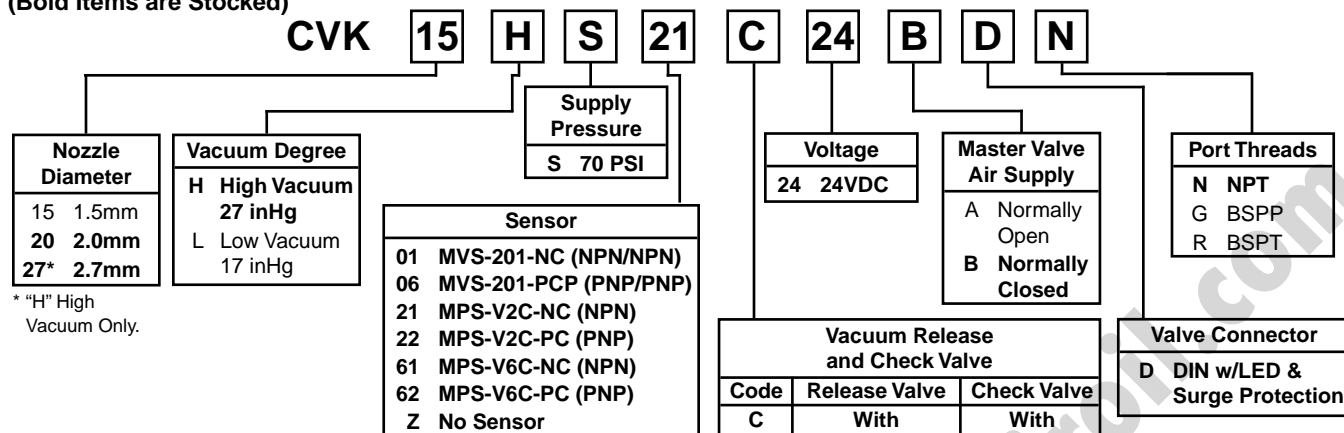
Normally Open Vacuum Circuit The Vacuum Pilot is Energized to Deactivate Vacuum





Model Number Index

(Bold Items are Stocked)



Specifications

Media	Non-Lubricated Compressed Air, Non-Corrosive Gases
Optimum Operating Pressure	70 PSI (5 kgf/cm ²)
Humidity	35 to 85%
Pressure Port	N: 1/4 NPT Female, G: 1/4 BSPP Female, R: 1/4 BSPT Female
Vacuum Port	N: 3/8 NPT Female, G: 3/8 BSPP Female, R: 3/8 BSPT Female
Operating Temperature	41 to 132°F (5 to 50°C)
Material	Aluminum, Brass, NBR

Vacuum Pilot and Blow-off Release Pilot

Type of Control Valve	Pilot Valve
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	70 PSI (5 kgf/cm ²)
Pilot Valve Air Supply	Normally Closed
Generator Weight	26.3 oz. (750g)
Manifold Weight	2-Station: 24 oz. (680g), 3-Station: 31 oz. (880g), 4-Station: 38 oz. (1080g), 5-Station: 45 oz. (1280g)

Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ * to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
CVK15HS	70	3.53	2.3	4.8	8.0	12.4	18.4	26.3	40.4	62.1	189.3
CVK20HS	70	6.36	1.1	2.5	5.0	7.6	12.1	18.6	29.9	53.4	129.9
CVK27HS	70	10.42	0.6	2.0	3.0	5.6	8.5	13.3	21.2	42.1	—

* 1 ft³ = 28.31 liters

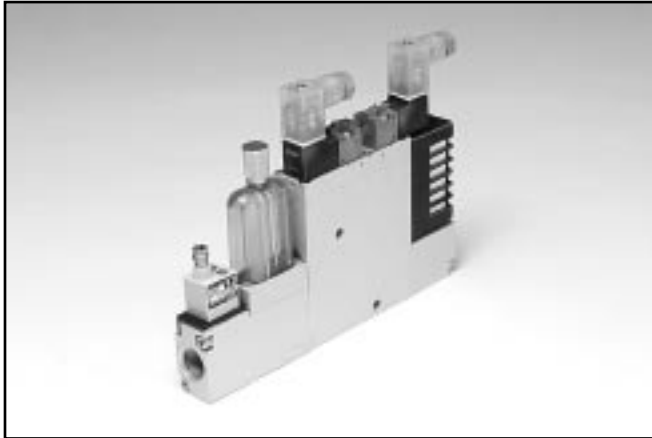
Vacuum Flow (SCFM)

Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30
CVK15HS	2.51	2.23	1.95	1.67	1.39	1.12	.85	.58	.30	—	—
CVK20HS	3.75	3.34	2.93	2.50	2.12	1.70	1.28	.86	.44	—	—
CVK27HS	5.75	5.09	4.43	3.77	3.11	2.45	1.80	1.15	.50	—	—





CVK with MPS-6 Series



The "V6" sensor has one normally open and one normally closed NPN or PNP output available for vacuum confirmation. The MPS-6 sensor is a cost effective performer with an output response time less than 1 msec. and a nice adjustable 220 degree output range.

The "V6" sensor is available with an M8, 4-Pin or grommated (2M) electrical connector. The mating M8, 4-Pin cable is not included with the MPS-6 Sensor and must be ordered separately. See CVK Accessories for cable options.

For more information on MPS-6 Series Sensor, see Section C.

CVK with MPS-2 Series



The "V2" 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 "V2" sensor is available with an M8, 4-Pin or grommated (2M) electrical connector. The mating M8, 4-Pin cable is not included with the MPS-2 Sensor and must be ordered separately. See CVK Accessories for cable options.

For more information on MPS-2 Series Sensor, see Section C.

CVK with MVS-201 Series



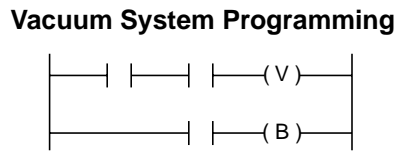
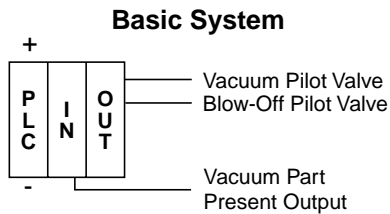
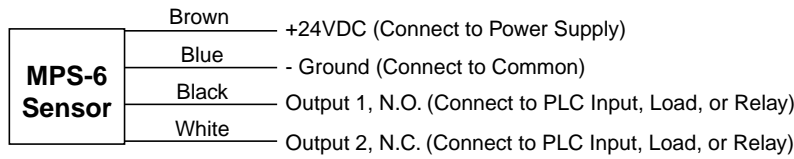
The "201" sensor has one output NPN or PNP for vacuum confirmation and a control output that interfaces directly with the blow-off release pilot valve. With programmable time control features and a special chip driver, the sensor automatically activates the blow-off release when the NPN or PNP input 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. See CVK Accessories for cable options.

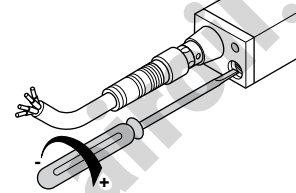
For more information on MVS-201 Series Sensor, see Section C.



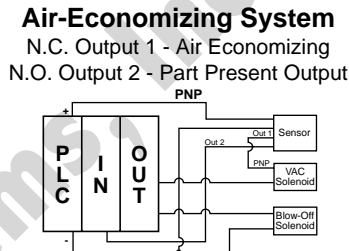
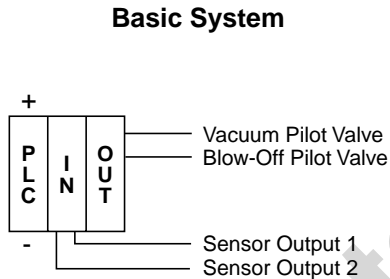
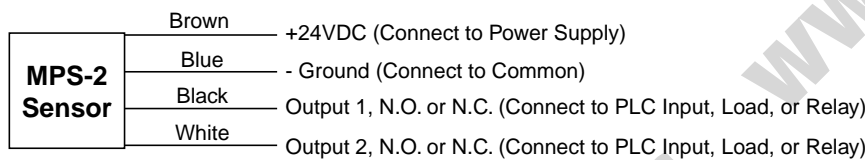
CVK with MPS-6 Series



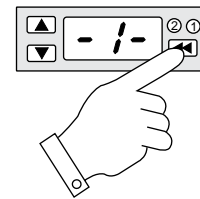
Output Adjustment
 Rotate the potentiometer trimmer to increase or decrease pressure switch point output. Excessive force or exceeding the limits of the trimmers may cause damage.



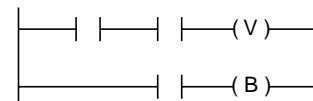
CVK with MPS-2 Series



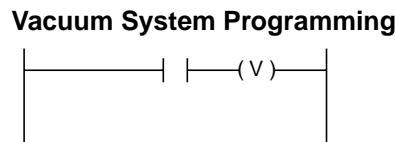
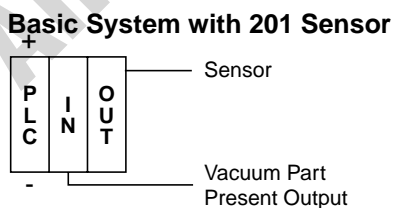
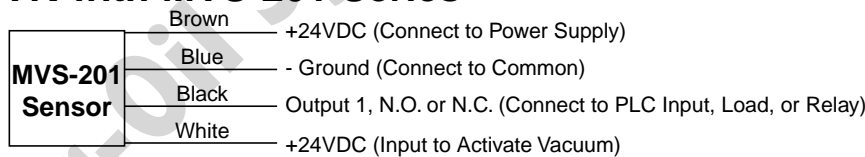
Output Adjustment
 Sensor functions and outputs are programmed by touch panel.



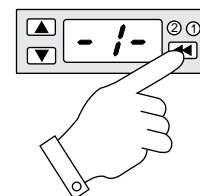
Vacuum System Programming



CVK with MVS-201 Series



Output Adjustment
 Sensor functions and outputs are programmed by touch panel.





B



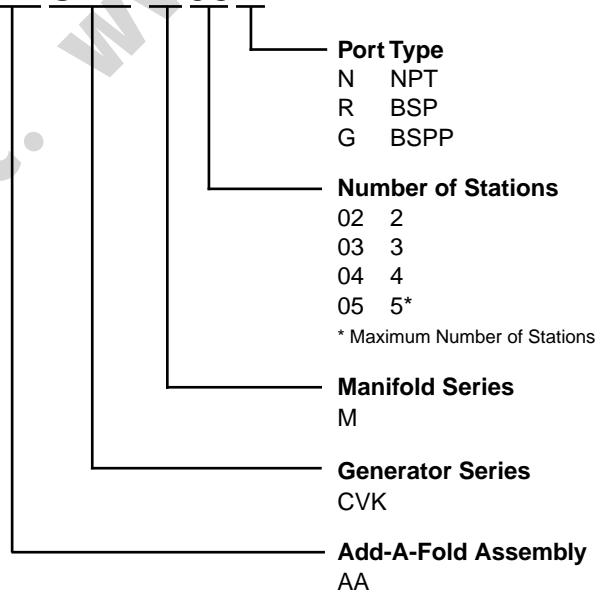
Example 1: Shown above is a 5-Station CVK Manifold with only 2 sensors and NPT Ports.

Qty.	Part No.	Comment
1	AACVKM04N.....	Add-A-Fold
1	CVK15HS21C24BDN.....	Station #1
1	CVK15HS21C24BDN.....	Station #2
1	CVK20HSZC24BDN.....	Station #3
1	CVK20HSZC24BDN.....	Station #4
1	CVK27HSZC24BDN.....	Station #5
<i>Alternative Method</i>		
1	AACVKM04N.....	Add-A-Fold
2	CVK15HS21C24BDN.....	Station #1-2
2	CVK20HSZC24BDN.....	Station #3-4
1	CVK27HSZC24BDN.....	Station #5

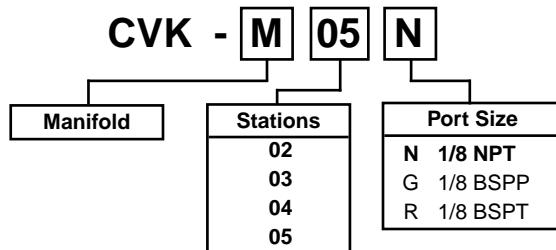
How To Order Add-A-Fold Assemblies

1. Manifold assemblies are multiple line item listings.
2. First line item must be the Add-A-Fold assembly part number.
3. Subsequent line items listed identify each station in the Manifold starting with Station Number 1.
4. Station Number 1 is the left most Generator when looking at the Manifold Generator Ports.
5. List either a part number of the Manifold Type Generator or a Blank Plate for each station of the Manifold.
6. See Model Number Index Code for CVK Generator number and Accessories for Blank Plate Part numbers.

