

Vacuum unit ideal for controlling large flow rates

VSQ Series

- Nozzle diameter: $\varnothing 0.7$, $\varnothing 1.0$, $\varnothing 1.2$, $\varnothing 1.5$, $\varnothing 2.0$



Features

Ejector system

- This 31.5 mm wide vacuum unit is ideal for controlling large flow rates.
- Three types of vacuum ejector units are available: single-nozzle, two-step nozzle and twin nozzle types.
- The twin nozzle is for uses with a long suction time and transfer time.
 - The vacuum startup to the reference vacuum pressure is controlled with the large bore size nozzle, and the pressure higher than the reference vacuum pressure is controlled with the small bore size nozzle, thereby greatly reducing the consumed flow rate. (Patent pending)
 - The vacuum generation is controlled with one signal.

VSQ

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VSB • VSC

VSG

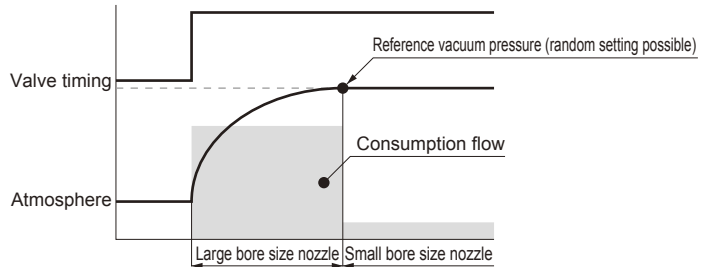
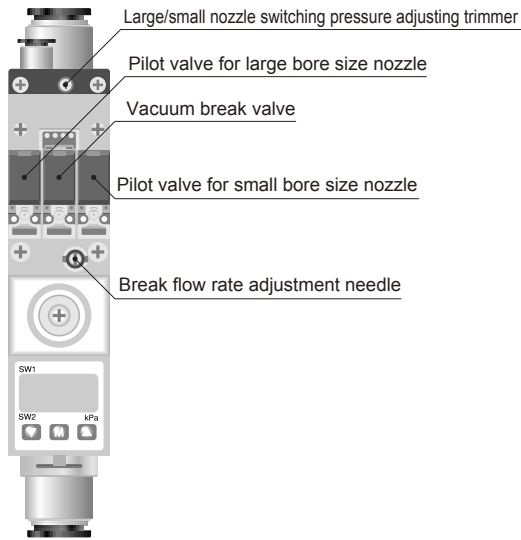
VSK
VSKM

VSJ
VSJM

VSX
VSXM

VSQ

VSZM



Nozzle type	Consumption flow	
T15	100	23
T20	200	46

- The two-step nozzle suction flow rate is about 40% more than the conventional signal.
- The single-nozzle is an orthodox integrated large flow vacuum generator.
- A full lineup of vacuum generating valve variations is available.
 - Single nozzle type: Normally open, normally closed, self hold type
 - 2 step nozzle type: Normally open, normally closed type
 - Twin nozzle types: Normally closed type

Specifications

Descriptions	VSQ
Working fluid	Air
Working pressure MPa	0.3 to 0.7
Ambient temperature °C	5 to 50

Ejector characteristics

Nozzle type		Nozzle diameter (mm)		Supply pressure (MPa)	Ultimate vacuum (-kPa)	Suction flow (ℓ/min. (ANR))	Air consumption flow (ℓ/min. (ANR))
Single nozzle	H15	1.5	-	0.5	93	63	100
	L15				66	95	
	E15				92	42	
	H20	2.0	-	0.5	93	110	200
	L20				66	180	
	E20				92	84	
Twin nozzles	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)
2 step nozzle	D07	0.7	-	0.5	93	24	23
	D10	1.0	-			36	46
	D12	1.2	-			40	70

Note 1: Values in () for the twin-nozzle are small bore nozzle values.

Solenoid valve specifications

● Pilot valve

Descriptions	Pilot valve	
Actuation	Direct operation	
Valve structure	Rubber sealant, poppet valve	
Rated voltage	24 VDC	100 VAC
Tolerable voltage fluctuation	24 VDC ±10%	100 VAC ±10%
Surge protective circuit	Surge absorber	Bridge diode
Power consumption	0.55W	1VA
Manual operation	Push type locking valve	
Operating display	During coil exciting: Red LED ON	

● Switching valve

• Twin nozzle types

Descriptions	Valve for small bore size	Valve for large bore size	Vacuum break valve
Actuation	Pneumatics operation using pilot valve		
Valve structure	Rubber sealant, poppet valve		
Valve type	Normally closed	Normally closed	Normally closed
Lubrication	Not required		
Effective sectional area (Cv flow factor)	3.5mm ² (0.19)	16.5mm ² (0.89)	3.5mm ² (0.19)

• 2 step nozzle type

Descriptions	Vacuum generator valve		Vacuum break valve
Actuation	Pneumatics operation using pilot valve		
Valve structure	Rubber sealant, poppet valve		
Valve type	Normally closed, normally open		Normally closed
Lubrication	Not required		
Effective sectional area (Cv flow factor)	3.5mm ² (0.19)		3.5mm ² (0.19)

• Single nozzle type

Descriptions	Vacuum generator valve		Vacuum break valve
Actuation	Pneumatics operation using pilot valve		
Valve structure	Rubber sealant, poppet valve		
Valve type	Normally closed, normally open, self hold		Normally closed
Lubrication	Not required		
Effective sectional area (Cv flow factor)	16.5mm ² (0.89)		3.5mm ² (0.19)
Minimum excitation time	50msec and over		

Vacuum switch specifications

Descriptions	Vacuum pressure switch
Working pressure range	-100 to 100kPa
Withstanding pressure	200kPa
Storage temperature range	-20 to 70°C
Working temperature range	-10 to 50°C
Working humidity range	35 to 85%RH
Power voltage	12 to 24 VDC ±10% ripple P-P 10% or less
Protective structure	IEC standards IP40 or equivalent
Number of pressure setting points	2
Switch output	NPN open collector 30 VDC 100mA or less residual voltage: 1.2V or less (load current 100mA)
Hysteresis	0 to 30digit (variable)
Repeatability	Within ±0.3%F.S.
Responsiveness	5msec max.
Display	2 1/2 digit 7 segment LED display
Number of displays	4 times/sec.
Display accuracy	±1%F.S.
Temperature characteristics	±0.3%F.S. (0 to 50°C, 25°C reference)

Ejector system

Vacuum filter specifications

Descriptions	Vacuum filter
Element material	PVF (poly-vinyl formal)
Filtration	10µm
Element surface area	1507mm ²
Replacement filter element model no.	VSQ-E

