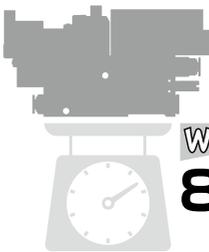


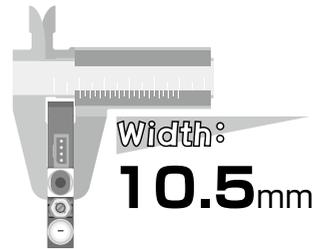
Complex Vacuum Generator with Lightweight, Compact Body and High Vacuum Cycle Vacuum Generator **VX** Series

188

- *Lightweight and compact body meeting market needs.*

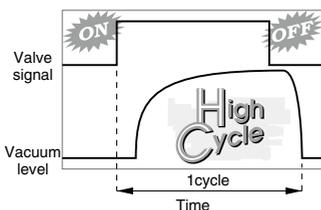


Weight:
80g



Width:
10.5mm

※ The above is the weight of a tube exhaust type with LED vacuum pressure sensor.

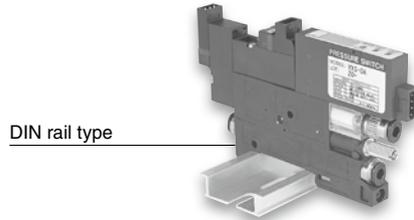
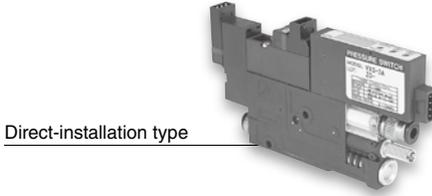


- *Pursue of faster responsiveness of suction solenoid valve to the extreme realized the high cycle of vacuum system.*

Two types of valves, Normally closed type and Double solenoid type (vacuum retention type) which is suitable to save energy, are selectable.

■ Characteristics

- *Wide variety of combinations enables to meet various applications. External Vacuum Controller for vacuum pump is also available.(P.338).*
- *2 installation methods are selectable. Direct-installation type is to fix the product from side using threads. The other DIN rail type is to install the product on DIN rail. Selection according to the application is possible.*



- *Vacuum switch with visibility improved LED display, and one with analog output with reasonable price are selectable.*

There are 2 kinds in vacuum switch with LED display. One is 2 switch output and the other is analog output type. Connector wire is adopted which makes wiring layout easy.

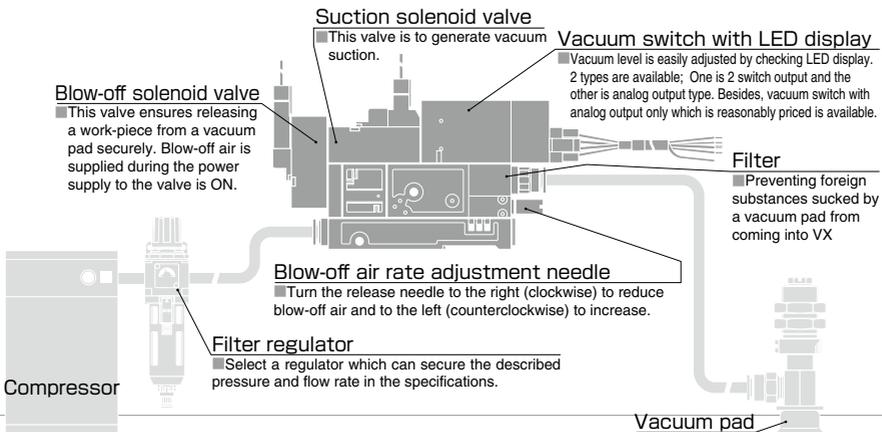
- *Max. 10 mounting units in a manifold type.*

- *Standard nozzle bore: 05(ø0.5mm), 07(v0.7mm) and 10(ø10mm).*

 *“Copper alloy free” and “Low level ozone proof” types are available in VX.*

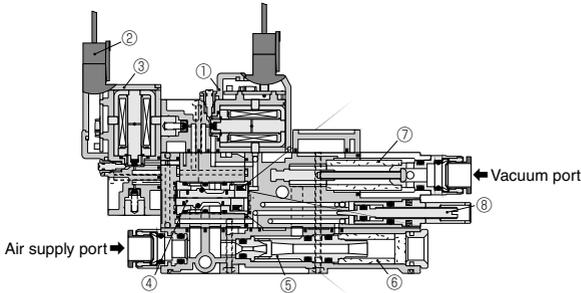
No copper alloy on airflow path. HMBR material for seal rubber. Krytox grease is a measure against low ozone concentration and dry air.

■ Piping Example



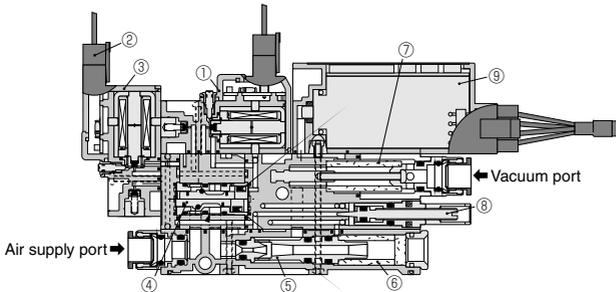
Construction

Example). VX□□□-□□S-D24 (Stand-alone type without vacuum switch)



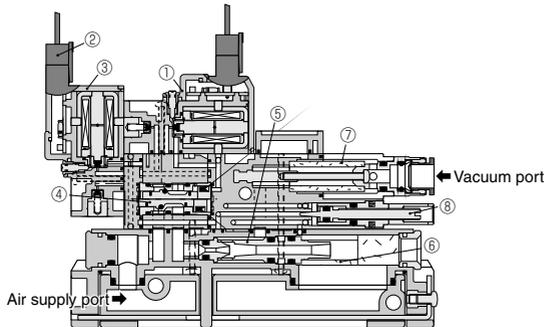
No.	Part name
①	Pilot valve for vacuum generation
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Ejector unit
⑥	Silencer element
⑦	Filter element
⑧	Blow-off air rate adjustment needle

Example). VX□□□-□□S-D24-D□ (Stand-alone type with vacuum switch)



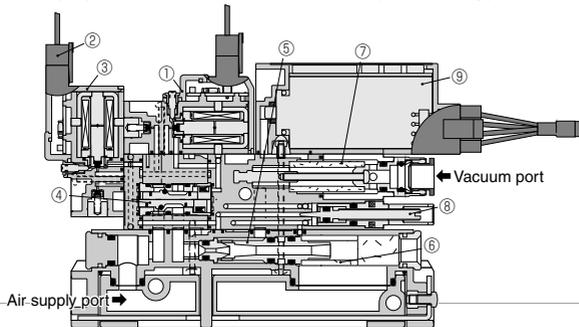
No.	Part name
①	Pilot valve for vacuum generation
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Ejector unit
⑥	Silencer element
⑦	Filter element
⑧	Blow-off air rate adjustment needle
⑨	Vacuum sensor unit

Example). VX□□□-□□S-□-M□ (Manifold type without vacuum switch)



No.	Part name
①	Pilot valve for vacuum generation
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Ejector unit
⑥	Silencer element
⑦	Filter element
⑧	Blow-off air rate adjustment needle

Example). VX□□□-□□S-□-D□-M□ (Manifold type with vacuum switch)



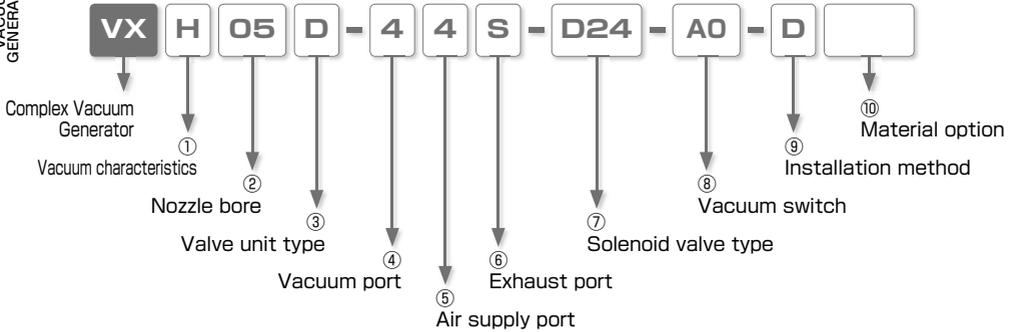
No.	Part name
①	Pilot valve for vacuum generation
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Ejector unit
⑥	Silencer element
⑦	Filter element
⑧	Blow-off air rate adjustment needle
⑨	Vacuum sensor unit

Vacuum Generator Series

Vacuum Generator VX

VACUUM GENERATOR

Model Designation of Stand-Alone Type (Example)



① Vacuum characteristics

Code	Performance	Code	Performance	Code	Performance
H	High-vacuum type (Rated supply pressure : 0.5MPa)	L	Large-flow type (Rated supply pressure : 0.5MPa)	E	High-vacuum at low air supply pressure type (Rated supply pressure : 0.35MPa)

② Nozzle bore

Code	Nozzle bore	H type		L type		E type		Air consumption
		Vacuum level, Suction flow		Vacuum level, Suction flow		Vacuum level, Suction flow		
05	0.5mm	-90.4kPa 7l/min(ANR)		-66.5kPa 12l/min(ANR)		-90.4kPa 3l/min(ANR)		115l/min(ANR) (8l/min(ANR))
07	0.7mm	-93.1kPa 13l/min(ANR)		-66.5kPa 24[22]l/min(ANR)		-90.4kPa 10.5l/min(ANR)		23l/min(ANR) (17l/min(ANR))
10	1.0mm	-93.1kPa 24[20]l/min(ANR)		-66.5kPa 26l/min(ANR)		-90.4kPa 20[19]l/min(ANR)		46l/min(ANR) (34l/min(ANR))

※ 1. Supply pressure is 0.5MPa for H and L type and 0.35MPa for E type.