AACVVK-M05N

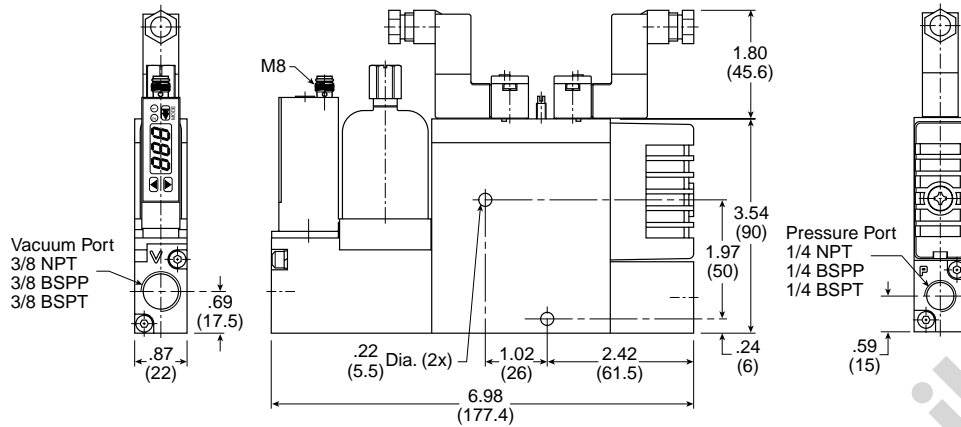


Manifold Block



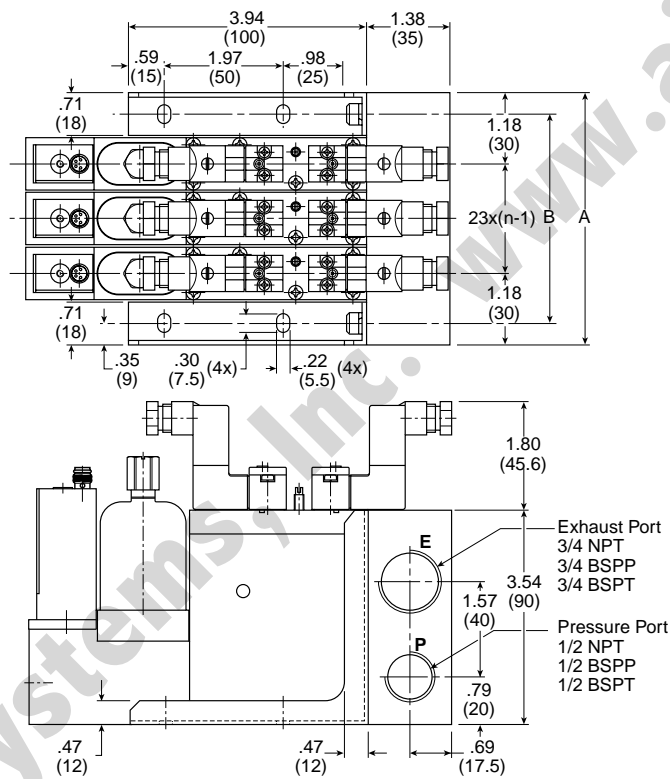


Generator



Manifold

3-Station Manifold Shown

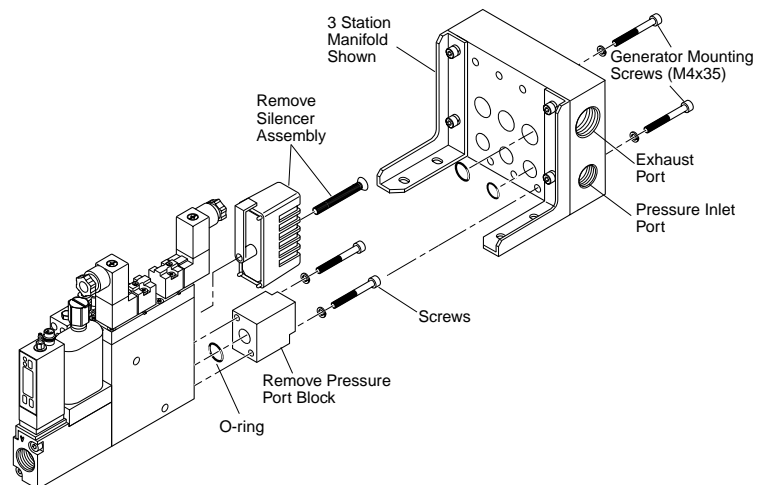


Manifold Assembly
Remove Pressure Port Block and Silencer Assembly. Use existing O-rings and Manifold Mounting Screws to secure the CVK unit to the Manifold.

n	2	3	4	5
A	3.27 (83)	4.17 (106)	5.08 (129)	5.98 (152)
B	2.56 (65)	3.46 (88)	4.37 (111)	5.28 (134)

Inches (mm)

n = Number of Stations



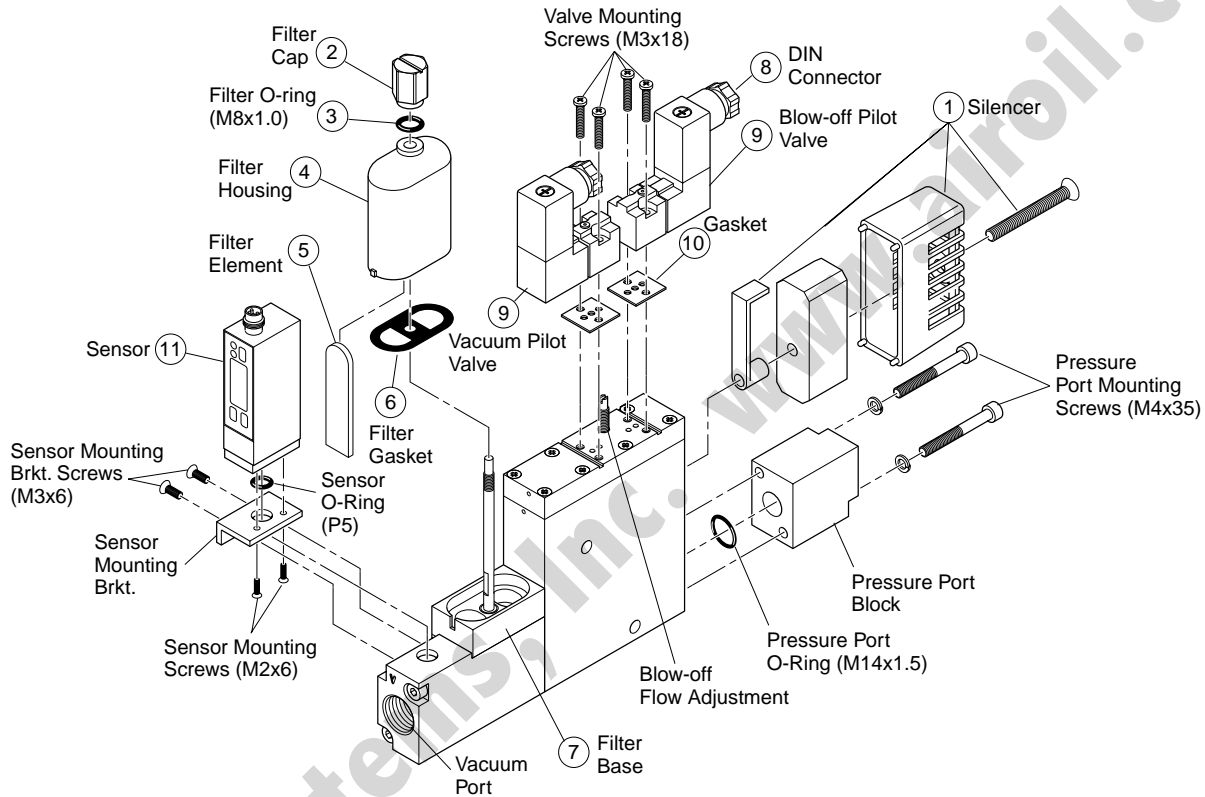


Replacement Components

Item	Part Number	Description
1	CVK-S	Silencer
2 thru 7	CVK-F	Filter Kit
5	CVK-E	Filter Element
8	PESC2020B	DIN Connector
8, 9, 10	P5136-M6L-DC24V	Pilot Valve Kit

Item	Part Number	Replacement Sensor
11	MPS-V6C-NC	MPS-V6 (NPN) Option
	MPS-V6C-PC	MPS-V6 (PNP) Option
	MPS-V2C-NC	MPS-V2 (NPN) Option
	MPS-V2C-PC	MPS-V2 (PNP) Option
	MVS-201-NC	MVS-201 (NPN) Option
	MVS-201-PCP	MVS-201 (PNP) Option

B



⚠ Cautions

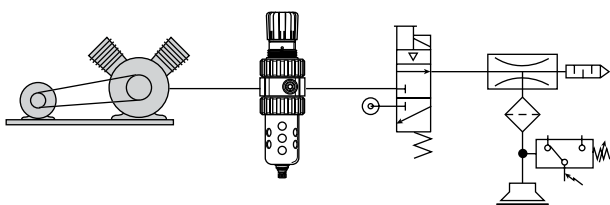
Do not use or expose the CVK with fluids or corrosive gases. Vacuum Venturi's are designed to be used with non-lubricated, non-corrosive, compressed air.

Do not operate CVK 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.

All normally closed vacuum circuits will interrupt the air supply to the venturi during a power failure or Emergency Stop condition. As a result, the product being transferred may be dropped, possibly creating a hazard to the surrounding environment. To avoid hazardous situations during a power loss or Emergency Stop condition, consider a normally open vacuum circuit.

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.

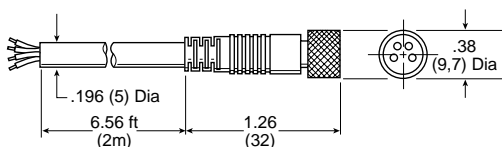




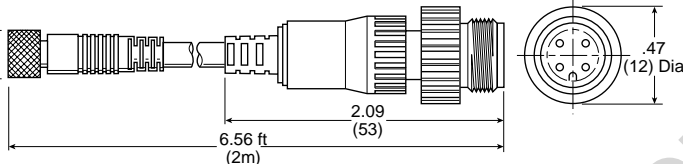
Accessories

Sensor Cables

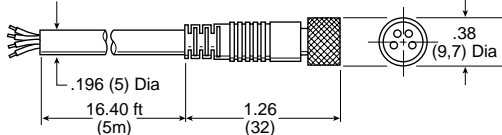
CB-M8-4P-2M, Female to Open Lead



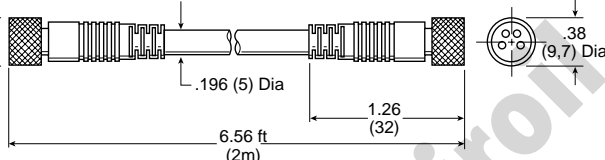
CB-M8-4P-M12-2M, M8 Female to M12 Male



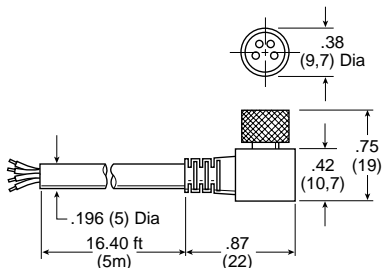
CB-M8-4P-5M, Female to Open Lead



CB-M8-4P-M8-2M, M8 Female to M8 Male



CB-M8-4P-5M-90, Female to Open Lead



Pin Out Connection

**Female Interface
4-Pin, M8**



**Male Interface
4-Pin, M8**



**Male Interface
4-Pin, M12**

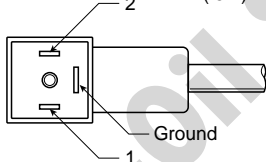
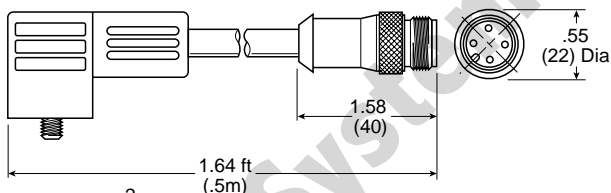


