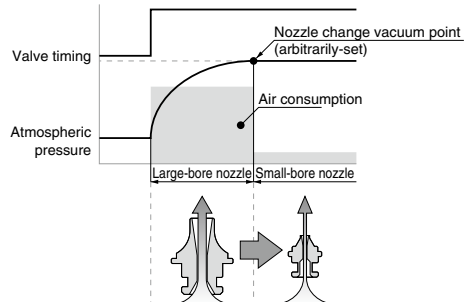
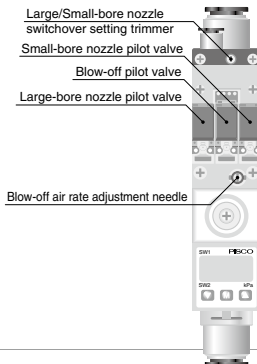


Complex vacuum generator best suitable for control large flow Vacuum Generator **VQ** Series

222

- *Best suitable to control large flow with width of 31.5mm.*
- *3 types of standardized nozzle; Single nozzle, Two-stage nozzle and Twin nozzle.*
- *The twin-nozzle type is the most durable unit for applications with longer suctioning or transportation time.*

The large-bore nozzle controls vacuum generation from start up to a prescribed reference preset pressure level, after which the small-bore nozzle takes over for maintaining a vacuum level. This combination makes possible substantial reductions in air consumption. Only one signal is used for vacuum generation as with previous models.



Nozzle type	Air consumption	
T15	100	23
T20	200	46

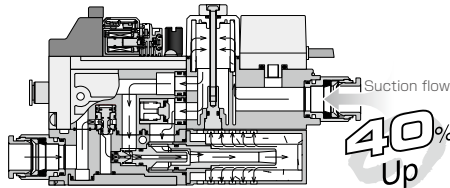
VQ

VZ

VN

■ Characteristics

- *Wide variety of combinations enables to meet various applications. External Vacuum Controller for a vacuum pump, VQP Series, is also available. (P.366).*
- *The two-stage nozzle type's vacuum suction rate has been increased by approximately 40% compared to conventional types.*



- *The single-nozzle type is an orthodox, complex vacuum generator designed to produce large vacuum flows.*
- *A wide variety of valve type is standardized.*

■ Single-nozzle type : Normally open, Normally closed, Double solenoid (retention) type

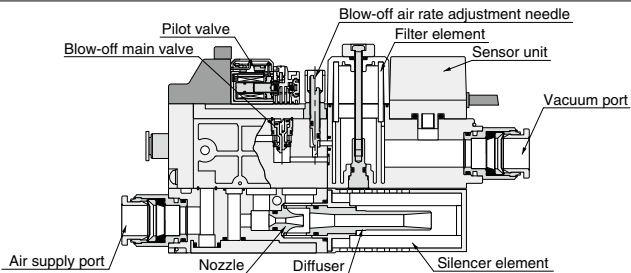
■ Two-stage nozzle type : Normally open, Normally closed type

■ Twin-nozzle type : Normally closed type

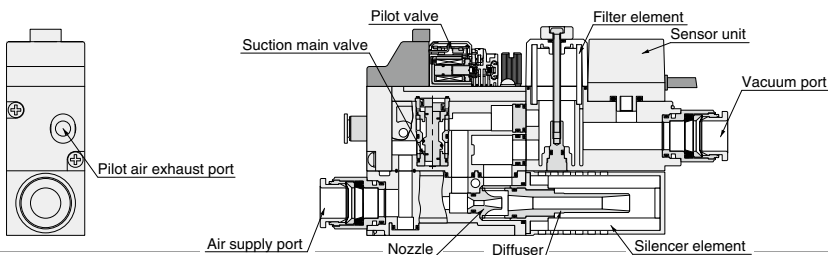
- *Visibility improvement by vacuum pressure sensor with 31mm size LED display.*

■ Construction (Single nozzle type)

● Construction (Blow-off)

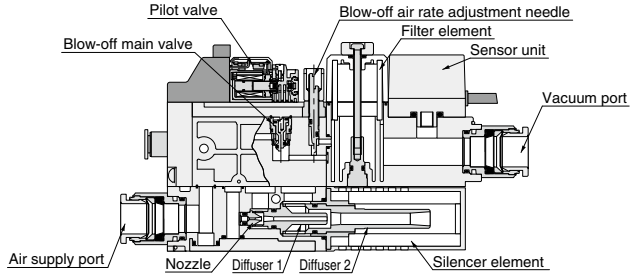


● Construction (Vacuum suction)

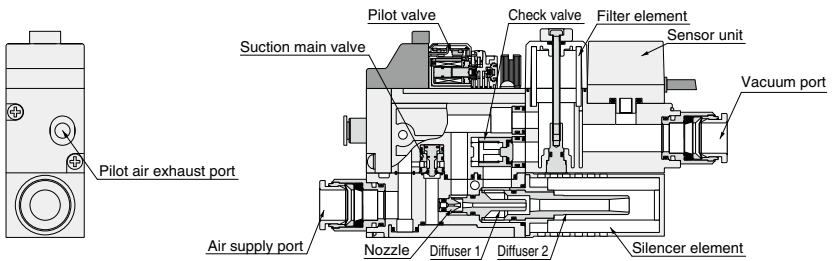


■ Construction (Two-stage nozzle type)

● Construction (Blow-off)

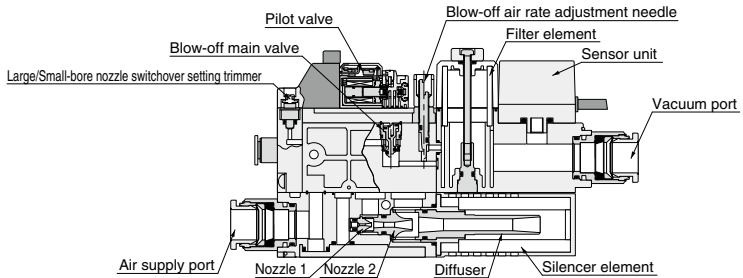


● Construction (Vacuum suction)

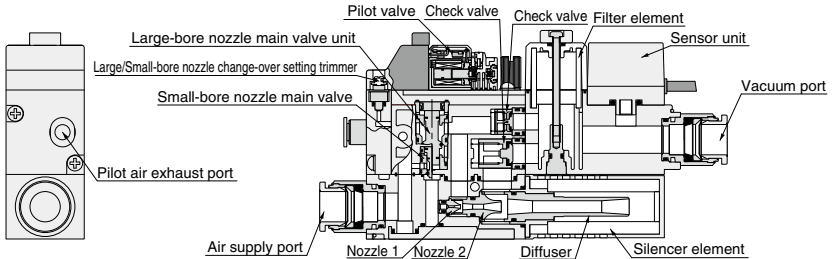


■ Construction (Twin nozzle type)

● Construction (Blow-off)



● Construction (Vacuum suction)



Vacuum Generator Series

Vacuum Generator VQ

VACUUM GENERATOR

Model Designation (Example)



- VQ** Vacuum generator to produce large vacuum flows
- T15** Vacuum characteristics & Nozzle bore
- C** Vacuum generator valve type
- O** Vacuum port size
- O** Vacuum port size
- S** Air supply port
- D24** Exhaust port size
- S** Pilot valve voltage
- ⑦** Vacuum switch

① Vacuum characteristics & Nozzle bore

Code		Nozzle diameter (mm)		Rated supply pressure (MPa)	Final vacuum (-kPa)	Suction flow (ℓ/min(ANR))	Air consumption (ℓ/min(ANR))
Single nozzle type	H15	ø1.5	—	0.5	93	63	100
	L15	ø1.5	—		66	95	
	E15	ø1.5	—	0.35	92	42	70
	H20	ø2.0	—	0.5	93	110	200
	L20	ø2.0	—		66	180	
	E20	ø2.0	—		0.35	92	84
Twin nozzle type	T15	ø0.7 (Small-bore)	ø1.5 (Large-bore)	0.5	93 (93)	40 (24)	100 (23)
	T20	ø1.0 (Small-bore)	ø2.0 (Large-bore)			70 (36)	200 (46)
Two-stage nozzle type	D07	ø0.7	—	0.5	93	24	23
	D10	ø1.0	—			36	46
	D12	ø1.2	—			40	70

※ The vacuum characteristics in () value for Twin-nozzle type is the value when small-bore nozzle is operated.
 ※ 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.

② Vacuum generator valve type

Code	Valve type	Code	Valve type	Code	Valve type
C	Normally closed type	O	Normally open type	D	Double solenoid type (Vacuum retention)

*1. "Normally-close (code: C)" only when a twin-nozzle type is selected in (1).

*2. "Normally-close (code: C)" or "normally-open (code: O)" only when a 2-stage nozzle type is selected in (1).

③ Vacuum port size (Applicable tube O.D.)

Code	8	0
Tube dia.(mm)	ø8 (Push-In Fitting)	ø10 (Push-In Fitting)

④ Air supply port (Applicable tube O.D.)

Code	6 (※)	8	0
Tube dia.(mm)	ø6 (Push-In Fitting)	ø8 (Push-In Fitting)	ø10 (Push-In Fitting)

※ ø6 is only selectable when two-stage nozzle is selected in ②.

⑤ Exhaust port

Code	S	J
Exhaust method	Silencer vent	Tube exhaust (ø12mm Push-In Fitting)

⑥ Pilot valve voltage

Code	D24	A100
Voltage	DC24V	AC100V

※ For twin nozzle type, only 24VDC (code: D24) is selectable.