※ 2. The values in [] are for suction flow of tube exhaust type.

※ 3. Air consumption values in () are for E type.

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

③ Valve unit type

Code	Valve unit type	Code	Valve unit type
D	Double solenoid type (Vacuum retention type)	No code	Normally closed

④ Vacuum (V) port (Applicable tube O.D.)

Code	3	4	6
Tube dia.(mm)	ø3 (Push-In Fitting)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)

⑤ Air supply (PS) port (Applicable tube O.D.)

Code	4	6
Tube dia.(mm)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)

⑥ Exhaust (EX) port

Code	S	J
Exhaust method	Silencer vent	Tube exhaust (ø6mm Push-In Fitting)

※ . Tube exhaust is not selectable for nozzle bore ø1mm of L (Large-flow type).

⑦ Solenoid valve type

Code	D24	A100
Voltage	DC24V	AC100V

⑧ Vacuum switch

Code	Switch	Code	Switch	Code	Switch
DW	Pressure sensor with LED display (2 switch outputs)	DA	Pressure sensor with LED display (Analog and switch output)	A0	Analog output pressure sensor (No LED)
No code	Without vacuum switch				

⑨ Installation method

Code	Installation method	Code	Installation method
D	DIN rail type	No code	Direct-installation type

⑩ Material option

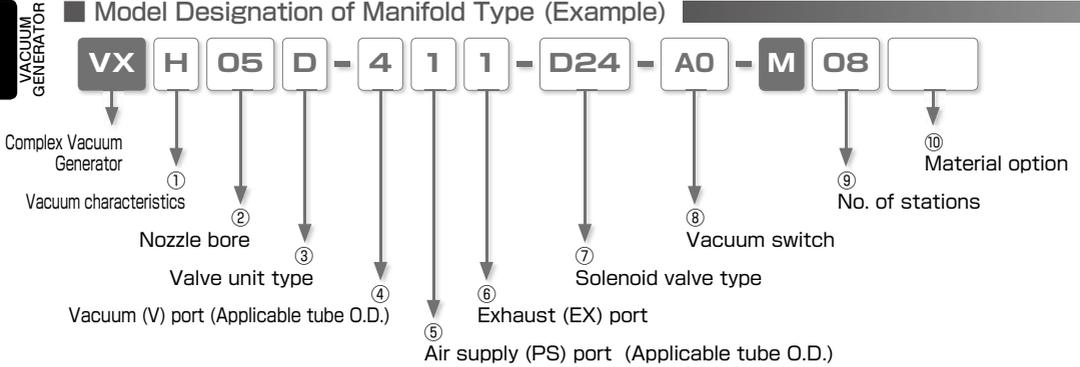
Code	No code	-S3
Material	Standard	No copper alloy & HNBR seal
Exhaust method	Silencer vent & Tube exhaust	Tube exhaust

※ . -S3 specification is only for where air flow through but not corresponding to electrical parts, wires or vacuum port size with $\phi 3\text{mm}$.

Vacuum Generator Series

Vacuum Generator VX

Model Designation of Manifold Type (Example)



① Vacuum characteristics

Code	Performance	Code	Performance	Code	Performance
H	High-vacuum type (Rated supply pressure : 0.5MPa)	L	Large-flow type (Rated supply pressure : 0.5MPa)	E	High-vacuum at low air supply pressure type (Rated supply pressure : 0.35MPa)
K	When different vacuum characteristics are mixed (Fill in the details on Specification order form)				

② Nozzle bore

Code	Nozzle bore	H type		L type		E type		Air consumption
		Vacuum level, Suction flow	Vacuum level, Suction flow					
05	0.5mm	-90.4kPa 7ℓ/min(ANR)	-66.5kPa 12ℓ/min(ANR)	-90.4kPa 3ℓ/min(ANR)	-90.4kPa 3ℓ/min(ANR)	11.5ℓ/min(ANR) (8ℓ/min(ANR))		
07	0.7mm	-93.1kPa 13ℓ/min(ANR)	-66.5kPa 24[22]ℓ/min(ANR)	-90.4kPa 10.5ℓ/min(ANR)	-90.4kPa 10.5ℓ/min(ANR)	23ℓ/min(ANR) (17ℓ/min(ANR))		
10	1.0mm	-93.1kPa 24[20]ℓ/min(ANR)	-66.5kPa 26ℓ/min(ANR)	-90.4kPa 20[19]ℓ/min(ANR)	-90.4kPa 20[19]ℓ/min(ANR)	46ℓ/min(ANR) (34ℓ/min(ANR))		
00	When different vacuum characteristics are mixed (Fill in the details on Specification order form)							

※ 1. Supply pressure is 0.5MPa for H and L type and 0.35MPa for E type.

※ 2. The values in [] are for suction flow of tube exhaust type.

※ 3. Air consumption values in () are for E type.

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

③ Valve unit type

Code	Valve unit type	Code	Valve unit type
D	Double solenoid type (Vacuum retention type)	No code	Normally closed
K	When different valves are mixed on a manifold (Fill in the details on Specification order form)		

④ Vacuum (V) port (Applicable tube O.D.)

Code	3	4	6	0
Tube dia.(mm)	ø3 (Push-In Fitting)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)	When different ports are mixed on a manifold (Fill in the details on Specification order form)

⑤ Air supply (PS) port (Applicable tube O.D.)

Code	4	6	8	1
Tube dia.(mm)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)	ø8 (Push-In Fitting)	ø10 (Push-In Fitting)

⑥ Exhaust (EX) port (Applicable tube O.D.)

Code	S	6	8	1
Exhaust method	Silencer vent	Tube exhaust (ø6mm Push-In Fitting)	Tube exhaust (ø8mm Push-In Fitting)	Tube exhaust (ø10mm Push-In Fitting)

⑦ Solenoid valve type

Code	D24	A100
Voltage	DC24V	AC100V

⑧ Vacuum switch

Code	Switch	Code	Switch	Code	Switch
DW	Pressure sensor with LED display (two switch outputs)	DA	Pressure sensor with LED display (analog and switch output)	A0	Analog output pressure sensor (no LED)
No code	Without vacuum switch				

⑨ No. of stations

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

⑩ Material option

Code	No code	-S3
Material	Standard	Copper alloy free
Exhaust method	Silencer vent & Tube exhaust	Tube exhaust

※ . -S3 specification is only for where air flow through but not corresponding to electrical parts, wires or vacuum port size with $\phi 3\text{mm}$.

- ※ 1. When simultaneous operation of all mounting units is required, contact us in advance.
- ※ 2. When 10 or more stations on a unit are required, contact PISCO in advance.

Model Designation of Manifold-base only (Example)

VXM - 8 S - 04

Manifold-base for High-cycle type vacuum generator

④ Material option

Air supply (PS) port (Applicable tube O.D.)

①

③ No. of stations

② Exhaust (EX) port (Applicable tube O.D.)

① Air supply port

Code	4	6	8	1
Tube dia.(mm)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)	ø8 (Push-In Fitting)	ø10 (Push-In Fitting)

② Exhaust port

Code	S	6	8	1
Exhaust method	Silencer vent	Tube exhaust (ø6mm Push-In Fitting)	Tube exhaust (ø8mm Push-In Fitting)	Tube exhaust (ø10mm Push-In Fitting)

③ No. of stations

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

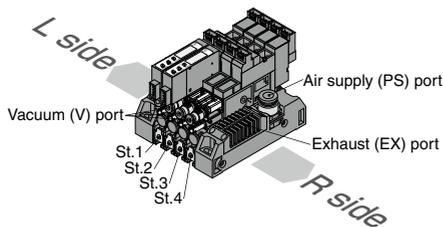
④ Material option

Code	No code	-S3
Material	Standard	Copper alloy free & HNBR seal
Exhaust method	Silencer vent & Tube exhaust	Tube exhaust

Specification Order Form Example of Manifold type

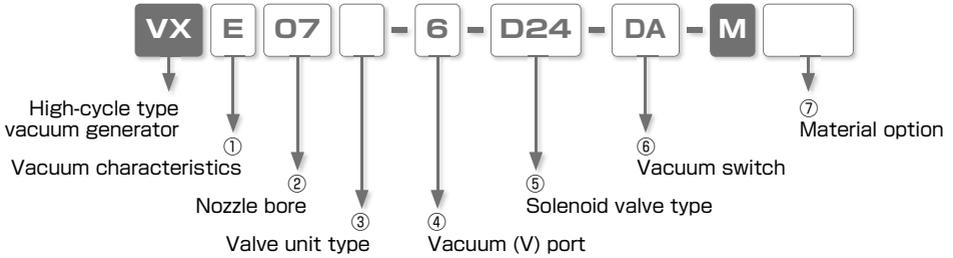
Vacuum generator type	Vacuum characteristics (1)	Nozzle bore (2)	Valve unit type (3)	Vacuum (V) port (4)	Air supply (PS) port (5)	Exhaust (EX) port (6)	Solenoid valve type (7)	Vacuum switch (8)	No. of stations (9)	Material option (10)				
VX	K	00	K	-	0	8	S	-	D24	-	K	-	04	
L	St. 1	E	07	d	-	6	-	-	-	-	DW	-		
	St. 2	E	07	d	-	6	-	-	-	-	DW	-		
St. no.	St. 3	H	05	-	-	4	-	-	-	-	-	-		
	St. 4	H	05	-	-	4	-	-	-	-	-	-		
	St. 5			-	-		-	-	-	-	-	-		
	St. 6			-	-		-	-	-	-	-	-		
	St. 7			-	-		-	-	-	-	-	-		
	St. 8			-	-		-	-	-	-	-	-		
	St. 9			-	-		-	-	-	-	-	-		
	St. 10			-	-		-	-	-	-	-	-		

Manifold Type Example



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

■ Model Designation of Manifold Installation Top-Mounting Unit alone (Example)



① Vacuum characteristics

Code	Performance	Code	Performance	Code	Performance
H	High-vacuum type (Rated supply pressure : 0.5MPa)	L	Large-flow type (Rated supply pressure : 0.5MPa)	E	High-vacuum at low air supply pressure type (Rated supply pressure : 0.35MPa)

② Nozzle bore

Code	Nozzle bore	H type Vacuum level, Suction flow	L type Vacuum level, Suction flow	E type Vacuum level, Suction flow	Air consumption
05	0.5mm	-90.4kPa 7[7]ℓ/min(ANR)	-66.5kPa 12[12]ℓ/min(ANR)	-90.4kPa 3[3]ℓ/min(ANR)	115ℓ/min(ANR) (8ℓ/min(ANR))
07	0.7mm	-93.1kPa 13[13]ℓ/min(ANR)	-66.5kPa 24[22]ℓ/min(ANR)	-90.4kPa 10.5[10.5]ℓ/min(ANR)	23ℓ/min(ANR) (17ℓ/min(ANR))
10	1.0mm	-93.1kPa 27[20]ℓ/min(ANR)	-66.5kPa 26ℓ/min(ANR)	-90.4kPa 20[19]ℓ/min(ANR)	46ℓ/min(ANR) (34ℓ/min(ANR))

- * 1. Supply pressure is 0.5MPa for H and L type and 0.35MPa for E type.
- * 2. The values in [] are for suction flow of tube exhaust type.
- * 3. Air consumption values in () are for E type.