Cable Pin	Color
1	Brown
2	White
3	Blue
4	Black

DIN Connector Options

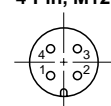
DIN Connector with M12 Connector

CB-94DN-M12-4P
(24VDC, LED / Surge Protection)



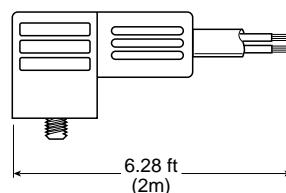
**Male Interface
4-Pin, M12**

Cable Pin	DIN
1	1
2	Not Used
3	Ground
4	2



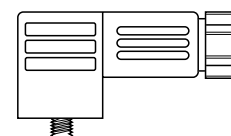
DIN Connector with Cable

PESC2220B
(24VDC, LED / Surge Protection)

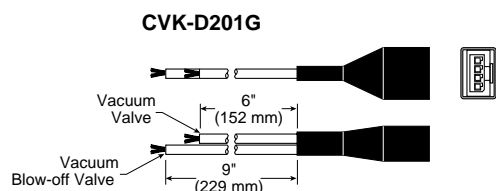


DIN Connector

PESC2020B
(24VDC, LED / Surge Protection)

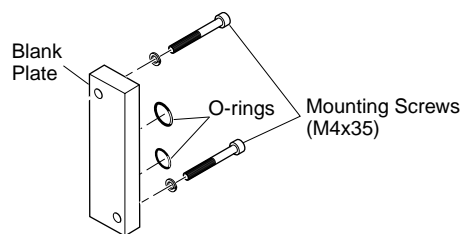


CVK-D201G Valve Cable* (Connects Sensor to Vacuum & Blow-off Release Pilot Valves)



Generator Blank Plate Kit CVK-BLK

Kit Includes: Blank Plate, Screws & O-rings

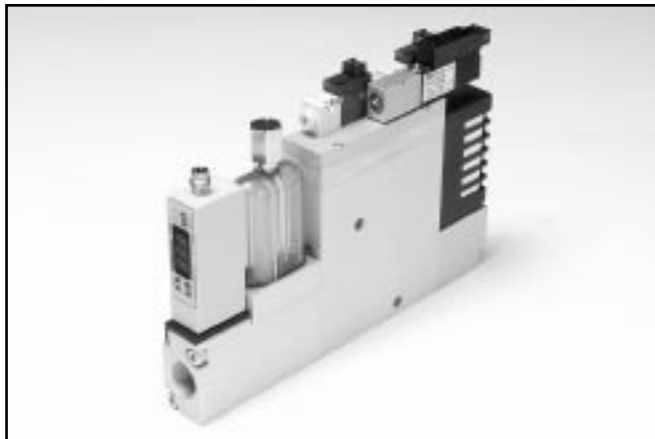


* Included with Generator Option 01 & 06.



CEK Emergency Stop

B



Characteristics

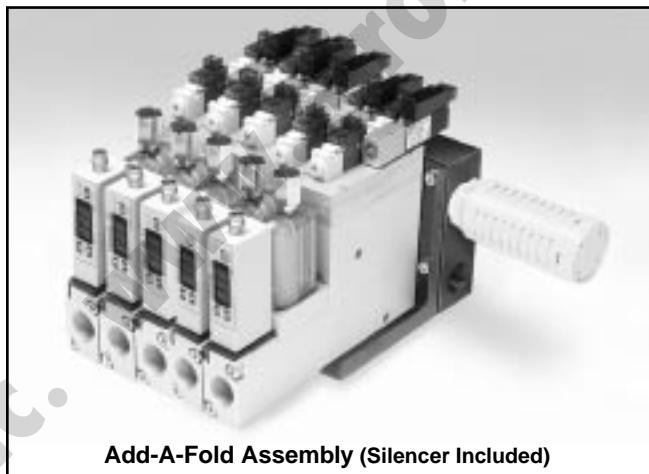
The CEK is a CVK unit with a Normally Closed Vacuum On / Off valve that maintains the last state of air during an emergency stop or power loss. In addition to this, an air-economizing valve has been added to interrupt the air supply by connecting the output signal from the sensor to minimize air consumption.

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.

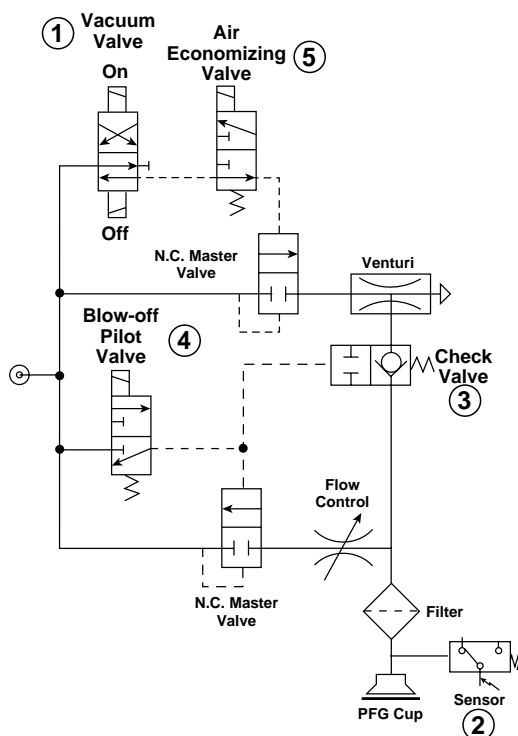
Features

- 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



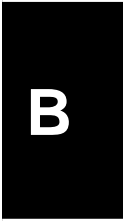
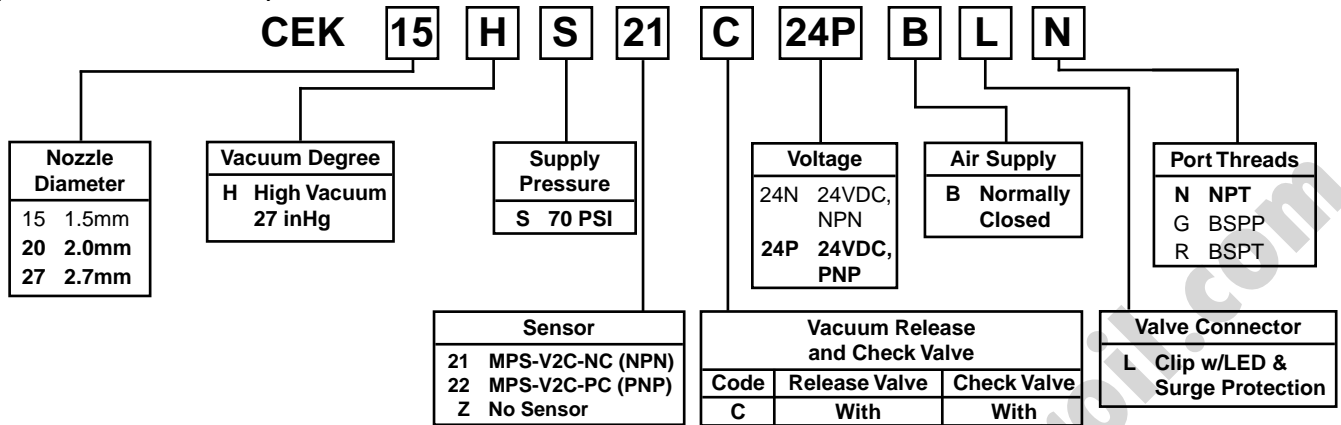
Add-A-Fold Assembly (Silencer Included)

Valve Controlled Emergency Stop Circuit



Model Number Index

(Bold Items are Stocked)



Specifications

Media	Non-Lubricated Compressed Air, Non-Corrosive Gases
Operating Pressure	70 PSI (5 kgf/cm ²)
Humidity	35 to 85%
Pressure Port	N: 1/4 NPT Female, G: 1/4 BSPP Female, R: 1/4 BSPT Female
Vacuum Port	N: 3/8 NPT Female, G: 3/8 BSPP Female, R: 3/8 BSPT Female
Operating Temperature	41 to 132°F (5 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	70 PSI (5 kgf/cm ²)	70 PSI (5 kgf/cm ²)	
Air Supply	Normally Closed	Normally Closed	
Generator Weight	26.3 oz. (750g)		
Manifold Weight	2-Station: 24 oz. (680g), 3-Station: 31 oz. (880g), 4-Station: 38 oz. (1080g), 5-Station: 45 oz. (1280g)		

Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ * to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
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	—

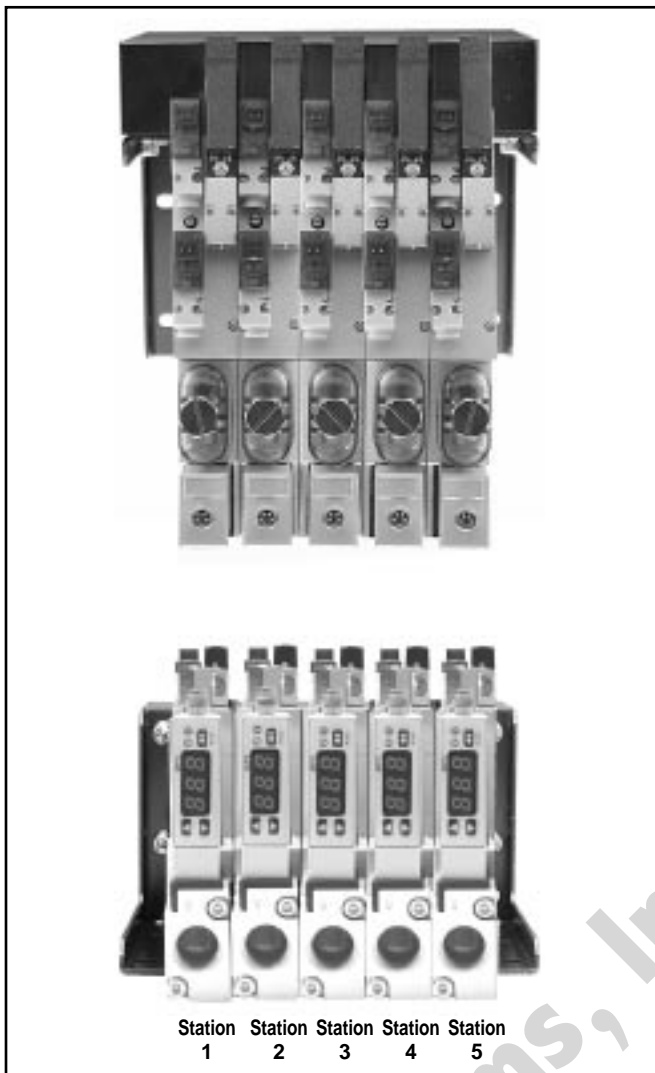
* 1 ft³ = 28.31 liters

Vacuum Flow (SCFM)

Nozzle Diameter	inHg										
	0	3	6	9	12	15	18	21	24	27	30
CEK15HS	2.51	2.23	1.95	1.67	1.39	1.12	.85	.58	.30	—	—
CEK20HS	3.75	3.34	2.93	2.50	2.12	1.70	1.28	.86	.44	—	—
CEK27HS	5.75	5.09	4.43	3.77	3.11	2.45	1.80	1.15	.50	—	—



B



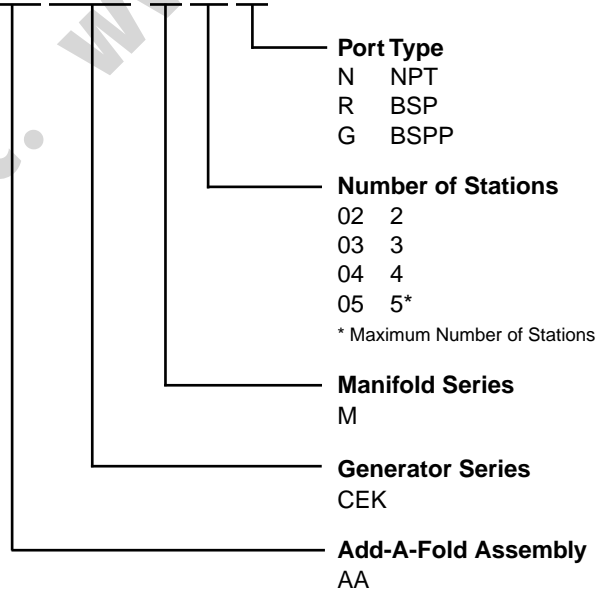
Example 1: Shown above is a 5-Station CVK Manifold with only 2 sensors and NPT Ports.

