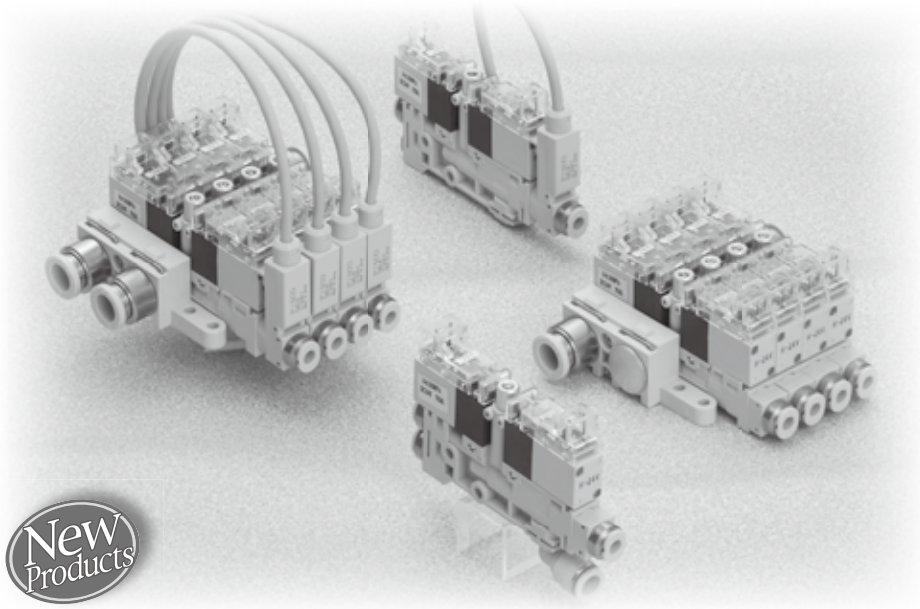


Complex Vacuum Generator realizing Stable and High-Speed Response

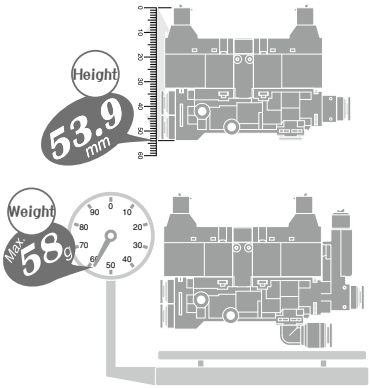
Vacuum Generator VN Series

● *Suitable for semiconductor industry such as IC chip loader or IC handler.*

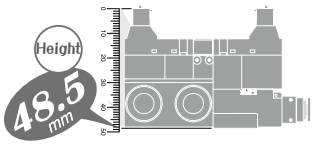
● *Suitable for the application requiring a limited space.*

Compact and lightweight ejector unit. The body height is lowered in particular for small space use.

● Stand-alone type



● Manifold type



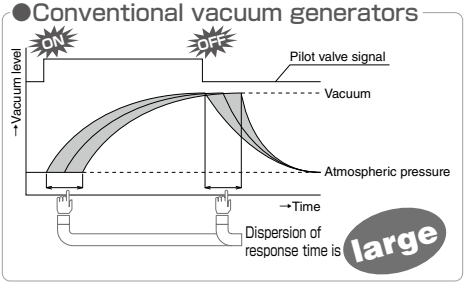
Characteristics

●*Wide variety of combinations enables to meet various applications. External Vacuum Controller for a vacuum pump, VNP Series, is also available. (P.394).*

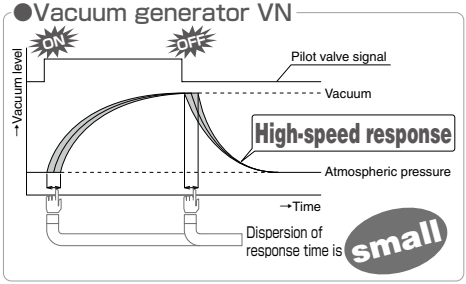
●*High-speed response time. (ON / OFF = 5msec or less)*

Direct operated solenoid valve is used for the main valve.

●Conventional vacuum generators

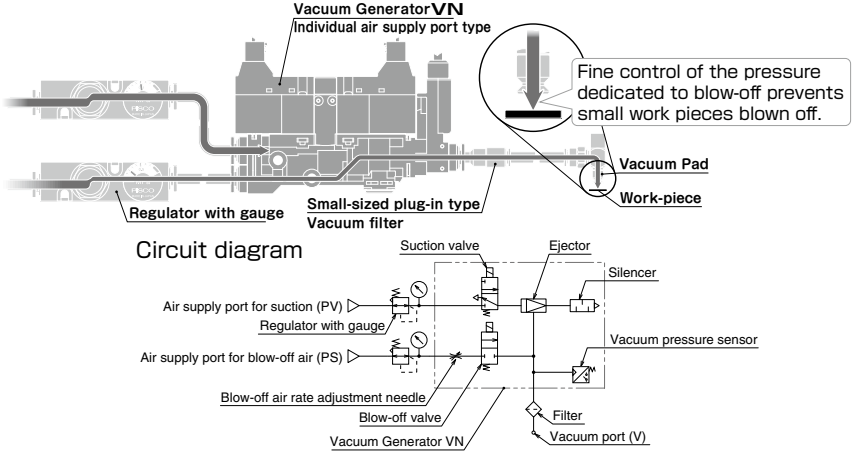


●Vacuum generator VN



●*Gently release a tiny work-piece by blow-off air.*

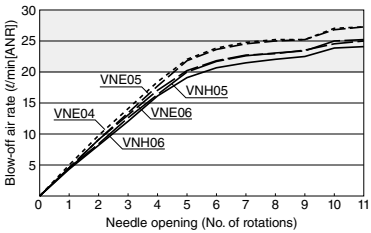
Air supply port for blow-off is independent. In addition to conventional adjustment of blow-off air rate, control by an external regulator make the fine adjustment of blow-off air easy.



●*Supply port in common type is also available.*

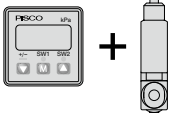
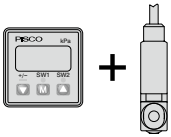
※Supply port in common: Air supply port for suction and for blow-off air is in common.

●Securing 20ℓ/min for blow-off air rate. (Supply pressure: 0.5Mpa)



●4 types of analog output sensors are selectable.

Analog output type vacuum pressure sensor for negative pressure, Separate LED indicator + Analog output type vacuum pressure sensor for negative pressure, Analog output type sensor for compound pressure, Separate LED indicator + Analog output type sensor for compound pressure

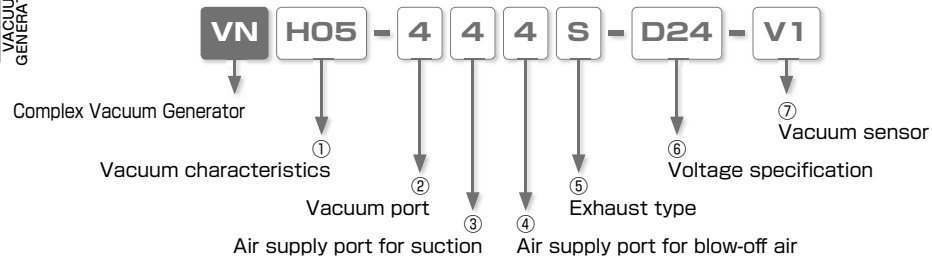
Analog output type sensor		Separate LED indicator + Analog output type sensor	
Negative pressure	Compound pressure	Negative pressure	Compound pressure
			

●External vacuum filter (option) is prepared.

Inconvenience from filter replacement due to the downsizing of this vacuum generator is resolved.

* Vacuum Generator VN series is not equipped with vacuum filter. Please make sure to order PISCO vacuum filter separately for long-term use.

Model Designation of Stand-Alone Type (Example)



① Vacuum characteristics

Vacuum characteristics	Nozzle bore (mm)	Rated supply pressure (MPa)	Final vacuum (-kPa)	Suction flow (ℓ/min[ANR])	Air consumption (ℓ/min[ANR])
E04	ø0.4	0.35	90.4	2	6
H05	ø0.5	0.5		7	11.5
E05		0.35		3	8
H06	ø0.6	0.5		9.5	16
E06		0.35		5	12

※ The values in the table are reference values only. Suction flow varies according to the vacuum system conditions; vacuum port dia. or tube length.

② Vacuum port (Applicable tube size)

Code	3	4	3L	4L
Tube dia. (mm)	ø3 (Straight push-in fitting)	ø4 (Straight push-in fitting)	ø3 (Elbow push-in fitting)	ø4 (Elbow push-in fitting)

③ Air supply port for suction (Applicable tube size)

Code	3	4
Tube dia. (mm)	ø3 (Straight push-in fitting)	ø4 (Straight push-in fitting)

④ Air supply port for blow-off air (Applicable tube size)

Code	3	4	N
Tube dia. (mm)	ø3 (Straight push-in fitting)	ø4 (Straight push-in fitting)	Common air supply port for suction and blow-off

※ When 3 or 4 is selected, suction air and blow-off air are separately supplied.

⑤ Exhaust type

Code	S	J※
Exhaust type	Silencer vent	Tube exhaust

※ Onlyø6mm Push-In Fitting is available for Tube exhaust.

⑥ Valve specification

Code	D24
Voltage	24VDC

⑦ Vacuum sensor

Code	No code	
Sensor	Without vacuum sensor	
Code	V1	V2
Sensor	Analog output type vacuum sensor for negative pressure	Separate LED indicator + Analog output type vacuum sensor for negative pressure
Code	R1	R2
Sensor	Analog output type sensor for compound pressure	Separate LED indicator + Analog output type sensor for compound pressure

Model code of Bracket for Stand-Alone Type (Option)

VNB ※ Including 2 hexagonal socket head screw (M3 x 12)

Model code of Silencer Element for Stand-Alone Type (Maintenance parts)

VN012B33

Model Designation of Manifold Type (Example)

VN H05 - 4 4 4 S - D24 - V1 - M 08

- VN: Vacuum Generator
- ① H05: Vacuum characteristics
- ② 4: Vacuum port
- ③ 4: Air supply port for suction
- ④ 4: Air supply port for blow-off air
- ⑤ S: Exhaust type
- ⑥ D24: Voltage specification
- ⑦ V1: Vacuum sensor
- ⑧ 08: No. of stations

① Vacuum characteristics

Vacuum characteristics	Nozzle bore (mm)	Rated supply pressure (MPa)	Final vacuum (-kPa)	Suction flow (ℓ/min[ANR])	Air consumption (ℓ/min[ANR])
E04	ø0.4	0.35	90.4	2	6
H05	ø0.5	0.5		7	11.5
E05		0.35		3	8
H06	ø0.6	0.5		9.5	16
E06		0.35		5	12
K	When different vacuum characteristics are mixed on a manifold (Fill in the details on Specification Order Form)				

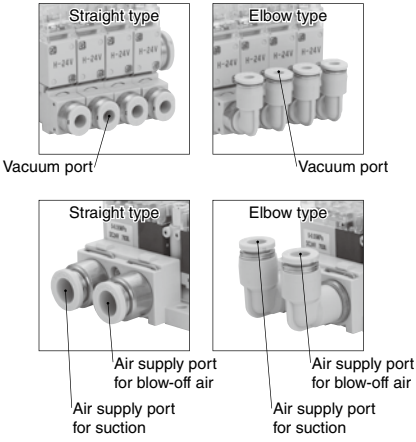
※ Mixing of E and H on the same manifold is not possible. Mixing of different nozzle sizes with same characteristic is possible.
※ The values in the table are reference values only. Suction flow varies according to the vacuum system conditions; vacuum port dia. or tube length.