③ Valve unit type

Code	Valve unit type	Code	Valve unit type
D	Double solenoid type (Vacuum retention type)	No code	Normally closed

④ Vacuum (V) port

Code	3	4	6
Tube dia.(mm)	ø3 (Push-In Fitting)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)

⑤ Solenoid valve type

Code	D24	A100
Voltage	DC24V	AC100V

⑥ Vacuum switch

Code	Switch	Code	Switch	Code	Switch
DW	Pressure sensor with LED display (two switch outputs)	DA	Pressure sensor with LED display (analog and switch output)	A0	Analog output pressure sensor (no LED)
No code	Without vacuum switch/vacuum switch				

⑦ Material option

Code	No code	-S3
Material	Standard	Copper alloy free & HNBR seal

- * . -S3 specification is only for where air flow through but not corresponding to electrical parts, wires or vacuum port size with ø3mm.



Vacuum Generator VX Series Specification Order Form

To: NIHON PISCO CO., Ltd. _____

Name : _____

Order No. : _____

Date : _____

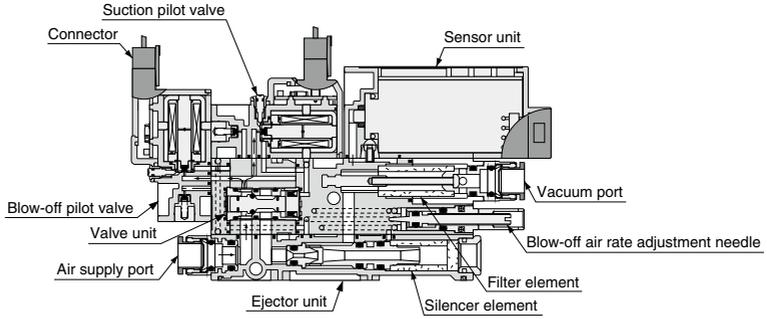
Requested EX-W PISCO Date : _____ Quantity : _____

Vacuum generator type	Vacuum characteristics (1)	Nozzle bore (2)	Valve unit type (3)		Vacuum (V) port (4)	Air supply (PS) port (5)	Exhaust (EX) port (6)		Solenoid valve type (7)		Vacuum switch (8)		No. of stations (9)	Material option (10)
VX	K	00	K	-	0	8	S	-	D24	-	K	-	04	
L	St. 1	E	07	D	-	6	/	/	-	/	-	DW	-	
↑	St. 2	E	07	D	-	6	/	/	-	/	-	DW	-	
	St. 3	H	05		-	4	/	/	-	/	-		-	
	St. 4	H	05		-	4	/	/	-	/	-		-	
St. no.	St. 5				-		/	/	-	/	-		-	
	St. 6				-		/	/	-	/	-		-	
	St. 7				-		/	/	-	/	-		-	
	St. 8				-		/	/	-	/	-		-	
↓	St. 9				-		/	/	-	/	-		-	
R	St. 10				-		/	/	-	/	-		-	

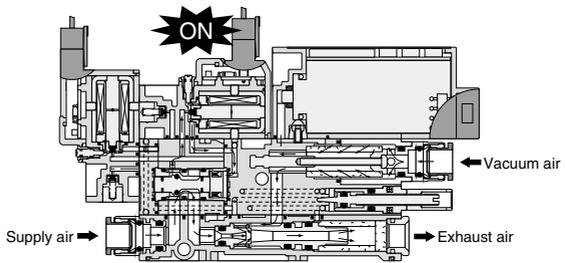
- ※ 1. Refer to the example on page 195 to fill in the form.
- ※ 2. Copy this page and use.
- ※ 3. Use this specification order form for different specifications of mounting units.
- ※ 4. -S3 specification is not selectable for silencer exhaust type and a type with vacuum port size with ø3mm.

How double solenoid type works

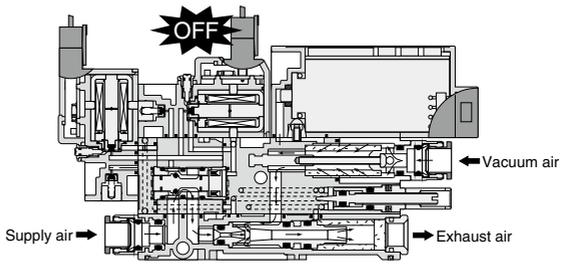
① When suction pilot valve is OFF (At vacuum generation suspended)



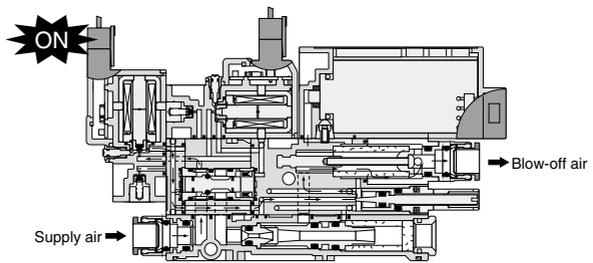
② When suction pilot valve is ON (At vacuum generating)



③ When suction pilot valve is OFF (At vacuum retention)

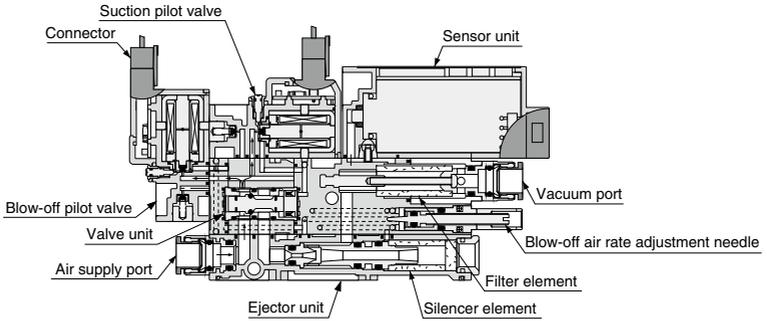


④ When blow-off pilot valve is ON (At vacuum generation suspended and supply of blow-off air)

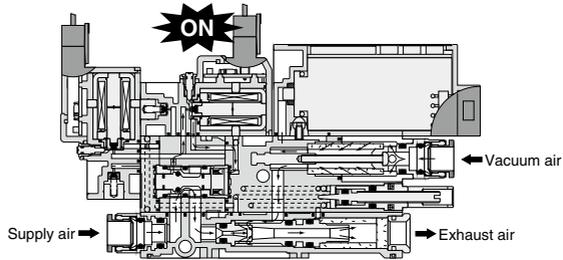


How normally closed type works

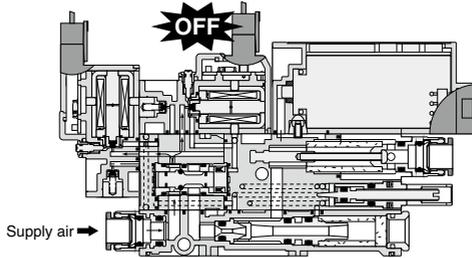
① When suction pilot valve is OFF (At vacuum generation suspended)



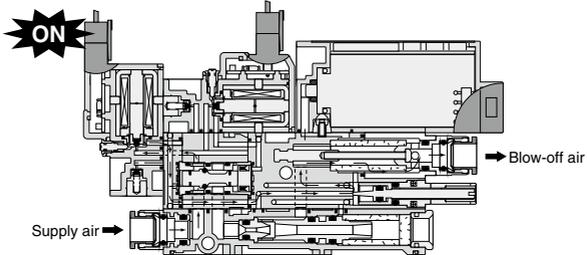
② When suction pilot valve is ON (At vacuum generation)



③ When suction pilot valve is OFF (At vacuum generation suspended)



④ When blow-off pilot valve is ON (At supply of blow-off air)



Specification (Supply pressure)

Fluid medium	Air
Operating pressure range	0.3 ~ 0.7 MPa
Operating temp. range	5 ~ 50°C
Protective structure	IEC standard IP40 equiv.

Ejector characteristics

Model code		Nozzle bore (mm)	Rated supply pressure (MPa)	Final vacuum (-kPa)	Suction flow (l/min(ANR))	Air consumption (l/min(ANR))
VXH05...	Silencer vent & Tube exhaust	0.5	0.5	90.4	7	11.5
VXL05...	Silencer vent & Tube exhaust			66.5	12	
VXE05...	Silencer vent & Tube exhaust		0.35	90.4	3	8
VXH07...	Silencer vent & Tube exhaust	0.7	0.5	93.1	13	23
VXL07...S	Silencer vent			66.5	24 (※)	
VXL07...J	Tube exhaust			22 (※)		
VXE07...	Silencer vent & Tube exhaust		0.35	90.4	10.5	17
VXH10...S	Silencer vent	1.0	0.5	93.1	24 (※)	46
VXH10...J	Tube exhaust			66.5	20 (※)	
VXL10...S	Silencer vent			26 (※)		
VXL10...J	Tube exhaust			19 (※)		
VXE10...S	Silencer vent	0.35	0.35	90.4	20 (※)	34
VXE10...J	Tube exhaust			90.4	19 (※)	

※ The specifications are different from those of other conventional PISCO vacuum generator series.