Qty.	Part No.	Comment
1	AACEK-M04N.....	Add-A-Fold
1	CEK15HS21C24BLN.....	Station #1
1	CEK15HS21C24BLN.....	Station #2
1	CEK20HS21C24BLN.....	Station #3
1	CEK20HS21C24BLN.....	Station #4
1	CEK27HS21C24BLN.....	Station #5
<i>Alternative Method</i>		
1	AACEKM04N.....	Add-A-Fold
2	CEK15HS21C24BLN.....	Station #1-2
2	CEK20HS21C24BLN.....	Station #3-4
1	CEK27HS21C24BLN.....	Station #5

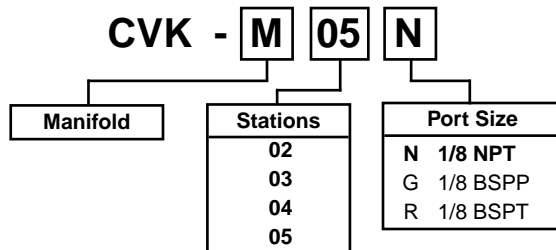
How To Order Add-A-Fold Assemblies

1. Manifold assemblies are multiple line item listings.
2. First line item must be the Add-A-Fold assembly part number.
3. Subsequent line items listed identify each station in the Manifold starting with Station Number 1.
4. Station Number 1 is the left most Generator when looking at the Manifold Generator Ports.
5. List either a part number of the Manifold Type Generator or a Blank Plate for each station of the Manifold.
6. See Model Number Index Code for CEK Generator number and Accessories for Blank Plate Part numbers.

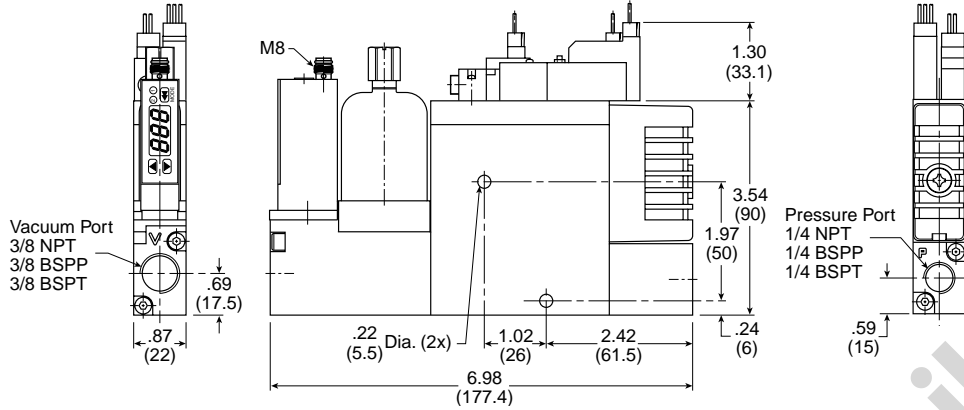
AACEK-M05N



Manifold Block

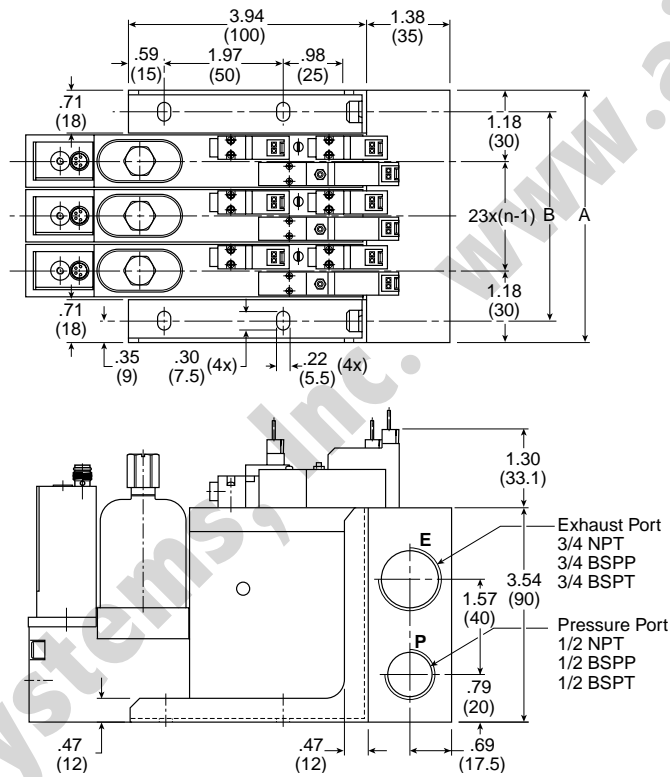


Generator



Manifold

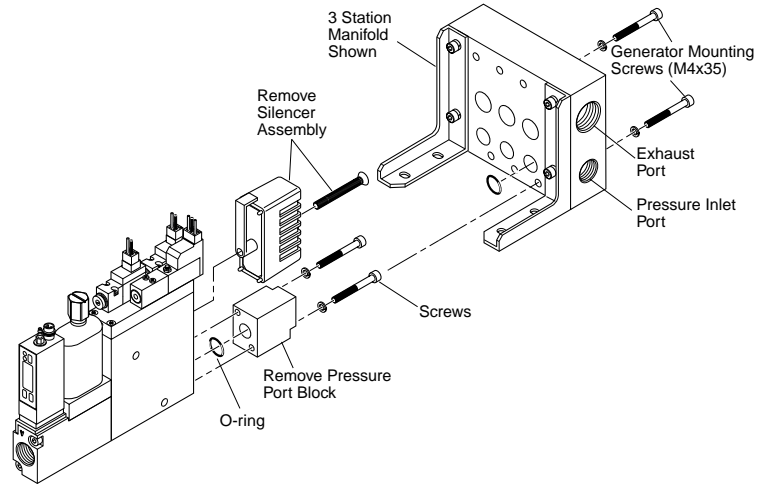
3-Station Manifold Shown



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.

n	2	3	4	5
A	3.27 (83)	4.17 (106)	5.08 (129)	5.98 (152)
B	2.56 (65)	3.46 (88)	4.37 (111)	5.28 (134)

Inches (mm)
n = Number of Stations



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-A-10-V	Air-Economizing Valve
10	MC2-5L	500mm Clip Lead
11,13	PCL241B-NB-D24SP	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-V2C-NC	MPS-V2 (NPN) Option
	MPS-V2C-PC	MPS-V2 (PNP) Option

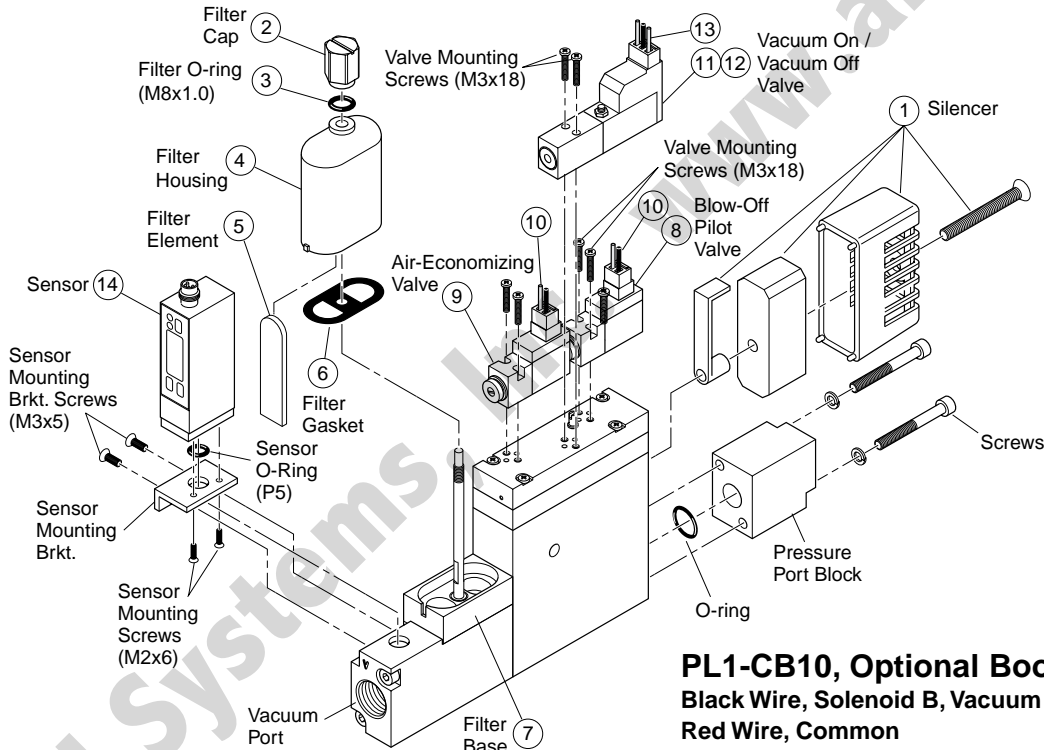
⚠ Cautions

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*

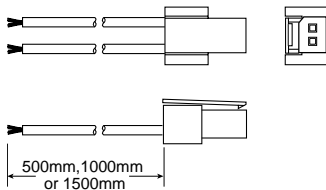
MC2-10L (1000mm) Lead

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

Positive "+" (Red Wire)

Negative "-" (Black Wire)

* Included with Generator



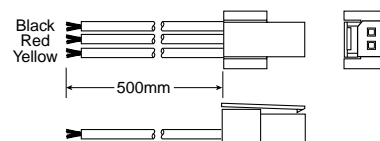
PCL2-D24-CL5* Cable

Black Wire, Solenoid B, Vacuum On

Red Wire, Common

Yellow Wire, Solenoid A, Vacuum Off

*Included with Generator

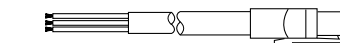
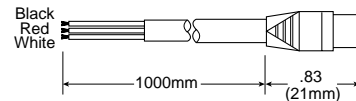


PL1-CB10, Optional Booted Cable

Black Wire, Solenoid B, Vacuum Off

Red Wire, Common

White Wire, Solenoid A, Vacuum On

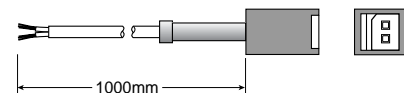


MC2-CB10 Valve Cable

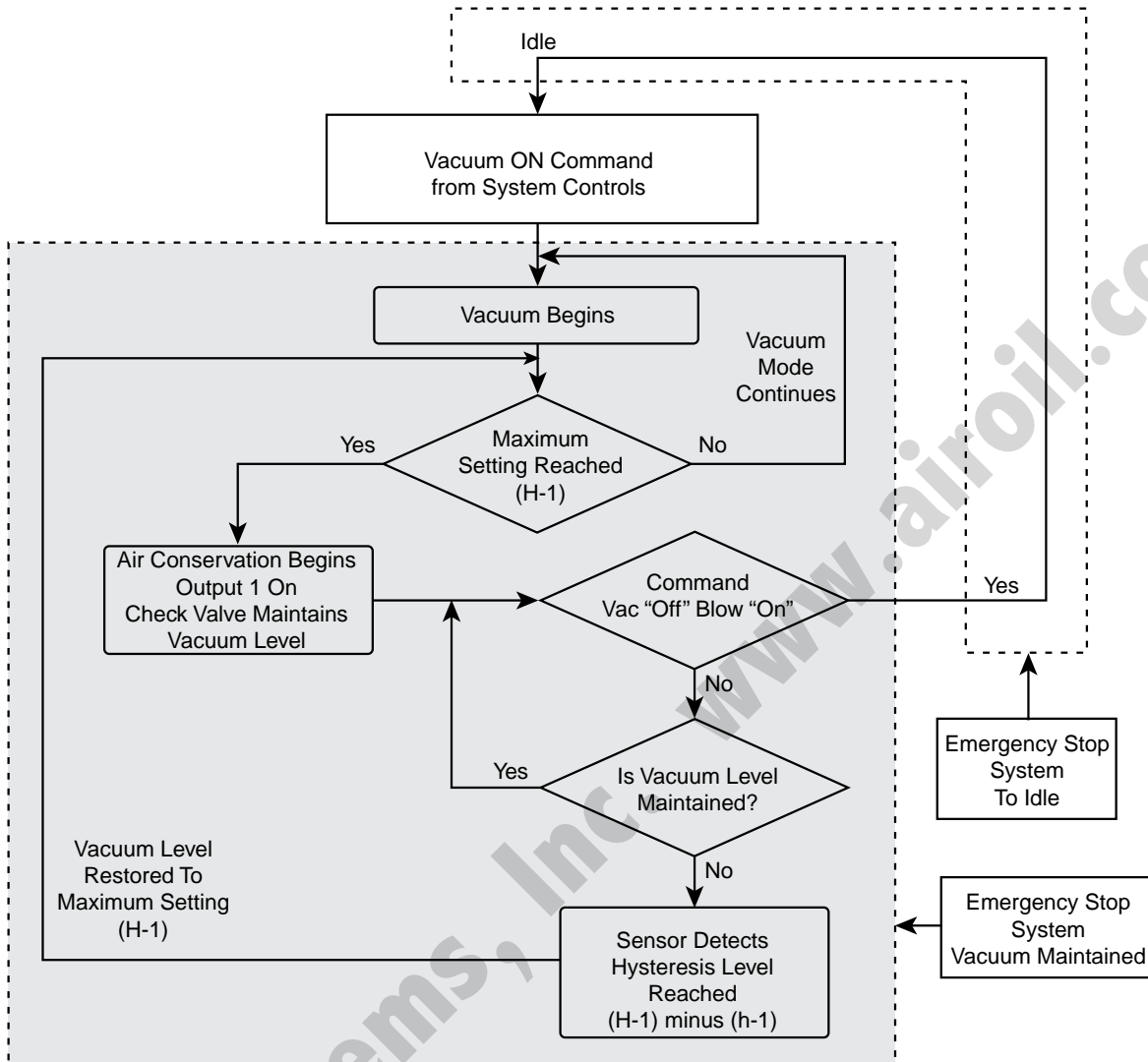
(Connects Power Source to Vacuum & Blow-off Release Pilot Valves)

