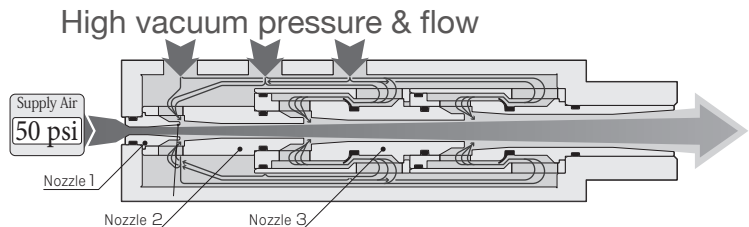


Multi-stage nozzle High Vacuum Ejector at Low Air Pressure Supply

Vacuum Generator **VVV**

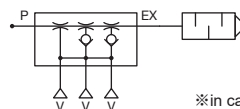
Ensuring high vacuum pressure & high vacuum flow by low 50psi air supply



Nozzle1 dia. (mm)	Vacuum level inHg (kPa)	Suction flow scfm (ℓ/min [ANR])	Air consumption scfm (ℓ/min [ANR])
ø1.6	-26.8 inHg (-90)	6.3scfm (180)	3.7scfm (105)
ø2.5	-27.8 inHg (-94)	15.1scfm (430)	9.5scfm (270)
ø2.7	-27.8 inHg (-94)	17.6scfm (500)	11.1scfm (315)

● Three vacuum ports are available in one unit.

Pneumatic symbol



※in case of silencer installed

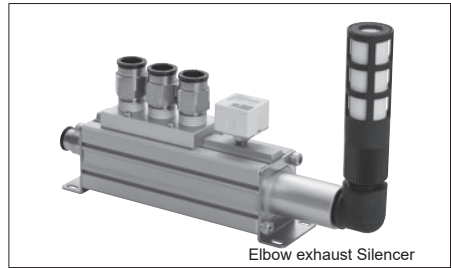
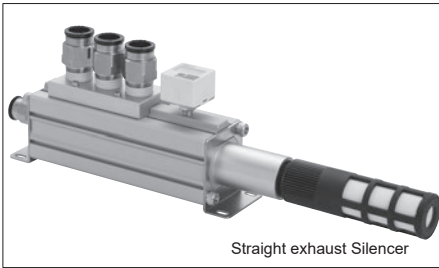
■ Characteristic

- *Long life cycle and easy maintenance.*

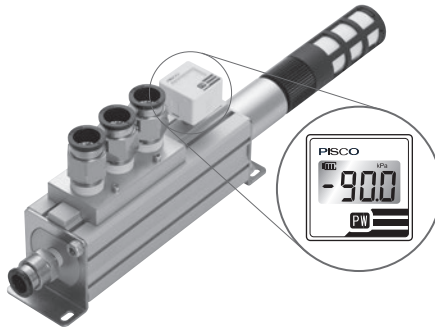
- *Vacuum ports direction can be changed.*

Instruction how to change the direction of vacuum ports is mentioned following page.

- *Straight or elbow silencer is available depending upon the installing space.*



- *Digital pressure gauge is available as an option*

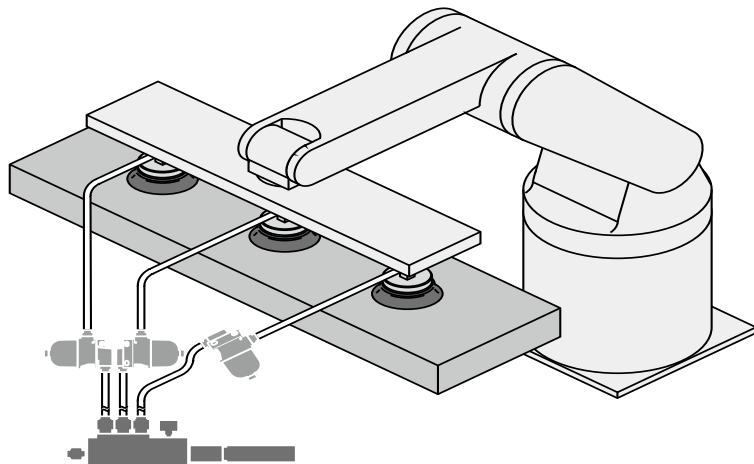




Applications

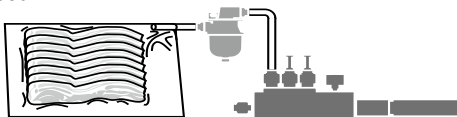
Suction transport

- Best suitable for a large & heavy workpiece in industries such as packaging or automobile, or suitable for an air-permeable workpiece.