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

Solenoid valve specification (Suction pilot valve / Blow-off solenoid valve)

■ Pilot valves

Item	Suction solenoid valve		Blow-off solenoid valve	
Operation system	Pilot valve			
Valve construction	Elastic seal, Poppet valve			
Rated voltage	DC24V	AC100V	DC24V	AC100V
Allowable voltage range	DC24V ±10%	AC100V ±10%	DC24V ±10%	AC100V ±10%
Surge protection circuit	Surge absorber	Diode bridge	Surge absorber	Diode bridge
Power consumption	1.2W (With LED)	1.5VA (With LED)	1.2W (With LED)	1.5VA (With LED)
Manual operation	Push button (Non-lock)			
Operation indicator	Coil excitation: Red LED ON			
Wire connection method	Connector type (Cable length : 500mm)			
	Red : DC24V Black : COM	Blue	Red : DC24V Black : COM	Blue

■ Changeover valve

Item	Suction solenoid valve
Operation system	Pneumatic operation by pilot valve
Valve construction	Elastic seal, Poppet valve
Proof pressure	1.05MPa
Valve type	Normally closed / Double solenoid
Lubrication	Not required
Effective sectional area	Air supply port (PS) size $\phi 4\text{mm}$: 3.5mm ² , Air supply port (PS) size $\phi 6\text{mm}$: 4.5mm ²
Response time (※)	Normally closed / Vacuum generation(OFF → ON): 7m·sec, Vacuum operation stop (ON → OFF): 16m·sec
	Double solenoid / Vacuum generation(OFF → ON): 7m·sec, Vacuum operation stop (ON → OFF): 9m·sec

※ 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.



Vacuum Generator Series

Vacuum Generator VX

VACUUM GENERATOR

Vacuum switch

Specification	Vacuum switch with LED display		Vacuum switch without LED display
	2 switch output (-DW)	Analog output & 1 switch output (-DA)	Analog output only (-A0)
Factory default pressure	-50kPa(SW1)、-10kPa(SW2)	-50kPa	
Current consumption	40mA or less		15mA or less
Pressure detection	Diffused semiconduction pressure switch		
Operating pressure range	-100 ~ 0kPa		
Pressure setting range	-99 ~ 0kPa		
Proof pressure	0.2MPa		
Operating temp. range	0 ~ 50°C (No freezing)		
Operating humidity range	35 ~ 85%RH (No dew condensation)		
Power requirements	12 ~ 24VDC ± 10% Ripple (P-P) 10% max.		
Protective structure	IEC standard IP40 equiv		
No. of pressure setting	2	1	
Operating accuracy	±3%F.S. max. (at Ta=25°C)		
Differential response	Fixed (2%F.S. max.)	Variable (About 0-15% of setting value)	
Switch output	NPN open collector output: 30V 80mA max. Residual voltage 0.8V max.		
Analog output	Output voltage	1 ~ 5V	
	Zero-point voltage	1±0.1V	
	Span voltage	4±0.1V	
	Output current	1mA max. (Load resistance: 5kΩ max.)	
	LIN/HYS	±0.5%F.S. max.	
Display	0 ~ -99kPa (2-digit red LED display)		
Display frequency	About 4 times / sec		
Indication accuracy	±3%F.S. ±2 digit		
Sensor resolution	1 digit		
Operation indicator	SW1: Red LED turns ON when pressure is above setting.	Red LED turns ON when	
	SW2: Green LED turns ON when pressure is above setting.	pressure is above setting.	
Function	1. MODE switch (ME / S1 / S2)	1. MODE switch (ME / SW)	
	2. S1 setting trimmer (2/3-rotation trimmer)	2. SW setting trimmer (2/3-rotation trimmer)	
	3. S2 setting trimmer (2/3-rotation trimmer)	3. HYS setting trimmer (About 0-15% of setting value)	

Blow-off air rate

Vacuum characteristics	Stand-alone type & DIN rail type	Manifold type
VXH05	0 ~ 9.5ℓ/min[ANR]	0 ~ 8.0ℓ/min[ANR]
VXH07	0 ~ 8.5ℓ/min[ANR]	0 ~ 6.0ℓ/min[ANR]
VXH10	0 ~ 6.5ℓ/min[ANR]	0 ~ 5.0ℓ/min[ANR]
VXL05	0 ~ 9.0ℓ/min[ANR]	0 ~ 7.0ℓ/min[ANR]
VXL07	0 ~ 7.0ℓ/min[ANR]	0 ~ 5.5ℓ/min[ANR]
VXL10	0 ~ 6.5ℓ/min[ANR]	0 ~ 4.5ℓ/min[ANR]
VXE05	0 ~ 9.5ℓ/min[ANR]	0 ~ 8.0ℓ/min[ANR]
VXE07	0 ~ 9.0ℓ/min[ANR]	0 ~ 7.0ℓ/min[ANR]
VXE10	0 ~ 7.5ℓ/min[ANR]	0 ~ 5.5ℓ/min[ANR]
VX□□D(Double solenoid)	0.2 ~ 2ℓ/min[ANR]	

※.The above value is 0.5Mpa of supply pressure.

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VH VS

VU

VUM

VY

VB

VW VC

VRL

VG

VK

VJ

VX

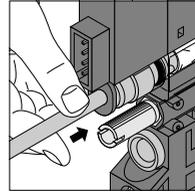
How to insert and disconnect

1. How to insert and disconnect tubes

① Tube insertion

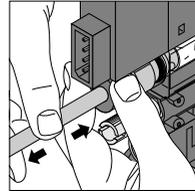
Insert a tube into Push-In Fitting of the vacuum generator VX up to the tube end. Lock-claws bite the tube to fix it and the elastic sleeve seals around the tube.

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



② Tube disconnection

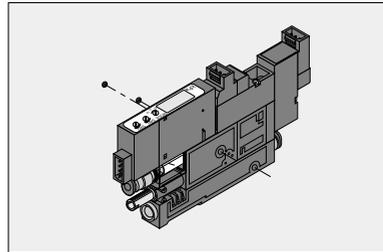
The tube is disconnected by pushing release-ring to release Lock-claws. Make sure to stop air supply before the tube disconnection.



2. How to fix the product

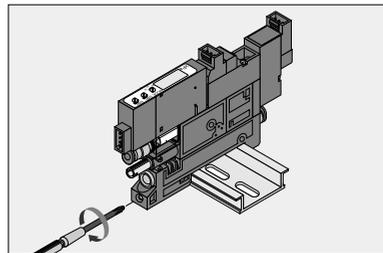
① Direct-installation type

Tighten M3 threads through the fixing holes on the resin body with tightening torque 0.3 to 0.35Nm. Refer to the outer dimensional drawings for the hole pitch.



② DIN rail type

Mount the product on a DIN rail and tighten DIN rail fixing screw with tightening torque 0.1-0.15Nm using a proper Phillips screwdriver. When shaking or physical impact on DIN rail is expected, attach commercialized metal stoppers on both sides to fix Din rail.



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.

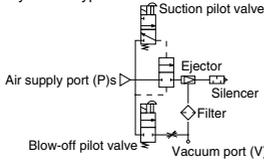
Vacuum Pads

- Vacuum Pad Standard Series . . . P.428
- Vacuum Pad Sponge Series . . . P.468
- Vacuum Pad Bellows Series . . . P.488
- Vacuum Pad Multi-Bellows Series P.508
- Vacuum Pad Oval Series P.526
- Vacuum Pad Soft Series P.550
- Vacuum Pad Soft Bellows Series · P.578
- Vacuum Pad Skidproof Series . . P.604
- Vacuum Pad Ultrathin Series . . . P.624
- Vacuum Pad Mark-free Series . . P.642
- Vacuum Pad Long Stroke Series · P.658

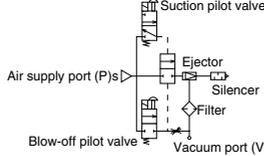
Standard Size List

Silencer vent, Direct-installation type or DIN rail type without Vacuum pressure sensor

Normally closed type



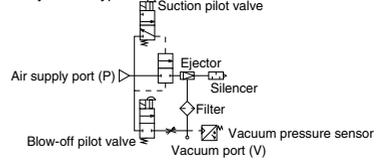
Double solenoid



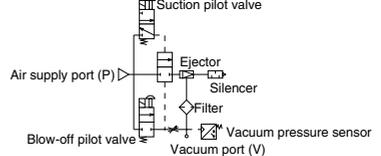
Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			4mm	6mm	
VX	206	3mm	●	●	With silencer
		4mm	●	●	
		4mm	●	●	With silencer
		6mm	●	●	

Silencer vent, Direct-installation type or DIN rail type with 2 switch output with LED display

Normally closed type



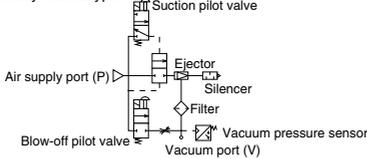
Double solenoid



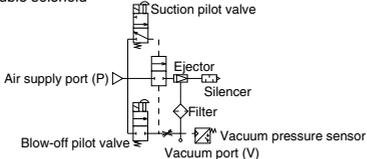
Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			4mm	6mm	
VX	207	3mm	●	●	With silencer
		4mm	●	●	
		4mm	●	●	With silencer
		6mm	●	●	