② Vacuum port (Applicable tube size)

Code	3	4	3L	4L	K
Tube dia.(mm)	ø3 (Straight push-in fitting)	ø4 (Straight push-in fitting)	ø8 (Elbow push-in fitting)	ø10 (Elbow push-in fitting)	When different vacuum ports are mixed on a manifold (Fill in the details on Specification Order Form)

③ Air supply port for suction (Applicable tube size)

Code			Tube dia. (mm) and Fitting type
Both sides	R side only	L side only	
4	4R	4H	ø4 (Straight push-in fitting)
6	6R	6H	ø6 (Straight push-in fitting)
8	8R	8H	ø8 (Straight push-in fitting)
4L	4LR	4LH	ø4 (Elbow push-in fitting)
6L	6LR	6LH	ø6 (Elbow push-in fitting)
8L	8LR	8LH	ø8 (Elbow push-in fitting)



④ Air supply port for blow-off air (Applicable tube size)

Code			Tube dia. (mm) and Fitting type
Both sides	R side only	L side only	
4	4R	4H	ø4 (Straight push-in fitting)
6	6R	6H	ø6 (Straight push-in fitting)
8	8R	8H	ø8 (Straight push-in fitting)
4L	4LR	4LH	ø4 (Elbow push-in fitting)
6L	6LR	6LH	ø6 (Elbow push-in fitting)
8L	8LR	8LH	ø8 (Elbow push-in fitting)
N			Common air supply port for suction and blow-off

※ When 4, 6, 8, 4L, 6L or 8L is selected for blow-off air supply port, suction air and blow-off air are separately supplied.

⑤ Exhaust type

Code	S
Exhaust type	Silencer vent

※ Tube exhaust is not available for Manifold type.

⑥ Valve voltage

Code	D24
Voltage	24VDC

⑦ Vacuum sensor

Code	No code	
Switch	Without vacuum switch	
Code	V1	V2
Switch	Analog output type vacuum sensor for negative pressure	Separate LED indicator + Analog output type vacuum sensor for negative pressure
Code	R1	R2
Switch	Analog output type sensor for compound pressure	Separate LED indicator + Analog output type sensor for compound pressure
Code	K	
Switch	When different vacuum sensors are mixed on a manifold (Fill in the details on Specification Order Form)	

⑧ No. of stations

Code	02	03	04	05	06	07	08	09	10
No. of stations	2	3	4	5	6	7	8	9	10

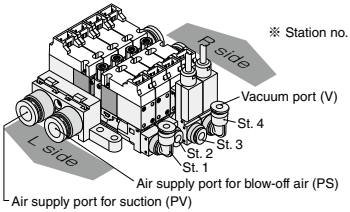
■ Model Code of Silencer Element for manifold type (Maintenance part)

VN013B19

VACUUM GENERATOR

Specification Order Form (example)

Vacuum generator type		Vacuum characteristics ①		Vacuum port ②	Air supply port for suction (PV) ③	Air supply port for blow-off air (PS) ④	Exhaust type ⑤		Voltage specification ⑥	Vacuum sensor ⑦		No. of stations ⑧
VN		K	–	K	8	8	S	–	**D24**	K	–	M04
L	St. 1	H04	–	4				–				
	St. 2	H05	–	4				–				
⬆	St. 3	H06	–	3L				–		V1		
	St. 4	H04	–	3L				–		V1		
St.	St. 5		–					–				
no.	St. 6		–					–				
	St. 7		–					–				
⬇	St. 8		–					–				
	St. 9		–					–				
R	St. 10		–					–				



※ Station no. is arranged St.1, St.2 ··· St.10 from L side.

Vacuum Generator VN Series Specification Order Form

To: NIHON PISCO CO., Ltd.

Name :

Order No. :

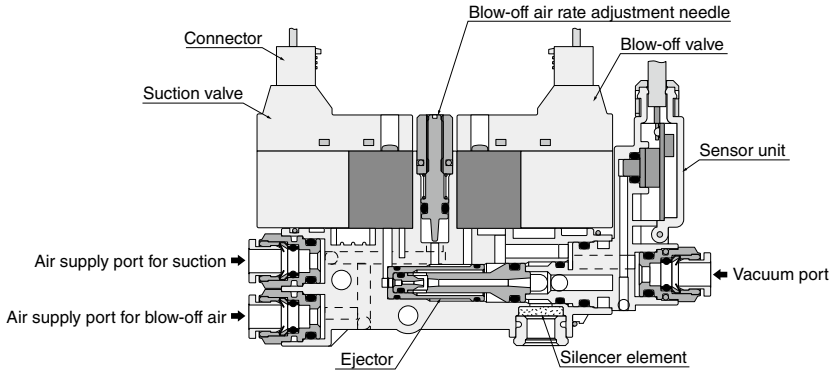
Date :

Requested EX-W PISCO Date : Quantity :

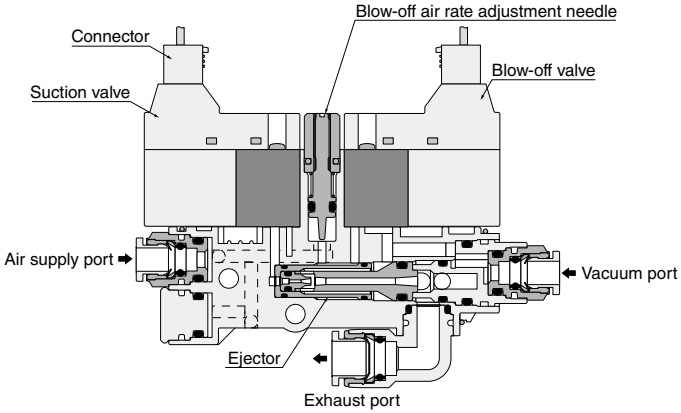
Vacuum generator type		Vacuum characteristics ①		Vacuum port ②	Air supply port for suction (PV) ③	Air supply port for blow-off air (PS) ④	Exhaust type ⑤		Voltage specification ⑥	Vacuum sensor ⑦		No. of stations ⑧
VN			–					–	D24		–	
L	St. 1		–					–				
	St. 2		–					–				
⬆	St. 3		–					–				
	St. 4		–					–				
St.	St. 5		–					–				
no.	St. 6		–					–				
	St. 7		–					–				
⬇	St. 8		–					–				
	St. 9		–					–				
R	St. 10		–					–				

※1. Refer to the previous page to fill in the form.
※2. Copy this page and use.
※3. Use this specification order form when ordering different specifications of mounting units.

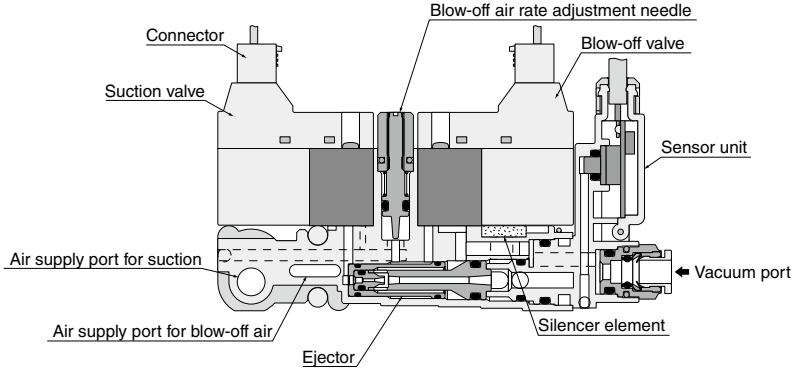
Construction of Individual air supply port, Silencer vent, Vacuum sensor



Construction of common air supply port, Tube exhaust, Without vacuum sensor

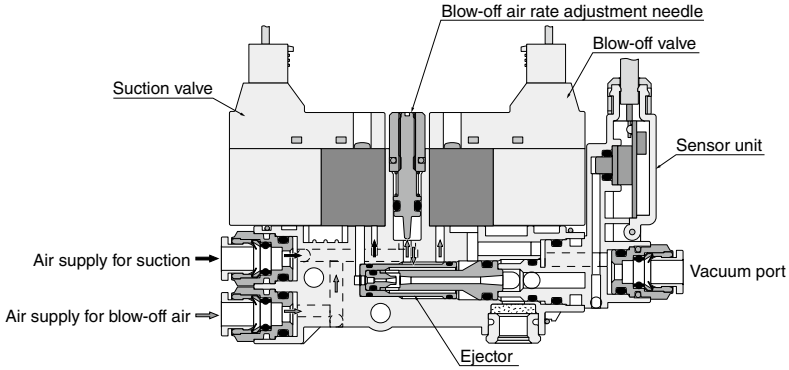


Construction of Manifold type, Vacuum sensor

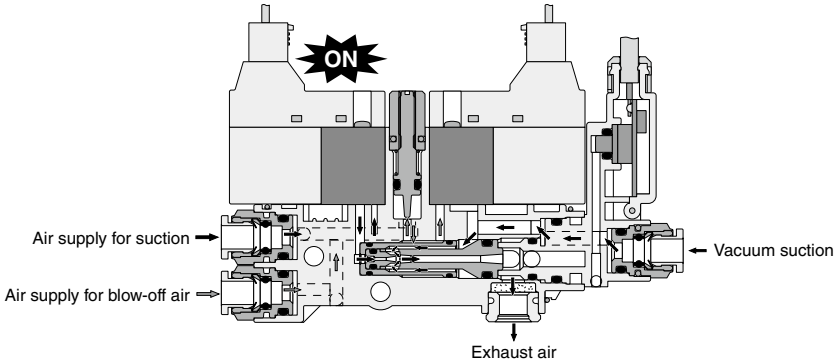


How Individual air supply port, silencer vent type works

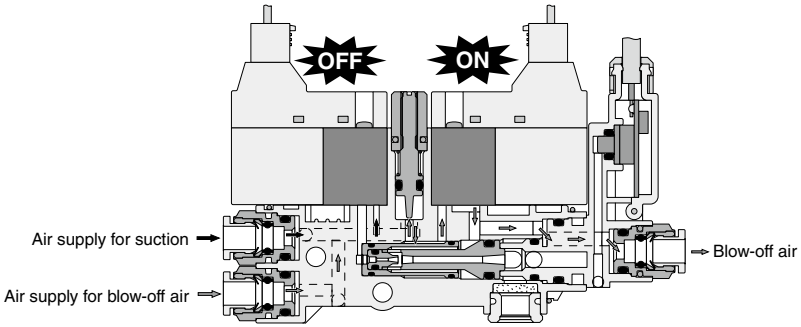
① Suction valve: OFF (At vacuum generation suspended)



② Suction valve: ON (At vacuum suction)



③ Blow-off valve: ON (At blow-off air supply)



Specification

Fluid medium	Air
Operating pressure range	0 ~ 0.55MPa
Operating temp. range	5 ~ 50°C (No freezing)
Operating humidity range	35 ~ 85%RH (No dew condensation)
Protective structure	IEC standard IP40 equiv.
Vibration resistance / shock resistance	Less than 50m/s² ／ Less than 150m/s²

Ejector Characteristics

Model code	Nozzle bore (mm)	Rated supply pressure (MPa)	Final vacuum (-kPa)	Suction flow (ℓ/min[ANR])	Air consumption (ℓ/min[ANR])
VNE04	0.4	0.35	90.4	2	6
VNH05	0.5	0.5		7	11.5
VNE05		0.35		3	8
VNH06	0.6	0.5		9.5	16
VNE06		0.35		5	12

※ The values in the table are reference values only. Suction flow varies according to the vacuum system conditions; vacuum port dia. or tube length.