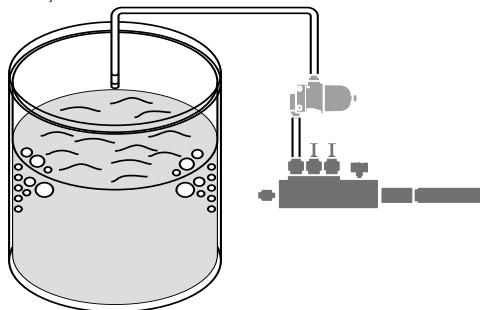
Vacuum packing

- Make a vacuum state in the bag, and then packing the products, including food.

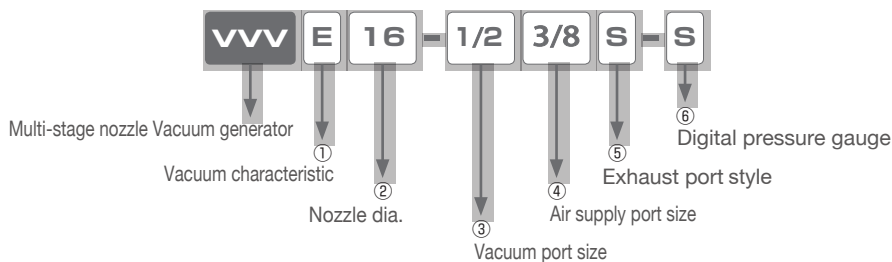


Defoaming/deaeration

- Removing air bubbles and air contained in adhesives, cosmetics (cream), distilled water, etc.



Model Designation (Example)



①. Vacuum characteristic

Code	E
Type	High-vacuum at low air pressure supply type

※ Supply Pressure 50psi (0.35MPa)

②. Nozzle dia.

E type : High-vacuum at low air pressure supply type				
Code	Nozzle 1 dia. (mm)	Vacuum level inHg (kPa)	Suction flow scfm (ℓ/min [ANR])	Air consumption scfm (ℓ/min [ANR])
16	ø1.6	-26.8 inHg (-90)	6.3scfm (180)	3.7scfm (105)
25	ø2.5	-27.8 inHg (-94)	15.1scfm (430)	9.5scfm (270)
27	ø2.7	-27.8 inHg (-94)	17.6scfm (500)	11.1scfm (315)

③. Vacuum port size

Code	1/2	12	16	04
Size	1/2" O.D. (ø12.7)	ø12	ø16 (5/8" O.D.)	Rc1/2 (BSPT female)
Port type	Push-in straight fitting and plug			Taper pipe internal thread
Remarks	PC12-04 (3 pc.) & PP12 (2 pc.) incl.		PC16-04 (3 pc.) & PP16 (2 pc.) incl.	

④. Air supply port size

Code	3/8	1/2	08	10	12	02
Size	3/8" O.D. (ø9.53)	1/2" O.D. (ø12.7)	ø8	ø10	ø12	Rc1/4 (BSPT)
Port type	Push-in straight fitting and plug					Taper pipe internal thread

⑤. Exhaust port

Code	No code	S
Port type	Taper pipe internal thread : Rc3/4 (BSPT)	With silencer

*Note: Silencer specification comes with elbow adapter block

⑥. Digital pressure gauge

Code	No code	G
Type	No gauge (Plugging)	With gauge

Silencer only (Example)