Silencer vent, Direct-installation type or DIN rail type with switch output and analog output sensor with LED display

Normally closed type



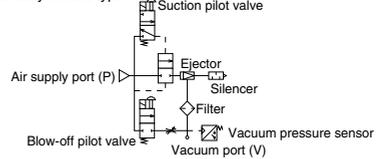
Double solenoid



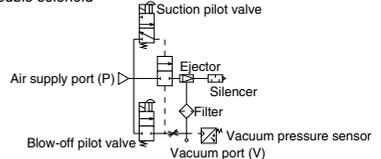
Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			4mm	6mm	
VX	208	3mm	●	●	With silencer
		4mm	●	●	
		4mm	●	●	With silencer
		6mm	●	●	

Silencer vent, Direct-installation type or DIN rail type with analog output sensor

Normally closed type



Double solenoid



Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			4mm	6mm	
VX	209	3mm	●	●	With silencer
		4mm	●	●	
		4mm	●	●	With silencer
		6mm	●	●	

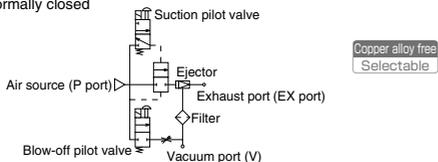
Vacuum Generator Series

Vacuum Generator VX

VACUUM GENERATOR

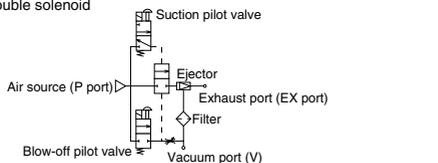
Tube exhaust, Direct-installation type or DIN rail type without vacuum pressure sensor

Normally closed



Copper alloy free
Selectable

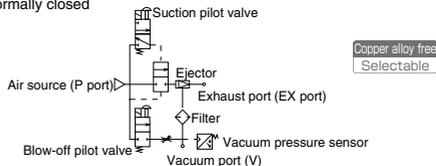
Double solenoid



Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			4mm	6mm	
VX	210	3mm	●	●	6mm
		4mm	●	●	
		4mm	●	●	
		6mm	●	●	

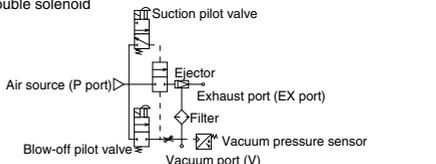
Tube exhaust, Direct-installation type or DIN rail type with 2 switch output with LED display

Normally closed



Copper alloy free
Selectable

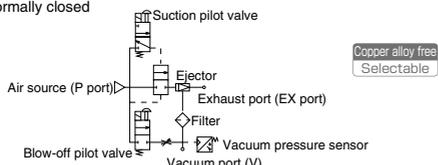
Double solenoid



Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			4mm	6mm	
VX	211	3mm	●	●	6mm
		4mm	●	●	
		4mm	●	●	
		6mm	●	●	

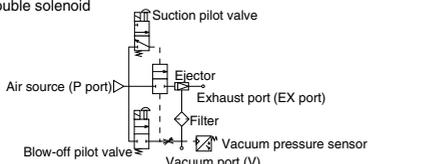
Tube exhaust, Direct-installation type or DIN rail type with switch output sensor and analog output with LED display

Normally closed



Copper alloy free
Selectable

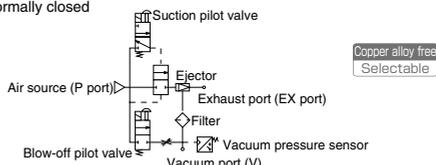
Double solenoid



Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			4mm	6mm	
VX	212	3mm	●	●	6mm
		4mm	●	●	
		4mm	●	●	
		6mm	●	●	

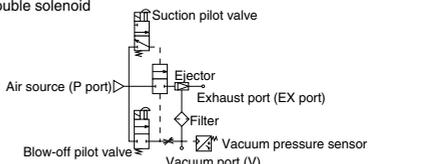
Tube exhaust, Direct-installation type or DIN rail type with analog output sensor

Normally closed



Copper alloy free
Selectable

Double solenoid



Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			4mm	6mm	
VX	213	3mm	●	●	6mm
		4mm	●	●	
		4mm	●	●	
		6mm	●	●	

205

VH VS

VU

VUM

VY

VB

VW VC

VRL

VG

VK

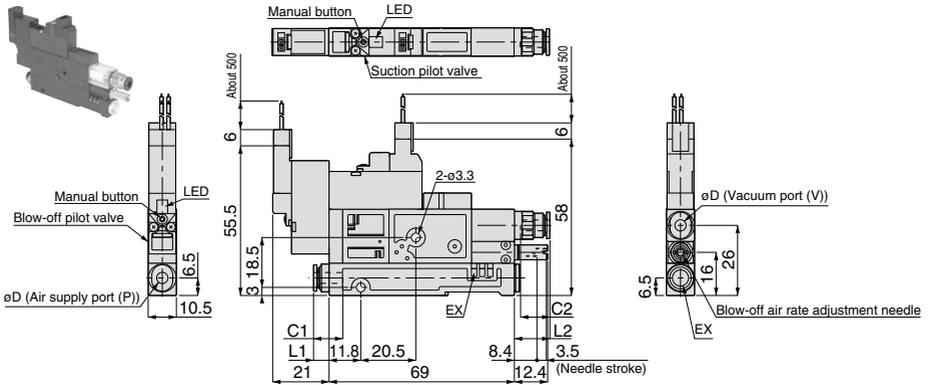
VJ

VX

VX Silencer vent, Direct-installation type



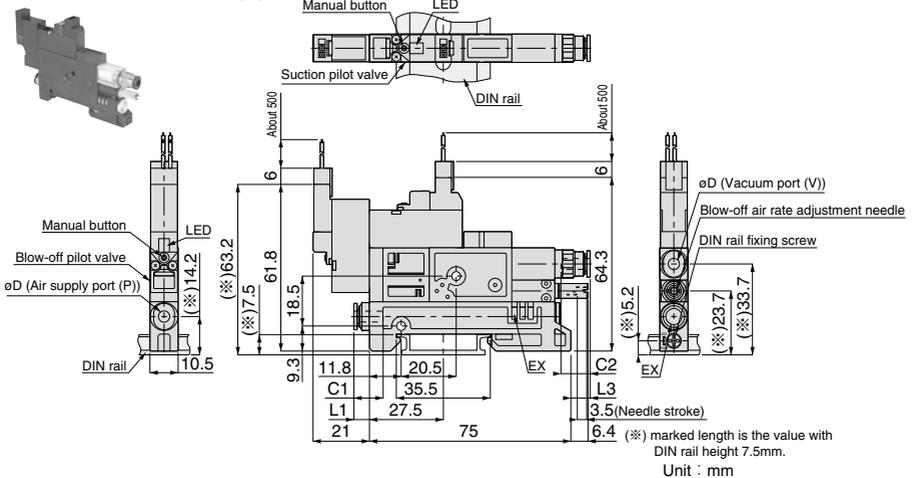
Model code : VX□□(D)-□□S-□



VX Silencer vent, DIN rail type



Model code : VX□□(D)-□□S-□-D



Common dimension list on this page

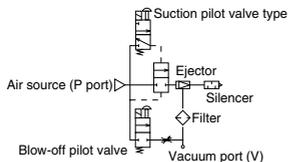
Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	-	10.4	-	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-001
6	11.7	11.7	8.7	13.5	7.5	

(*) marked length is the value with DIN rail height 7.5mm.

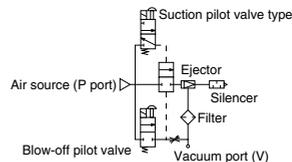
Unit : mm

Common circuit diagram on this page

VX□□-□□S-□(-D)(Normally closed type)



VX□□D-□□S-□(-D)(Double solenoid type)



Characteristic chart page



CAD data is available at PISCO website.

VX

VQ

VZ

VN

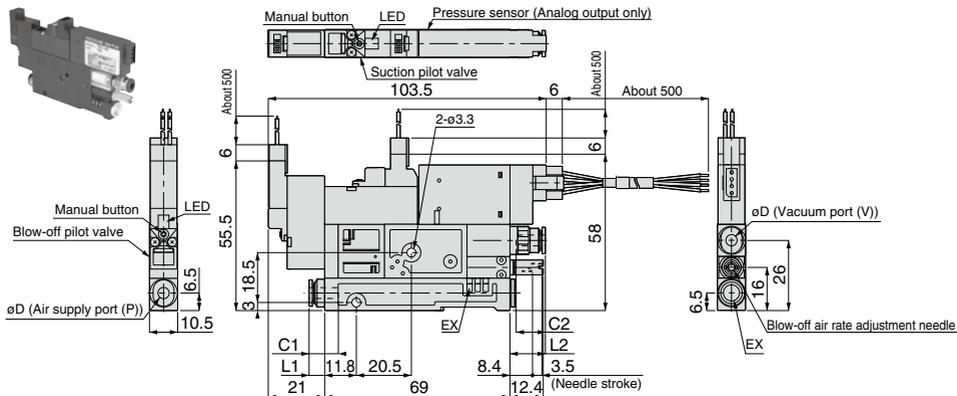
Vacuum Generator Series

Vacuum Generator VX

VACUUM GENERATOR

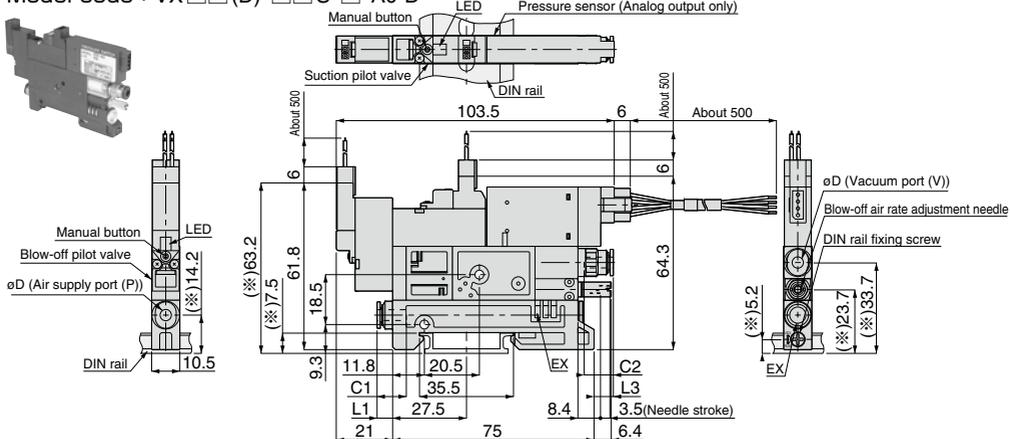
VX Silencer vent, Pressure sensor with analog output, Direct-installation type

Model code : VX□□(D)-□□S-□-A0



VX Silencer vent, Pressure sensor with analog output, DIN rail type

Model code : VX□□(D)-□□S-□-A0-D



(*) marked length is the value with DIN rail height 7.5mm.