Solenoid Valve

Item	Suction valve	Blow-off valve
Operating system	Direct operation	
Valve construction	Elastic seal, Poppet valve	
Rated voltage	24VDC	
Allowable voltage range	±10%	
Surge protection circuit	Surge absorber	
Power consumption	Startup: 2.2W Retention: 0.6W (Power saving circuit)	
Operation indicator LED	Green LED	
Operating pressure range	0 ~ 0.55MPa	0 ~ 0.55MPa
Valve type	Normally closed	
Response time (※)	Vacuum suction (OFF → ON) / Vacuum stop (ON → OFF): 5 msec or less for each	
Wiring method	Connector (Cable length: 500mm)	
	Red lead wire: +24VDC, Black lead wire: -0V	

(※)Response time is the time length until pressure change at vacuum port is detected under rated supply pressure and rated voltage. Vacuum arrival time and blow-off time at the piping end (work-piece) vary according to ejector characteristics, volume (tube length), blow-off air rate and others.

Blow-Off Function

Blow-off air rate	0 ~ 20ℓ/min[ANR] (Supply pressure is at 0.5MPa)

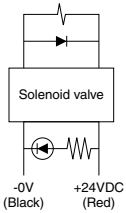
※ Air rate is adjustable with the blow-off air rate adjustment needle.

Vacuum Sensor

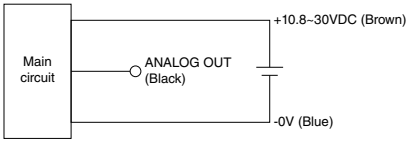
Item		Negative pressure (-V1)	Compound pressure (-R1)
Rated voltage		10.8 ~ 30VDC (Ripple included)	
Current consumption		Less than 20mA (24VDC at no-load)	
Pressure detection		Proliferated semiconductor pressure sensor, gauge pressure	
Operating pressure range		-100 ~ 0kPa	-100 ~ 300kPa
Proof pressure		200kPa	600kPa
Storage temperature range		-20 ~ 70°C (Atmospheric pressure / Humidity: 65% RH or less)	
Operating temp. range		-10 ~ 60°C (No freezing)	
Operating humanity range		35 ~ 85%RH (No dew condensation)	
Protective structure		IEC standard IP40 equiv.	
Analog output	Output voltage	1 ~ 5V	
	Zero-point voltage	1±0.1V (=Atmospheric pressure)	1±0.1V (=At 100kPa)
	Max. pressure voltage	5±0.1V (=At 100kPa)	5±0.1V (=At 300kPa)
	Linearity	±0.5% F.S. or less	
	Temperature characteristics	±2% F.S. or less (0 ~ 50°C、Ta=25°C)	
	Output current	Output current: 1mA max. (load resistance 50kΩmax.)	

Circuit diagram

Solenoid valve



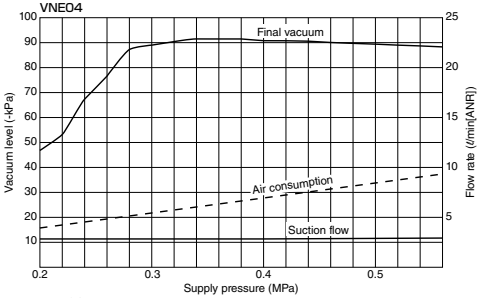
Vacuum sensor



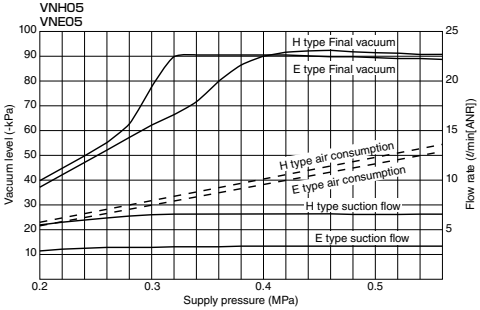
Characteristics

Vacuum characteristics chart

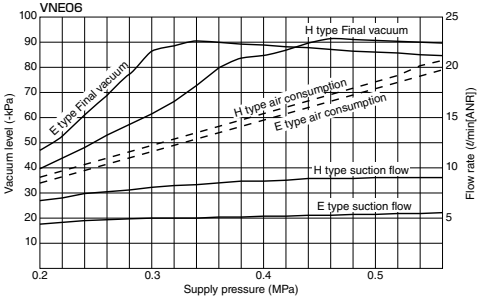
VNE04



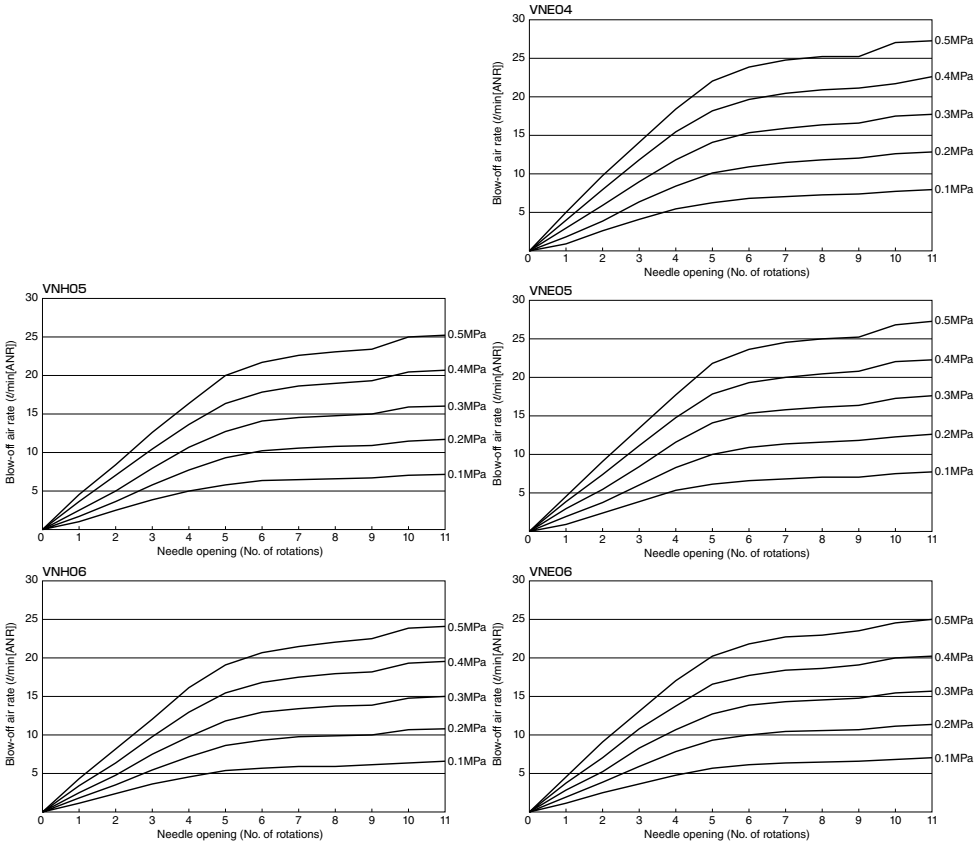
VNH05
VNE05



VNH06
VNE06



Flow characteristics chart of blow-off air



Applicable Tube and Related Products

Polyurethane Tube (Piping products catalog P.596)

■ Polyurethane Tube is for the general pneumatic piping and suitable for a compact piping.

Nylon Tube (Piping products catalog P.608)

■ Nylon Tube is for the general pneumatic piping and suitable for a high-pressure fluid up to 1.5MPa (NB tube: 1.0MPa).

Vacuum Tube (Piping products catalog P.612)

■ Vacuum Tube is a ultra-soft tube and suitable for piping of vacuum generators or actuators.

Vacuum Pads

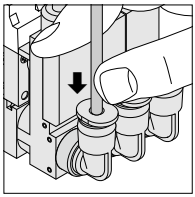
How to insert and disconnect

1. How to insert and disconnect tubes

① Tube insertion

Insert a tube into Push-In Fitting of the vacuum generator VN up to the tube end. Lock-claws bite the tube to fix it and the elastic sleeve seals around the tube.

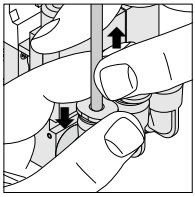
Refer to "2. Instructions for Tube Insertion" under "Common Safety Instructions for Fittings" .



② Tube disconnection

The tube is disconnected by pushing release-ring to release Lock-claws.

Make sure to stop air supply before the tube disconnection.

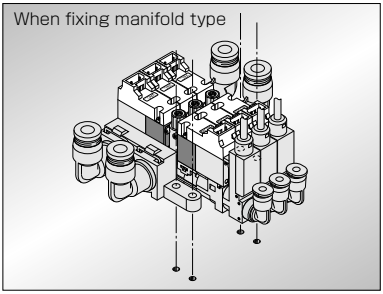


2. How to fix Stand-alone/Manifold type

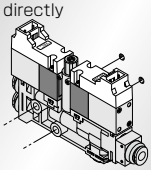
In order to fix the vacuum generator, use the fixing holes on the body to tighten with M3 thread with tightening torque 0.3-0.35Nm. Tightening with the torque out of the recommended range may result in falling of the product or damaging the products.

Refer to the outer dimensional drawings of the mounting hole pitch.

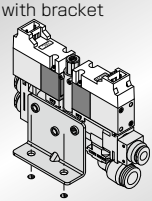
When fixing manifold type



When fixing stand-alone type directly



When fixing stand-alone type with bracket



Weight List

Model code	Unit combinations	Weight (g)
VN□□-□□□S-D24-□	Individual air supply port, Silencer vent, Stand-alone with Vacuum sensor	56
VN□□-□□□S-D24	Individual air supply port, Silencer vent, Stand-alone without Vacuum sensor	52.5
VN□□-□□□J-D24-□	Individual air supply port, Tube exhaust, Stand-alone with Vacuum sensor	58
VN□□-□□□J-D24	Individual air supply port, Tube exhaust, Stand-alone without Vacuum sensor	54.5
VN□□-□□NS-D24-□	Common air supply port, Silencer vent, Stand-alone with Vacuum sensor	54
VN□□-□□NS-D24	Common air supply port, Silencer vent, Stand-alone without Vacuum sensor	50.5
VN□□-□□NJ-D24-□	Common air supply port, Tube exhaust, Stand-alone with Vacuum sensor	56
VN□□-□□NJ-D24	Common air supply port, Tube exhaust, Stand-alone without Vacuum sensor	52.5
VN-□S-M	Individual air supply port, Manifold side block	171
VN-NS-M	Common air supply port, Manifold side block	164

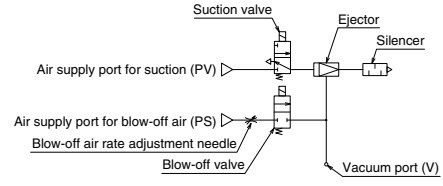
■ For manifold type, weight of mounting unit increases by 46.5g/ mounting unit with a sensor, and 43g/mounting unit without a sensor.