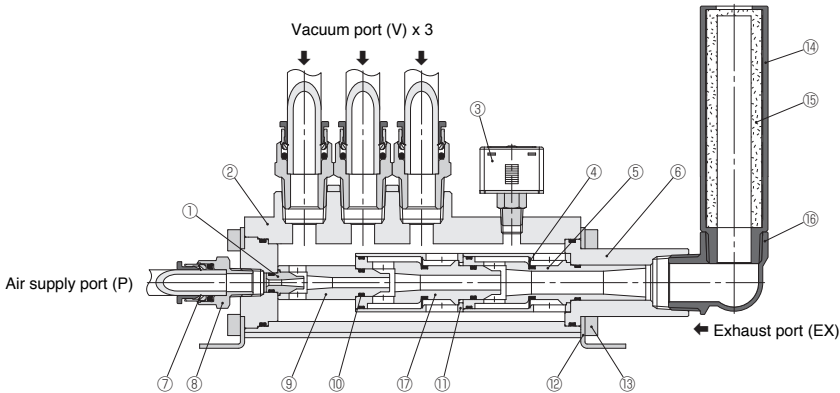
VVVSRO6L

Silencer for multi-stage nozzle vacuum generator

Specification

Fluid medium	Air
Operating pressure range	43.5~101.5psi (0.3 ~ 0.7 MPa)
Rated pressure supply	50psi (0.35 MPa)
Operating temp. range	40~ 122°F (5 ~ 50°C) (No freezing)

Constructions

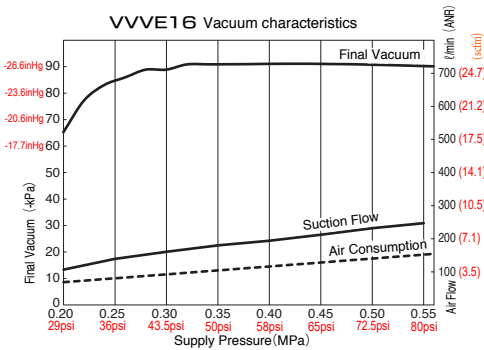


No.	Part	Material
①	Nozzle 1	Electroless nickel-plated brass
②	Body	Aluminum
③	Digital Pressure Gauge (Option)	—
④	One-way rubber seal	NBR
⑤	Diffuser	Aluminum
⑥	Exhaust head	Aluminum
⑦	Joint Ass'y	—
⑧	Fitting metal body	Electroless nickel-plated brass
⑨	Nozzle 2	Aluminum

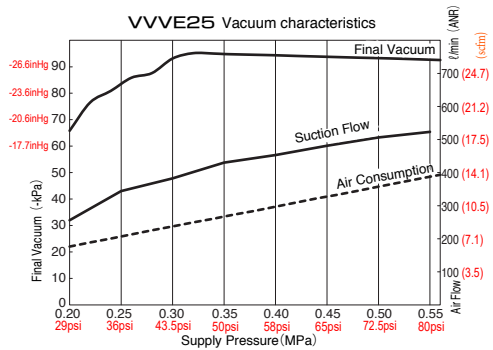
No.	Part	Material
⑩	O-ring	NBR
⑪	Nozzle cover	Aluminum
⑫	Bracket	Electroless nickel-plated SPCC
⑬	Fastening bolt	Nickel-plated iron
⑭	Silencer unit	PBT
⑮	Element	PVF
⑯	Elbow adaptor block	PBT
⑰	Nozzle 3	Aluminum

Characteristics

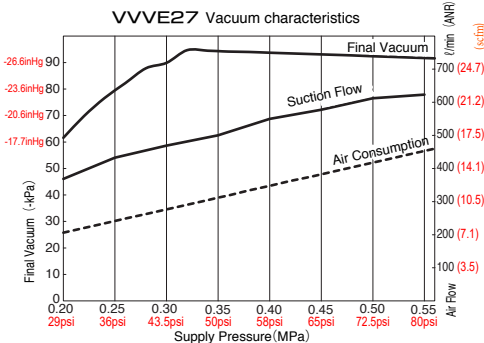
VVVE16 Vacuum characteristics



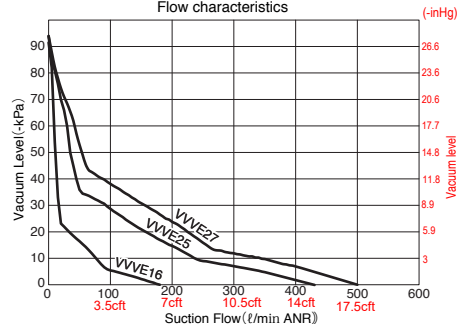
VVVE25 Vacuum characteristics



VVVE27 Vacuum characteristics



Flow characteristics



Detailed Safety Instructions

Before using PISCO products, be sure to read "Safety Instructions" and "Safety Instruction Manual", "Common Safety Instructions for Vacuum Series" and "Common Safety Instructions for Mechanical Vacuum Switch".