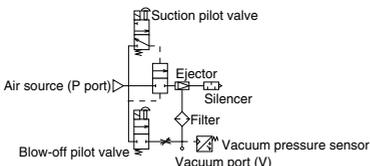
Unit : mm

Common dimension list on this page

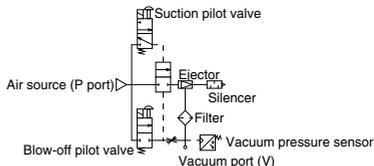
Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	-	10.4	-	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-004
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VX□□-□□S-□-A0(D)(Normally closed type)



VX□□D-□□S-□-A0(D)(Double solenoid type)



Characteristic chart page



CAD data is available at PISCO website.

Vacuum Generator Series

Vacuum Generator VX

VACUUM GENERATOR

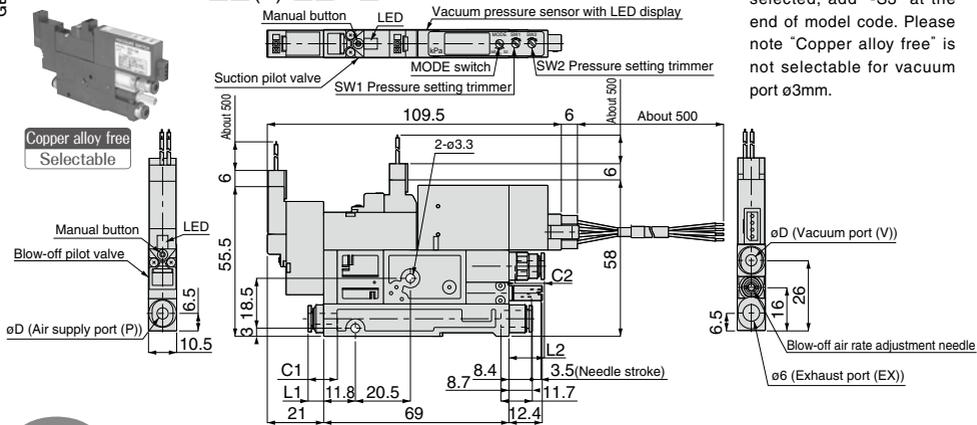
VX

Tube exhaust, 2 switch output with LED display,
Direct-installation type

Model code : VX□□(D)-□□J-□-DW



※ When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for vacuum port ø3mm.

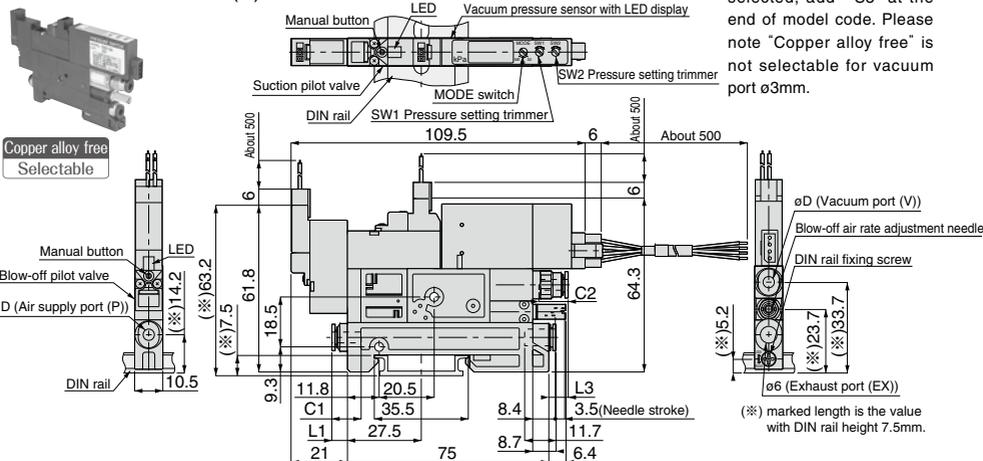


※ When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for vacuum port ø3mm.

VX

Tube exhaust, 2 switch output with LED display,
DIN rail type

Model code : VX□□(D)-□□J-□-DW-D



(※) marked length is the value with DIN rail height 7.5mm.

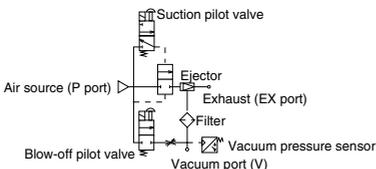
Unit : mm

Common dimension list on this page

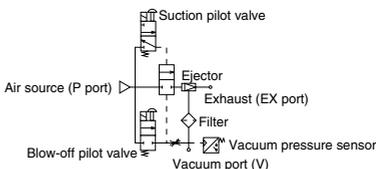
Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	-	10.4	-	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-006
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VX□□-□□J-□-DW-(D)(Normally closed type)



VX□□D-□□J-□-DW-(D)(Double solenoid)



Vacuum Generator Series

Vacuum Generator VX

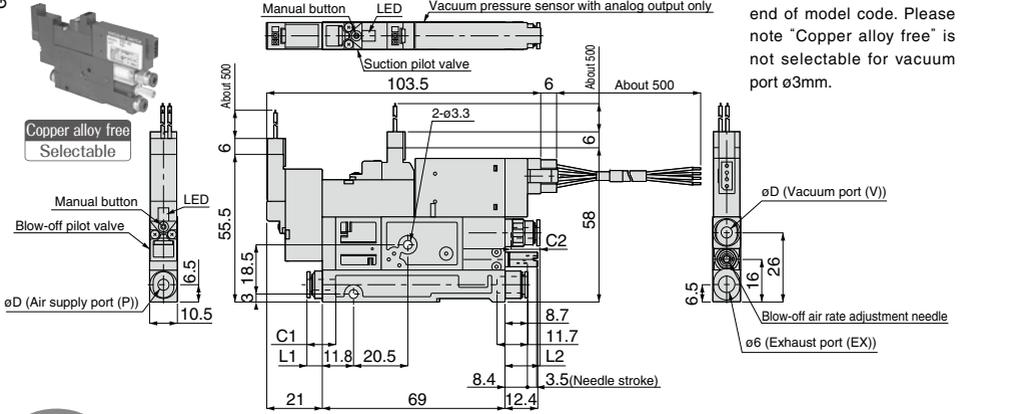
VACUUM GENERATOR

VX Tube exhaust, Analog output sensor, Direct-installation type

Model code : VX□□(D)-□□J-□-A0



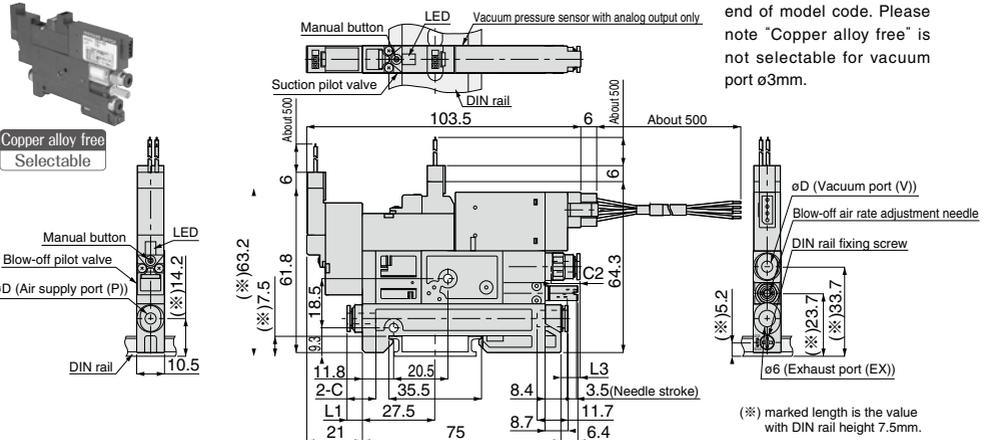
※When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for vacuum port ø3mm.



※When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for vacuum port ø3mm.

VX Tube exhaust, Analog output sensor, DIN rail type

Model code : VX□□(D)-□□J-□-A0-D



(※) marked length is the value with DIN rail height 7.5mm.