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Vacuum break

Descriptions	Vacuum break
Vacuum break air flow rate	0 to 50 l/min. (ANR) (supply pressure: 0.5 MPa)

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Valve lead wire color

● 24 VDC specifications

Nozzle type	Black	Gray	Blue	Brown
Twin nozzle types	Vacuum occurrence (-)	Vacuum break (-)	Minus (-)	24 VDC (+ common)
2 step nozzle type	Vacuum occurrence (-)	Vacuum break (-)	-	24 VDC (+ common)
Single nozzle type	Vacuum occurrence (-)	Vacuum break (-)	-	24 VDC (+ common)

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● 100 VAC specifications

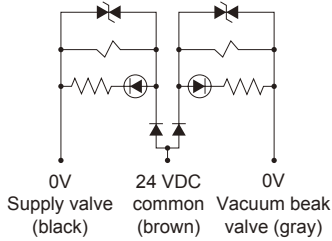
Nozzle type	Black	Gray	Blue	Brown
2 step nozzle type	Vacuum occurrence (-)	Vacuum break (-)	-	Common
Single nozzle type	Vacuum occurrence (-)	Vacuum break (-)	-	Common

VSZM

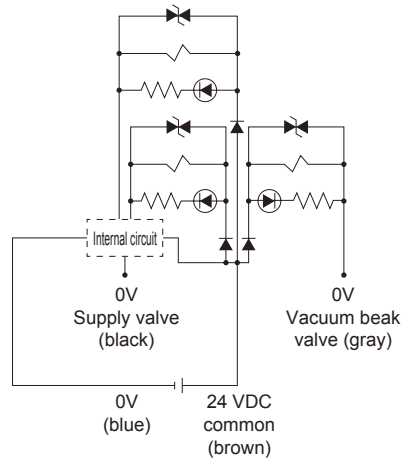
Electric circuit (solenoid valve)

● 24 VDC

- Single nozzle type
- 2 step nozzle type

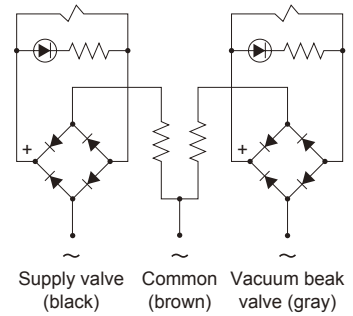


• Twin nozzle types

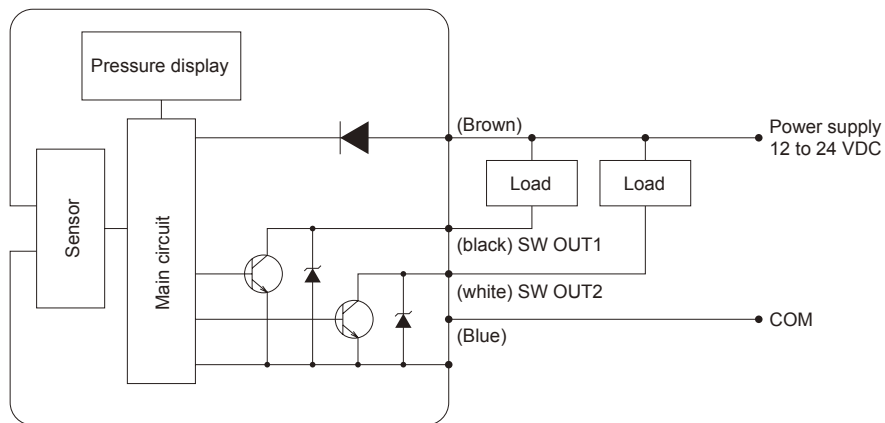


● 100 VAC

- Single nozzle type
- 2 step nozzle type

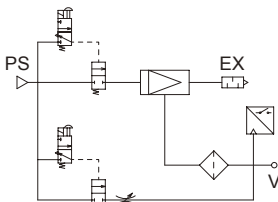


Pressure switch electric circuit drawing for vacuum

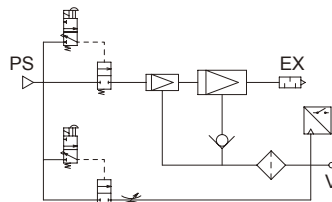


Circuit diagram

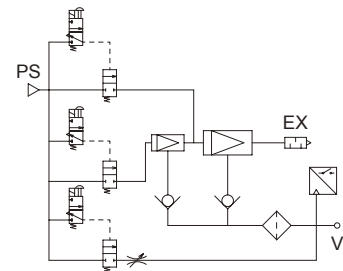
● Single nozzle type



● 2 step nozzle type



● Twin nozzle types



Ejector system

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How to order

● 31.5mm width discrete vacuum ejector unit

VSQ - **T15** **B** - **10** **10** **J** - **3** - **SW**

A Vacuum characteristics, nozzle diameter

B Valve type

C Vacuum port (V)

D Air supply port (PS)

E Exhaust port (EX)

F Solenoid valve voltage

G Vacuum switch specifications

Symbol	Descriptions	
A Vacuum characteristics, nozzle diameter Note 1, 2, 3, 4		
	Vacuum characteristics	Nozzle diameter
H15	High vacuum/medium flow type	ø1.5
L15	Medium vacuum/large flow rate type	ø1.5
E15	High vacuum/small flow rate type	ø1.5
H20	High vacuum/medium flow type	ø2.0
L20	Medium vacuum/large flow rate type	ø2.0
E20	High vacuum/small flow rate type	ø2.0
T15	Twin nozzle types	ø1.5 (ø0.7)
T20	Twin nozzle types	ø2.0 (ø1.0)
D07	2 step nozzle type	ø0.7
D10	2 step nozzle type	ø1.0
D12	2 step nozzle type	ø1.2
B Valve type Note 1, Note 2		
A	Normally open type	
B	Normally closed type	
D	Self hold type	
C Vacuum port (V)		
8	ø8 push-in joint	
10	ø10 push-in joint	
D Air supply port (PS) Note 3		
6	ø6 push-in joint	
8	ø8 push-in joint	
10	ø10 push-in joint	
E Exhaust port (EX)		
S	Atmospheric release with silencer	
J	ø12 push-in joint common exhaust	
F Solenoid valve voltage Note 4		
1	100 VAC	
3	24 VDC	
G Vacuum switch specifications		
Blank	Without vacuum switch	
SW	2-point NPN output with LED display	

⚠ Note on model no. selection

Note 1: When **A** "T15" and "T20", **B** "A" or "D" can not be selected.

Note 2: When **A** "D07", "D10" or "D12" **B** "D" can not be selected.