Example) Individual air supply port, Silencer vent, 4 stations with Vacuum sensor

171+(4x46.5)=357g → Manifold weight (171g) + 4 mounting units with vacuum sensor (186g)

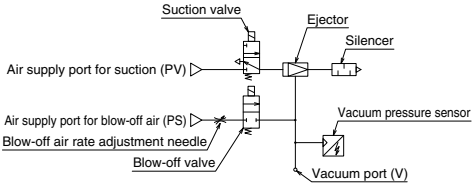
Standard Size List

Individual air supply port, Silencer vent, Without vacuum pressure sensor



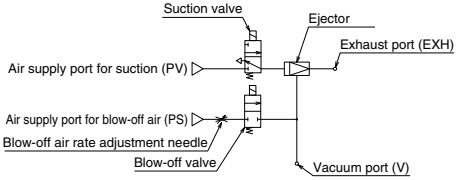
Type	Page to refer	Vacuum port	Air supply port for suction 3mm	Air supply port for suction 4mm	Air supply port for blow-off air
VN	299	3mm	●	●	3mm
		4mm	●	●	4mm

Individual air supply port, Silencer vent, With pressure vacuum sensor



Type	Page to refer	Vacuum port	Air supply port for suction 3mm	Air supply port for suction 4mm	Air supply port for blow-off air
VN	299	3mm	●	●	3mm
		4mm	●	●	4mm

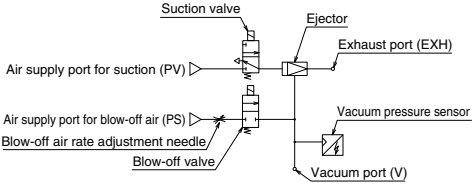
Individual air supply port, Tube exhaust, Without vacuum pressure sensor



Type	Page to refer	Vacuum port	Air supply port for suction 3mm	Air supply port for suction 4mm	Air supply port for blow-off air
VN	300	3mm	●	●	3mm
		4mm	●	●	4mm

* Exhaust port size is 6mm only.

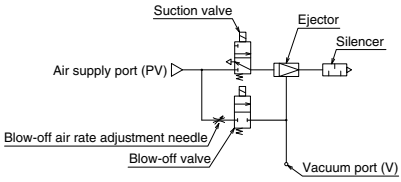
Individual air supply port, Tube exhaust, With vacuum pressure sensor



Type	Page to refer	Vacuum port	Air supply port for suction 3mm	Air supply port for suction 4mm	Air supply port for blow-off air
VN	300	3mm	●	●	3mm
		4mm	●	●	4mm

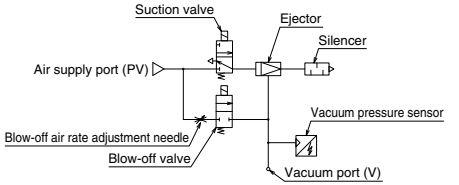
* Exhaust port size is 6mm only.

Common air supply port, Silencer vent, Without vacuum pressure sensor



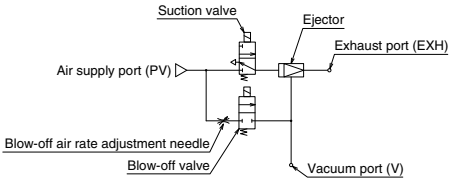
Type	Page to refer	Vacuum port	Air supply port 3mm	Air supply port 4mm
VN	301	3mm	●	●
		4mm	●	●

Common air supply port, Silencer vent, With vacuum pressure sensor



Type	Page to refer	Vacuum port	Air supply port 3mm	Air supply port 4mm
VN	301	3mm	●	●
		4mm	●	●

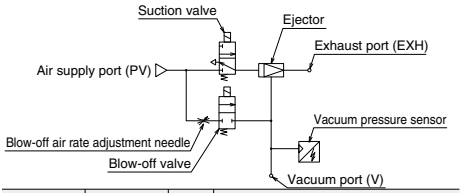
Common air supply port, Tube exhaust, Without vacuum pressure sensor



Type	Page to refer	Vacuum port	Air supply port 3mm	Air supply port 4mm
VN	302	3mm	●	●
		4mm	●	●

* Exhaust port size is 6mm only.

Common air supply port, Tube exhaust, With vacuum pressure sensor



Type	Page to refer	Vacuum port	Air supply port 3mm	Air supply port 4mm
VN	302	3mm	●	●
		4mm	●	●

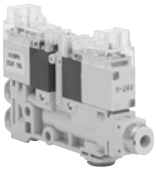
* Exhaust port size is 6mm only.

VACUUM GENERATOR

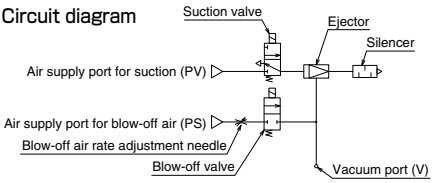
VN Individual air supply port, Silencer vent, Without vacuum pressure sensor

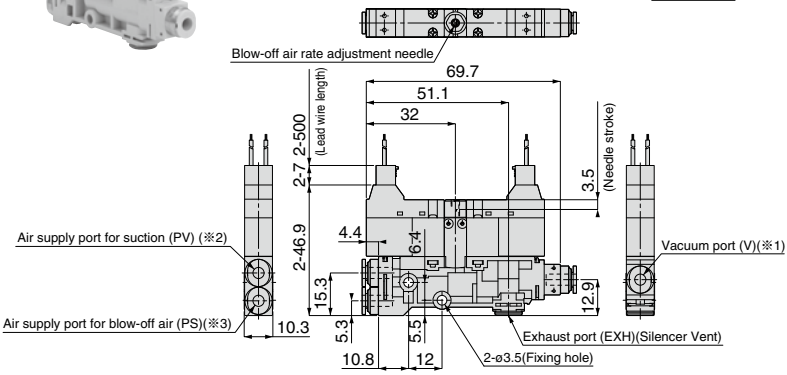
Chart P.295

Model code : VN□-□□□S-D24



Circuit diagram



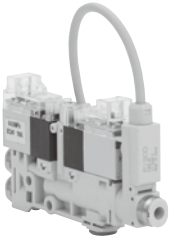


※ 1. Refer to table 1 on page 303 for the dimension of Vacuum port (V).
※ 2. Refer to table 2 on page 303 for the dimension of Air supply port for suction (PV).
※ 3. Refer to table 2 on page 303 for the dimension of Air supply port for blow-off air (PS).

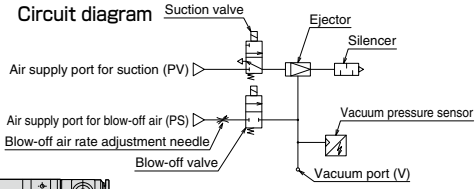
VN Individual air supply port, Silencer vent, With vacuum pressure sensor

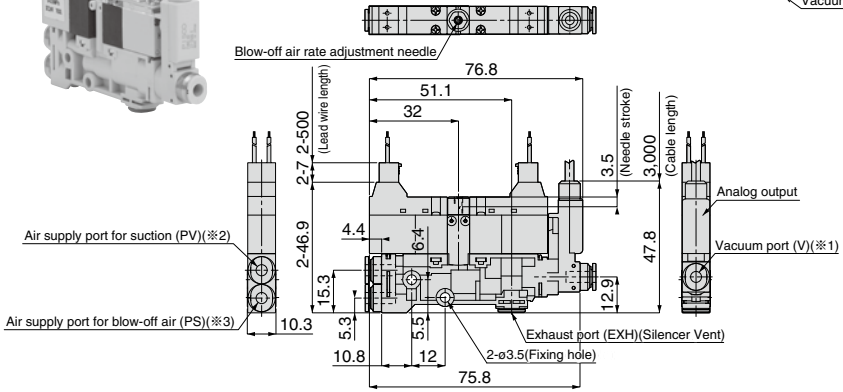
Chart P.295

Model code : VN□-□□□S-D24-□1



Circuit diagram



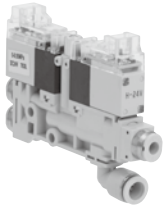


※ 1. Refer to table 1 on page 303 for the dimension of Vacuum port (V).
※ 2. Refer to table 2 on page 303 for the dimension of Air supply port for suction (PV).
※ 3. Refer to table 2 on page 303 for the dimension of Air supply port for blow-off air (PS).

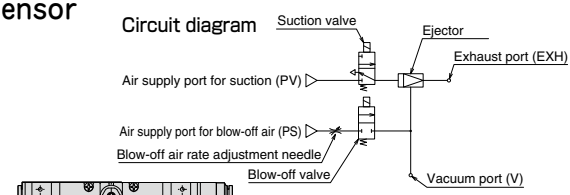
VN Individual air supply port, Tube exhaust, Without vacuum pressure sensor

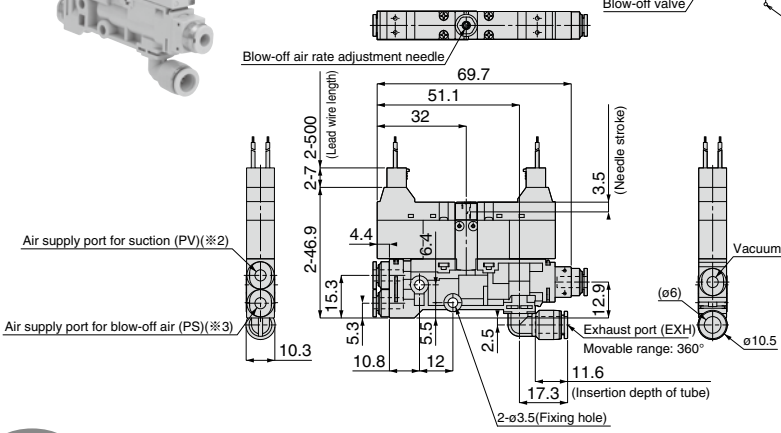
Chart P.295

Model code : VN□-□□□J-D24



Circuit diagram

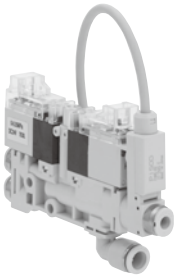




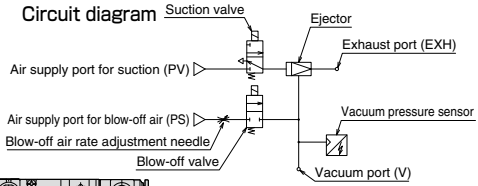
VN Individual air supply port, Tube exhaust, With Vacuum pressure sensor, Without vacuum pressure sensor

Chart P.295

Model code : VN□-□□□J-D24-□1



Circuit diagram



※ 1. Refer to table 1 on page 303 for the dimension of Vacuum port (V).
※ 2. Refer to table 2 on page 303 for the dimension of Air supply port for suction (PV).
※ 3. Refer to table 2 on page 303 for the dimension of Air supply port for blow-off air (PS).

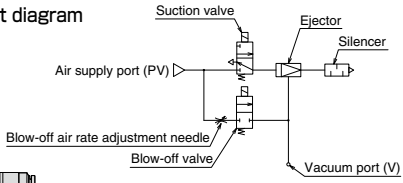
Chart P.000 Characteristic chart page

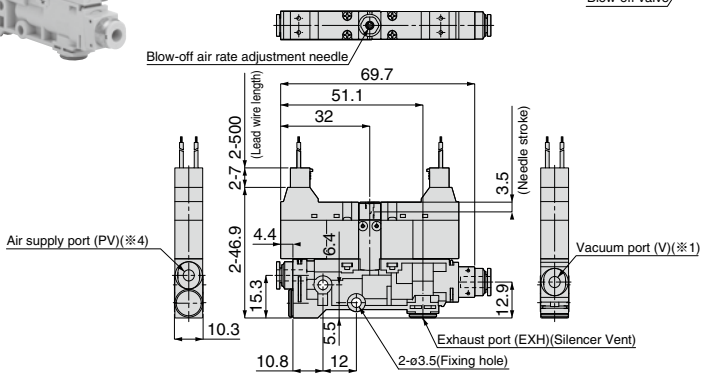
VN Common air supply port, Silencer vent, Without vacuum pressure sensor

Chart P.295

Model code : VN□-□□NS-D24

Circuit diagram



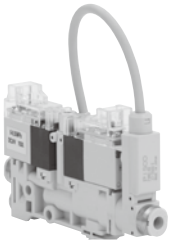


※ 1. Refer to table 1 on page 303 for the dimension of Vacuum port (V).
※ 2. Refer to table 2 on page 303 for the dimension of Air supply port for suction (PV).