⑦ Vacuum switch

Code	Sensor	Code	Sensor
S	2 switch output with 31mm LED display	No code	Without vacuum switch

Vacuum Generator Series

Vacuum Generator VQ

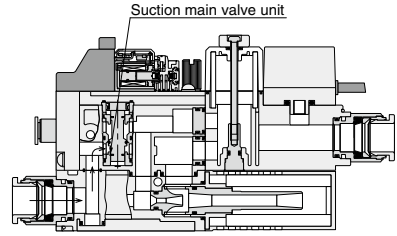
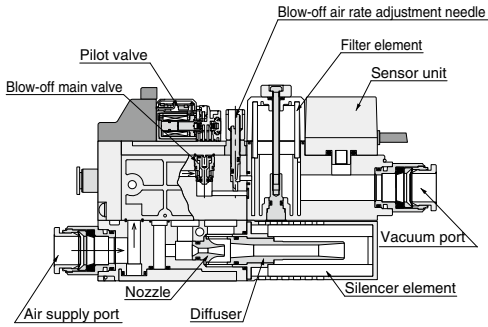
VACUUM
GENERATOR

How single nozzle with normally closed type works

At vacuum generation suspended

● Blow-off

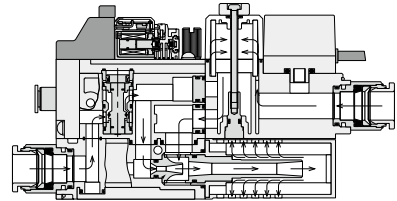
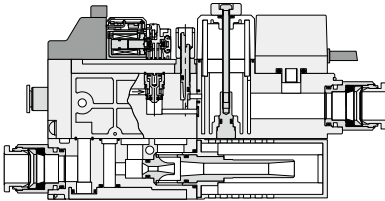
● Vacuum suction



At vacuum generating

● Blow-off

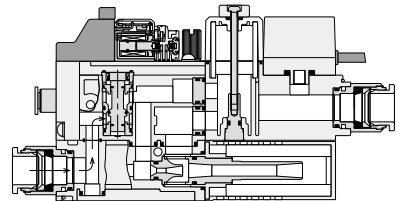
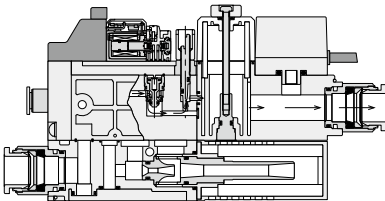
● Vacuum suction



At blow-off air supply

● Blow-off

● Vacuum suction



227

VH-VS

VU

VUM

VY

VB

VW-VC

VRL

VG

VK

VJ

VX

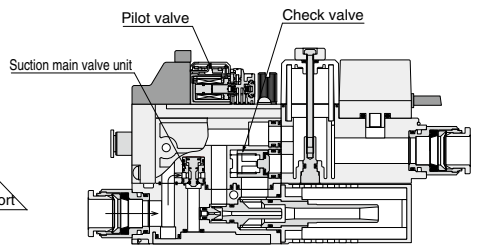
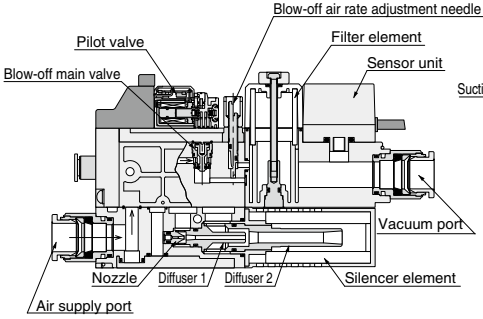
VQ

■ How two-stage nozzle with normally closed type works

At vacuum generation suspended

● Blow-off

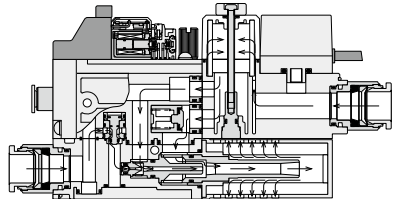
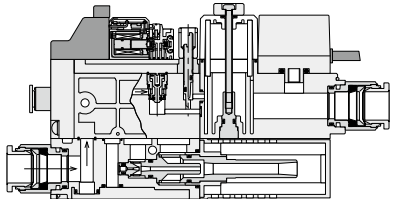
● Vacuum suction



At vacuum generating

● Blow-off

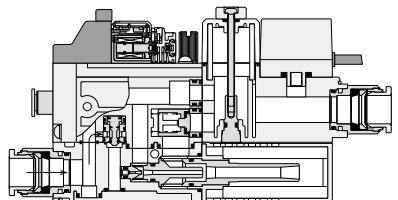
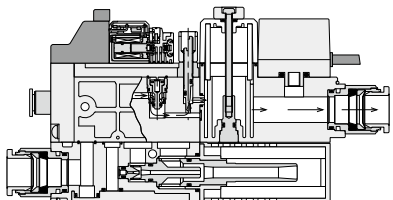
● Vacuum suction



At blow-off air supply

● Blow-off

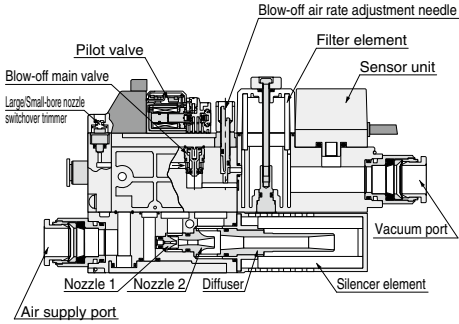
● Vacuum suction



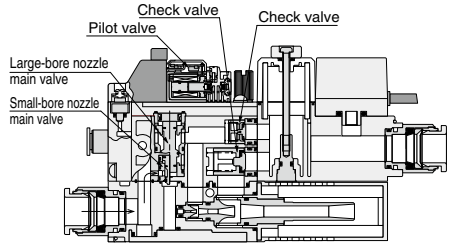
How twin nozzle type works

At vacuum generation suspended

● Blow-off

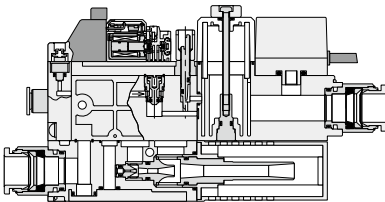


● Vacuum suction

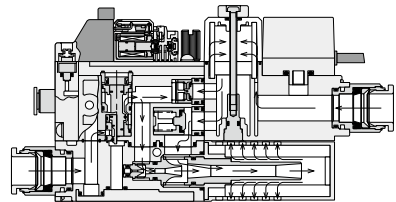


At vacuum generating (Large-bore nozzle: from set up to switchover vacuum pressure point)

● Blow-off

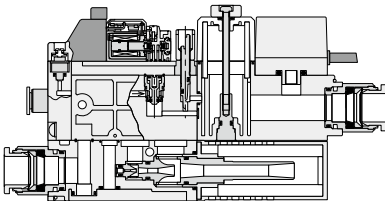


● Vacuum suction

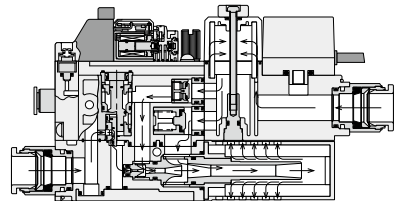


At vacuum generating (Small-bore nozzle: more than switchover vacuum pressure point)

● Blow-off

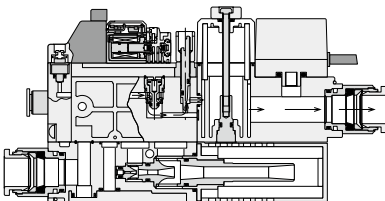


● Vacuum suction

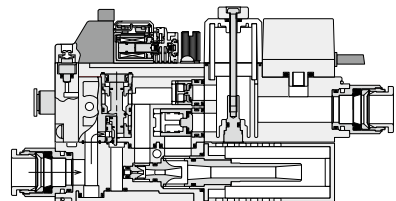


At blow-off air supply

● Blow-off



● Vacuum suction



■ Specification (Supply pressure)

Fluid medium	Air
Operating pressure range	0.3 ~ 0.7 MPa
Rated supply pressure	H and L type : 0.5 MPa, E type : 0.35 MPa
Operating temp. range	5 ~ 50°C

■ Ejector characteristics

Nozzle type		Nozzle bore (mm)		Rated supply pressure (MPa)	Final vacuum (-kPa)	Suction flow (ℓ/min(ANR))	Air consumption (ℓ/min(ANR))
Single nozzle	H15	1.5	-	0.5	93	63	100
	L15				66	95	
	E15			0.35	92	42	70
	H20	2.0	-	0.5	93	110	200
	L20				66	180	
	E20			0.35	92	84	150
Twin nozzle	T15	0.7 (Small-bore)	1.5 (Large-bore)	0.5	93(93)	40(24)	100(23)
	T20	1.0 (Small-bore)	2.0 (Large-bore)			70(36)	200(46)
Two-stage nozzle	D07	0.7	-	0.5	93	24	23
	D10	1.0	-			36	46
	D12	1.2	-			40	70

※ The vacuum characteristics in () value for Twin-nozzle type is the value when small-bore nozzle is operated.
 ※ 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 specification

■ Pilot valve

Operating system	Direct operation	
Valve construction	Elastic seal, Poppet valve	
Rated voltage	DC24V	AC100V
Allowable voltage range	DC24V ±10%	AC100V ±10%
Surge protection circuit	Surge absorber	Diode bridge
Power consumption	0.55W	1VA
Manual operation	Push-lock button	
Operation indicator	Coil excitation: Red LED ON	

■ Switchover valve Twin nozzle type

Item	Valve for small-bore nozzle	Valve for large-bore nozzle	Blow-off solenoid valve
Operating system	Pneumatic operation by pilot valve		
Valve construction	Elastic seal, Poppet valve		
Valve type	Normally closed		
Lubrication	Not required		
Effective sectional area (Cv)	3.5mm ² (0.19)	16.5mm ² (0.89)	3.5mm ² (0.19)