Note 3: **A** "D07", "D10" or "D12" can be selected for **D** "6".

Note 4: When **A** "T15" and "T20" **F** "1" can not be selected.

● Model no.

· Filter elementment

VSQ-E

· Silencer element

VSQ-SE

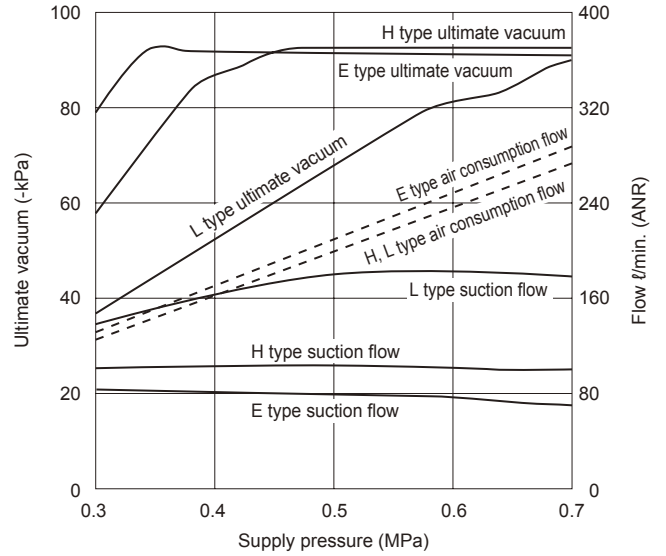
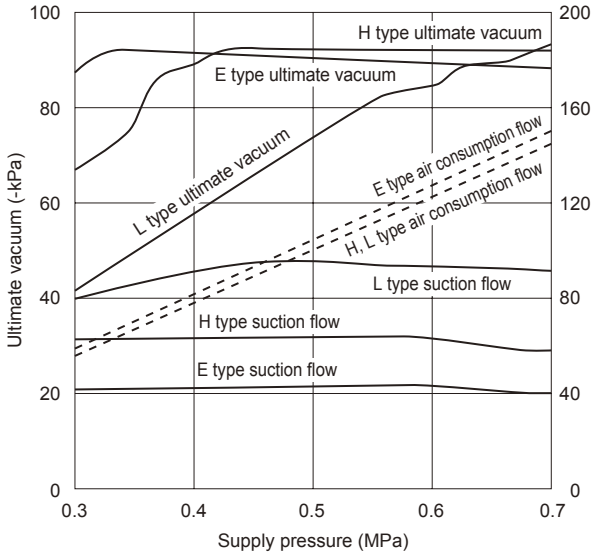
CKD

Vacuum characteristics

● Single nozzle type

- VSQ-H15*-*-*-*-*
- VSQ-L15*-*-*-*-*
- VSQ-E15*-*-*-*-*vacuum characteristics diagram

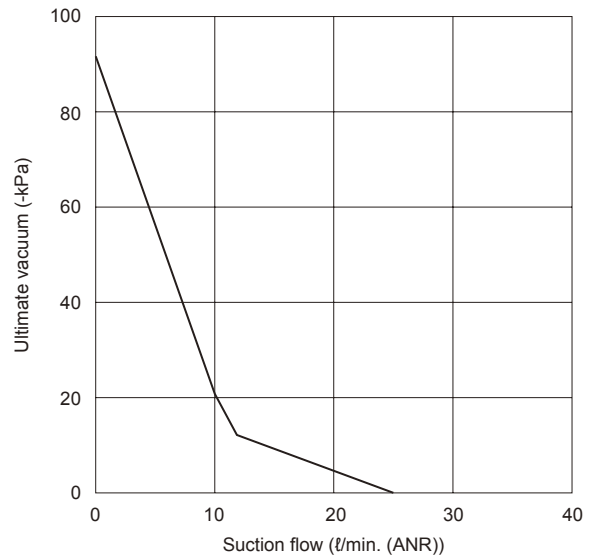
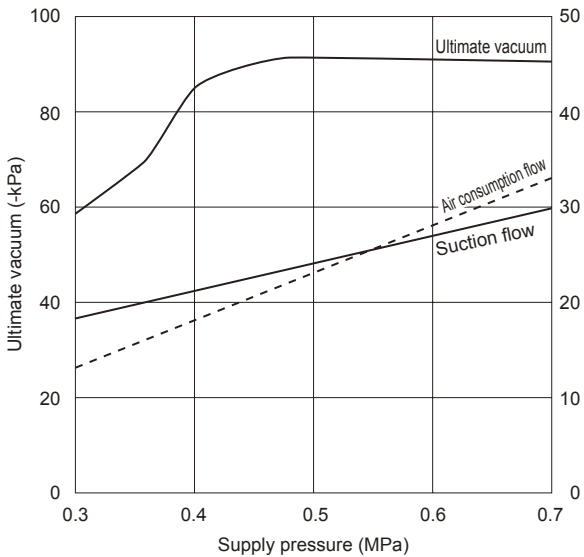
- VSQ-H20*-*-*-*-*
- VSQ-L20*-*-*-*-*
- VSQ-E20*-*-*-*-*vacuum characteristics diagram



● 2 Step nozzle type

- VSQ-D07*-*-*-*-*vacuum characteristics diagram

- VSQ-D07*-*-*-*-*flow characteristics diagram



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- VSQ
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Vacuum characteristics