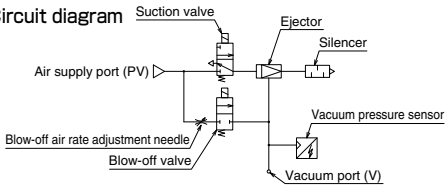
VN Common air supply port, Silencer vent, With vacuum pressure sensor

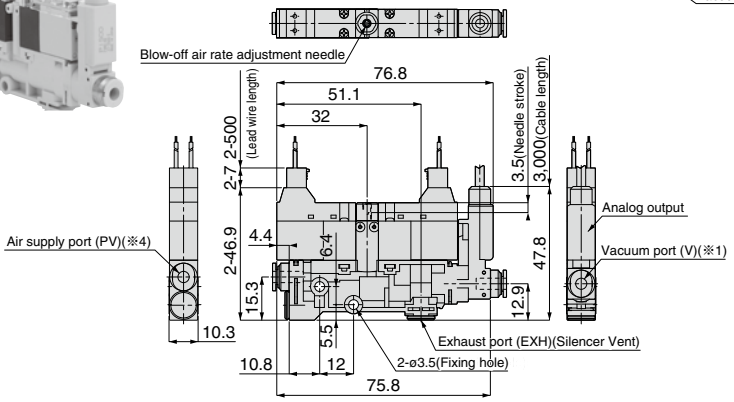
Chart P.295

Model code : VN□-□□NS-D24-□1



Circuit diagram



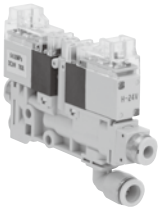


※ 1. Refer to table 1 on page 303 for the dimension of Vacuum port (V).
※ 2. Refer to table 2 on page 303 for the dimension of Air supply port for suction (PV).

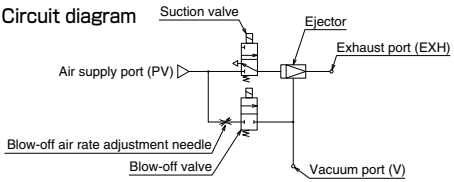
VN Common air supply port, Tube exhaust, Without vacuum pressure sensor

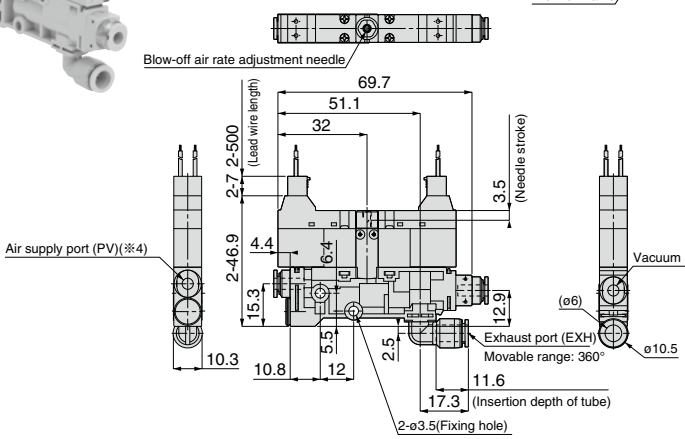
Chart P.295

Model code : VN□-□□NJ-D24



Circuit diagram

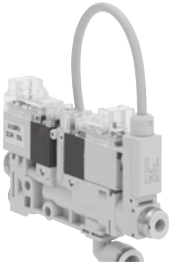




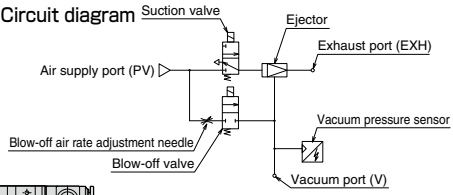
VN Common air supply port, Tube exhaust, With vacuum pressure sensor

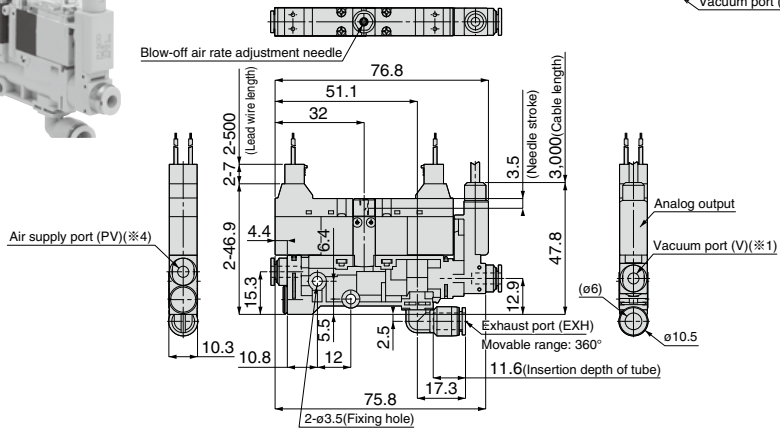
Chart P.295

Model code : VN□-□□NJ-D24-□1



Circuit diagram





※ 1. Refer to table 1 on page 303 for the dimension of Vacuum port (V).
※ 2. Refer to table 2 on page 303 for the dimension of Air supply port for suction (PV).

Chart P.000 Characteristic chart page

VACUUM GENERATOR

Fitting Dimension of Stand-Alone type

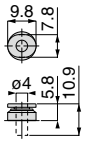
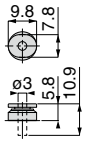
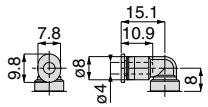
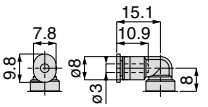
			
4(ø4 Straight type)	3(ø3 Straight type)	4L(ø4 Elbow type)	3L(ø3 Elbow type)

Table 1：Push-In Fitting type of Vacuum port

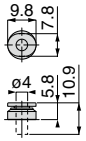
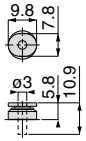
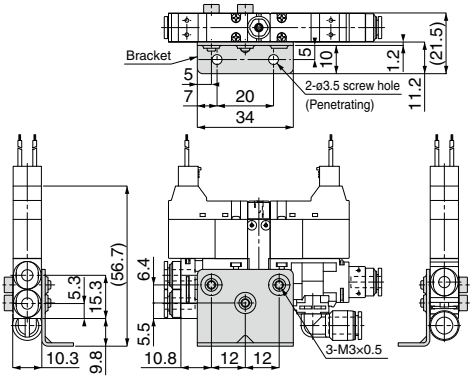
	
4(ø4 Straight type)	3(ø3 Straight type)

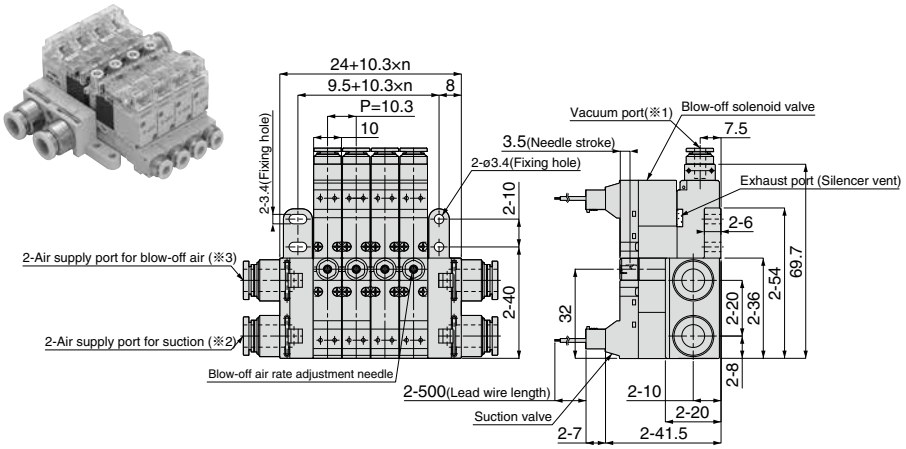
Table 2：Push-In Fitting type of Air supply port

VNB Bracket for Stand-Alone type (Option)



VN Individual air supply port, Silencer vent, Without vacuum pressure sensor

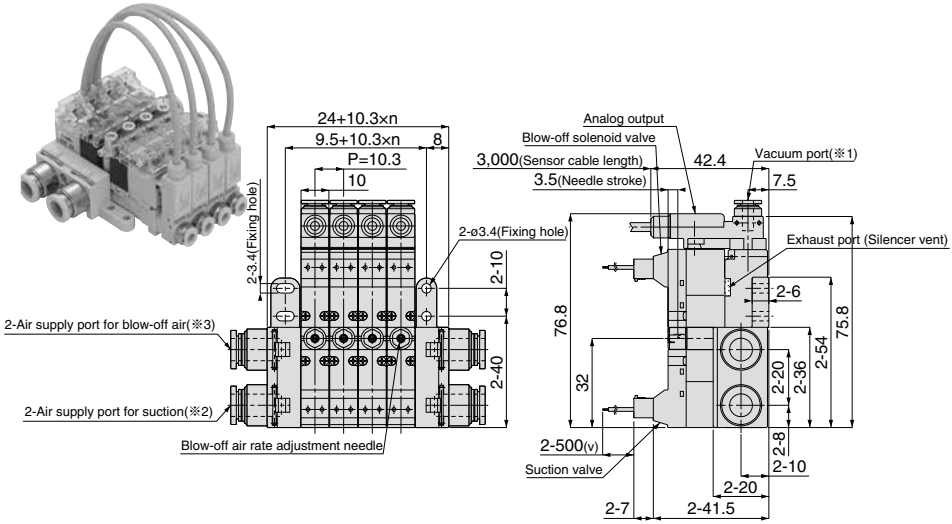
Model code：VN□-□□□S-D24-M□



※ 1. Refer to table 1 on page 306 for the dimension of Vacuum port.
※ 2. Refer to table 2 on page 306 for the dimension of Air supply port for suction.
※ 3. Refer to table 2 on page 306 for the dimension of Air supply port for blow-off air.

VN Individual air supply port, Silencer vent, With vacuum pressure sensor

Model code：VN□-□□□S-D24-□1-M□

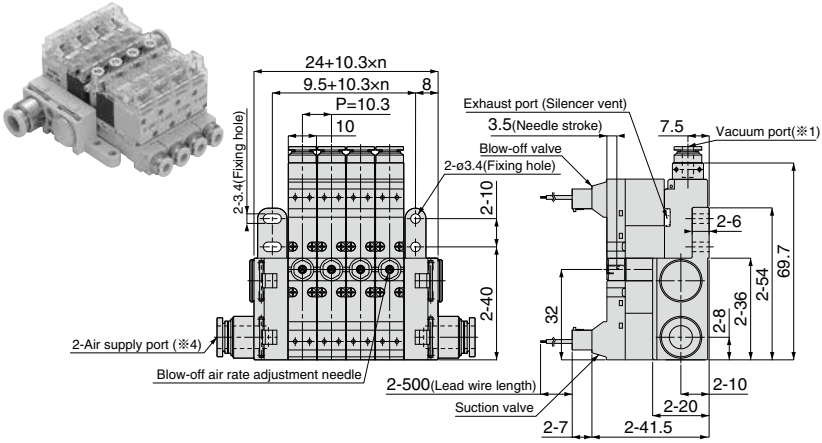


※ 1. Refer to table 1 on page 306 for the dimension of Vacuum port.
※ 2. Refer to table 2 on page 306 for the dimension of Air supply port for suction.
※ 3. Refer to table 2 on page 306 for the dimension of Air supply port for blow-off air.