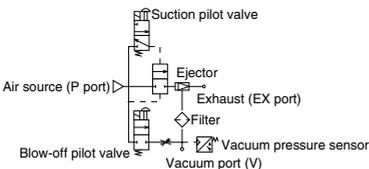
Unit : mm

Common dimension list on this page

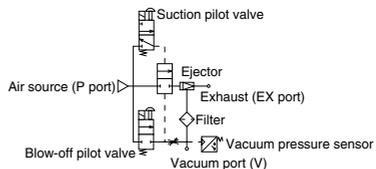
Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	-	10.4	-	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-008
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VX□□-□□J-□-A0-(D)(Normally closed type)



VX□□D-□□J-□-A0-(D)(Double solenoid)



Vacuum Generator Series

Vacuum Generator VX

VX-M Silencer vent, Manifold type



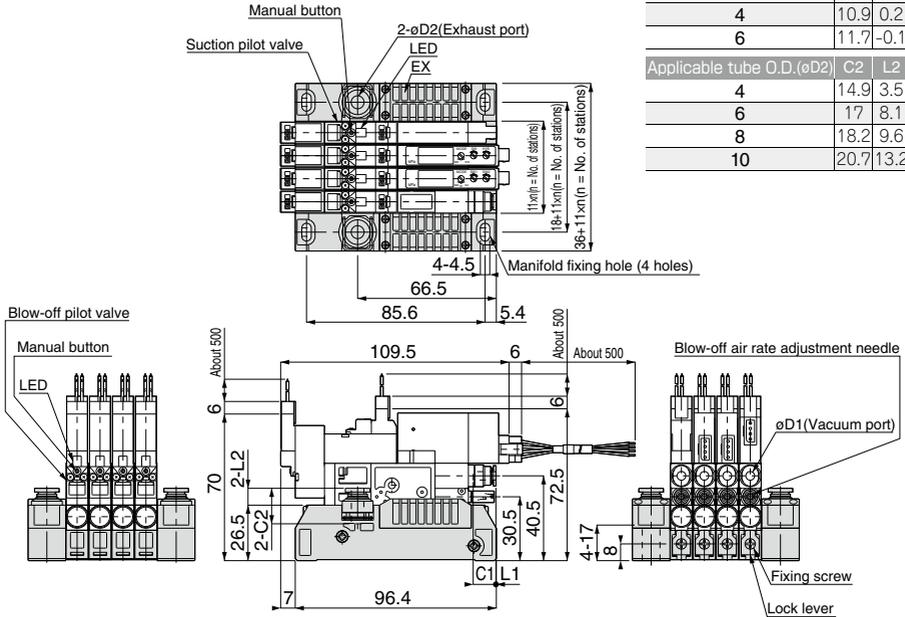
VACUUM GENERATOR

Model code	CAD file name
VX□□□-□□S-□-□-□M□	VVX-017, 018, 019, 020

Unit : mm

Applicable tube O.D.(ϕ D1)	C1	L1
3	10.4	0.2
4	10.9	0.2
6	11.7	-0.1

Applicable tube O.D.(ϕ D2)	C2	L2
4	14.9	3.5
6	17	8.1
8	18.2	9.6
10	20.7	13.2



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VH VS

VU

VUM

VY

VB

VM VC

VRL

VG

VK

VJ

VX



CAD data is available at PISCO website.

△ 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

1. The compressed air is dangerous if mishandled. It is recommended that a person having enough knowledge and experience carry out the assembling or maintenance of a machine or a device using pneumatic equipments.
2. At maintenance check of the product, shut electrical power supply and the air supply, and make sure to vent the residual pressure in the air circuit in advance. When installing or removing of a unit to/from a manifold, make sure to shut off air supply and to exhaust the residual pressure in the air circuit first.
3. The product is not explosive-proof. Do not use it in the environments containing flammable or explosive gases or liquid. Please avoid using in conditions that pressure of 0.1MPa or higher is continuously supplied to vacuum circuit.
4. 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.
5. 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.

Caution

1. The product shall be used within the operating pressure range. Otherwise, there are risks of damage or deformation.
2. Regarding double-solenoid types (VX□□D···), the switchover valve (main valve) is placed in neutral after the supply of pilot air has been suspended (the same is true when the valve is being operated for the first time after shipment). When resuming the supply of pilot air, be sure to send a signal to the pilot valve, or conduct switchover operations manually as required.
3. The increase of manifold station may cause troubles such as performance drop by a shortage of air supply and insufficient capability to exhaust, and exhaust air leak to the vacuum port. Allowable station numbers of simultaneous operation differs by nozzle size, vacuum performance, and other conditions. Please contact us for details.
4. 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

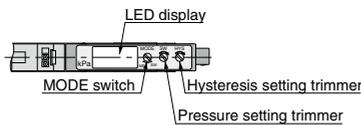
■ Vacuum Switch with LED display

(1) Pressure Setting Method

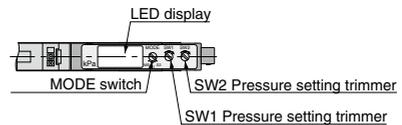
- ① Turn on the power (Make sure the correct wiring and apply DC power to the vacuum switch).
- ② -1 Set the indicator switch at Pressure Setting Mode (ME → S1 / S2 and SW)
- ② -2 (Vacuum switch with analog output)
Fully turn the hysteresis setting trimmer (HYS) in the counterclockwise direction in order to minimize the hysteresis adjustment in advance.
- ③ Adjust the pressure adjusting trimmer (S1 / S2 and SW) with a flathead screwdriver to set at the desired value.
- ④ Set the indicator switch at ME and apply pressure and check the actual operation.
 - (Vacuum switch with 2 switch output)
Switch output 1 (S1): Red LED turns ON at the pressure with more than the setting.
Switch output 2 (S2): Green LED turns ON at the pressure with more than the setting.
 - (Vacuum switch with analog output)
Switch output (SW): Red LED turns ON at the pressure with more than the setting.

(2) Differential response setting

- ① Differential response setting can be adjusted by the hysteresis setting trimmer (HYS).
- ② Differential response setting range is regulated within about 0-15% of the set value. Differential response setting becomes large when the trimmer is turned in the clockwise direction.
- ③ Confirmation of Hysteresis
Gradually increase and decrease the supply pressure around the set pressure value and read the value by a vacuum gauge when operation indicator lamp turns ON/OFF. The difference in the displayed values is taken as differential response.
- ④ Hysteresis adjustment is useful for the following cases:
 - Increase differential response when pressure pulsates with output repeatedly showing small on/off movements.
 - When an allowable range is to be set for the lowering of pressure.

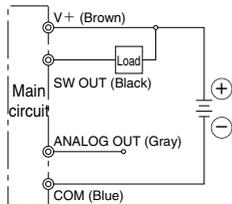


**Vacuum pressure sensor with LED display
(Analog output and 1 switch output)**

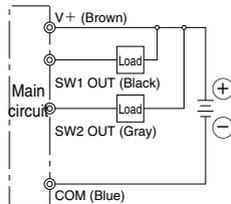


**Vacuum pressure sensor with LED display
(2 switch output)**

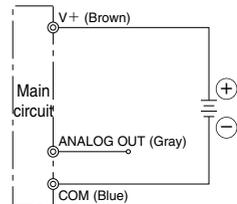
(3) Wire Connecting Method



**Vacuum pressure sensor with LED display
(Analog output and 1 switch output)**



**Vacuum pressure sensor with LED display
(2 switch output)**



Analog output sensor

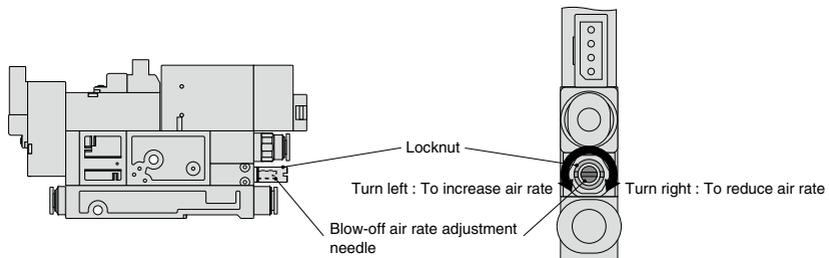
■ Safety Instructions for Vacuum Switch with LED display

- ① Do not use the vacuum switch in the environment or gasses containing corrosive substance. It may cause a sensor trouble.
- ② Wiring or ways by which noise or other disturbance is caused may cause a sensor trouble.
- ③ Since the sensors are not explosive-proof, do not use them in an inflammable or explosive gas, fluid or atmosphere.
- ④ Since the sensors are not drip / dust proof, do not use them in locations where they may be exposed to water or oil drops or dust.
- ⑤ Do not use the sensor in an atmosphere exceeding the range of application temperature or causing heat as sensor malfunction may result.
- ⑥ Make sure to turn off the power before wiring. Check the wire colors, and do not short-circuit output terminals, power supply terminals and COM terminals when wiring. Short-circuits may cause a sensor trouble.
- ⑦ Do not give an excessive tensile strength and bending on a lead wire. Otherwise, breaking wire or damage on connector may be caused.
- ⑧ Instant application of pressure about 0.5MPa does not affect the sensor performance, but do not keep applying 0.2MPa or more constantly during blow-off air supply. It may be a cause of damaging the sensor.
- ⑨ When adjusting pressure and differential response, use a flathead screwdriver (accessory). Do not apply an excessive force on the trimmer and slowly turn it within its rotation limits. Otherwise, there is a risk of damaging the trimmer and the circuit board.
- ⑩ Supply a stable DC power to the product.
- ⑪ Add a surge absorption circuit to relays or solenoid valves, etc. which are to be connected with output terminal and source terminal. Do not apply a current exceeding 80mA.
- ⑫ Ground the FG terminal when using a unit power source such as switching current.
- ⑬ Output terminals (lead wire color: black and gray) and other terminals should not be short-circuited.
- ⑭ Avoid strong external impacts and excessive force on the sensor body.

■ Blow-off air adjustment method

■ Turn the blow-off air rate adjustment needle to the right (clockwise) to reduce blow-off air and to the left (counterclockwise) to increase. After the adjustment, tighten the locknut firmly with 0.1 to 0.2Nm of the tightening torque.

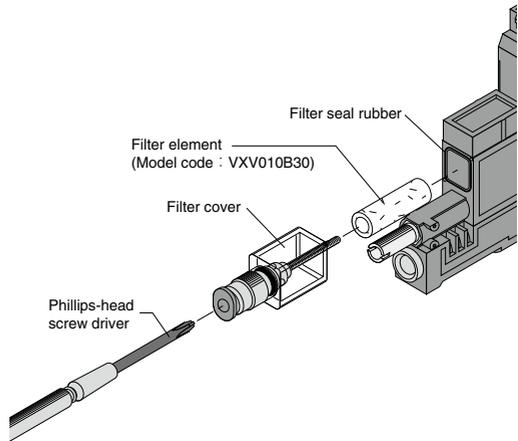
※ . Make sure to use a proper flathead screwdriver for the needle adjustment.