● 2 Step nozzle type

· VSQ-D10*-***-**-**vacuum characteristics diagram

· VSQ-D10*-***-**-**flow characteristics diagram

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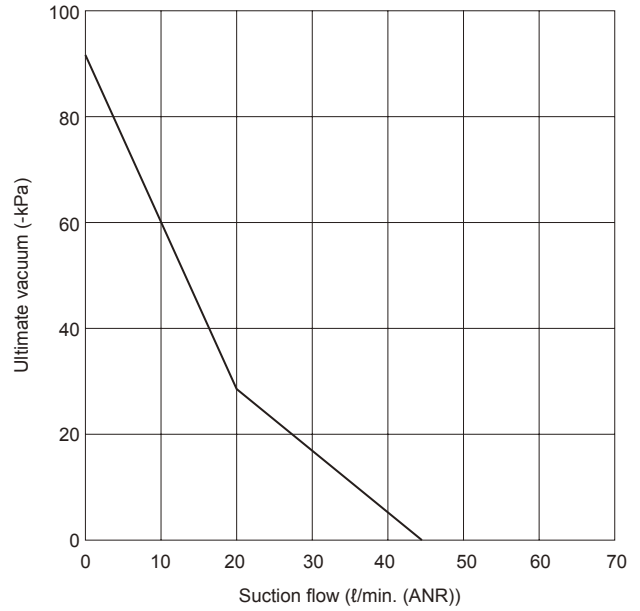
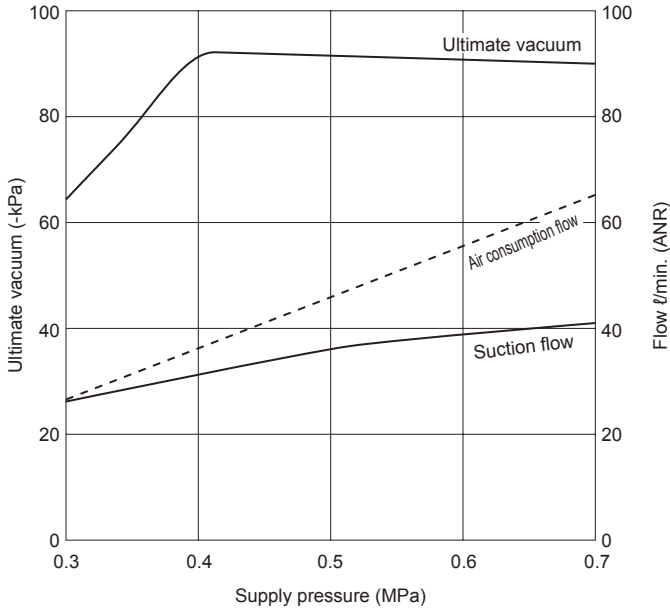
VSK
VSKM

VSJ
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VSX
VSXM

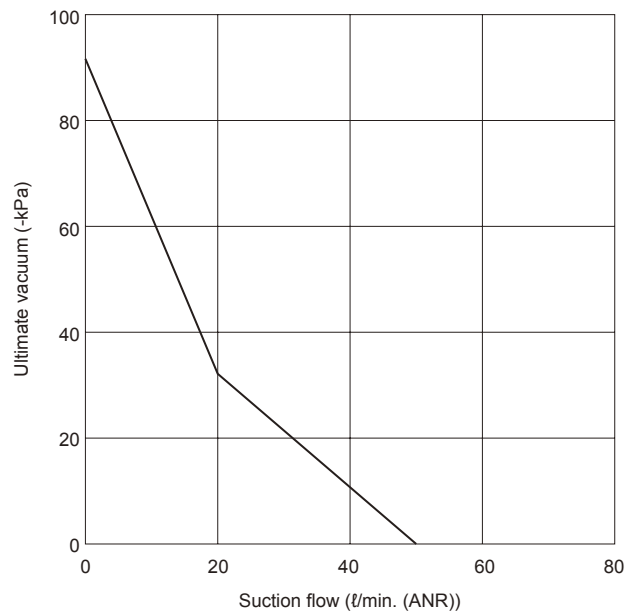
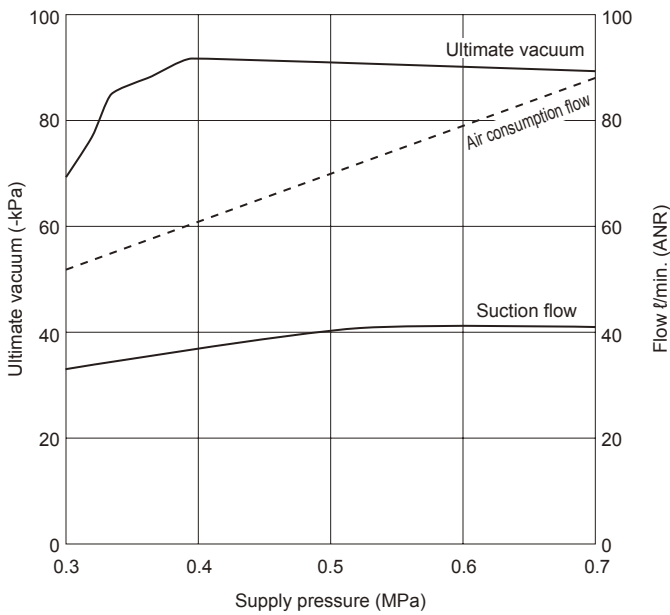
VSQ

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· VSQ-D12*-***-**-**vacuum characteristics diagram

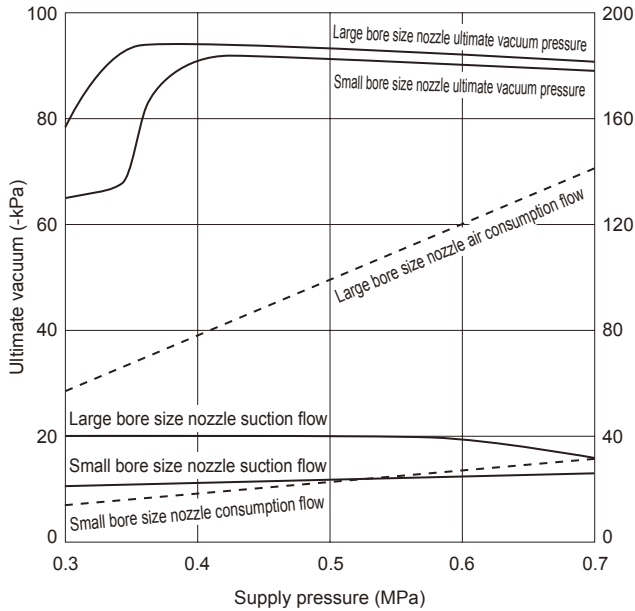
· VSQ-D12*-***-**-**flow characteristics diagram