Warning

1. Maintenance of vacuum generator VVV shall be carried out by a person who has sufficient knowledge of vacuum equipment and understands structure.

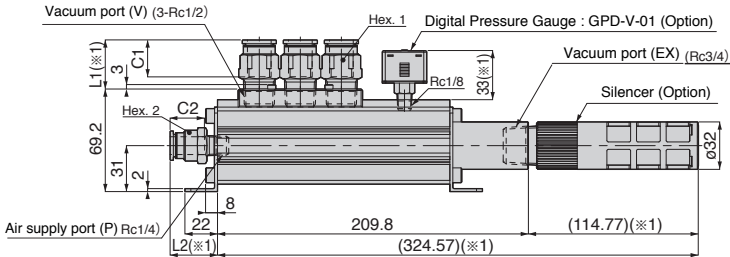
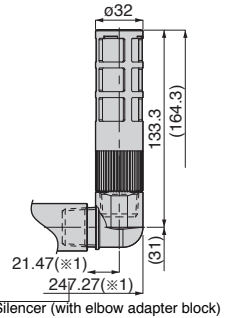
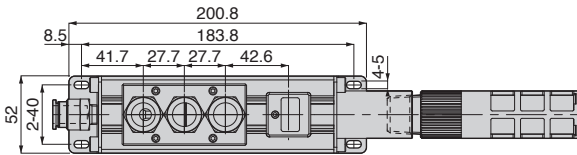
Cautions

1. Use of vacuum filter is recommended to prevent possible entering of foreign objects from vacuum port.
2. When selecting an exhaust piping or a use without silencer with dust existing in air or pipe, dust may enter from the exhaust port by back-flow at operation stop, and it may cause malfunction and performance drop.
3. Suction flow is reduced by 15% when using silencer with elbow block.
4. Vacuum characteristic is determined by our measurement standard. The listed suction flow rate may not be assured depending on the vacuum systems.



Multi-stage nozzle Vacuum Generator

Unit : mm



Model	Nozzle dia. (ømm)	Supply air pressure (MPa)	Final vacuum (-kPa)	Suction flow (ℓ/min [ANR])	Air consumption (ℓ/min [ANR])	Weight (g)	CAD file name
VVE16- <u>3</u> <u>4</u>	1.6	50psi (0.35MPa)	-26.8 inHg (90)	6.3scfm (180)	3.7scfm (105)	1016	VVVmain body : VVVE-_-_-
VVE16- <u>3</u> <u>4</u> S						1051[1071]	
VVE16- <u>3</u> <u>4</u> -G						1053	
VVE16- <u>3</u> <u>4</u> S-G						1088[1108]	
VVE25- <u>3</u> <u>4</u>	2.5	50psi (0.35MPa)	-27.8 inHg (94)	15.1scfm (430)	9.5scfm (270)	1003	Silencer (Straight) : VVVSR06L_S
VVE25- <u>3</u> <u>4</u> S						1038[1058]	
VVE25- <u>3</u> <u>4</u> -G						1040	
VVE25- <u>3</u> <u>4</u> S-G						1075[1095]	
VVE27- <u>3</u> <u>4</u>	2.7	50psi (0.35MPa)	-27.8 inHg (-94)	17.6scfm (500)	11.1scfm (315)	997	Silencer (Elbow) : VVVSR06L_L
VVE27- <u>3</u> <u>4</u> S						1032[1052]	
VVE27- <u>3</u> <u>4</u> -G						1034	
VVE27- <u>3</u> <u>4</u> S-G						1069[1089]	

※ Specify the vacuum port size in 3 and the air supply port size in 4 as per the model designation example.

※ The numerics in parentheses () in Weight means the weight when silencer used with elbow adapter block.



Dimensions of push-in fitting on vacuum port (V)							Dimensions of push-in fitting on air supply port (P)						
Unit : mm							Unit : mm						
Model	Model code as optional attachment [4]	Tube O.D. øD	C1	L1	Hex.1	WT. (g)	Model	Model code as optional attachment [5]	Tube O.D. øD	C2	L2	Hex.2	WT. (g)
PC12-04	1/2	1/2"	23.1	25.5	21	43	PC3/8-02	3/8	3/8"	20.7	23.8	17	19
PC12-04	12	12	23.3	25.7	21	44	PC1/2-02	1/2	1/2"	23.1	29.7	21	36
PC16-04	16	16 (5/8")	24.8	33.1	24	63	PC8-02	08	8	18.2	20.6	14	14
※ Weight of the plug for vacuum port push-in fitting Plug (PP1/2) for PC12-04 : 2.9g Plug (PP12) for PC12-04 : 2.4g Plug (PP16) for PC16-04 : 4.2g							PC10-02	10	10	20.7	23.8	17	19
							PC12-02	12	12	23.3	29.9	21	37

※ 1. Reference dimensions after complete tightening

※ 2. For the details of the push-in fitting for vacuum port and air supply port, please refer to Pisco web site.