Positive "+" (Red Wire)

Negative "-" (Black Wire)





CEK - System Logic



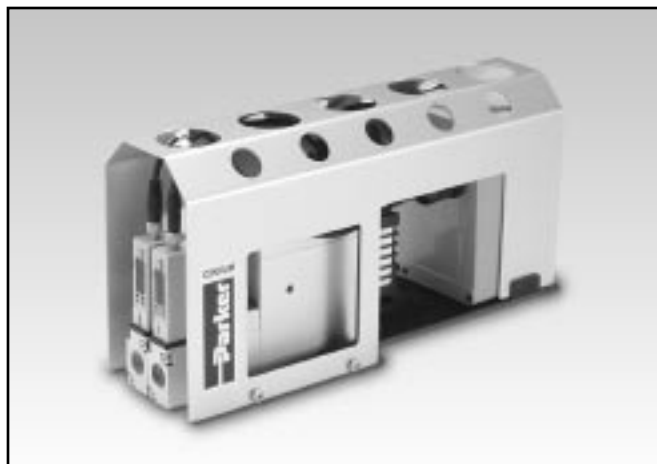
CEK - Emergency Stop Operating System (EOS)

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 	Idle	Blow-Off	EOS On
	Vacuum On		On or Idle 	
Restore Power	Vacuum On Air-Economizing Function Resumes	Idle	Idle	EOS Off

CVXCEK



B

Characteristics

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

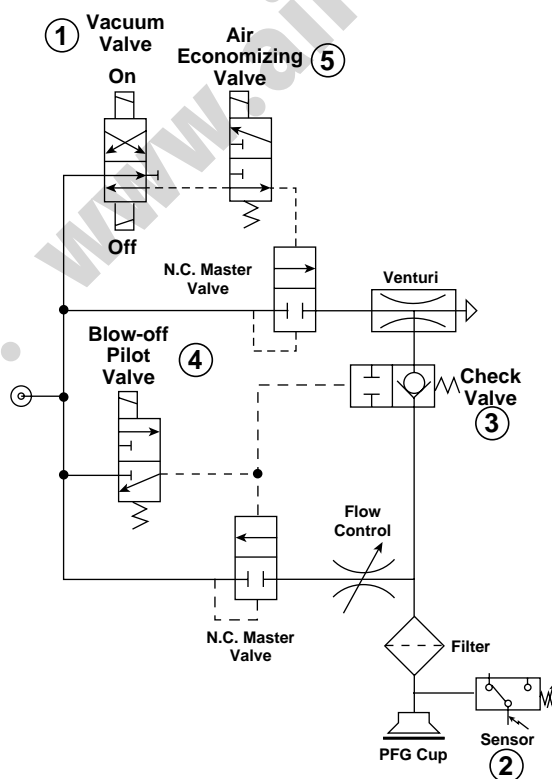
Each CVXCEK unit consists of 2 independent vacuum generators labeled channel 1 and channel 2. Each vacuum generator has a vacuum ON / OFF solenoid pilot valve, blow-off solenoid pilot valve, Air-Economizing valve, blow-off needle control valve, pressure sensor, vacuum check valve, vacuum filter, and 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.

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.

Features

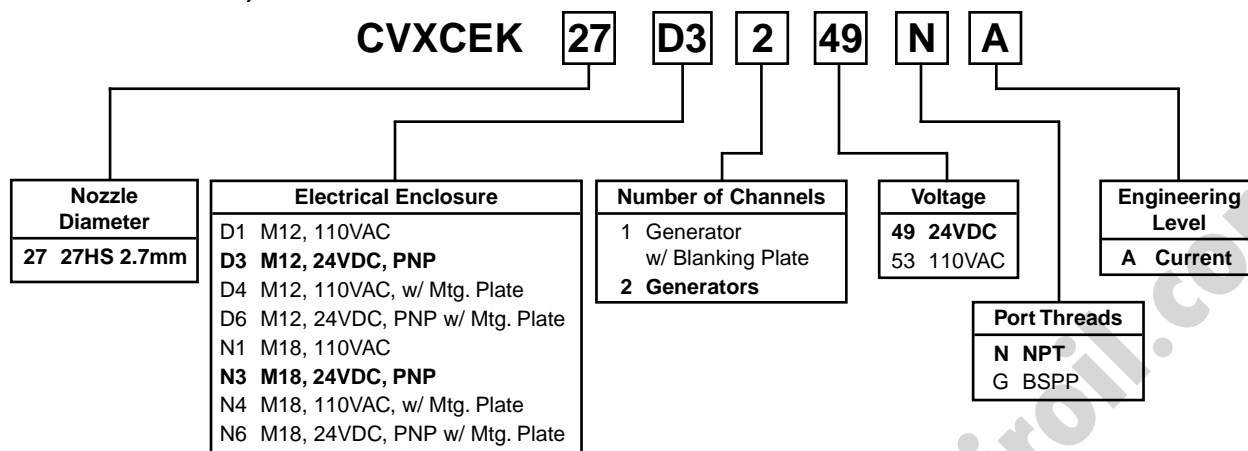
- Integrated Double Solenoid for Hold Last State Conditions
- Integrated Vacuum Pilot
- Integrated Blow-off Pilot
- Integrated Filter, Silencer
- Air Economizing Capabilities
- Manifolds for up to 5 Units



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

(Bold Items are Standard)



Specifications

Media	Non-Lubricated Compressed Air, Non-Corrosive Gases
Operating Pressure	70 PSI
Humidity	35 to 85%
Pressure Port	N: 1/4 NPT Female, G: 1/4 BSPP Female, R: 1/4 BSPT Female
Vacuum Port	N: 3/8 NPT Female, G: 3/8 BSPP Female, R: 3/8 BSPT Female
Operating Temperature	41 to 132°F (5 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	70 PSI	70 PSI		-14.7 PSI to 72.5 PSI	
Air Supply	Normally Closed	Normally Closed		N/A	
Manifold Weight	1-Station: 62 oz. (1758g), 2-Station: 88 oz. (2495g)				

* 110VAC units use 24VDC Solenoids and Sensors.

Performance

Series / Nozzle Diameter	Nozzle Diameter (mm)	Vacuum Degree at 70 PSI	Vacuum Flow per Channel (SCFM)	Air Consumption per Channel (SCFM)
CVXCEK27	2.7	27	5.75	10.41

Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure	Air Consumption Per Channel	Evacuation Time per Channel in sec / ft ³ to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
CVXCEK27	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)

Nozzle Dia.	inHg										
	0	3	6	9	12	15	18	21	24	27	30
27HS	5.75	5.09	4.43	3.77	3.11	2.45	1.80	1.15	.50	—	—



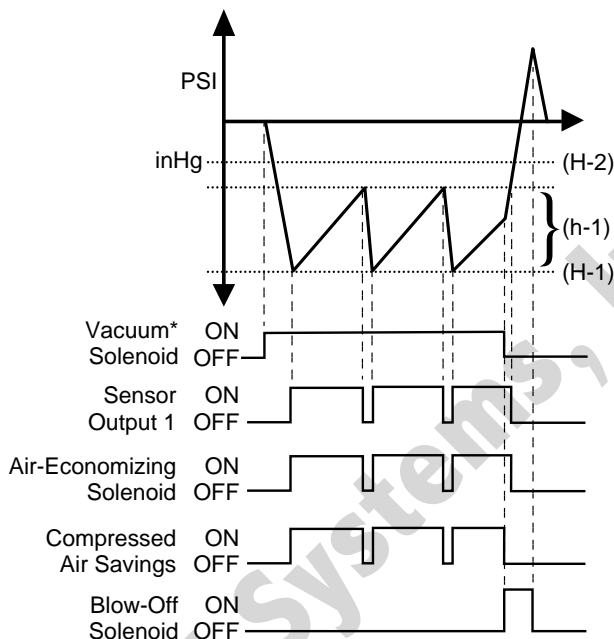
Sensor Output Function

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.

B

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-Economizing 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 Hysteresis Range (h-1) to the hysteresis switch point setting vacuum (H-1) minus (h-1). At this point, the sensor output switches to an open position, Non-passing state and de-activates the Air-Economizing Valve. This cycle will continue depending on the vacuum system and until blow-off function is enabled.

Sensor Output 2 - Vacuum Confirmation - Part Presence Signa

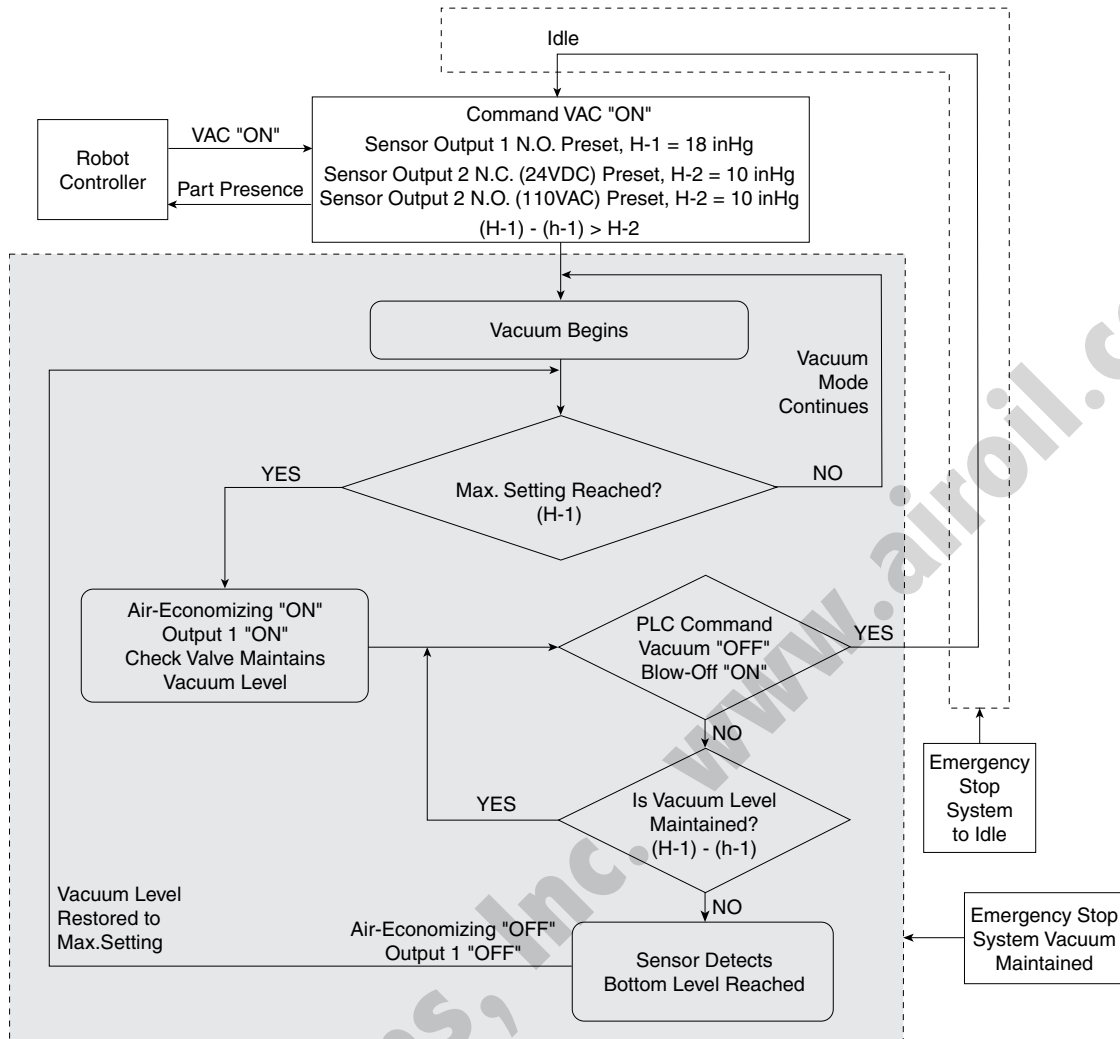
Operates as an Output from the Sensor to provide a Part Presence Signal. This sensor output interfaces with the Input table on the PLC/PC. When the cup is adhered to the part, vacuum level increases and at the Switch Point Setting (H-2), the sensor changes state to indicate a part presence Signal.