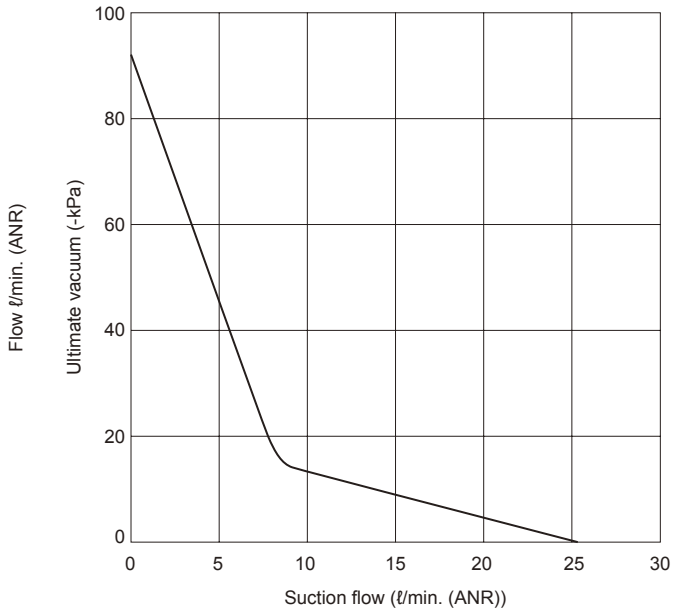
Vacuum characteristics

● Twin nozzle types

· VSQ-T15B-***-*vacuum characteristics diagram

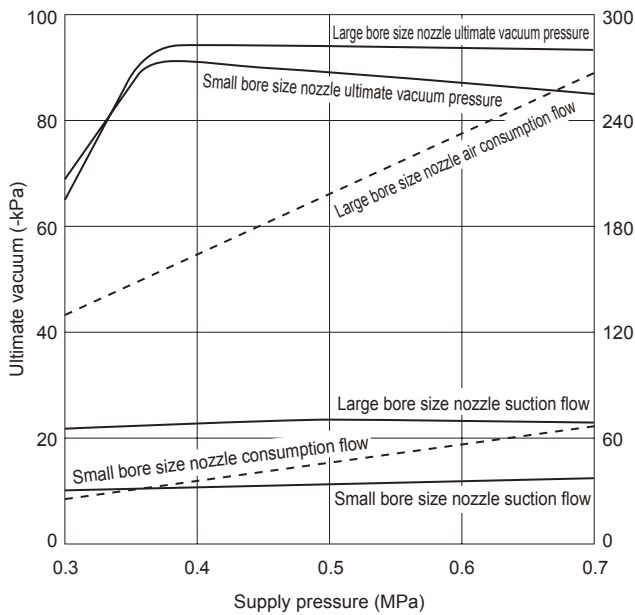


· VSQ-T15B-***-*flow characteristics diagram (small bore size nozzle)

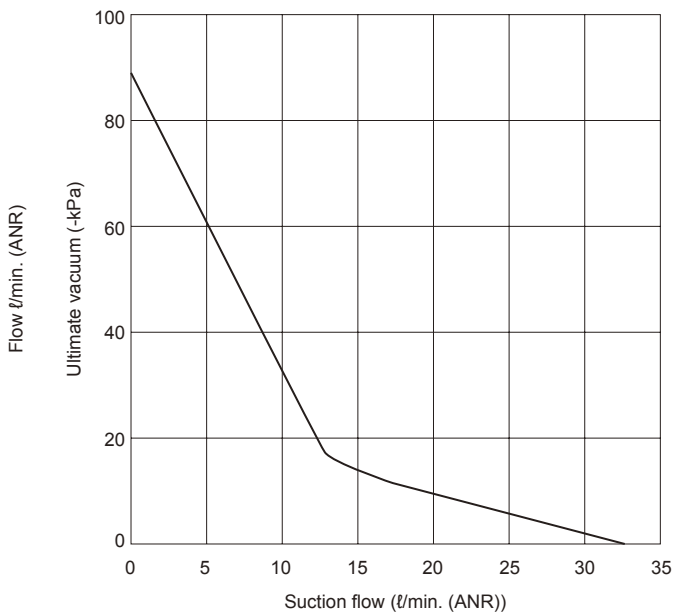


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· VSQ-T20B-***-*vacuum characteristics diagram



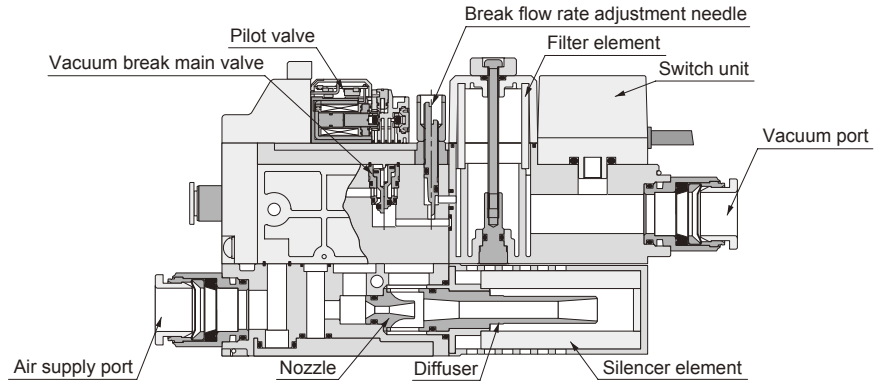
· VSQ-T20B-***-*flow characteristics diagram (small bore size nozzle)



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VSQ
VSZM

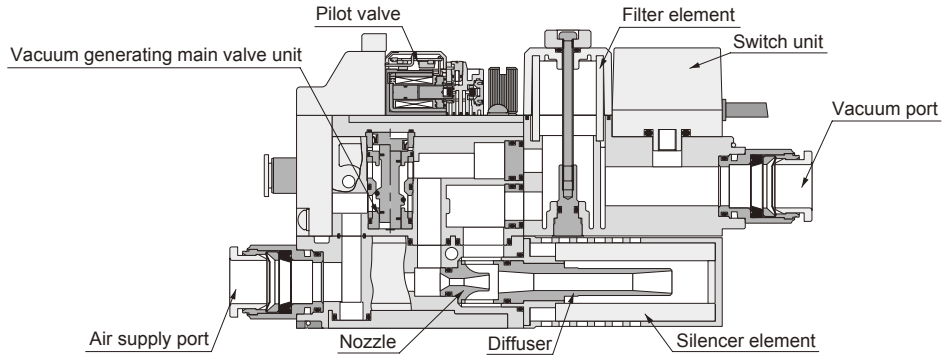
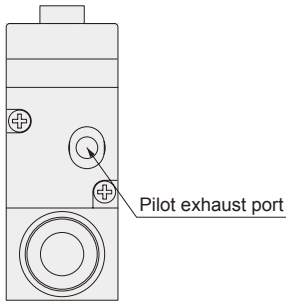
Internal structure drawing

- Single nozzle type
 - Break circuit



Ejector system

- Vacuum circuit



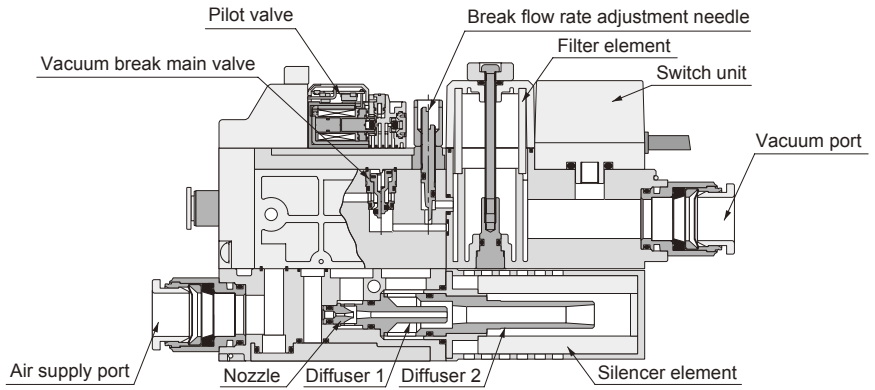
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- 2 Step nozzle type
 - Break circuit