VACUUM GENERATOR

VN Common air supply port, Silencer vent, Without vacuum pressure sensor

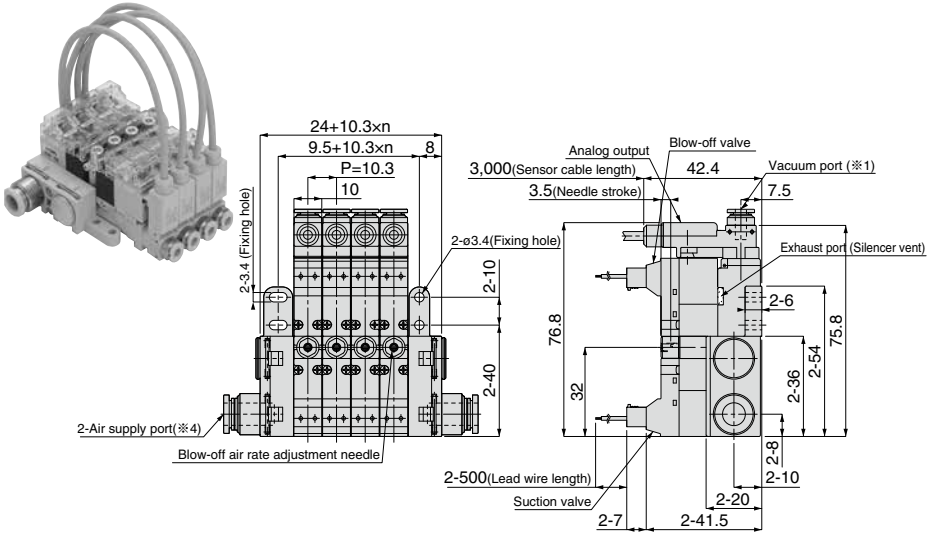
Model code : VN□-□□NS-D24-M□



※ 1. Refer to table 1 on page 306 for the dimension of Vacuum port.
※ 4. Refer to table 2 on page 306 for the dimension of Air supply port.

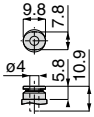
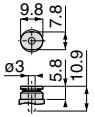
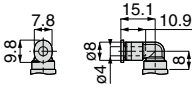
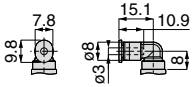
VN Common air supply port, Silencer vent, With Vacuum pressure sensor

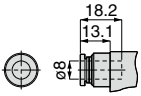
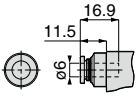
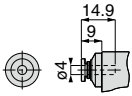
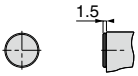
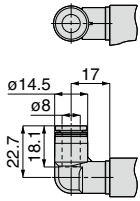
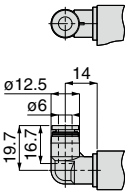
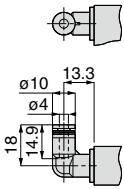
Model code : VN□-□□NS-D24-□1-M□



※ 1. Refer to table 1 on page 306 for the dimension of Vacuum port.
※ 4. Refer to table 2 on page 306 for the dimension of Air supply port.

Fitting Dimension of Manifold type

			
4(ø4 Straight type)	3(ø3 Straight type)	4L(ø4 Elbow type)	3L(ø3 Elbow type)
Table 1：Push-In Fitting of Vacuum port			

			
8(ø8 Straight type)	6(ø6 Straight type)	4(ø4 Straight type)	Plug(For one-side supply)
			
8(ø8 Elbow type)	6(ø6 Elbow type)	4(ø4 Elbow type)	
Table 2：Push-In Fitting of Air supply port			

⚠ Detailed Safety Instructions

Before using PISCO products, be sure to read “Safety Instructions” and “Safety Instruction Manual” on page 35-39 and “Common Safety Instructions for Vacuum Series” on page 47-49.

Warning

[Products Handling]

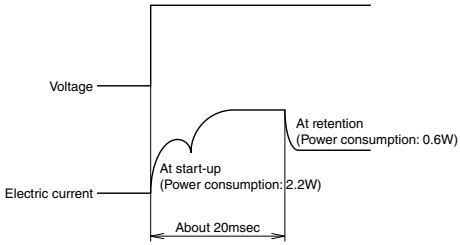
1. Do not step onto or place objects on the devices. These may cause falling accident, fall of devices, injuries from falling and malfunctions from device breakage.
2. Do not wash or paint the devices with solvent or water. Solvent use may cause breakage of resin parts and malfunction by port clogs.

[Products maintenance]

1. Carry out maintenance and checks of equipment only after turning power off, shutting air off and making sure that the residual pressure in the piping has dropped to zero.
2. When installing wiring and piping, be sure to switch off the power and make sure there is no wrong wiring and wrong piping before applying power and air.
3. Tighten screws with recommended tightening torque. The recommended tightening torque for fixing device is specified on "How to fix Stand alone / Manifold type" of page 297. The recommended tightening torque is written on “How to replace silencer elements” of page 309. Improper tightening may cause air leakage, dropout or breakage of the products.

[Products application]

1. For the operation of the solenoid valve, make sure that the leakage current is less than 1mA. Leakage current larger than that may cause malfunction.
2. Avoid applying excessive vibration or shocks to the devises. (Check the specification on page 293.) It may damage devises and lead to malfunction of solenoid valve.
3. The coil in a pilot solenoid valve generates heat under the following ① to ③ conditions. The heat may cause dropping life cycle, malfunctions, getting burnt or damaging peripheral machines.
   Contact us when the power is applied to the vacuum generator under the following conditions:
   ① The power is continuously ON for over 2 hours.
   ② High-cycle operation.
   ③ Even when intermittent running of the generator is carried out, the total operation time per day is longer than non-operation time.
4. When the electricity is applied to valves continuously for a long time, the coils generate heat. It may cause dropping life cycle, malfunctions, getting burnt or damaging peripheral machines due to the heat.
5. Current limit circuit is adopted for the solenoid valve. It features the current drop when the coil is energized and retains current. Therefore, the use under the vibration or shock greater than the specification must be avoided. It may cause valve malfunction.



Electric current and voltage waveform at valve excitation

Caution

[Products Handling]

1. Do not give an excessive tensile strength and bending on a lead wire. Otherwise, breaking wire or damage on connector may be caused.
2. Compressed air contains many kinds of drains such as water, oxidized oil, tar and other foreign substances. Dehumidify the compressed air by using an after-cooler or a dryer and improve the air quality, since those drains seriously impair the performance of the vacuum generator.
3. Do not use lubricators.
4. Foreign substances such as rusts or dust in the pipes may cause malfunction. Place a filter finer than 5μm ahead of the air supply port. It is recommended to carry out pipe flushing before operation and on a proper regular basis.
5. Avoid using the vacuum generator under the condition of corrosive and / or inflammable gas. Also do not use these gasses as a fluid medium.
6. The product is not drip/dust proof. Do not use the vacuum generator in location where it may be exposed to water, oil drop or dust.
7. The lead wire of solenoid valve is polarized. Therefore, wrong polarity does not activate the solenoid valve.

[Products maintenance]

1. When replacing cartridge fittings for air supply (PS, PV) or vacuum (V) port, be sure to remove foreign substance from the seal and fix the fastening pin firmly in place.
2. The performance of silencer may deteriorate due to when much dust is stuck on the elements. Periodical cleaning and replacing of the elements are recommended.

[Products application]

1. In selecting the piping to the vacuum (V) port, secure piping bore and length for enough effective sectional area. Insufficient effective sectional area may cause performance drop in characteristics such as suction flow and vacuum release airflow.
2. In selecting the piping to the supply (PS,PV) port, select piping bore and length to secure enough effective sectional area. Insufficient effective sectional area may cause performance drop due to short supply of compressed air and vacuum flow.
3. This product is not equipped with a vacuum filter. Make sure to select and use PISCO vacuum filter. If the filter is not used, dust or other particles are accumulated inside the product and cause vacuum performance drop and solenoid valve malfunction such as air leakage. (Recommended filter: VFU series and VFJ series)
4. As for manifold types, allowable station numbers for the simultaneous operation depends on the condition of the air supply (supply port size, piping length, regulator processing flow rate and etc.) and/or air consumption (vacuum characteristics) of ejector. If simultaneous operation of mounting units on a manifold is required, contact PISCO before the use.
5. Although the exhaust of the model with a manifold type is silencer vent by each individual unit, the exhaust air of operating unit or blow-off air flows into the vacuum port of non-operating unit. If such exhaust air causes the problem, please contact PISCO.

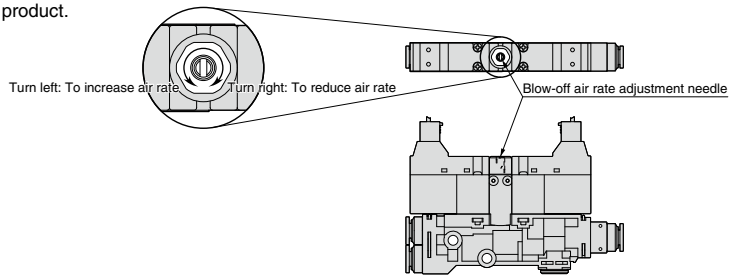
⚠ Safety Rules for Use

How to adjust blow-off air flow

■ Turn the blow-off air rate adjustment needle to the right (clockwise) to reduce blow-off air and to the left (counterclockwise) to increase.

※ Make sure to use a proper size of a flathead screwdriver for the needle adjustment of blow-off air flow.

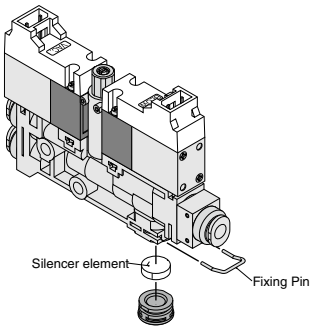
※ A spring is installed under the needle in order to avoid an unexpected needle rotation, so there is no locknut. Do not use a spanner or other tools for the hexagonal-colum. Otherwise, it may cause damage to the product.



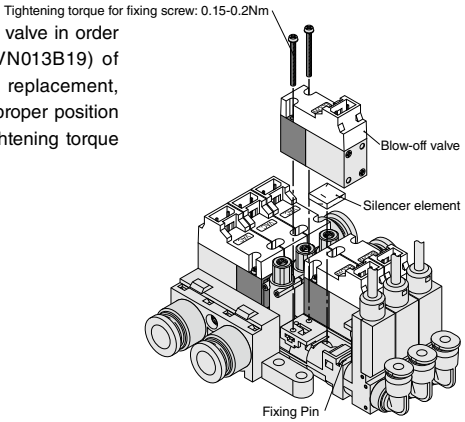
How to replace silencer elements

■ Use a flathead screwdriver to pull out the fixing pin in order to replace silencer elements (Model code: VN012B33) of stand-alone type. Make sure to insert the pin properly after the replacement.

※ Pay attentions to the direction of the fixing pin when inserting. In case it is inserted with a wrong direction, the pin can be fallen out by vibration during the operation.



■ Use a Phillips screwdriver to remove a blow-off valve in order to replace silencer elements (Model code: VN013B19) of manifold type. Insert the pin properly after the replacement, make sure the seal rubbers of the valve in the proper position and tighten the fixing screws firmly with the tightening torque 0.15-0.2Nm.