Vacuum Generator Series

Vacuum Generator VQ

VACUUM GENERATOR

Two-stage nozzle type

Item	Suction solenoid valve	Blow-off solenoid valve
Operating system	Pneumatic operation by pilot valve	
Valve construction	Elastic seal , Poppet valve	
Valve type	N.C. (Normally closed), N.O. (Normally open)	N.C. (Normally closed)
Lubrication	Not required	
Effective sectional area (Cv)	3.5mm ² (0.19)	

Single nozzle type

Item	Suction solenoid valve	Blow-off solenoid valve
Operating system	Pneumatic operation by pilot valve	
Valve construction	Elastic seal , Poppet valve	
Valve type	N.C. (Normally closed), N.O. (Normally open), Double solenoid	N.C. (Normally closed)
Lubrication	Not required	
Effective sectional area (Cv)	16.5mm ² (0.89)	3.5mm ² (0.19)
Min. excitation time	50 m · sec or more	

Vacuum switch specification

Operating pressure range	-100 ~ 100kPa
Proof pressure	200kPa
Operating temp. range	-10 ~ 50°C (No freezing)
Operating humidity range	35 ~ 85%RH (No dew condensation)
Power requirement	12-24V DC±10%, Ripple (P-P) 10% or less
Protective structure	IEC specification IP40-equivalent
No. of pressure setting	2
Switch output	NPN Open collector output / DC30V 100mA or less / Residual voltage : 1.2V or less (Load current : 100mA)
Differential response	0 ~ 30 digit (Variable)
Accuracy of response	Within the range of ±3%F.S.
Response time	5m-sec max.
Display	2-1/2 digit-7-segmented LED display
Display frequency	About 4 times/sec.
Indication accuracy	±1%F.S. ±1 digit
Temperature characteristics	±0.3%F.S. max. (0 ~ 50°C, Standard: 25°C)

Filter specification

Element material	PVF (Polyvinyl formal)
Filtering capacity	10µm
Filter surface area	1,507mm ²
Replacement element model code	VQ030B61

Blow-off function

Blow-off air rate	0 ~ 50l/min(ANR) (Supply pressure: at 0.5Mpa)
-------------------	---

231

VH- VS

VU

VUM

VY

VB

VM- VC

VRL

VG

VK

VJ

VX

VQ

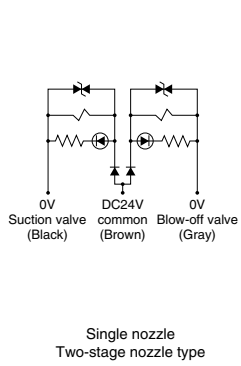
Valve lead wire color

DC24V type	Black	Gray	Blue	Brown
Twin nozzle type	Vacuum suction(-)	Blow-off(-)	Minus (-)	DC24V (+ common)
Two-stage nozzle type	Vacuum suction(-)	Blow-off(-)		DC24V (+ common)
Single nozzle type	Vacuum suction(-)	Blow-off(-)		DC24V (+ common)

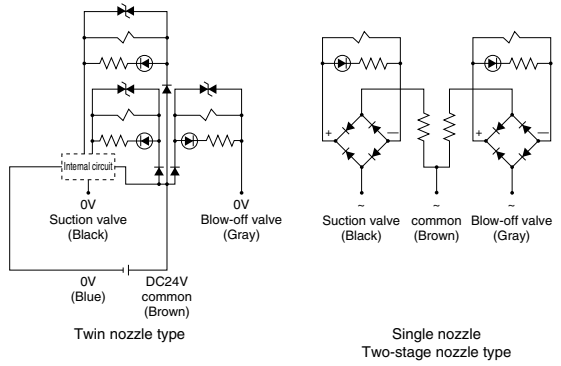
100V AC type	Black	Gray	Blue	Brown
Two-stage nozzle type	Vacuum suction(-)	Blow-off(-)		common
Single nozzle type	Vacuum suction(-)	Blow-off(-)		common

Circuit diagram (Solenoid valve)

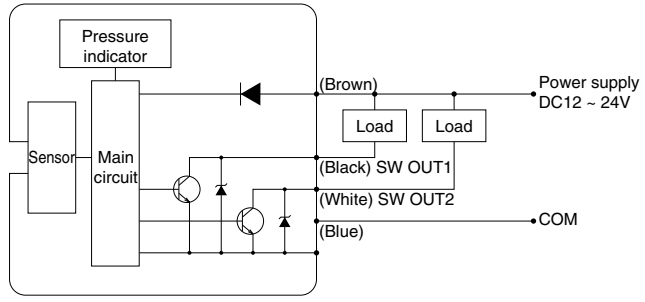
DC24V



AC100V



Vacuum switch circuit



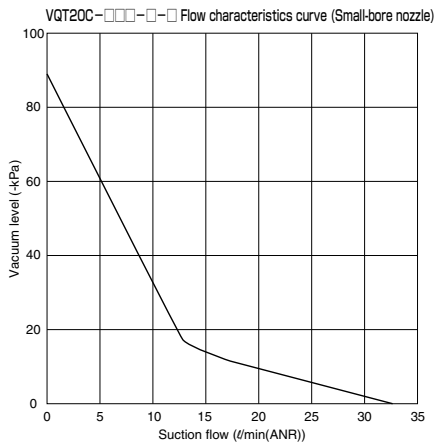
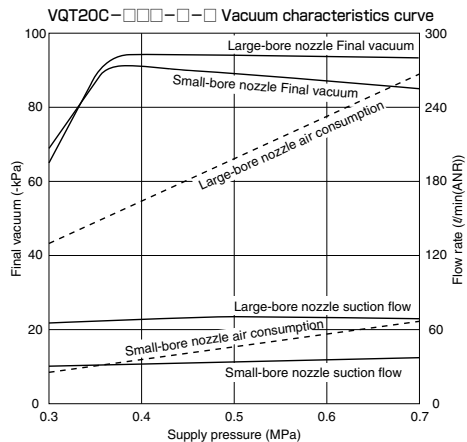
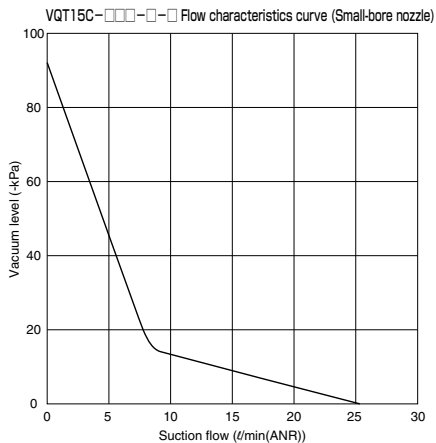
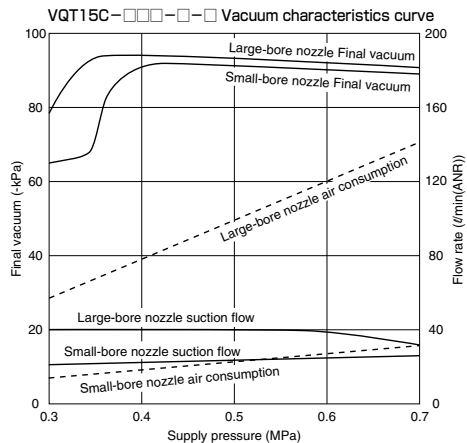


Vacuum Generator Series

Vacuum Generator VQ

VACUUM GENERATOR

■ Characteristics of twin nozzle type



233

VH-VS

VU

VUM

VY

VB

VM-VC

VRL

VG

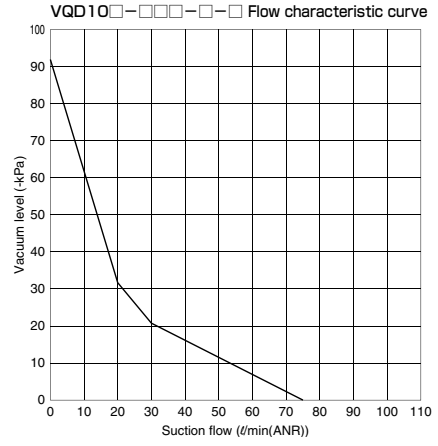
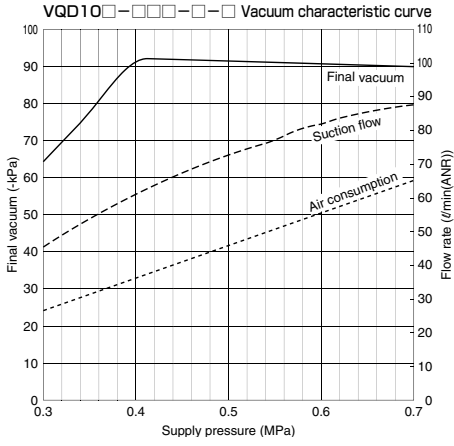
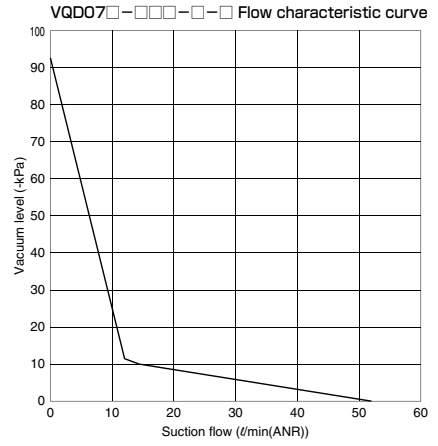
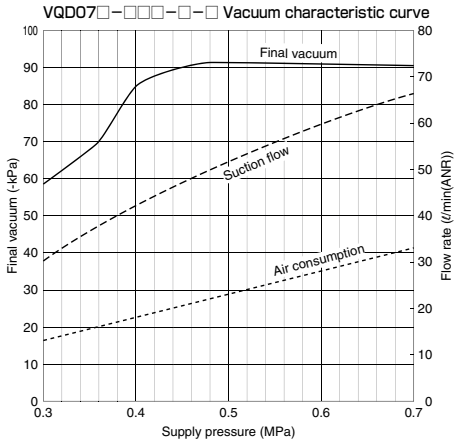
VK