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.



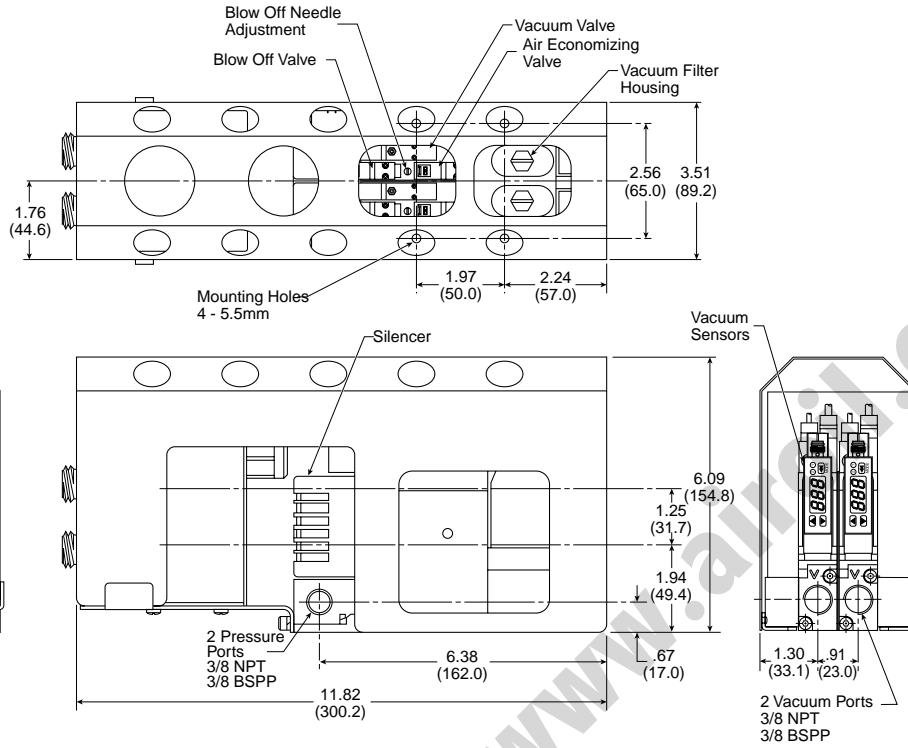
CVXCEK - Emergency Stop Operating System (EOS)

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

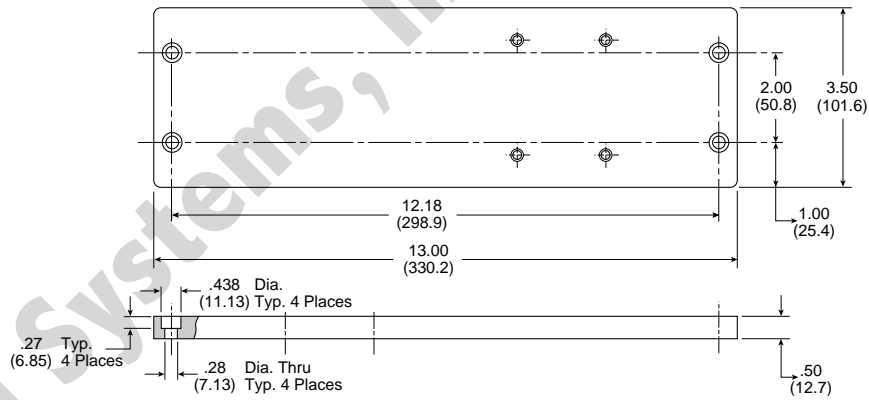
The chart below illustrates the state of operation in different modes.

Modes	Vacuum On	Vacuum Off	Blow-Off
Normal Conditions	Air Economizing 18 to 15.5 inHg	Idle	Blow-off On Blow-off Idle
Emergency Stop Event			
Input Power On Output Power Off	Air Economizing 18 to 15.5 inHg	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 18 to 15.5 inHg	Idle	Idle

B



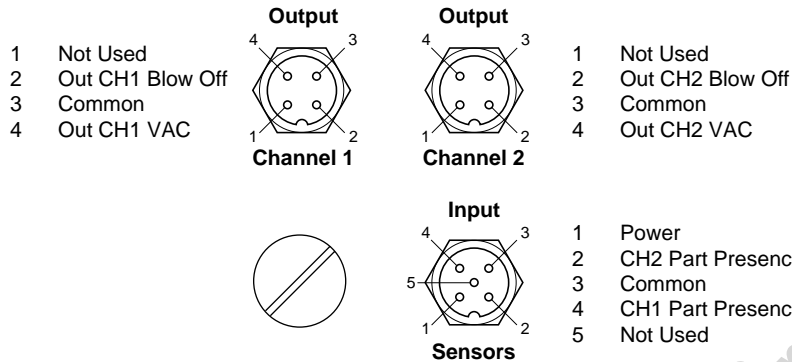
Optional Mounting Plate



M12, 24VDC

Output - 4-Pin, M12, Keyed Male

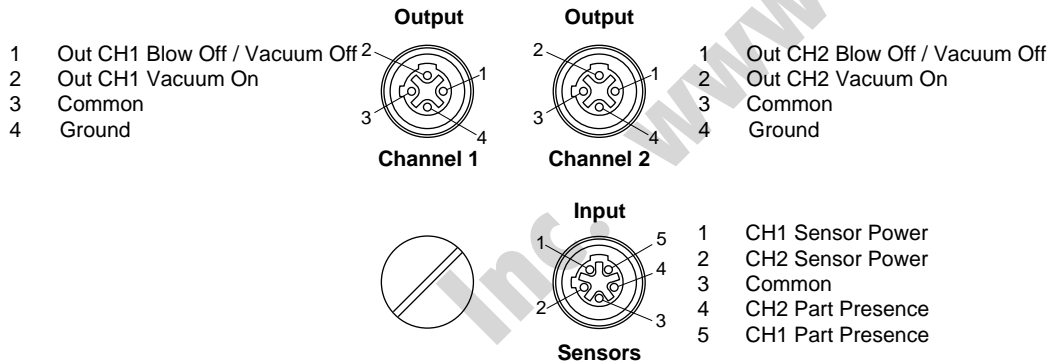
Input - 5-Pin, M12, Keyed Male



M12, 110VAC

Output - 4-Pin, M12, Double Keyed Male

Input - 5-Pin, M12, Double Keyed Male

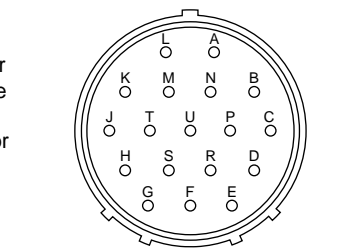


M18, 24VDC & 110VAC

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.

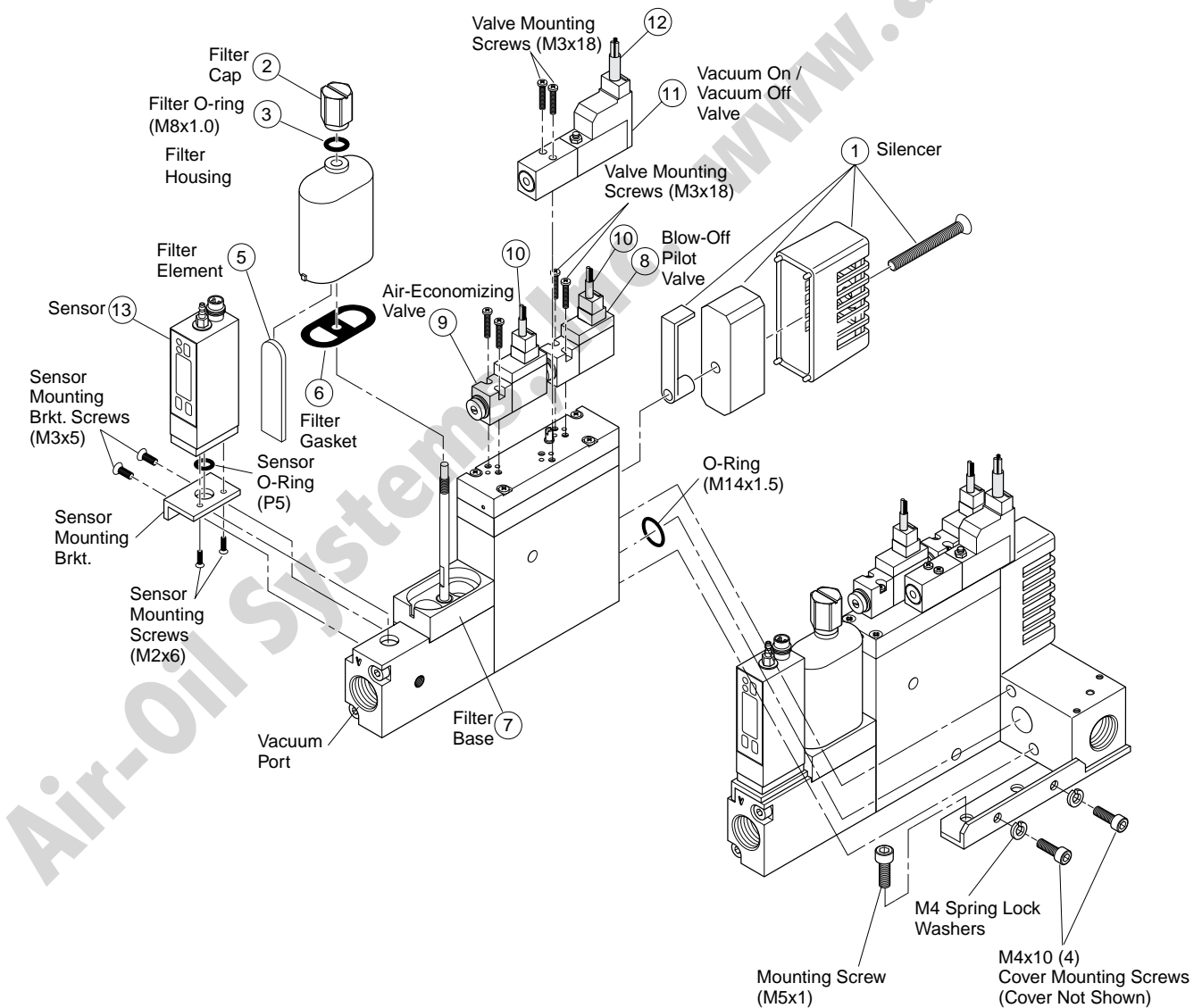
Pin P / T & J are jumpered inside unit.
This is for monitoring power only. Pin P / T is not necessary
for operation of the unit.