How to replace and clean nozzles and diffusers

To remove the diffuser, firstly remove the blow-off valve, lock pin for vacuum port block with or without sensor unit. Then, pull out the diffuser using needle-nose pliers etc. To prevent the nozzle from jumping out, cover the main body with a cushioning material (sponge etc.), and supply vacuum generating air (*1,*2) and energize vacuum generating solenoid valve. After the nozzle is pushed out by supplied air, remove the cushioning material and take out the nozzle.

Remove any foreign substance adhered to the nozzle, diffuser interior and seal using air blowing or wiping (*3).

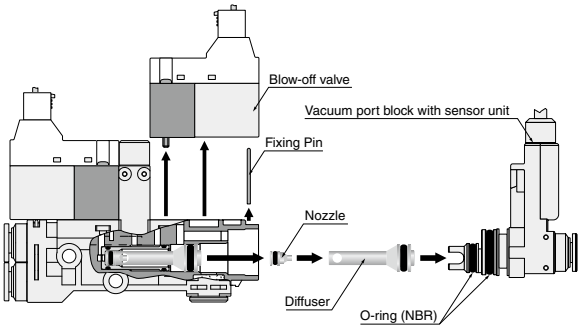
Install the nozzle on the diffuser, and insert to the main body, taking care that the nozzle is not detached from the diffuser. Push in the diffuser by taking care not to damage the tip and install the vacuum port block with or without sensor unit. After inserting the lock pin to fix the vacuum port, tighten the blow-off valve by the fixing screws with a tightening torque of 0.15-0.2N.m. For installation of the silencer element, refer to "How to replace the silencer elements".

※ 1 <Warning> When the air is applied to the generator, do not point the nozzle port toward anyone. There is a possibility that the nozzle jumps out and cause injury.

※ 2 <Warning> By supplying air without having installed the blow-off valve, the air blows out from the square hole of main unit. In such case, close blow-off air rate adjustment needle completely before supplying air.

※ 3 Nozzle, diffuser, seal rubbers and inside of the body shall not be damaged, since there is a possibility of a performance drop.

※ 4 When attaching the vacuum port block, make sure to remove dusts or fluffs stuck on O-ring.



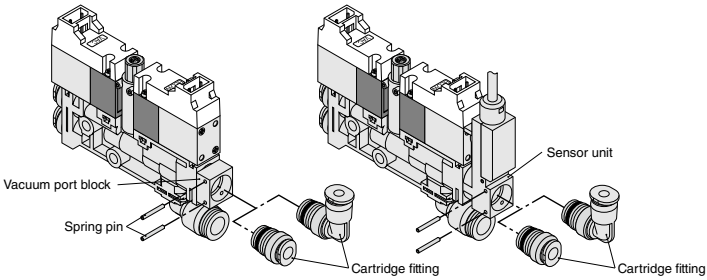
How to replace cartridge fittings

<Vacuum port>

Stand-Alone Type

Pull out the spring pins (2 pieces) inserted from the side of vacuum port block with or without sensor unit with the jig like ø1mm pin and replace the cartridge fitting.

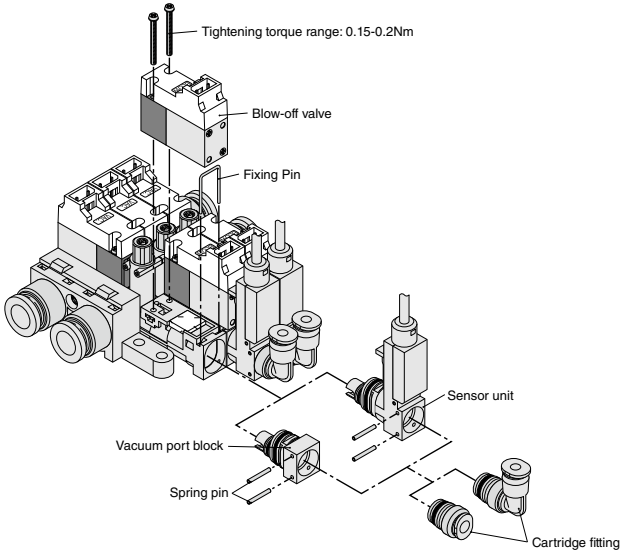
※ When attaching a new cartridge fitting, make sure to remove dusts or fluffs stuck on O-ring. O-ring and inside of the body shall not be damaged, since it may cause a performance drop.



Manifold Type

Using a suitable Philips screwdriver to remove the vacuum blow-off valve. Pull out the fixing pin using a flat-blade screwdriver and remove the vacuum port block with or without sensor unit. Pull out the spring pins (2 pieces) inserted from the side of the vacuum port block with the jig like ø1mm pin and replace the cartridge fittings. After checking the rubber gasket for the solenoid valve is not missing, securely tighten the two fixing screws with a tightening torque of 0.15-0.2N.m.

※ When attaching a new cartridge fitting, make sure to remove dusts or fluffs stuck on O-ring. O-ring and inside of the body shall not be damaged, since it may cause a performance drop.

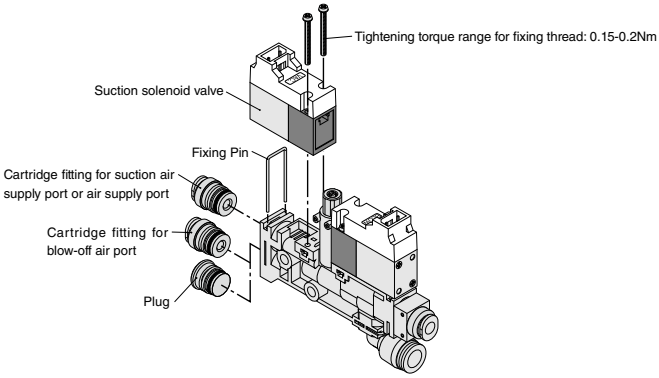


<Supply port>

■ Stand-Alone Type

Using a suitable Philips screwdriver to remove suction solenoid valve. Pull out a fixing pin on suction air supply port, blow-off air supply port or air supply port with a flathead screwdriver. After checking the packing for the solenoid valve is not missing, securely tighten the two fixing screws with tightening torque of 0.15-0.2N.m.

※ When attaching a new cartridge fitting, make sure to remove dusts or fluffs stuck on O-ring. O-ring and inside of the body shall not be damaged, since it may cause a performance drop.

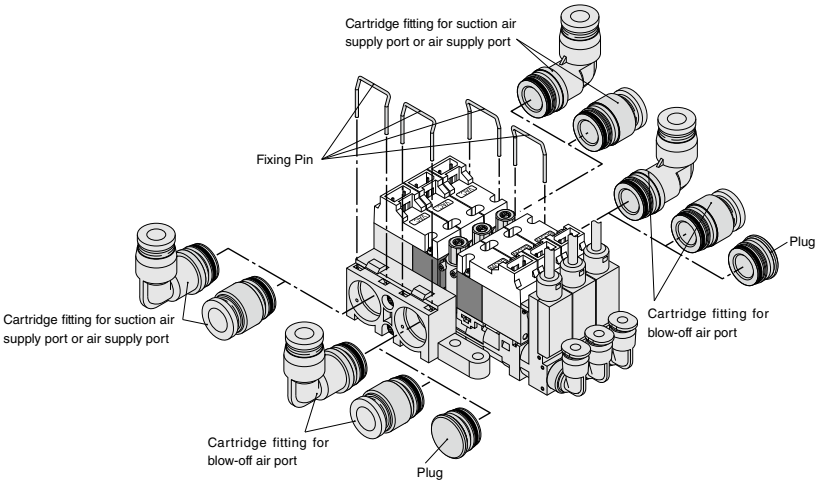


■ Manifold Type

Pull out the fixing pin with a flathead screwdriver and replace cartridge fittings.

※ When attaching a new cartridge fitting, make sure to remove dusts or fluffs stuck on O-ring. O-ring and inside of the body shall not be damaged, since it may cause a performance drop.

※ Be careful of the direction of fixing pin. If the fixing pin is inserted with a wrong direction, the pin may drop off due to vibration.



⚠ SAFETY Instructions

This safety instructions aim to prevent personal injury and damage to properties by requiring proper use of PISCO products.

Be certain to follow ISO 4414 and JIS B 8370

ISO 4414 : Pneumatic fluid power···Recomendations for the application of equipment to transmission and control systems.

JIS B 8370 : General rules and safety requirements for systems and their components.

This safety instructions is classified into “Danger”, “Warning” and “Caution” depending on the degree of danger or damages caused by improper use of PISCO products.

⚠ Danger	Hazardous conditions. It can cause death or serious personal injury.
⚠ Warning	Hazardous conditions depending on usages. Improper use of PISCO products can cause death or serious personal injury.
⚠ Caution	Hazardous conditions depending on usages. Improper use of PISCO products can cause personal injury or damages to properties.

⚠ Warning

1. Selection of pneumatic products
   ① A user who is a pneumatic system designer or has sufficient experience and technical expertise should select PISCO products.
   ② Due to wide variety of operating conditions and applications for PISCO products, carry out the analysis and evaluation on PISCO products. The pneumatic system designer is solely responsible for assuring that the user's requirements are met and that the application presents no health or safety hazards. All designers are required to fully understand the specifications of PISCO products and constitute all systems based on the latest catalog or information, considering any malfunctions.

2. Handle the pneumatic equipment with enough knowledge and experience
   ① Improper use of compressed air is dangerous. Assembly, operation and maintenance of machines using pneumatic equipment should be conducted by a person with enough knowledge and experience.

3. Do not operate machine / equipment or remove pneumatic equipment until safety is confirmed.
   ① Make sure that preventive measures against falling work-pieces or sudden movements of machine are completed before inspection or maintenance of these machine.
   ② Make sure the above preventive measures are completed. A compressed air supply and the power supply to the machine must be off, and also the compressed air in the systems must be exhausted.
   ③ Restart the machines with care after ensuring to take all preventive measures against sudden movements.

Disclaimer

1. PISCO does not take any responsibility for any incidental or indirect loss, such as production line stop, interruption of business, loss of benefits, personal injury, etc., caused by any failure on use or application of PISCO products.

2. PISCO does not take any responsibility for any loss caused by natural disasters, fires not related to PISCO products, acts by third parties, and intentional or accidental damages of PISCO products due to incorrect usage.

3. PISCO does not take any responsibility for any loss caused by improper usage of PISCO products such as exceeding the specification limit or not following the usage the published instructions and catalog allow.

4. PISCO does not take any responsibility for any loss caused by remodeling of PISCO products, or by combinational use with non-PISCO products and other software systems.

5. The damages caused by the defect of Pisco products shall be covered but limited to the full amount of the PISCO products paid by the customer.

⚠ SAFETY INSTRUCTION MANUAL

PISCO products are designed and manufactured for use in general industrial machines. Be sure to read and follow the instructions below.

⚠ Danger

1. Do not use PISCO products for the following applications.
   ① Equipment used for maintaining / handling human life and body.
   ② Equipment used for moving / transporting human.
   ③ Equipment specifically used for safety purposes.