VJ

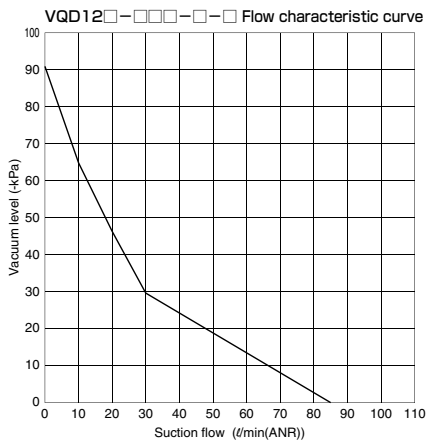
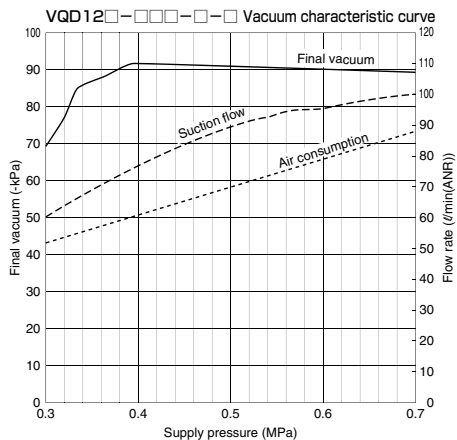
VX

VQ

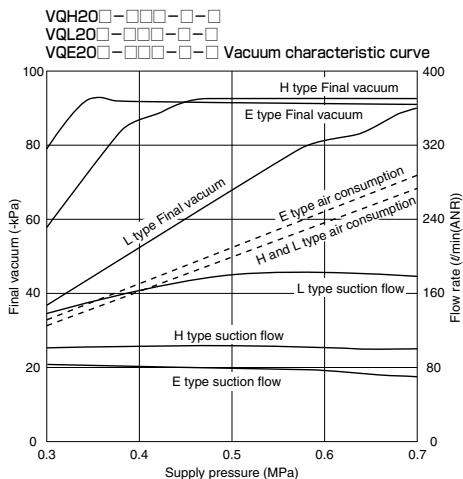
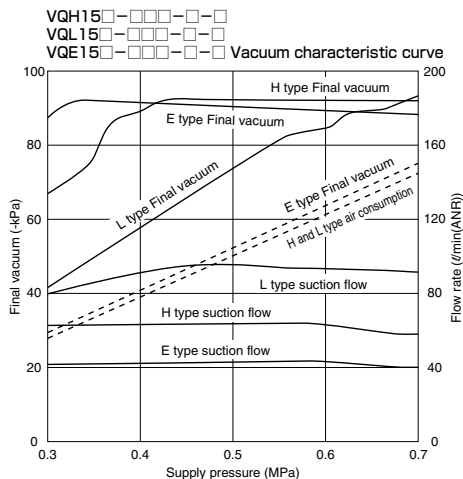
■ Characteristics of two-stage nozzle type



Characteristics of two-stage nozzle type



Characteristics of single nozzle type



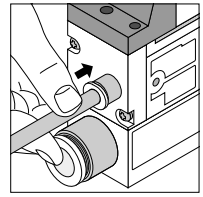
How to insert and disconnect

1. How to insert and disconnect tubes

① Tube insertion

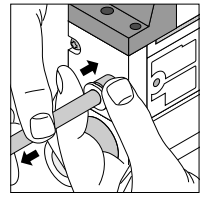
Insert a tube into Push-In Fitting of the vacuum generator VQ up to the tube end. Lock-claws bite the tube to fix it and the elastic sleeve seals around the tube.

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



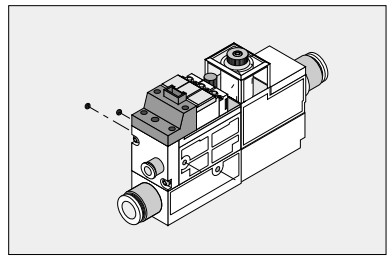
② Tube disconnection

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 body

In order to fix the vacuum generator VQ, 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.



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)

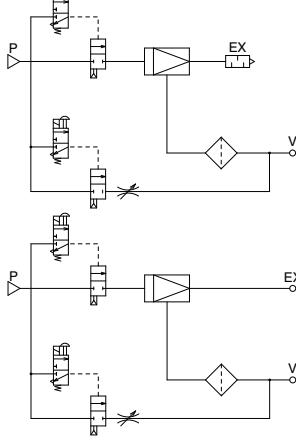
■ Vacuum Tube is a ultra-soft tube and suitable for piping of vacuum generators or actuators.

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

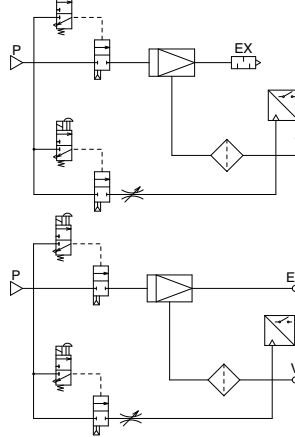
Size List of single nozzle type

Silencer vent or Tube exhaust, Without vacuum switch, Normally closed



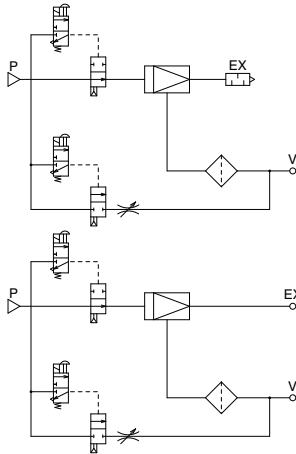
Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
VQ	241	8mm	●	●	12mm
			●	●	With silencer
			●	●	12mm
VQ	241	10mm	●	●	12mm
			●	●	With silencer
			●	●	12mm

Silencer vent or Tube exhaust, Vacuum switch, Normally closed



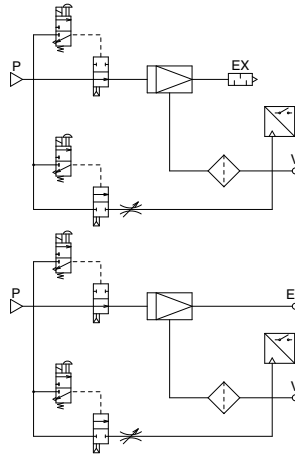
Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
VQ	241	8mm	●	●	12mm
			●	●	With silencer
			●	●	12mm
VQ	241	10mm	●	●	12mm
			●	●	With silencer
			●	●	12mm

Silencer vent or Tube exhaust, Without vacuum switch, Normally open



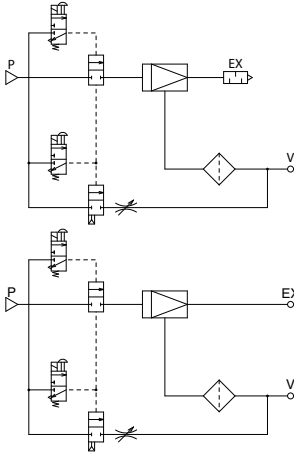
Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
VQ	241	8mm	●	●	12mm
			●	●	With silencer
			●	●	12mm
VQ	241	10mm	●	●	12mm
			●	●	With silencer
			●	●	12mm

Silencer vent or Tube exhaust, Vacuum switch, Normally open

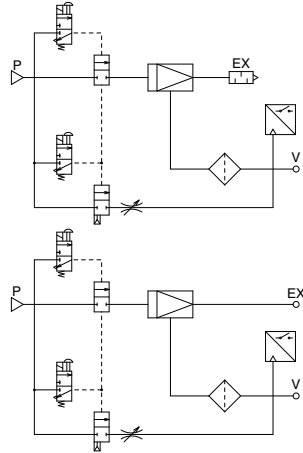


Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
VQ	241	8mm	●	●	12mm
			●	●	With silencer
			●	●	12mm
VQ	241	10mm	●	●	12mm
			●	●	With silencer
			●	●	12mm

Silencer vent or Tube exhaust, Without vacuum switch, Double solenoid



Silencer vent or Tube exhaust, Vacuum switch, Double solenoid

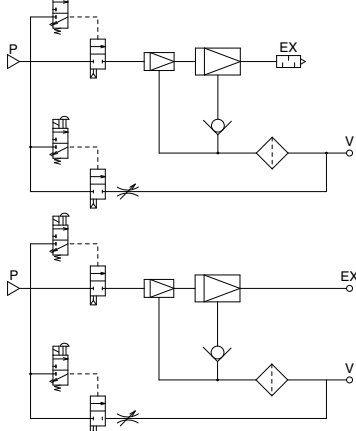


Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
Vc	241	8mm	●	●	12mm
			●	●	With silencer
		10mm	●	●	12mm
			●	●	With silencer

Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
Vc	241	8mm	●	●	12mm
			●	●	With silencer
		10mm	●	●	12mm
			●	●	With silencer