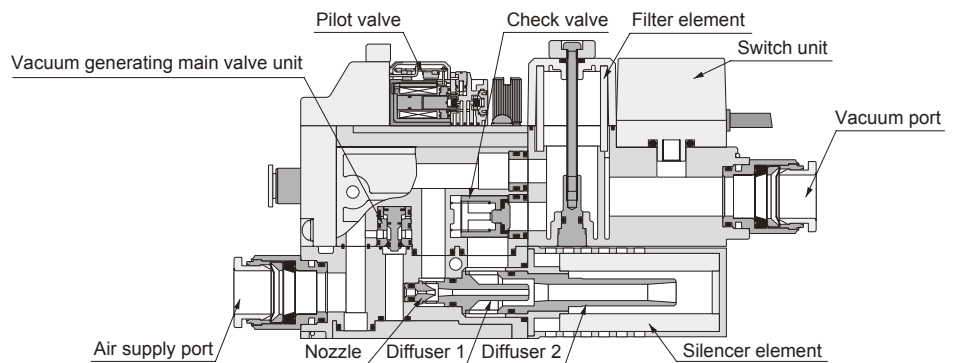
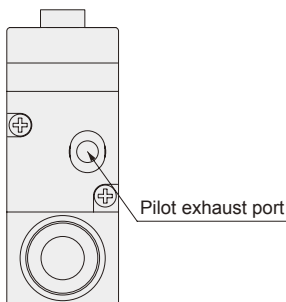
VSJ
VSJM

VSX
VSXM

VSQ

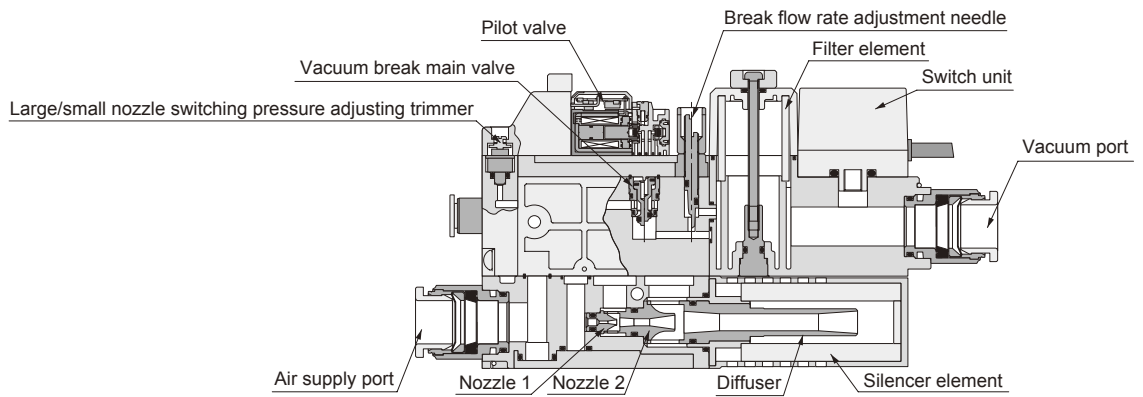
VSZM

- Vacuum circuit



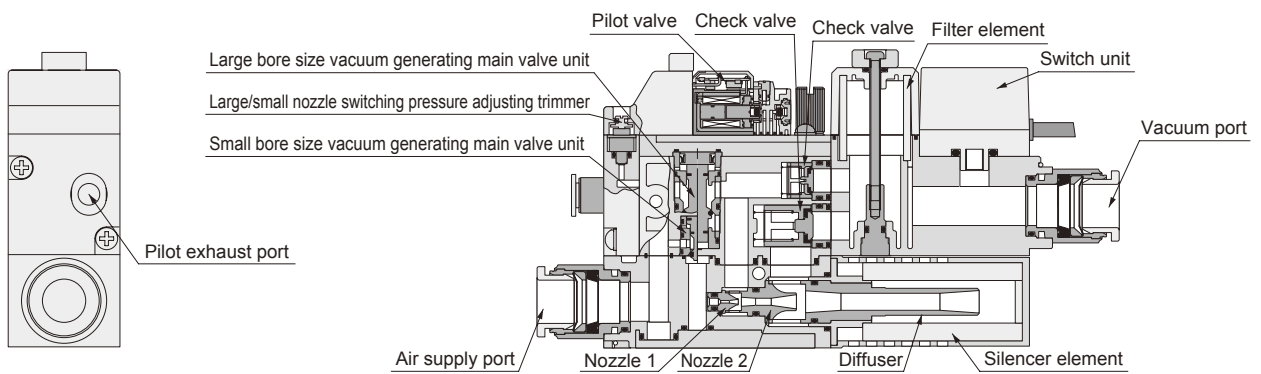
Internal structure drawing

- Twin nozzle types
- Break circuit



Ejector system

- Vacuum circuit



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VSX
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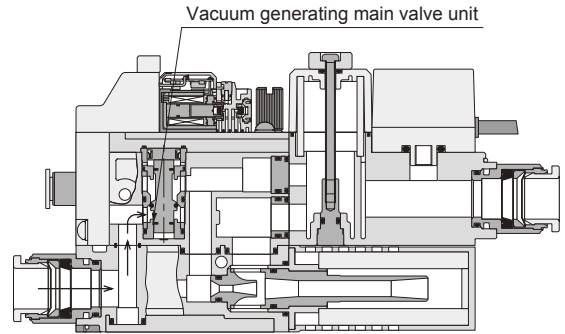
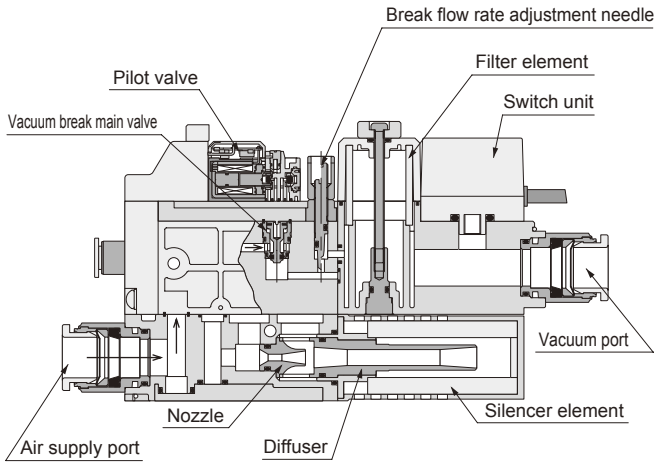
VSZM