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
	PCL241B-NB-D24SP	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

B



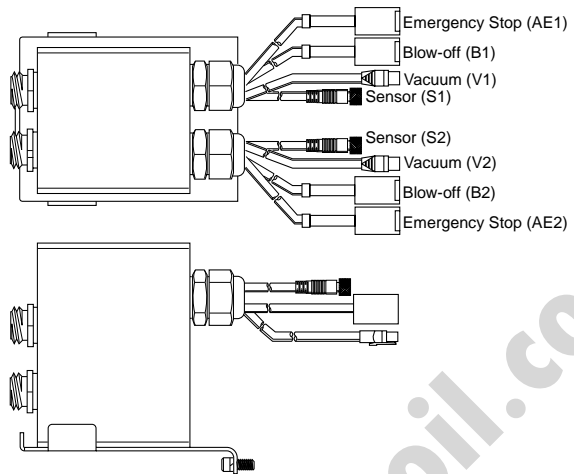
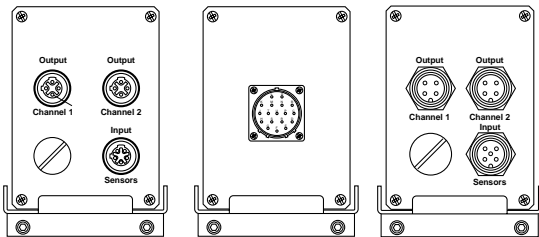
Discrete Kits

PSCEKD1A - M12, 110VAC

PSCEKN1A - M18, 110VAC

PSCEKN3A - M18, 24VDC

PSCEKD3A - M12, 24VDC

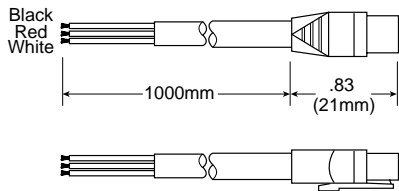


PL1-CB10, Valve Cable

Black Wire, Solenoid B, Vacuum Off

Red Wire, Common

White Wire, Solenoid A, Vacuum On

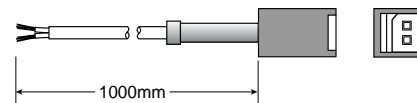


MC2-CB10 Valve Cable

(Connects Power Source to the Air-Economizing & Blow-off Release Pilot Valves)

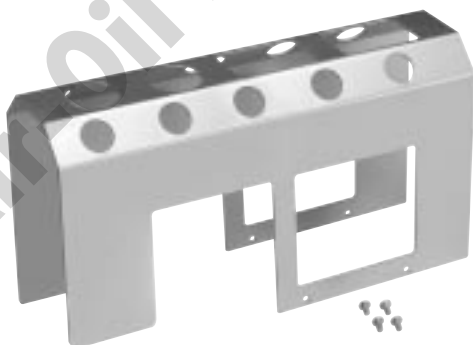
Positive "+" (Red Wire)

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.

A

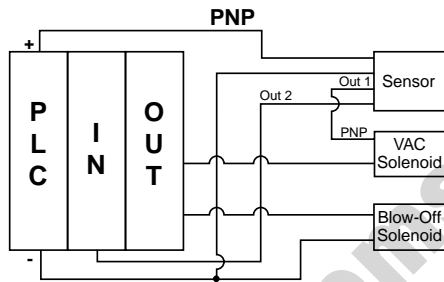
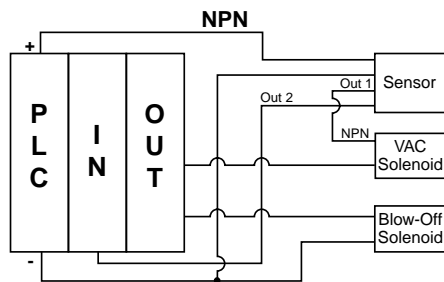
Air Consumption

The amount of air in (measured in SCFM) consumed to achieve the maximum rated vacuum level of the venturi.

Air-Economizing Function

The CVK and CEK integrated vacuum generators have the capacity to minimize air consumption by utilizing the built in check valve. Once a predetermined vacuum level has been achieved (with a non-porous application) , the check valve can maintain the vacuum level within the system. The hysteresis feature of the vacuum sensor can maintain the vacuum level of the system indefinitely when properly wired to the vacuum solenoid pilot valve.

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



 B

Blow-off Needle

This is a flow adjustment supplied on integrated units to control the flow rate of the blow-off release.

Blow-off Time

The amount of time required to break the vacuum and release the product in a pick and place application. This is signal controlled by the PLC or by the MVS-201 sensor.

Blow-off Release Master Valve

This is a shuttle valve that works by differential forces which is piloted by a 2-3 valve. This valve is always configured normally closed.

Blow-off Needle

This is a flow adjustment supplied on integrated units to control the flow rate of the blow-off release.

Blow-off Time

The amount of time required to break the vacuum and release the product in a pick and place application. This is signal controlled by the PLC or by the MVS-201 sensor.

 E

Emergency Stop

Emergency stop conditions for factory automation; this is an external override condition that is usually activated by the machine operator to temporarily shut the equipment down. The relevance to vacuum is the ability of the vacuum equipment to maintain the last output state of the control circuit. This feature would prevent part loss during this event as a normally closed system could maintain the current vacuum state without the presence of power.

Electrical Connections

Pilot valves for all integrated generators are 24VDC. The basic connectors for these valves are described as push in clip type (L) or DIN type (D). All electronic connections include LED and surge suppression.

 F

Filtration

Filtration between the pad and generator is recommended. Regular maintenance of filters maintains the efficiency of the system.

 I

Integrated Vacuum Generator

A vacuum venturi with integrated vacuum and blow-off release pilot valves built on the unit to minimize response times of the system. The unit may also incorporate filters, silencers, blow-off flow controls , and optional sensors.

 L

Last Output State

During an emergency stop or power loss event, emergency stop circuits from Parker can maintain the current state of operation. This is referred to as maintaining the last output state from the system controls.

 P

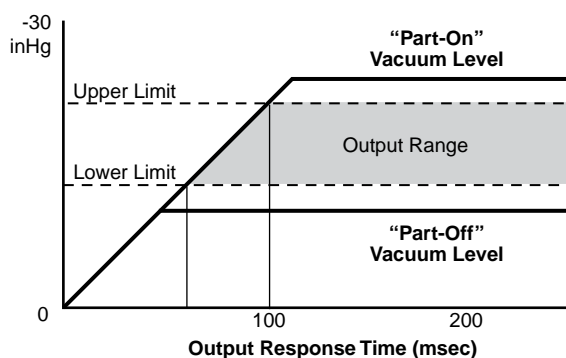
Part Present Signal

Each sensor has an available NPN / PNP output and can be used for numerous purposes. One of them is a part present signal that usually signifies that a preset output for a vacuum level has been achieved and it is safe to proceed. The accuracy and repeatability of this signal can be critical to high speed applications. False or dropped signals can interrupt the systems operations. Therefore, stable vacuum levels and output settings near the "part-off" vacuum level are critical.

Glossary

“Part-on” / “Part-off” Vacuum Differential

You must determine the highs and lows of the vacuum system in order to properly set the sensor outputs. Typically with venturi systems at fixed operating pressures, the maximum vacuum level is known. The “Part-off” vacuum level of the system must be determined by operating the system “open” while the sensor displays the level of vacuum in the system. This is known as the “Part-on” / “Part-off” differential in vacuum levels. Once this window of vacuum is known, the part present signal could be set in the middle between these vacuum levels. Ideally, it would be best if this window was as big as possible to avoid any issues with the sensors. Yet, sometimes by design or necessity, this window is very small or insignificant due to a high speed operation. To maximize the speed of the machinery, reduce the response time of the sensor output by setting the output around 1 inHg above the open vacuum level. The system response time is minimized and thus the “Part-on” / “Part-off” window is insignificant.



Power Loss

This refers to loss of electrical power supply to the system. Unlike other pneumatic components with safety features, loss of electrical power to a normally closed vacuum circuit could be catastrophic; possibly resulting in dropping the product. To prevent this situation, consider an E-stop circuit or a normally open vacuum circuit.

Pressure Sensor

A piezo resistive sensor used to monitor pressure levels in the system. The sensors supply NPN/PNP open collector transistor outputs back to the PLC for confirmation.

R

Response Time

The time to evacuate the air out of a closed system to a certain vacuum level. This is critical to the overall performance of the vacuum system.

Remote Sensing

Vacuum pressure confirmation and the speed of the output response is critical to high speed applications. To accomplish this, position pressure sensors near the suction cups to maximize “part-on/part-off” vacuum differential and reducing response times. These remote sensors can be then centrally programmed at a convenient location with the use of MPS-7 series CPU's.

T

Threads

NPT (National Pipe Taper)

BSPT (British Standard Pipe Taper)

BSPP (British Standard Pipe Parallel)

G (Gaus)

M (Metric)

NPS (Dry Seal American Standard Fuel Internal Straight Pipe)

V

Vacuum

Any reference to vacuum or negative pressures could be defined as a force applied to a closed system by the difference in the number of air molecules within a chamber, enclosure, piping system, etc. to the number of air molecules outside of these systems or enclosures. The outside atmospheric pressure is larger and applies a force to the lesser pressures in the systems or enclosures. Therefore, vacuum is a differential pressure whereby atmosphere is the reference and external force.

Vacuum Confirmation

Term used to describe an output signal npn/pnp from the sensor to the PLC when the suction cup has made a proper seal with the product before transfer. This verifies that the vacuum level is safe to proceed.

Vacuum Flow

Represented as SCFM, this is the rate at which air molecules can be evacuated through a venturi system.

Vacuum Generator

This is sometimes referred to as an ejector. The venturi generates vacuum with compressed air by evacuating air molecules from a closed system.

Vacuum Release Pilot Valve

Also referred to as Discharge valve, this valve pilots the Blow-off release master valve to effectively release the product during pick and place applications. This function is essential to high speed applications.

Vacuum Master Valve

This is a shuttle valve that works by differential forces which is piloted by a 2-3 valve. This valve can be configured normally closed or open.

Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ * to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
MCA05HS	70	0.47	20.9	48.3	82.0	125.4	181.9	249.7	353.1	494.4	—
MCA07HS	70	0.80	9.6	21.2	35.0	55.9	87.6	130.5	182.2	262.4	—
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
CV10LSCK	70	1.55	3.7	7.6	13.0	20.3	33.1	—	—	—	—
CV15HSCK	70	3.53	2.5	4.8	7.0	11.0	15.5	22.0	31.9	46.6	112.1
CV15LSCK	70	3.53	2.0	3.1	5.0	7.6	12.1	—	—	—	—
CV20HSCK	70	6.36	0.7	2.8	5.0	6.5	9.0	13.0	18.9	27.4	60.7
CV20LSCK	70	6.36	1.1	2.0	3.0	3.7	5.6	—	—	—	—
CV15HSVR	70	3.53	2.5	4.8	7.0	11.0	15.5	22.0	31.9	46.6	112.1
HF50	80	6.64	0.32	1.06	2.54	6.14	11.44	17.37	29.03	50.22	141.75
HF100	80	13.20	0.13	0.21	0.85	1.91	3.81	5.72	9.53	16.74	47.25
HF200	80	26.90	0.04	0.19	0.42	1.06	1.91	2.97	5.09	8.69	24.79
CHF10	80	3.3	0.45	1.48	3.39	8.26	15.47	23.31	38.78	66.96	189.22
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)

Nozzle Diameter	nHg										
	0	3	6	9	12	15	18	21	24	27	30
MCA05HS	.18	.16	.19	.12	.10	.08	.07	.05	.03	—	—
MCA07HS	.41	.37	.32	.27	.22	.18	.14	.10	.06	—	—
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	—
CV10LSCK	1.27	1.05	.83	.59	.38	.17	—	—	—	—	—
CV15HSCK	2.22	1.98	1.74	1.5	1.26	1.01	.76	.51	.25	.10	—
CV15LSCK	3.35	2.79	2.23	1.67	1.10	.53	—	—	—	—	—
CV20HSCK	3.88	3.45	3.02	2.59	2.16	1.73	1.30	.87	.44	.25	—
CV20LSCK	5.85	5.09	4.03	2.97	1.91	.85	—	—	—	—	—
CV15HSVR	2.22	1.98	1.74	1.5	1.26	1.01	.76	.51	.25	.10	—
HF50	22.00	12.12	7.87	3.85	2.76	2.12	1.45	0.81	0.35	0.03	—
HF100	42.00	24.59	14.48	8.02	5.47	4.24	2.93	1.66	0.67	0.04	—
HF200	91.00	52.86	34.38	16.78	12.00	9.29	6.36	3.64	1.52	0.05	—
CHF10	12.50	7.24	4.69	2.29	1.63	1.27	0.85	0.49	0.21	0.03	—
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	—