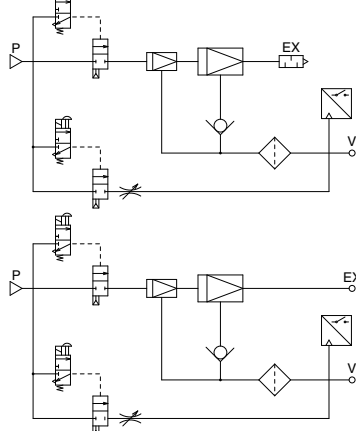
Size List of two-stage nozzle type

Silencer vent or Tube exhaust, Without vacuum switch, Normally closed



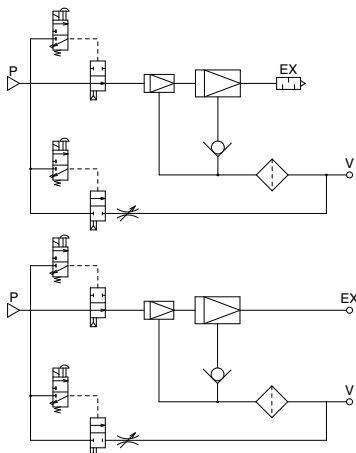
Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
Vc□	244	8mm	●	●	12mm
			●	●	With silencer
		10mm	●	●	12mm
			●	●	With silencer

Silencer vent or Tube exhaust, Vacuum switch, Normally closed



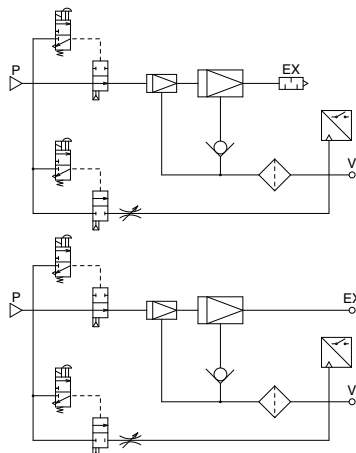
Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
Vc□	244	8mm	●	●	12mm
			●	●	With silencer
		10mm	●	●	12mm
			●	●	With silencer

Silencer vent or Tube exhaust, Without vacuum switch, Normally open



Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
Vc□	244	8mm	●	●	12mm
			●	●	With silencer
		10mm	●	●	12mm
			●	●	With silencer

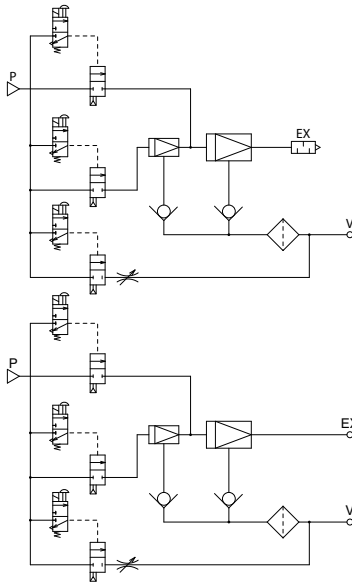
Silencer vent or Tube exhaust, Vacuum switch, Normally open



Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
Vc□	244	8mm	●	●	12mm
			●	●	With silencer
		10mm	●	●	12mm
			●	●	With silencer

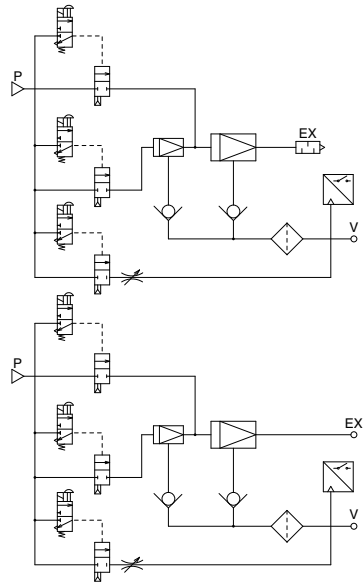
Size List of twin nozzle type

Silencer vent or Tube exhaust, Without vacuum switch, Normally closed



Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
Veti	245	8mm	●	●	12mm
			●	●	With silencer
		10mm	●	●	12mm
			●	●	With silencer

Silencer vent or Tube exhaust, Vacuum switch, Normally closed



Type	Page to refer	Vacuum port	Air supply port		Exhaust port
			8mm	10mm	
Veti	245	8mm	●	●	12mm
			●	●	With silencer
		10mm	●	●	12mm
			●	●	With silencer

Vacuum Generator Series

Vacuum Generator VQ

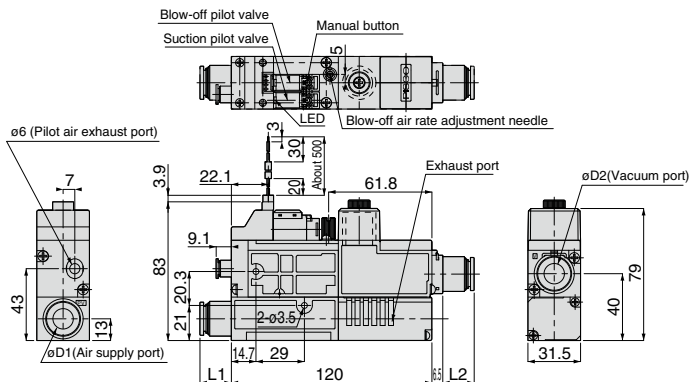
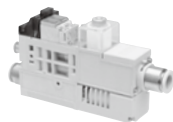
VACUUM GENERATOR

VQ Silencer vent, Single nozzle type, Without vacuum switch

Model code : VQ□□-□□S-□



Refer to page 237~238 for circuit.



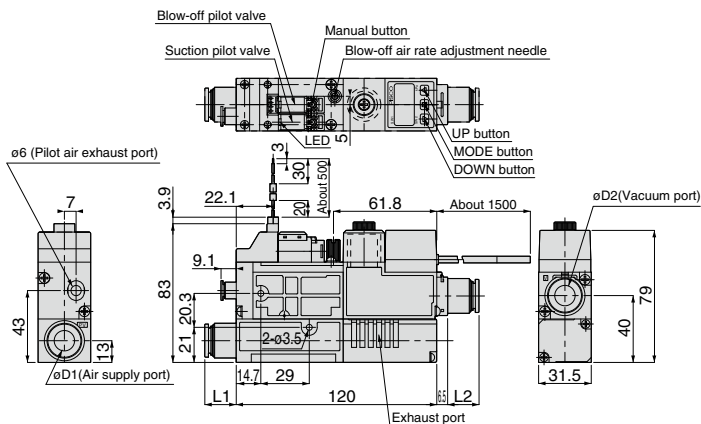
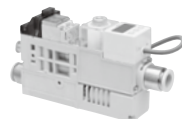
VQ Silencer vent, Single nozzle type, 2 switch output

Model code : VQ□□-□□S-□S



Refer to page 237~238 for circuit.

241



Common dimension list on this page Unit : mm

	Applicable tube		Applicable tube	
	O.D. øD1	L1	O.D. øD2	L2
Air supply port	8	12.2	-	-
	10	14.7	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7



Characteristic chart page

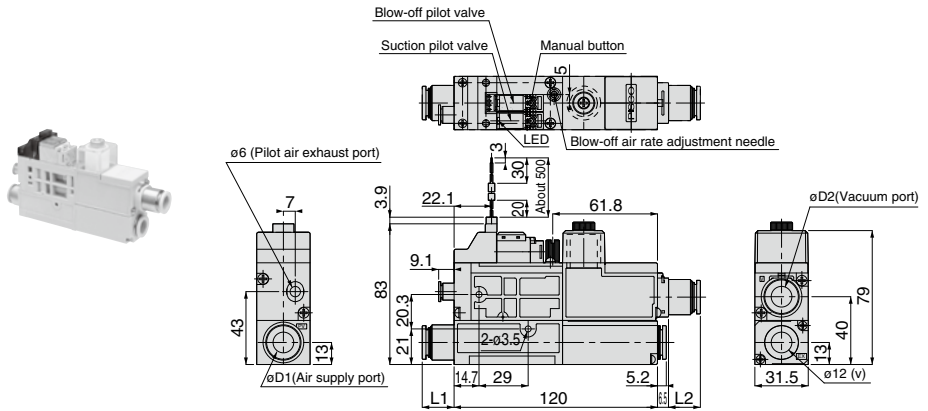
- VH VS
- VU
- VUM
- VY
- VB
- VM VC
- VRL
- VG
- VK
- VJ
- VX
- VQ

VQ Tube exhaust, Single nozzle type,
Without vacuum switch

Chart P.235

Model code : VQ□□-□□J-□

Refer to page 237~238 for circuit.

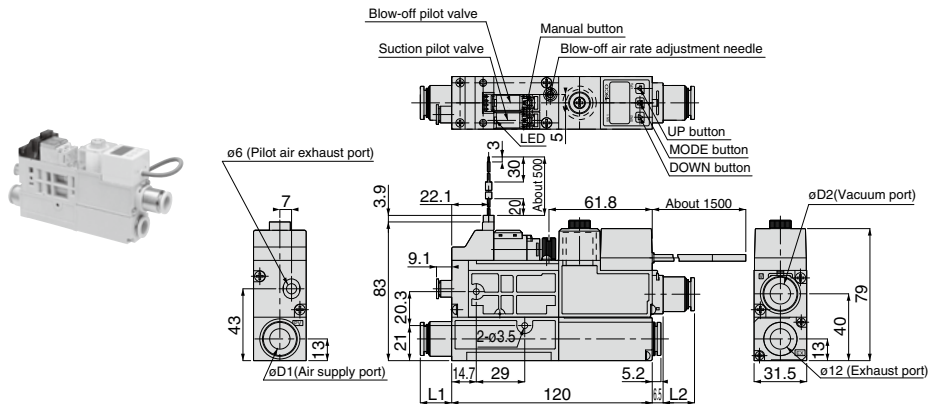


VQ Tube exhaust, Single nozzle type,
2 switch output

Chart P.235

Model code : VQ□□-□□J-□S

Refer to page 237~238 for circuit.