Operational explanation drawing (single nozzle type, normally closed)

- Vacuum generation stop state
- Break circuit

- Vacuum circuit

Ejector system



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- Vacuum generating state
- Break circuit

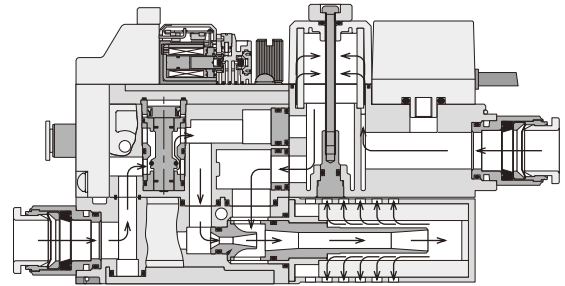
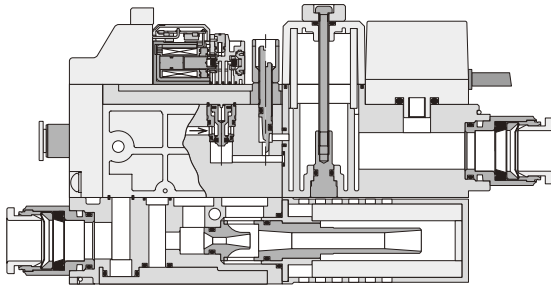
- Vacuum circuit

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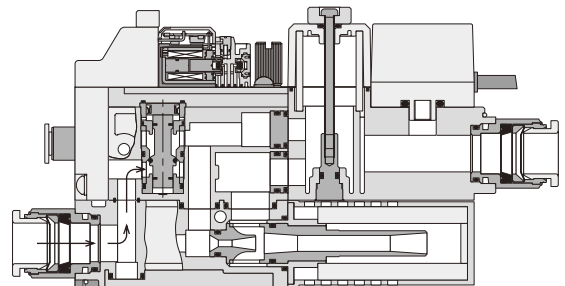
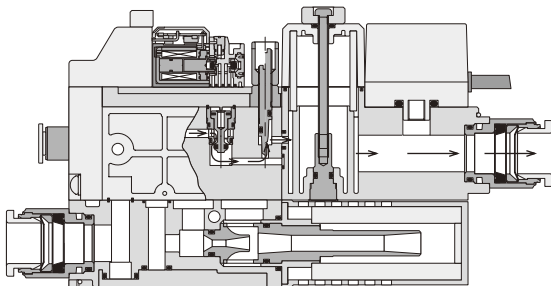
V SX
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- Vacuum break air supply
- Break circuit

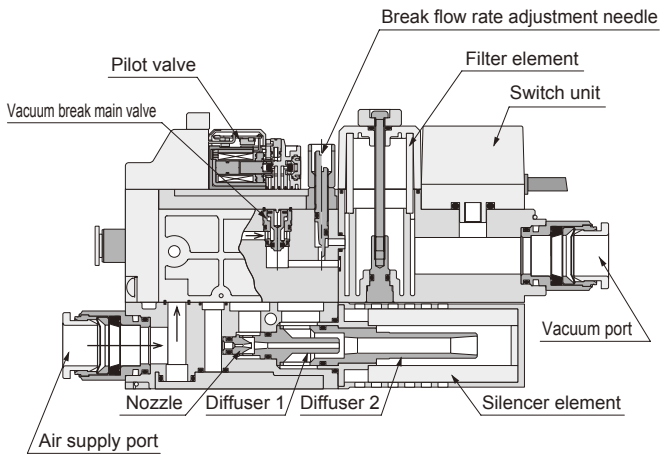
- Vacuum circuit

VSZM

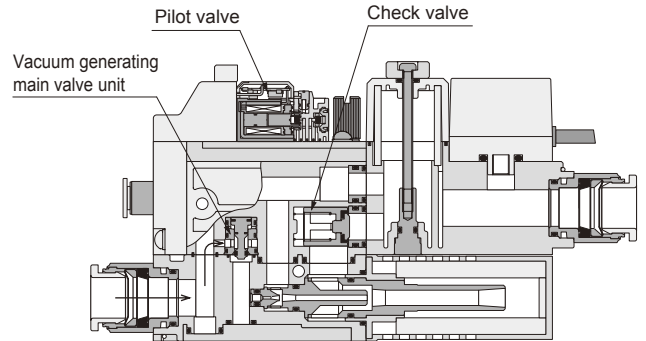


Operational explanation drawing (2 step nozzle type, normally closed)

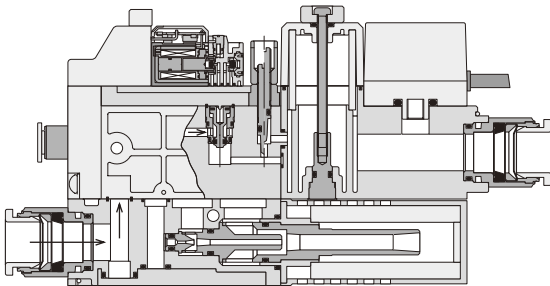
- Vacuum generation stop state
- Break circuit



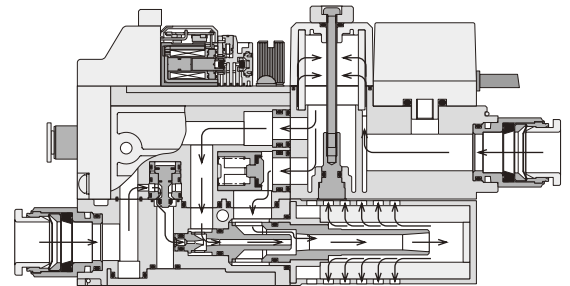
- Vacuum circuit



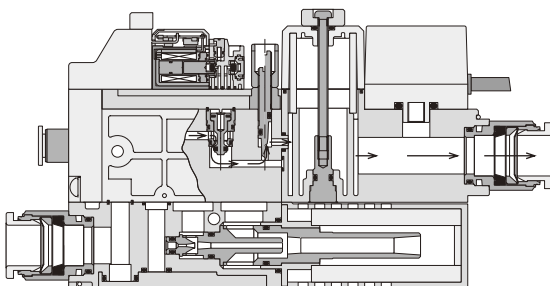
- Vacuum generating state
- Break circuit