How to replace Filter Elements

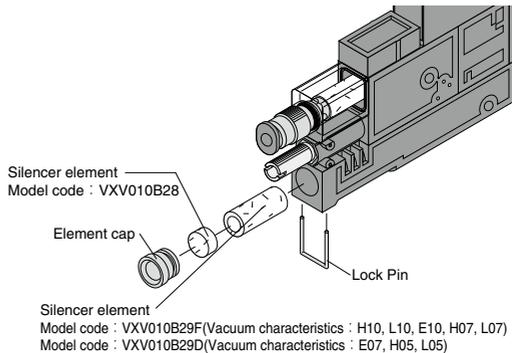
When replacing the filter element, remove the vacuum port piping. Then, loosen the screw inside the joint (at the end of the tube insertion hole) using a Phillips type screwdriver(※) with an outside diameter of $\varnothing 2.5\text{mm}$ or less, and remove the vacuum port. After replacing the filter element, make sure that the filter packing has not been detached, then install the filter element and filter window on the vacuum port, and fasten the port to the main body. For fastening, apply the tightening torque of $0.1 \sim 0.15\text{N}\cdot\text{m}$.

※.Do not let the screw driver touch the Lock-claws. Damage or deformation of the Lock-claws may result in the degradation of the tensile strength.

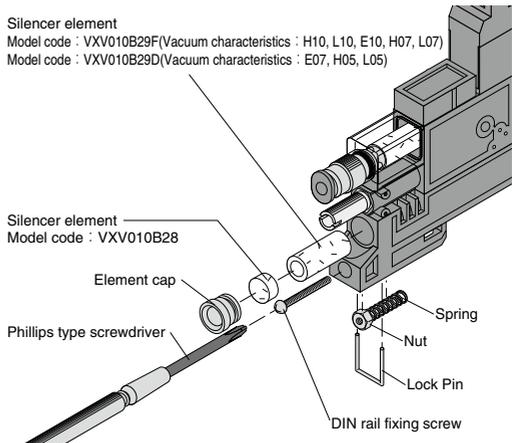


Replacement of Silencer Elements

When replacing the silencer element of a direct mount type unit, pull out the lock pin using a flat-tip screwdriver and replace the elements. After replacing the element, insert the lock pin correctly. The lock pin is bent for fall-proof. Therefore, please insert the pin in the direction as shown in the right picture.



When replacing the silencer element of a DIN rail type unit, remove the screw for fixing the DIN rail, using an appropriate Phillips type screwdriver. Then, remove the fixing pin using a flat-tip screwdriver. After replacing the elements, insert the lock pin correctly to install the screw for fixing the DIN rail. The lock pin is bent for fall-proof. Therefore, please insert the pin in the direction as shown in the right picture.



■ How to attach / detach and clean the nozzle and diffuser

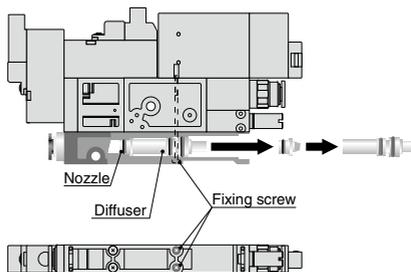
■ Pull out the diffuser with a pair of long-nose pliers after removing the cover and the diffuser retainer. Use a cushion material such as a sponge to cover the nozzle port to prevent the nozzle from jumping out. Apply the air to the vacuum generator (*5) and the nozzle comes out by the air pressure. Take out the cushion material and then take out the nozzle.

Remove any foreign substance from nozzle, inside of diffuser by air blowing or wiping(*6). Combine the nozzle with the diffuser and push them back into the body with the attention not to drop the nozzle. Place the diffuser retainer on the diffuser and tighten the cover with 0.2-0.25Nm of the tightening torque.

For installation of the silencer element, refer to the section "How to replace the silencer elements."

(*5) <Warning> *During applying the air to the generator, do not point the nozzle port toward anyone. There is a risk of injury by the nozzle jumping out.

(*6) Do not damage nozzle, diffuser bore, seal rubber and the seal part of the body. It may cause performance drop.



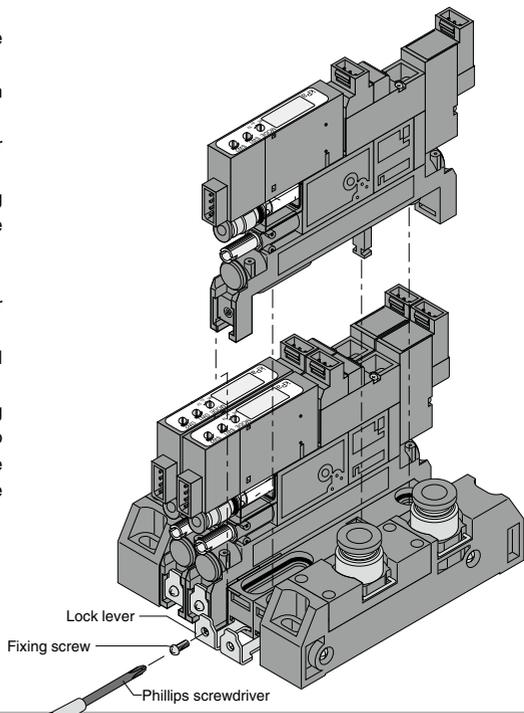
■ How to replace Mounting units of Manifold type

■ How to detach a mounting unit

- Shut off the air supply and exhaust the residual pressure.
- Turn off the power supply and detach the wiring.
- Use a proper-sized Phillips screwdriver to remove the fixing screw.
- Pull out lock lever completely by using a flathead screwdriver and detach the mounting unit.

■ How to install a mounting unit

- Make sure not to lose O-rings of air supply and exhaust ports.
- Fully pull out the lock lever and install a mounting unit.
- While pushing down the mounting units, push the lock lever back to the original position and tighten the fixing screw with 0.15-0.2Nm of the tightening torque to fix the lock lever.



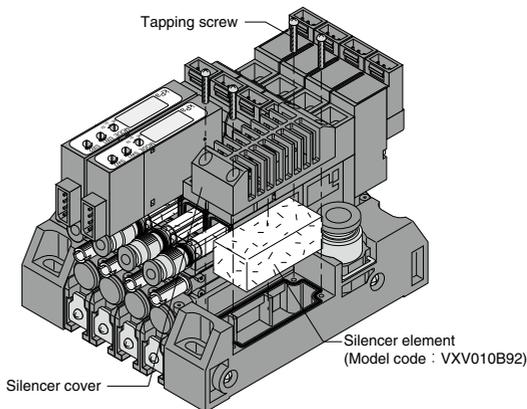
■ How to replace Silencer Elements of Manifold Type

■ How to detach a silencer element

- Remove 4 tapping screws by a Phillips screwdriver.
- Detach the element cover and replace the silencer elements (Model code: VXV010B92).

■ How to install silencer element

- Tighten 4 tapping screws firmly with 0.3-0.4Nm of the tightening torque with a proper screwdriver.





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...Recommendations 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°C (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

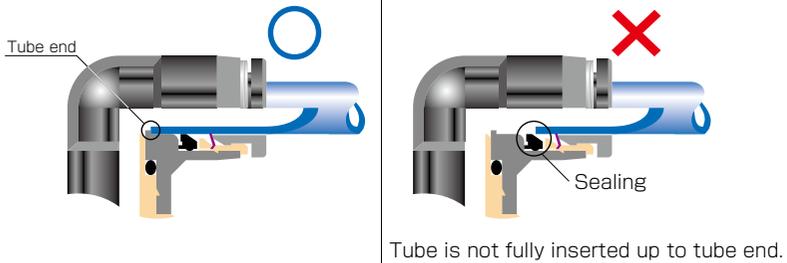
1. Remove dusts or drain before piping. They may get into the peripheral machine / facilities and cause malfunction.
2. When inserting an ultra-soft tube into push-in fitting, make sure to place an Insert Ring into the tube edge. There is a risk of causing the escape of tube and a fluid leakage without 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	inch size	Nylon tube	Polyurethane tube
ø1.8mm	—	± 0.05mm	ø1/8	± 0.1mm	± 0.15mm
ø3mm	—	± 0.15mm	ø5/32	± 0.1mm	± 0.15mm
ø4mm	± 0.1mm	± 0.15mm	ø3/16	± 0.1mm	± 0.15mm
ø6mm	± 0.1mm	± 0.15mm	ø1/4	± 0.1mm	± 0.15mm
ø8mm	± 0.1mm	± 0.15mm	ø5/16	± 0.1mm	± 0.15mm
ø10mm	± 0.1mm	± 0.15mm	ø3/8	± 0.1mm	± 0.15mm
ø12mm	± 0.1mm	± 0.15mm	ø1/2	± 0.1mm	± 0.15mm
ø16mm	± 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.



- 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;
 - ① Shear drop of the lock-claws edge
 - ② The 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		
Taper pipe thread	M8 × 0.75	1 ~ 2N·m	White	—
	R1/8	7 ~ 9N·m		
	R1/4	12 ~ 14N·m		
	R3/8	22 ~ 24N·m		
Unified thread	R1/2	28 ~ 30N·m	—	SUS304, NBR
	No.10-32UNF	1.0 ~ 1.5N·m		
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.

VACUUM GENERATOR
EXTERNAL VACUUM CONTROLLER
VACUUM PAD
VACUUM ACCESSORIES
48
VH-VS
VU
VUM
VY
VB
VM-VC
VRL
VG
VK
VJ
VX
VQ
VZ
VN

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.