Common dimension list on this page Unit : mm

	Applicable tube		Applicable tube	
	O.D. øD1	L1	O.D. øD2	L2
Air supply port	8	12.2	-	-
	10	14.7	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7

Vacuum Generator Series

Vacuum Generator VQ

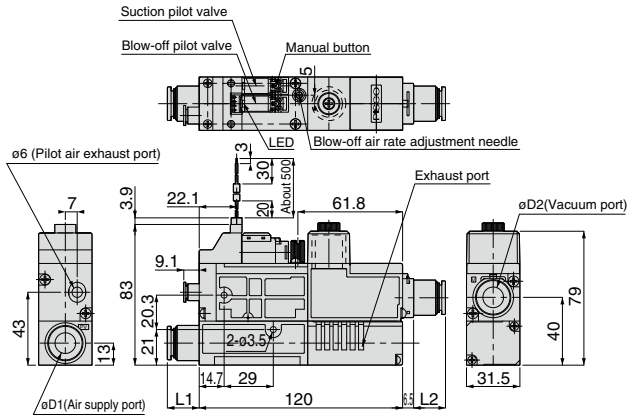
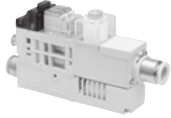
VACUUM GENERATOR

VQD Silencer vent, Two-stage nozzle type, Without vacuum switch

Model code : VQD□-□□S-□



Refer to page 239 for circuit.



VQD Silencer vent, Two-stage nozzle type, 2 switch output

Model code : VQD□-□□S-□S



Refer to page 239 for circuit.

243

VH-VS

VU

VUM

VY

VB

VM-VC

VRL

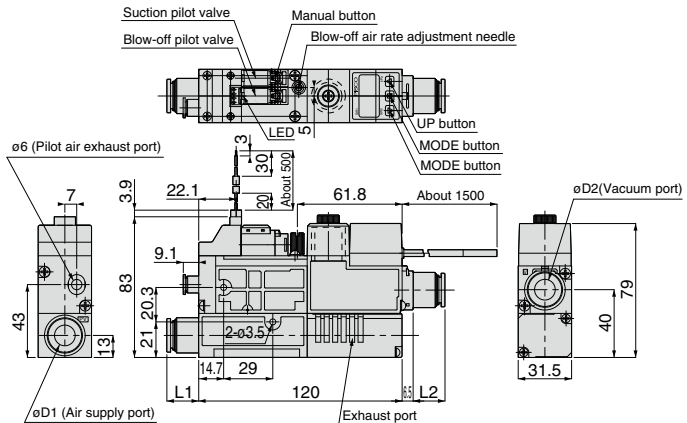
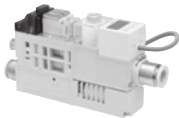
VG

VK

VJ

VX

VQ



Common dimension list on this page Unit : mm

	Applicable tube		Applicable tube	
	O.D. øD1	L1	O.D. øD2	L2
Air supply port	8	12.2	-	-
	10	14.7	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7



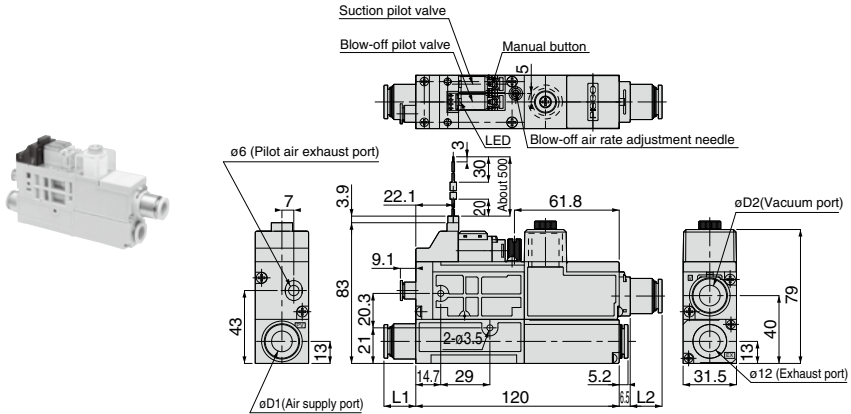
Characteristic chart page

VQD Tube exhaust, Two-stage nozzle type, Without vacuum switch

Chart P.234

Model code : VQD□-□□J-□

Refer to page 239 for circuit.

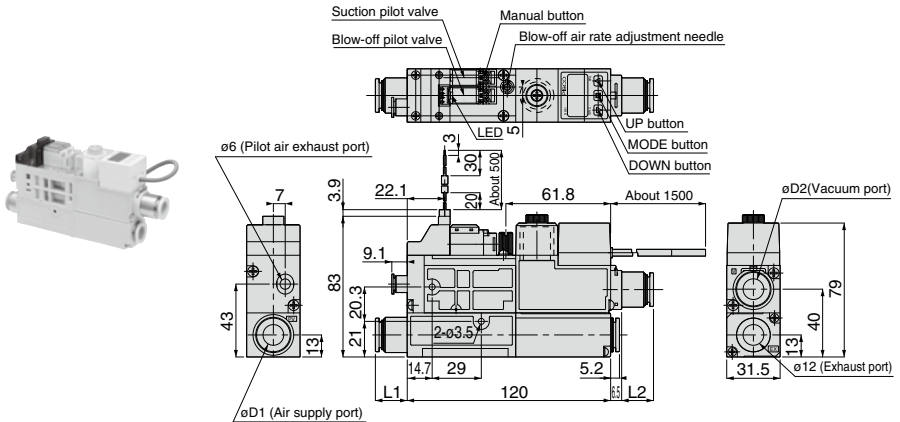


VQD Tube exhaust, Two-stage nozzle type, 2 switch output

Chart P.234

Model code : VQD□-□□J-□S

Refer to page 239 for circuit.



Common dimension list on this page

Unit : mm

	Applicable tube		Applicable tube	
	O.D. øD1	L1	O.D. øD2	L2
Air supply port	8	12.2	-	-
	10	14.7	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7

Vacuum Generator Series

Vacuum Generator VQ

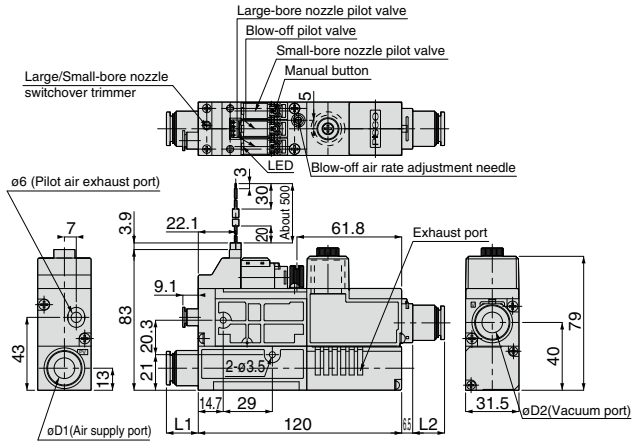
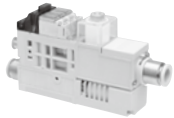
VACUUM GENERATOR

VQT Silencer vent, Twin nozzle type, Without vacuum switch

Model code : VQT□C-□□S-□



Refer to page 240 for circuit.



VQT Silencer vent, Twin nozzle type, 2 switch output

Model code : VQT□C-□□S-□S



Refer to page 240 for circuit.

245

VH-VS

VU

VUM

VY

VB

VM-VC

VRL

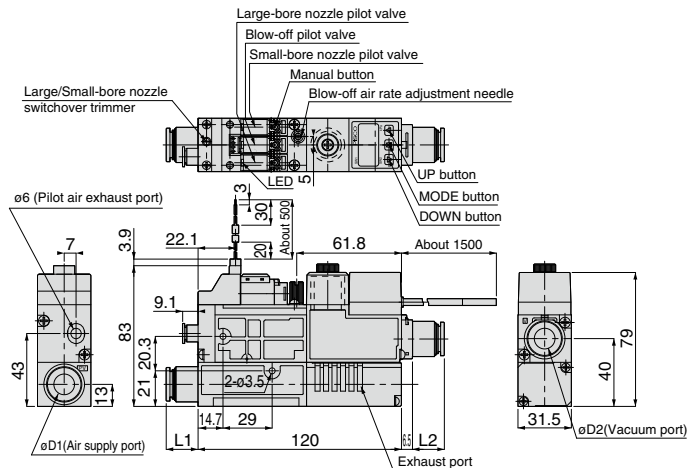
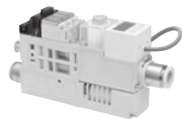
VG

VK

VJ

VX

VQ



Common dimension list on this page Unit : mm

	Applicable tube		Applicable tube	
	O.D. oD1	L1	O.D. oD2	L2
Air supply port	8	12.2	-	-
	10	14.7	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7