B

Air-Oil Separator

Evacuation Time

Series / Nozzle Diameter	Air Supply Pressure PSI	Air Consumption SCFM	Evacuation Time in sec / ft ³ * to reach different Vacuum Levels (inHg)								
			3	6	9	12	15	18	21	24	27
MC207HS	70	0.79	11.0	25.1	42.0	66.4	96.3	135.6	187.3	275.4	—
MC210HS	70	1.55	5.4	12.1	20.0	32.2	52.0	85.0	120.1	183.9	—
MC305HS	70	0.35	19.2	44.4	75.0	117.8	171.2	230.8	310.7	428.2	—
MC305HR	70	0.35	24.9	58.2	99.0	146.6	205.6	278.5	381.4	508.5	—
MC307HS	70	0.79	10.5	24.0	40.0	61.6	88.1	127.4	192.4	296.6	—
MC307HR	70	0.79	1.6	26.3	45.0	69.5	102.0	149.7	230.5	339.0	—
MC310HS	70	1.55	6.5	15.5	27.0	42.7	64.4	96.9	154.0	263.3	—
MC310HR	70	1.55	6.5	15.8	27.0	43.8	70.1	110.2	159.6	271.2	—
CVR213HS	70	2.65	3.1	7.3	12.0	18.1	26.8	39.5	57.6	84.5	174.0
CVK15HS	70	3.53	2.3	4.8	8.0	12.4	18.4	26.3	40.4	62.1	189.3
CVK15LS	70	3.53	1.1	2.8	5.0	9.3	16.7	—	—	—	—
CVK20HS	70	6.36	1.1	2.5	5.0	7.6	12.1	18.6	29.9	53.4	129.9
CVK20LS	70	6.36	0.8	2.3	4.0	7.6	15.5	—	—	—	—
CVK27HS	70	10.42	0.6	2.0	3.0	5.6	8.5	13.3	21.2	42.1	—
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)

Nozzle Diameter	nHg										
	0	3	6	9	12	15	18	21	24	27	30
MC207HS	.40	.36	.32	.28	.24	.20	.15	.11	.07	—	—
MC210HS	.71	.64	.57	.49	.42	.34	.25	.17	.10	—	—
MC305HS	.19	.17	.15	.13	.11	.09	.07	.05	.03	—	—
MC305HR	.14	.12	.10	.09	.08	.07	.06	.44	.02	—	—
MC307HS	.39	.35	.31	.27	.23	.19	.14	.09	.05	—	—
MC307HR	.32	.29	.25	.22	.19	.15	.11	.07	.04	—	—
MC310HS	.71	.63	.55	.47	.39	.31	.23	.16	.08	—	—
MC310HR	.53	.47	.41	.35	.29	.23	.17	.11	.06	—	—
CVR213HS	1.30	1.15	1.00	0.87	0.72	0.57	0.43	0.29	0.15	—	—
CVK15HS	2.51	2.23	1.95	1.67	1.39	1.12	.85	.58	.30	—	—
CVK15LS	3.67	3.02	2.37	1.72	1.06	.40	—	—	—	—	—
CVK20HS	3.75	3.34	2.93	2.50	2.12	1.70	1.28	.86	.44	—	—
CVK20LS	5.61	4.61	3.60	2.60	1.60	.60	—	—	—	—	—
CVK27HS	5.75	5.09	4.43	3.77	3.11	2.45	1.80	1.15	.50	—	—
CEK15HS	2.51	2.23	1.95	1.67	1.39	1.12	.85	.58	.30	—	—
CEK20HS	3.75	3.34	2.93	2.50	2.12	1.70	1.28	.86	.44	—	—
CEK27HS	5.75	5.09	4.43	3.77	3.11	2.45	1.80	1.15	.50	—	—
CVXCEK	5.75	5.09	4.43	3.77	3.11	2.45	1.80	1.15	.50	—	—



Air-Oil Systems, Inc.

Safety Guide For Selecting And Using Pneumatic Division Products And Related Accessories

WARNING:

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF PNEUMATIC DIVISION PRODUCTS, ASSEMBLIES OR RELATED ITEMS ("PRODUCTS") CAN CAUSE DEATH, PERSONAL INJURY, AND PROPERTY DAMAGE. POSSIBLE CONSEQUENCES OF FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THESE PRODUCTS INCLUDE BUT ARE NOT LIMITED TO:

- Unintended or mistimed cycling or motion of machine members or failure to cycle
- Work pieces or component parts being thrown off at high speeds.
- Failure of a device to function properly for example, failure to clamp or unclamp an associated item or device.
- Explosion
- Suddenly moving or falling objects.
- Release of toxic or otherwise injurious liquids or gasses.

Before selecting or using any of these Products, it is important that you read and follow the instructions below.

1. GENERAL INSTRUCTIONS

- 1.1. Scope:** This safety guide is designed to cover general guidelines on the installation, use, and maintenance of Pneumatic Division Valves, FRLs (Filters, Pressure Regulators, and Lubricators), Vacuum products and related accessory components.
- 1.2. Fail-Safe:** Valves, FRLs, Vacuum products and their related components can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of associated valves, FRLs or Vacuum products will not endanger persons or property.
- 1.3. Relevant International Standards:** For a good guide to the application of a broad spectrum of pneumatic fluid power devices see: ISO 4414:1998, Pneumatic Fluid Power – General Rules Relating to Systems. See www.iso.org for ordering information.
- 1.4. Distribution:** Provide a copy of this safety guide to each person that is responsible for selection, installation, or use of Valves, FRLs or Vacuum products. Do not select, or use Parker valves, FRLs or vacuum products without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the products considered or selected.
- 1.5. User Responsibility:** Due to the wide variety of operating conditions and applications for valves, FRLs, and vacuum products Parker and its distributors do not represent or warrant that any particular valve, FRL or vacuum product is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:
 - Making the final selection of the appropriate valve, FRL, Vacuum component, or accessory.
 - Assuring that all user's performance, endurance, maintenance, safety, and warning requirements are met and that the application presents no health or safety hazards.
 - Complying with all existing warning labels and / or providing all appropriate health and safety warnings on the equipment on which the valves, FRLs or Vacuum products are used; and,
 - Assuring compliance with all applicable government and industry standards.
- 1.6. Safety Devices:** Safety devices should not be removed, or defeated.
- 1.7. Warning Labels:** Warning labels should not be removed, painted over or otherwise obscured.
- 1.8. Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

2. PRODUCT SELECTION INSTRUCTIONS

- 2.1. Flow Rate:** The flow rate requirements of a system are frequently the primary consideration when designing any pneumatic system. System components need to be able to provide adequate flow and pressure for the desired application.
- 2.2. Pressure Rating:** Never exceed the rated pressure of a product. Consult product labeling, Pneumatic Division catalogs or the instruction sheets supplied for maximum pressure ratings.
- 2.3. Temperature Rating:** Never exceed the temperature rating of a product. Excessive heat can shorten the life expectancy of a product and result in complete product failure.
- 2.4. Environment:** Many environmental conditions can affect the integrity and suitability of a product for a given application. Pneumatic Division products are designed for use in general purpose industrial applications. If these products are to be used in unusual circumstances such as direct sunlight and/or corrosive or caustic environments, such use can shorten the useful life and lead to premature failure of a product.
- 2.5. Lubrication and Compressor Carryover:** Some modern synthetic oils can and will attack nitrile seals. If there is any possibility of synthetic oils or greases migrating into the pneumatic components check for compatibility with the seal materials used. Consult the factory or product literature for materials of construction.
- 2.6. Polycarbonate Bowls and Sight Glasses:** To avoid potential polycarbonate bowl failures:
 - Do not locate polycarbonate bowls or sight glasses in areas where they could be subject to direct sunlight, impact blow, or temperatures outside of the rated range.
 - Do not expose or clean polycarbonate bowls with detergents, chlorinated hydro-carbons, ketones, esters or certain alcohols.
 - Do not use polycarbonate bowls or sight glasses in air systems where compressors are lubricated with fire resistant fluids such as phosphate ester and di-ester lubricants.

2.7. Chemical Compatibility: For more information on plastic component chemical compatibility see Pneumatic Division technical bulletins Tec-3, Tec-4, and Tec-5

- 2.8. Product Rupture:** Product rupture can cause death, serious personal injury, and property damage.
- Do not connect pressure regulators or other Pneumatic Division products to bottled gas cylinders.
 - Do not exceed the maximum primary pressure rating of any pressure regulator or any system component.
 - Consult product labeling or product literature for pressure rating limitations.

3. PRODUCT ASSEMBLY AND INSTALLATION INSTRUCTIONS

- 3.1. Component Inspection:** Prior to assembly or installation a careful examination of the valves, FRLs or vacuum products must be performed. All components must be checked for correct style, size, and catalog number. DO NOT use any component that displays any signs of nonconformance.
- 3.2. Installation Instructions:** Parker published Installation Instructions must be followed for installation of Parker valves, FRLs and vacuum components. These instructions are provided with every Parker valve or FRL sold, or by calling 1-800-CPARKER, or at www.parker.com.
- 3.3. Air Supply:** The air supply or control medium supplied to Valves, FRLs and Vacuum components must be moisture-free if ambient temperature can drop below freezing

4. VALVE AND FRL MAINTENANCE AND REPLACEMENT INSTRUCTIONS

- 4.1. Maintenance:** Even with proper selection and installation, valve, FRL and vacuum products service life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a component failure, and experience with any known failures in the application or in similar applications should determine the frequency of inspections and the servicing or replacement of Pneumatic Division products so that products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at minimum, must include instructions 4.2 through 4.10.
- 4.2. Installation and Service Instructions:** Before attempting to service or replace any worn or damaged parts consult the appropriate Service Bulletin for the valve or FRL in question for the appropriate practices to service the unit in question. These Service and Installation Instructions are provided with every Parker valve and FRL sold, or are available by calling 1-800-CPARKER, or by accessing the Parker web site at www.parker.com.
- 4.3. Lockout / Tagout Procedures:** Be sure to follow all required lockout and tagout procedures when servicing equipment. For more information see: OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – (Lockout / Tagout)
- 4.4. Visual Inspection:** Any of the following conditions requires immediate system shut down and replacement of worn or damaged components:
- Air leakage: Look and listen to see if there are any signs of visual damage to any of the components in the system. Leakage is an indication of worn or damaged components.
 - Damaged or degraded components: Look to see if there are any visible signs of wear or component degradation.
 - Kinked, crushed, or damaged hoses. Kinked hoses can result in restricted air flow and lead to unpredictable system behavior.
 - Any observed improper system or component function: Immediately shut down the system and correct malfunction.
 - Excessive dirt build-up: Dirt and clutter can mask potentially hazardous situations.

Caution: Leak detection solutions should be rinsed off after use.

- 4.5. Routine Maintenance Issues:**
- Remove excessive dirt, grime and clutter from work areas.
 - Make sure all required guards and shields are in place.
- 4.6. Functional Test:** Before initiating automatic operation, operate the system manually to make sure all required functions operate properly and safely.
- 4.7. Service or Replacement Intervals:** It is the user's responsibility to establish appropriate service intervals. Valves, FRLs and vacuum products contain components that age, harden, wear, and otherwise deteriorate over time. Environmental conditions can significantly accelerate this process. Valves, FRLs and vacuum components need to be serviced or replaced on routine intervals. Service intervals need to be established based on:
- Previous performance experiences.
 - Government and / or industrial standards.
 - When failures could result in unacceptable down time, equipment damage or personal injury risk.
- 4.8. Servicing or Replacing of any Worn or Damaged Parts:** To avoid unpredictable system behavior that can cause death, personal injury and property damage:
- Follow all government, state and local safety and servicing practices prior to service including but not limited to all OSHA Lockout Tagout procedures (OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – Lockout / Tagout).
 - Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
 - Disconnect air supply and depressurize all air lines connected to system and Pneumatic Division products before installation, service, or conversion.
 - Installation, servicing, and / or conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
 - After installation, servicing, or conversions air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or if the product does not operate properly, do not put product or system into use.
 - Warnings and specifications on the product should not be covered or painted over. If masking is not possible, contact your local representative for replacement labels.
- 4.9. Putting Serviced System Back into Operation:** Follow the guidelines above and all relevant Installation and Maintenance Instructions supplied with the valve FRL or vacuum component to insure proper function of the system.

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7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitations, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid

by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer, or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter "Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.