※ 3. For the details of the optional digital pressure gauge: GPD-V-01, please refer to Pisco web site.

※ 4. Total weight of vacuum generator VVV shall be calculated by adding the above appropriate weights of selected specification such as size of push-in fittings, silencer type, optional digital

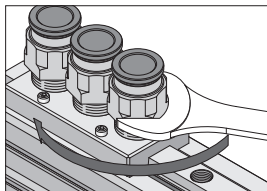
Installation

1. Fitting

Install push-in fittings on vacuum ports and supply port with a wrench. The following chart is the tightening torque.

Port	Thread Size	Tightening Torque
Supply	Rc1/4	7 ~ 9N·m
Vacuum	Rc1/2	20 ~ 22N·m

❖ Rc thread is same as BSPT (female thread)

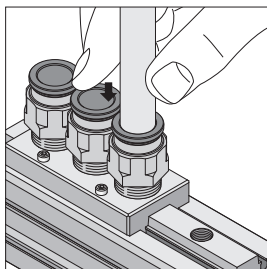


2. Connection and disconnection of Tubings

①. Tubing connection

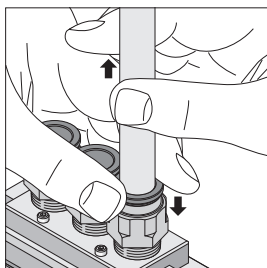
Push in a tubing up to the very end. The lock-claws bite the tubing and hold it automatically.

Before installation, please refer to the "Instruction for tubing connection" described.



②. Tubing disconnection

The tubing is disconnected by pushing release-ring to release Lock-claws. Make sure to stop air supply before the tube disconnection.

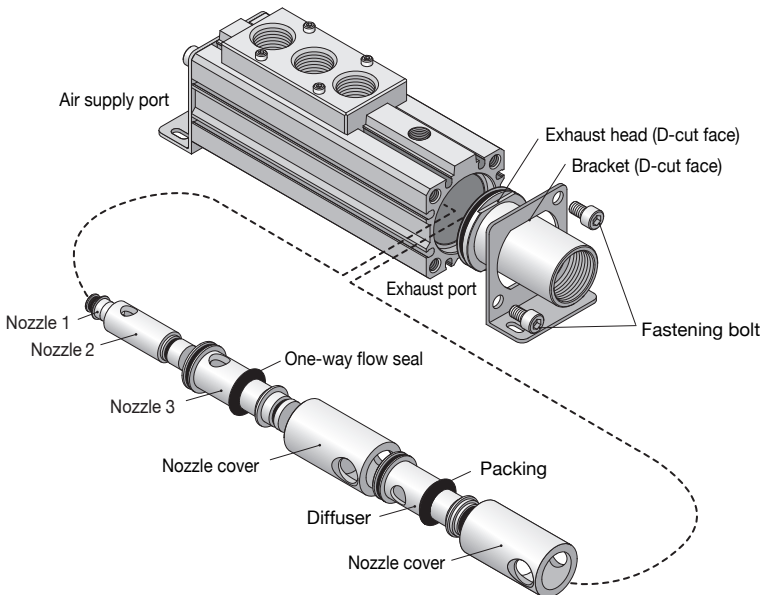


■ Maintenance method

■ Follow the below procedures for cleaning the nozzle and the diffuser.

Please carry out a maintenance with sufficient attention not to get injured.