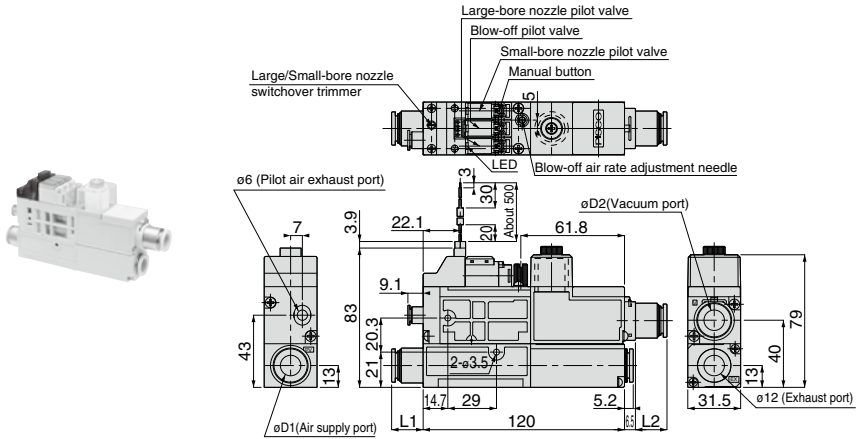


Characteristic chart page

VQT Tube exhaust, Twin nozzle type, Without vacuum switch

Model code : VQT□C-□□J-□

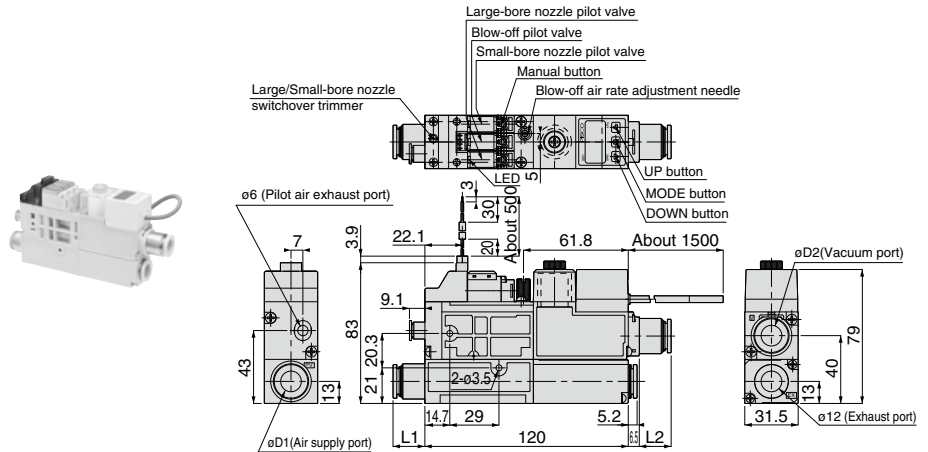
Refer to page 240 for circuit.



VQT Tube exhaust, Twin nozzle, 2 switch output

Model code : VQT□C-□□J-□S

Refer to page 240 for circuit.



Common dimension list on this page Unit : mm

	Applicable tube		Applicable tube	
	O.D. øD1	L1	O.D. øD2	L2
Air supply port	8	12.2	-	-
	10	14.7	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7

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. Operating temp. range of this series is 5-50°C . Do not operate the product out this range.
2. 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.
3. 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.
4. Switchover valve of double-solenoid types 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.
5. For the operation of the valve, make sure that the leakage current is less than 1mA. Leakage current larger than that may cause malfunction.
6. Do not use the product in the environment including a corrosive gas.
7. The product is not explosive-proof. Do not use it in the environments containing flammable or explosive gases or liquid. It may cause a fire or an explosion under these environments.
8. Do not use the product out of the operation temperature range. It may cause a malfunction of the sensor by the heat.
9. When wiring, be sure to 1) switch OFF the power, and 2) confirm the color of each lead wire, terminal numbers, etc. in order to prevent the output terminal from being inadvertently short-circuited with the power source and COM terminals. Short-circuits can cause sensor problems.

Caution

1. 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.
2. Do not use lubricators.
3. Rusts in the pipes may cause malfunction. Place a filter finer than 5 μ m ahead of the air supply port. It is recommended to carry out pipe flushing before operation and on a proper regular basis.
4. Do not give an excessive tensile strength and bending on a lead wire. Otherwise, breaking wire or damage on connector may be caused.
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. Avoid sucking dust, salt and / or iron powders.
8. Do not operate Blow-off solenoid valves during vacuum generation.
9. When replacing supply ports and vacuum ports cartridges, be sure to remove foreign substances sticking to cartridge seals; make sure cartridge fixing pins are properly inserted into the appropriate ports.
10. Use the shortest pipes as much as possible when piping vacuum components (concentrated exhaust, pilot air exhaust and supply units). Using long pipes can prevent vacuum units from performing properly.
11. Supply a stable DC power to the product.
12. Add a surge absorption circuit to relays or solenoid valves, etc. which are to be connected with output terminal and source terminal. Avoid any use which involves over 80mA in current.
13. Ground the FG terminal when using a unit power source such as switching current.
14. Output terminals and other terminals should not be short-circuited.
15. Do not apply excessive loads to vacuum generators. Subjecting them to excessive loads can damage the equipment.
16. Do not wire nozzles and other components in a way that will subject them to applied pressure. Do not use them in an arbitrary manner, either. It can cause malfunctions.
17. In case of using twin-nozzle type, please set pressure allowance between the vacuum level at work suction time and the setting value of Large/Small nozzle switchover pressure sensor. If these values are similar, the Large/Small caliber pilot valve might actuate simultaneously.

⚠ Safety Rules for Use

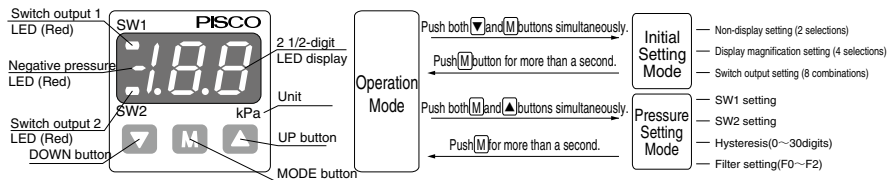
■ 1. Valve Operation Usage

- Power ON. Turn on the power supply after making sure the correct wiring.
- Provide power to lead wires which are to be used (Black: Suction valve / Gray: Blow-off valve) to start a valve.

■ 2. Valve Operation of Twin Nozzle type

- Keep applying consistent voltage to brown and blue lead wires when to operate twin nozzle type.
- Use large/small-bore nozzle switchover trimmer to adjust the switchover vacuum pressure point.
- ※ Switchover of large and small nozzles is controlled by the internal circuit after applying a voltage to suction pilot valve of large nozzle.

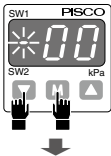
■ 3. Parts Names of Vacuum Switch Display and Operation Method



■ 4. Initial Setting Mode of Vacuum Switch

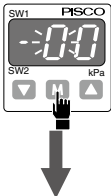
■ Starting Initial Setting Mode

Push both **DOWN** and **MODE** buttons simultaneously in Operation Mode. The third digit starts flashing when Initial Setting Mode starts. **000** is displayed at the first use.



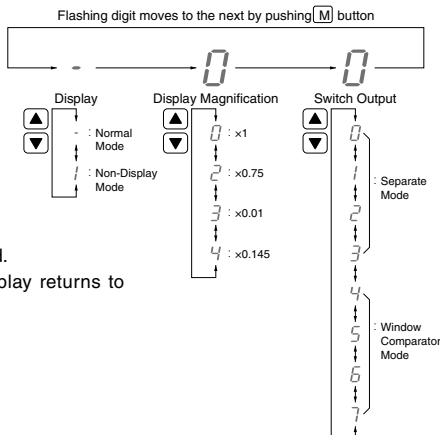
■ Setting Initial Conditions

Push **MODE** button to move to the next digit. The flashing digit is to be set. Pushing **DOWN** or **UP** button can change the condition of setting.



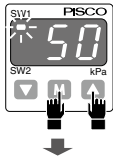
■ Exiting Initial Setting Mode

Push **MODE** button for more than a second. Initial conditions are set and the display returns to Operation Mode.



■ 5. Pressure Setting Mode of Vacuum Switch

■ Starting Pressure Setting Mode

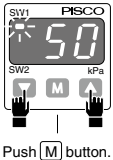


Push both **[M]** and **[▲]** buttons simultaneously in Operation Mode.

Once Pressure Setting Mode starts, SW1 starts flashing and Setting Value 1 is indicated.

[50] is displayed at the first use.

■ Setting Pressure Values



[Setting Value 1 (P1)]

SW1 LED starts flashing.

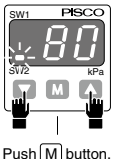
Setting Value 1 (P1) is set by pushing **[▼]** or **[▲]** button.

(**[50]** is displayed at the first use)

Note1) Setting values are available within operating pressure range.

Note2) Available setting values in window comparator mode are range of "P1 ≤ P2-2H" .

Push **[M]** button.



[Setting Value 2 (P2)]

SW2 LED starts flashing.

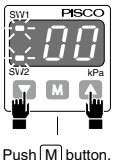
Setting Value 2 (P2) can be set by pushing **[▼]** or **[▲]** button.

(**[50]** is displayed at the first use)

Note1) Setting values are available within operating pressure range.

Note2) Available setting values in window comparator mode are range of "P1 ≤ P2-2H" .

Push **[M]** button.



[Hysteresis (H) Setting]

SW1 and SW2 start flashing.

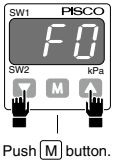
Hysteresis (H) can be set by pushing **[▼]** or **[▲]** button.

(**[00]** is displayed at the first use)

Note1) Setting digits should be less than 30.

Note2) Available setting values in window comparator mode are range of "P1 ≤ P2-2H" .

Push **[M]** button.



[Digital Filter Setting]

Digital Filter can be set by pushing **[▼]** or **[▲]** button.

F0 : No filter F1 : 25ms filter F2 : 250ms filter

(**[F0]** is displayed at the first use)

Push **[M]** button.

■ Exiting Pressure Setting Mode



Push **[M]** for more than a second.

Pressure conditions are set and the display returns to Operation Mode.

6. Vacuum Switch Functions

Non-Display Mode

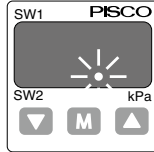
When any button is not touched for about 10 seconds, the system automatically select non-display mode and LED indication function will sleep. Pushing any button while sleeping, LED indication will come back.

Note1) The decimal point in the below figure flashes while Non-Display Mode.

Note2) Switch output and switch output indicator are active during Non-Display Mode.

Note3) No error message will appear during Non-Display Mode.

※ Refer to "Initial Setting Mode (P.249)" for Non-Display Mode.