⚠ Warning

1. Do not use PISCO products under the following conditions.
   ① Beyond the specifications or conditions stated in the catalog, or the instructions.
   ② Under the direct sunlight or outdoors.
   ③ Excessive vibrations and impacts.
   ④ Exposure / adhere to corrosive gas, inflammable gas, chemicals, seawater, water and vapor. *
   * Some products can be used under the condition above(④), refer to the details of specification and condition of each product.
2. Do not disassemble or modify PISCO products, which affect the performance, function, and basic structure of the product.
3. Turn off the power supply, stop the air supply to PISCO products, and make sure there is no residual air pressure in the pipes before maintenance and inspection.
4. Do not touch the release-ring of push-in fitting when there is a working pressure. The lock may be released by the physical contact, and tube may fly out or slip out.
5. Frequent switchover of compressed air may generate heat, and there is a risk of causing burn injury.
6. Avoid any load on PISCO products, such as a tensile strength, twisting and bending. Otherwise, there is a risk of causing damage to the products.
7. As for applications where threads or tubes swing / rotate, use Rotary Joints, High Rotary Joints or Multi-Circuit Rotary Block only. The other PISCO products can be damaged in these applications.
8. Use only Die Temperature Control Fitting Series, Tube Fitting Stainless SUS316 Series, Tube Fitting Stainless SUS316 Compression Fitting Series or Tube Fitting Brass Series under the condition of over 60℃ (140° F) water or thermal oil. Other PISCO products can be damaged by heat and hydrolysis under the condition above.
9. As for the condition required to dissipate static electricity or provide an antistatic performance, use EG series fitting and antistatic products only, and do not use other PISCO products. There is a risk that static electricity can cause system defects or failures.
10. Use only Fittings with a characteristic of spatter-proof such as Anti-spatter or Brass series in a place where flame and weld spatter is produced. There is a risk of causing fire by sparks.
11. Turn off the power supply to PISCO products, and make sure there is no residual air pressure in the pipes and equipment before maintenance. Follow the instructions below in order to ensure safety.
    ① Make sure the safety of all systems related to PISCO products before maintenance.
    ② Restart of operation after maintenance shall be proceeded with care after ensuring safety of the system by preventive measures against unexpected movements of machines and devices where pneumatic equipment is used.
    ③ Keep enough space for maintenance when designing a circuit.
12. Take safety measures such as providing a protection cover if there is a risk of causing damages or fires on machine / facilities by a fluid leakage.

⚠ Caution

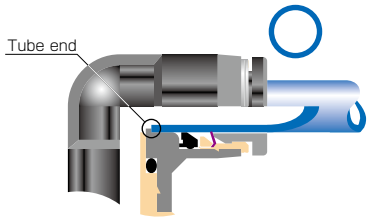
1. Remove dusts or drain before piping. They may get into the peripheral machine / facilities and cause malfunction.
2. When inserting an ultra-soft tube into push-in fitting, make sure to place an Insert Ring into the tube edge. There is a risk of causing the escape of tube and a fluid leakage without using an Insert Ring.
3. The product incorporating NBR as seal rubber material has a risk of malfunction caused by ozone crack. Ozone exists in high concentrations in static elimination air, clean-room, and near the high-voltage motors, etc. As a countermeasure, material change from NBR to HNBR or FKM is necessary. Consult with PISCO for more information.
4. Special option "Oil-free" products may cause a very small amount of a fluid leakage. When a fluid medium is liquid or the products are required to be used in harsh environments, contact us for further information.
5. In case of using non-PISCO brand tubes, make sure the tolerance of the outer tube diameter is within the limits of Table 1.

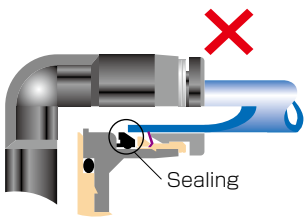
● Table 1. Tube O.D. Tolerance

mm size	Nylon tube	Polyurethane tube
ø1.8mm	—	±0.05mm
ø3mm	—	±0.15mm
ø4mm	±0.1mm	±0.15mm
ø6mm	±0.1mm	±0.15mm
ø8mm	±0.1mm	±0.15mm
ø10mm	±0.1mm	±0.15mm
ø12mm	±0.1mm	±0.15mm
ø16mm	±0.1mm	±0.15mm

inch size	Nylon tube	Polyurethane tube
ø1/8	±0.1mm	±0.15mm
ø5/32	±0.1mm	±0.15mm
ø3/16	±0.1mm	±0.15mm
ø1/4	±0.1mm	±0.15mm
ø5/16	±0.1mm	±0.15mm
ø3/8	±0.1mm	±0.15mm
ø1/2	±0.1mm	±0.15mm
ø5/8	±0.1mm	±0.15mm

6. Instructions for Tube Insertion
   ① Make sure that the cut end surface of the tube is at right angle without a scratch on the surface and deformations.
   ② When inserting a tube, the tube needs to be inserted fully into the push-in fitting until the tubing edge touches the tube end of the fitting as shown in the figure below. Otherwise, there is a risk of leakage.





Tube is not fully inserted up to tube end.

   ③ After inserting the tube, make sure it is inserted properly and not to be disconnected by pulling it moderately.

※. When inserting tubes, Lock-claws may be hardly visible in the hole, observed from the front face of the release-ring. But it does not mean the tube will surely escape. Major causes of the tube escape are the followings;
①Shear drop of the lock-claws edge
②The problem of tube diameter (usually small)
Therefore, follow the above instructions from ① to ③, even lock-claws is hardly visible.

7. Instructions for Tube Disconnection
   ① Make sure there is no air pressure inside of the tube, before disconnecting it.
   ② Push the release-ring of the push-in fitting evenly and deeply enough to pull out the tube toward oneself. By insufficient pushing of the release-ring, the tube may not be pulled out or damaged by scratch, and tube shavings may remain inside of the fitting, which may cause the leakage later.
8. Instructions for Installing a fitting
   ① When installing a fitting, use proper tools to tighten a hexagonal-column or an inner hexagonal socket. When inserting a hex key into the inner hexagonal socket of the fitting, be careful so that the tool does not touch lock-claws. The deformation of lock-claws may result in a poor performance of systems or an escape of the tube.
   ② Refer to Table 2 which shows the recommended tightening torque. Do not exceed these limits to tighten a thread. Excessive tightening may break the thread part or deform the gasket and cause a fluid leakage. Tightening thread with tightening torque lower than these limits may cause a loosened thread or a fluid leakage.
   ③ Adjust the tube direction while tightening thread within these limits, since some PISCO products are not rotatable after the installation.

● Table 2: Recommended tightening torque / Sealock color / Gasket materials

Thread type	Thread size	Tightening torque	Sealock color	Gasket materials
Metric thread	M3 × 0.5	0.7N·m	—	SUS304 NBR
	M5 × 0.8	1.0 ~ 1.5N·m		
	M6 × 1	2 ~ 2.7N·m		
	M3 × 0.5	0.5 ~ 0.6N·m		POM
	M5 × 0.8	1 ~ 1.5N·m		
	M6 × 0.75	0.8 ~ 1N·m		
	M8 × 0.75	1 ~ 2N·m		
Taper pipe thread	R1/8	7 ~ 9N·m	White	—
	R1/4	12 ~ 14N·m		
	R3/8	22 ~ 24N·m		
	R1/2	28 ~ 30N·m		
Unified thread	No.10-32UNF	1.0 ~ 1.5N·m	—	SUS304、NBR
National pipe thread taper	1/16-27NPT	7 ~ 9N·m	White	—
	1/8-27NPT	7 ~ 9N·m		
	1/4-18NPT	12 ~ 14N·m		
	3/8-18NPT	22 ~ 24N·m		
	1/2-14NPT	28 ~ 30N·m		

※ These values may differ for some products. Refer to each specification as well.

9. Instructions for removing a fitting
   ① When removing a fitting, use proper tools to loosen a hexagonal-column or an inner hex bolt.
   ② Remove the sealant stuck on the mating equipment. The remained sealant may get into the peripheral equipment and cause malfunctions.
10. Arrange piping avoiding any load on fittings and tubes such as twist, tensile, moment load, shaking and physical impact. These may cause damages to fittings, tube deformations, bursting and the escape of tubes.

⚠ 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. If there is a risk of dropping work-pieces during vacuum suction, take a safety measure against the falling of them.
2. Avoid supplying more than 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 drop of vacuum pressure caused by problems of the supplied air or the power supply. Decrease of suction force may lead to a danger of falling work-piece so that safety measure against the falling of them is necessary.
4. When more than 2 vacuum pads are plumbed on a single ejector and one of them has a suction problem such as vacuum leak, there is a risk of releasing work-pieces from the other pad due to the drop of the vacuum pressure.
5. Do not use in the way by which exhaust port is blocked or exhaust resistance is increased. Otherwise, there is a risk of no vacuum generation or a drop of the vacuum pressure.
6. Do not use the product in the circumstance of corrosive gas, inflammable gas, explosive gas, chemicals, seawater and vapor or do not expose the product to those. Never allow the product to suck those things.
7. Provide a protective cover on the products when it is exposed to sunlight.
8. 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.
9. Before replacing the element, thoroughly read and understand the method of filter replacement in the catalog.
10. Make sure the correct port of the vacuum generator by this catalog or marking on the products when plumbing. Wrong plumbing can be a risk to damage the product.
11. Supply clean air without sludge or dusts to an ejector. Do not lubricate by a lubricator. There is a risk of malfunction or performance impairing by impurities and oil contained in the compressed air.
12. Do not apply extreme tension, twist or bending forces on a lead wire. Otherwise, it may cause a wire breaking.
13. Locknut needs to be tightened firmly by hand. Do not use any tool to tighten. In case of using tools to tighten the locknut, it may damage the locknut or the product. Inadequate tightening may loosen the locknut and the initial setting can be changed.
14. Do not force the product to rotate or swing even its resin body is rotatable. It may cause damage to the product and a fluid leakage.
15. Do not supply an air pressure or a dry air to the products over the necessary amount. There is a risk of deteriorating rubber materials and malfunction due to oil.
16. 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.

17. Do not use the product in the environment of inflammable or explosive gas / fluid. It can cause a fire or an explosion hazard.
18. Do not use the product in the circumstance of corrosive gas, inflammable gas, explosive gas, chemicals, seawater and vapor or do not expose the product to those. Otherwise, it may be a cause of malfunction.
19. Do not clean or paint the products by water or a solvent.

⚠ Caution

1. Operating pressure range in the catalog is the values during ejector operation. Secure the described value of the supplied air, taking a drop of the pressure into consideration. Insufficient pressure, which does not satisfy the spec, may cause abnormal noise, unstable performance and may negatively affect sensors, bringing troubles at last.
2. Effective cross-section area of the air supply side needs to be three times as large as effective cross-section area of the nozzle bore. When arranging piping or selecting PISCO products, secure required effective cross-section area. Insufficient supply pressure may be a cause to impair performance.
3. A Shorter distance of plumbing with a wider bore is preferable at vacuum system side. A long plumbing with a small bore may result in slow response time at the time of releasing work-piece as well as in failure to secure adequate suction flow rate.
4. Plumb a vacuum switch and an ejector with vacuum switch at the end of vacuum system as much as possible. A long distance between a vacuum switch and a vacuum system end may increase plumbing resistance which may lead to a high vacuum level at the sensor even when no suctioning and a malfunction of vacuum switch. Make sure to evaluate the products in an actual system.
5. 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.
6. Refer to “Common Safety Instructions for Pressure Sensors” and “Detailed Safety Instructions” for the handling of digital vacuum switch sensor.
7. Refer to “Common Safety Instructions for Mechanical Vacuum Sensor” for the handling of mechanical vacuum switch.
8. 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
Thinner
Carbon tetrachloride
Chloroform
Acetate
Aniline
Cyclohexane
Trichloroethylene
Sulfuric acid
Lactic acid
Water soluble cutting oil (alkaline)

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

9. 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
Methanol
Ethanol
Nitric acid
Sulfuric acid
Hydrochloric acid
Lactic acid
Acetone
Chloroform
Aniline
Trichloroethylene
Hydrogen peroxide

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