- ① Loosen fastening bolts of exhaust side, then remove the bracket and the exhaust head.
- ② Remove the nozzles and the diffuser from ejector body.
By removing the exhaust head, the nozzles and the diffuser are released. However, the 1st stage nozzle may remain in the ejector. Loosen fastening bolts and remove the bracket and the air supply head and a fitting as well if equipped, then push out the 1st stage nozzle from the air supply port. Be careful not to damage the inner side of nozzle, otherwise the performance may not be assured.
- ③ Remove deposits by air blow or wiping with soft cloth from the nozzles, the diffuser, the nozzle covers, the one-way flow seals and the o-rings.
- ④ Preassemble the nozzles, the nozzle covers and the diffuser, then insert the nozzle subassembly into the ejector body.
- ⑤ Reinstall the exhaust head and the bracket, and tighten the fastening bolt with the tightening torque of 2.4 to 2.66Nm. Make sure to fit the D-cut of the head and bracket when installing them.

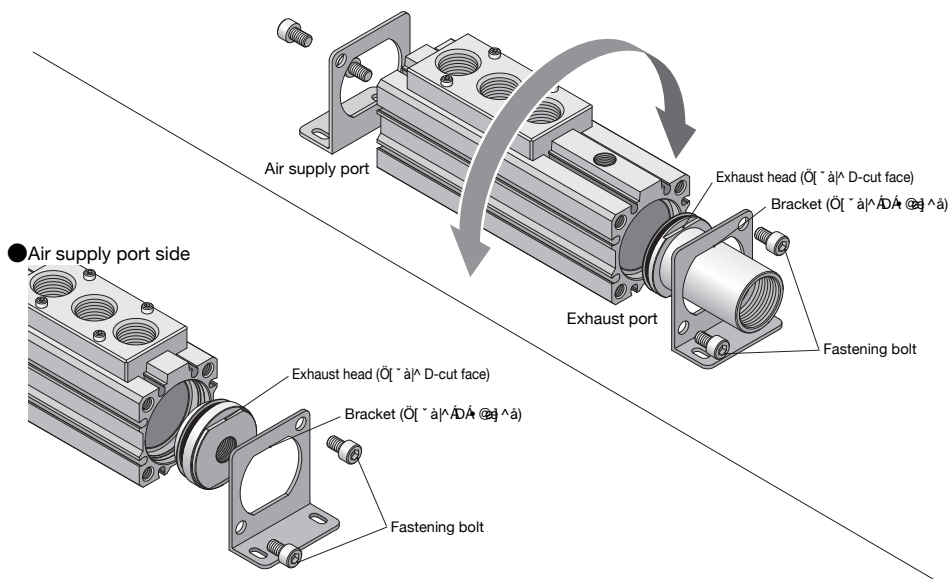




■ Method to change the vacuum port direction

■ Follow the below procedures for changing vacuum port direction.

- ① Loosen fastening bolts of both port sides, then rotate the body to change the direction of vacuum ports.
- ② When changing the direction, be sure to align the Double-D seams of the heads and brackets when rotating the ejector body.
- ③ Fix the heads and brackets by tightening the fastening bolt with the tightening torque of 2.4 to 2.66Nm.





Common Safety Instructions for Vacuum Series

Before selecting or using PISCO products, read the following instructions. Read the detailed instructions for individual series.

Warning

1. There is always a risk work pieces falling off during the vacuum operation. Please be sure to take into consideration safety measures against the falling of them or possible damage(s) caused by falling components.
2. Avoid supplying more than 14.5psi (0.1MPa) pressure constantly in a vacuum circuit. Since vacuum generators are not explosive-proof, there is a risk of damaging the products.
3. Pay attention to the dropping of vacuum pressure caused by problems in the air or power supply. Decrease of vacuum pressure/suction force may lead to the possibility of work-pieces falling off, so that safety measure must be taken into consideration.
4. When more than 2 vacuum pads are plumbed on a single ejector and one of them has a sealing problem such as vacuum leakage, there is a risk of g work-pieces discharge from the other pad due to the drop of the vacuum pressure level.
5. Do not use vacuum generators with the exhaust port blocked or with heavy exhaust resistance. Otherwise, vacuum may not be created and/or a drop in the vacuum pressure may occur.