Display Magnification

Select Display Magnification from the right table.

※ Refer to "Initial Setting Mode (P.249)" for Display magnification.

Code	Pressure range	
	Display magnification	Display range
0	×1 (kPa)	-100 ~ 100
2	×0.75 (cmHg)	-75 ~ 75
3	×0.01 (bar)	-1.00 ~ 1.00
4	×0.145 (psi)	-14.5 ~ 14.5

Switch Output

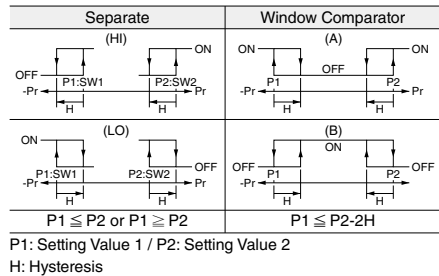
Switch output is selectable from the following table.

Note1) Under separate mode, SW1 & Setting Value1 and SW2 & Setting Value2 work respectively.

Note2) Under window comparator mode, SW1 and SW2 operate at their common lower limit (Setting Value 1) and their upper limit (Setting Value 2).

※ Refer to "Initial Setting Mode (P.249)" for Switch Output.

Output Mode	SW1				SW2			
	Separate		Window Comparator		Separate		Window Comparator	
Operation	HI	LO	A	B	HI	LO	A	B
Code	0	○			○			
	1	○				○		
	2				○			
	3		○			○		
	4			○				○
	5			○				○
	6				○			○
	7				○			○
	Setting Value 1	Lower limit : Setting Value 1 Upper limit : Setting Value 2		Setting Value 2	Lower limit : Setting Value 2 Upper limit : Setting Value 1		Setting Value 1	
	Note 1	Note 2	Note 1	Note 2				



Digital Filter

There are two selections (25ms or 250ms) of Digital Filter.

Use the digital filter function when the pressure fluctuates rapidly.

Note1) Selected digital filter (25ms or 250ms) is reflected on pressure indication and switch output.

※ Refer to "Pressure Setting Mode of Vacuum Switch (P.250)" for the digital filter setting.

7. Zero Point Adjustment and Error Message of Vacuum Switch

Starting Zero point adjustment



Release the applied pressure in pressure port to have the atmospheric pressure condition. (i.e., No pressure is applied.)
Push both and simultaneously in Operation Mode.
Once Zero Point Adjustment starts, **0A** starts flashing.

Exiting Zero Point Adjustment



Release and buttons during **0A** flashing.
Zero point adjustment is completed after a second and the display returns to Operation Mode.



Error message **E2** is displayed when any pressure is supplied to the sensor during the zero adjustment. Escape **E2** by pressing **M** button for more than a second.
Release the pressure in the pressure port and operate Zero Point Adjustment again.

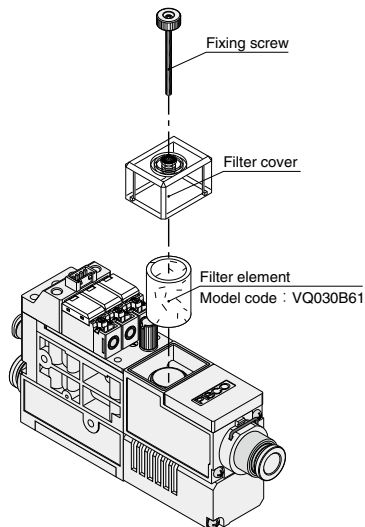
Actions for Error

Error message	Error details	Countermeasures
	An overload current is supplied. (SW1 or SW2 LED which detects the overload current starts flashing)	Turn off the power and check the overload condition.
	Pressure is supplied to the sensor during the zero adjustment.	Release E2 by pressing M button. Release the pressure in the pressure port and operate Zero Point Adjustment again.
	Vacuum pressure is exceeding 110% or more of the rated supply pressure. (Example indication of 111kPa)	Check the supply pressure.
	Supply pressure is higher than the range of pressure display.	Check the supply pressure.
	Supply pressure is lower than the range of pressure display.	Check the supply pressure.

※ Error message is not displayed during Non-Display Mode.

8. How to replace Filter Elements

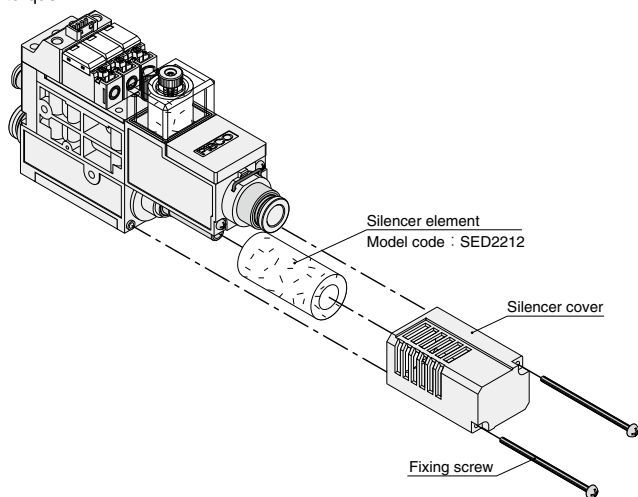
- Remove the fixing screw to replace filter elements. Make sure to place the filter seal rubber properly and tighten the screw to fix the filter cover with 0.3-0.5Nm of the tightening torque after the replacement.



9. Replacement of Silencer Element

- Replace silencer elements following the instructions below.

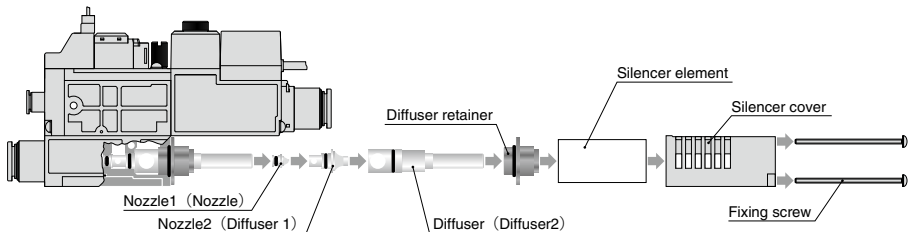
- Remove 2 fixing screws of silencer cover.
- Take out the silencer element
- Replace with a new element and tighten the screws to fix the filter cover with 0.4-0.5Nm of the tightening torque.



10. How to replace and clean Nozzles and Diffusers

Replace and clean nozzles and diffusers following the instructions below.

- ① Remove 2 fixing screws with a Phillips screwdriver to take out silencer cover.
 - ② -1 Single nozzle type: Pull out diffuser retainer, diffuser and nozzle in this order.
 - ② -2 Twin nozzle type: Pull out diffuser retainer, diffuser, nozzle2 and nozzle1 in this order.
 - ② -3 Two-stage nozzle type: Pull out diffuser retainer, diffuser2, diffuser1 and nozzle in this order.
 - ③ -1 Single nozzle type: Remove foreign substances adhered to nozzle1, diffuser inside and seal rubbers by air blowing or wiping.
 - ③ -2 Twin nozzle type: Remove the substances adhered to nozzle1 & 2, diffuser2 inside and seal rubbers by air blowing or wiping.
 - ③ -3 Two-stage nozzle type: Remove the substances adhered to nozzle, inside of diffuser1 & 2 and seal rubbers by air blowing or wiping.
- (Note) Pay special attention not to damage inside of nozzle & diffuser and seal rubbers.
- ④ -1 Single nozzle type: Place back nozzle1, diffuser and diffuser retainer in this order.
 - ④ -2 Twin nozzle type: Place back nozzle1, nozzle2, diffuser and diffuser retainer in this order.
 - ④ -3 Two-stage nozzle type: Place back nozzle, diffuser1, diffuser2 and diffuser retainer in this order.
 - ⑤ Tighten the screws to fix the silencer cover with 0.4-0.5Nm of the tightening torque.



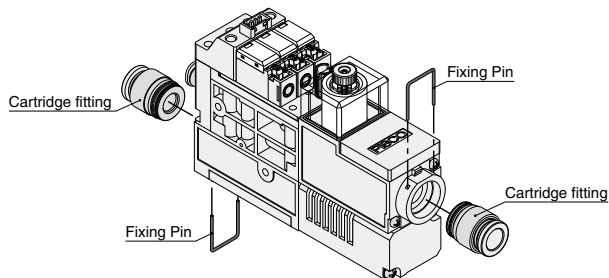
※ () is for two-stage nozzle.

11. How to replace Cartridge Fittings

Replace cartridge fittings following the instructions below.

- ① Use a flathead screwdriver to pull out a fixing pin.
- ② Pull out a cartridge fitting.

(Note) When a new cartridge fitting is attached, check if there are no dusts or fluffs stuck on O-ring.





Vacuum Generator Series

Vacuum Generator VQ

VACUUM
GENERATOR

255

VH-VS

VU

VUM

VY

VB

VM-VC

VRL

VG

VK

VJ

VX

VQ

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

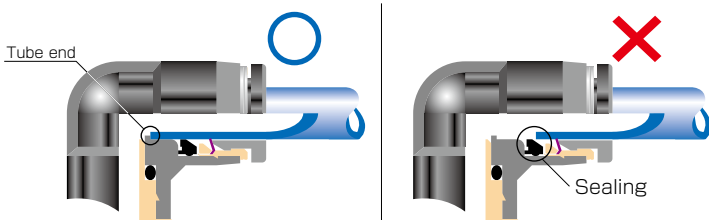
1. Remove dusts or drain before piping. They may get into the peripheral machine / facilities and cause malfunction.
2. When inserting an ultra-soft tube into push-in fitting, make sure to place an Insert Ring into the tube edge. There is a risk of causing the escape of tube and a fluid leakage without 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.



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;
- 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.