Caution

1. Carry out clogging check for silencer element in an ejector and a vacuum filter periodically. Clogged element will be a cause to impair the performance or a cause of troubles.
2. Before replacing the element, thoroughly read and understand the method of filter replacement in the catalog.
3. Keep the product away from water, oil drops or dusts. These may cause malfunction. Take a proper measure to protect the product before the operation.
4. Refer to “4. Instructions for Installing a fitting” and “5. Instructions for Removing a fitting” under “Common Safety Instructions for Fittings” , when installing or removing Fittings.
5. Refer to “Common Safety Instructions for Pressure Sensors” and “Detailed Safety Instructions” for the handling of digital vacuum switch sensor.
6. Refer to “Common Safety Instructions for Mechanical Vacuum Sensor” for the handling of mechanical vacuum switch.
7. The material of plastic filter cover for VG, VK, VJ, VZ and VX series is PCTG. Avoid the adherence of Chemicals below to the products, and do not use them under those chemical environments.

● Table Chemical Name

Chemical Name	Chemical Name	Chemical Name
Acetone	Silicone Oil	Methanol
Aniline	Ammonium hydroxide	Lacquer
Hydrogen chloride gas	Ammonium hydroxide (concentrate)	Sulfuric acid (10% 20℃)
Chloroform	Trichloroethylene	Sulfuric acid (concentrate • 20℃)
Ethyl Acetate	Toluene	Sulfuric acid (concentrate • 70℃)
Carbon tetrachloride	Ethylene dichloride	
Cyclohexane	Lactic acid (high temp.)	
Dimethylformamide (DMF)	Lactic acid (low temp.)	
Nitric acid (61% 20℃)	Phenol (Hydroxybenzene)	
Silicone grease	Benzene (Benzol)	

* There are more chemicals which should be avoided. Contact us for the use under chemical circumstance.

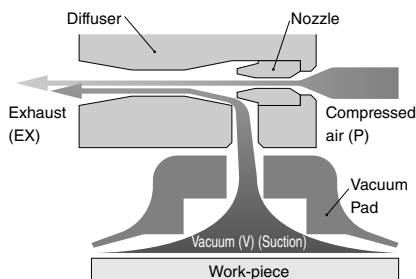
8. The material of plastic filter cover for VQ and VFU series is PA. Avoid the adherence of chemicals below to the products, and do not use them under those chemical environments.

● Table Chemical Name

Chemical Name	Chemical Name	Chemical Name
Aniline	Chromic acid (10% 70°C)	Steam (over 260°C)
Ethylene chlorohydrin	Chromic acid (25% 70°C)	Tetrachloroethane
Epichlorohydrin	Chlorosulfonic acid	Tetrahydrofuran
Ethyl chloride (Chloroethane)	Chlorotoluene	Trichloroethylene (Trichlen)
Thionyl chloride	Chlorobenzene	Ethylene dichloride
Benzyl chloride	Chloroform	Methylene dichloride
Methyl chloride	Acetic acid (Acetic Anhydride)	Nitrobenzene
Hydrochloric acid (20% 80°C)	Hypochlorous acid	Carbon disulfide
Hydrochloric acid (37% 20°C)	Calcium hypochlorite	Perchloroethylene
Nitrohydrochloric acid	Calcium hypochlorite (5% 70°C)	Phenol (Hydroxybenzene)
Ozone	Tetrachloroethane	Benzyl chloride
Sodium peroxide	Tetrachloromethane	Acetic anhydride
Caustic soda (30% 70°C)	Dichlorobenzene	Monochlorobenzene (Benzene chloride)
Potassium permanganate	Dimethylformamide (DMF)	Monochloroacetate (Chloroacetic acid)
Formic acid (50% 20°C)	Hydrobromic acid (20% 20°C)	Sulfuric acid (concentrate · 20°C)
Formic acid (90% 20°C)	Hydrobromic acid (40% 20°C)	Sulfuric acid (fuming)
Crezol	Bromine	Phosphate (concertrate)
Chromic acid (2% 70°C)	Steam (204°C~260°C)	
Chromic acid (2% 50°C)	Steam (below 204°C)	

* There are more chemicals which should be avoided. Contact us for the use under chemical circumstance.

Mechanism of Vacuum Generator



- An ejector (Vacuum generator) can generate the vacuum suction force by applying a compressed air to it. Its mechanism is explained in the left figure.
- Compressed air is squeezed and released to diffuser with high speed. The vacuum force is generated by a drop of pressure level due to a high-speed jet flow, and enables to convey a work-piece.
- An ejector consists of a nozzle and a diffuser in order to obtain a high degree of vacuum level by a high-speed jet flow. Final vacuum, exhaust airflow (suction flow) and air consumption are determined by the shapes and dimensions of these components.