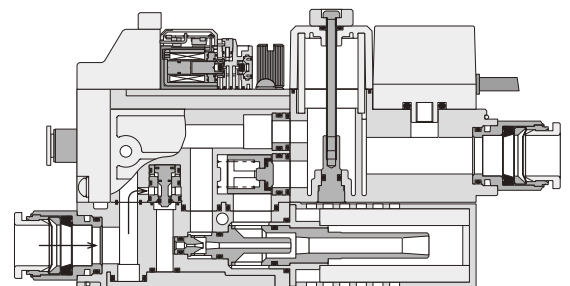
- Vacuum circuit



- Vacuum break air supply
- Break circuit



- Vacuum circuit



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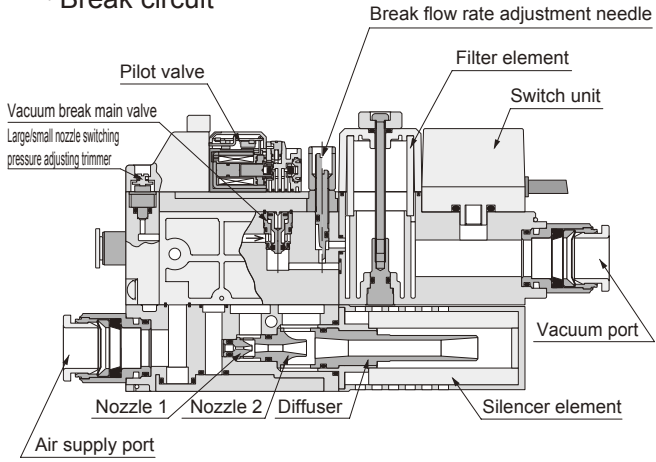
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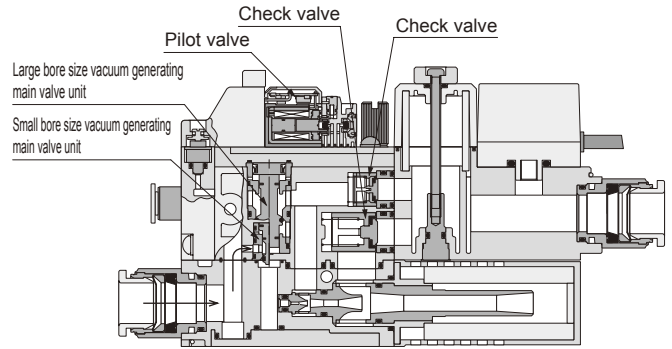
Operational explanation drawing (twin nozzle type)

● Vacuum generation stop state

• Break circuit

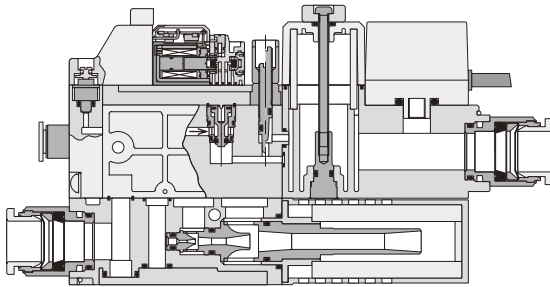


• Vacuum circuit

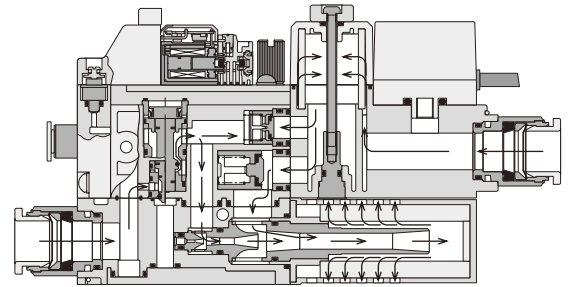


● Vacuum generating state (vacuum startup to reference vacuum pressure: large bore size nozzle)

• Break circuit

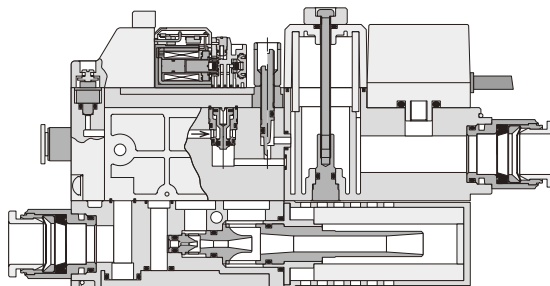


• Vacuum circuit

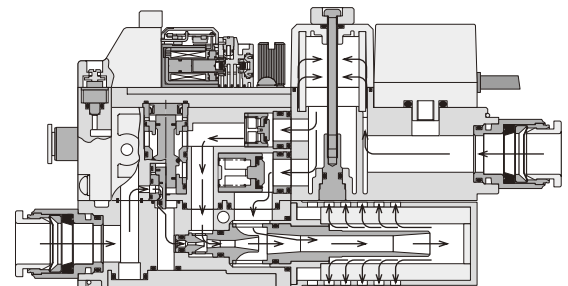


● Vacuum occurrence state (higher than reference vacuum pressure: small bore size nozzle)

• Break circuit

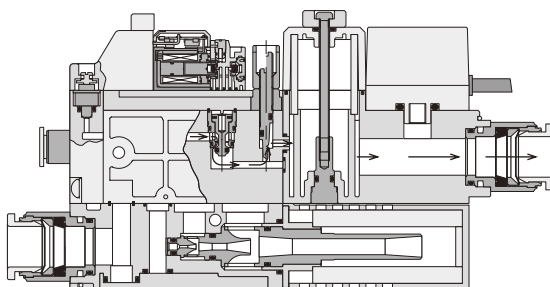


• Vacuum circuit

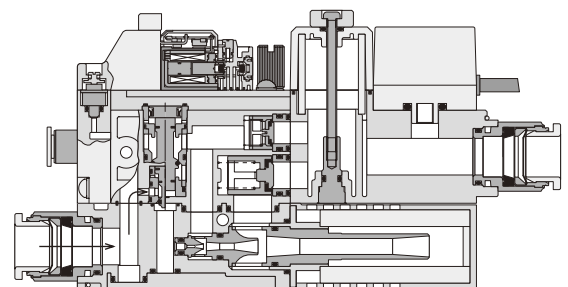


● Vacuum break air supply

• Break circuit



• Vacuum circuit



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V SX
V SXM

VSQ

VSZM

MEMO

Ejector system

VSY

VSH•VSU
VSB•VSC

VSG

VSK
VSKM

VSJ
VSJM

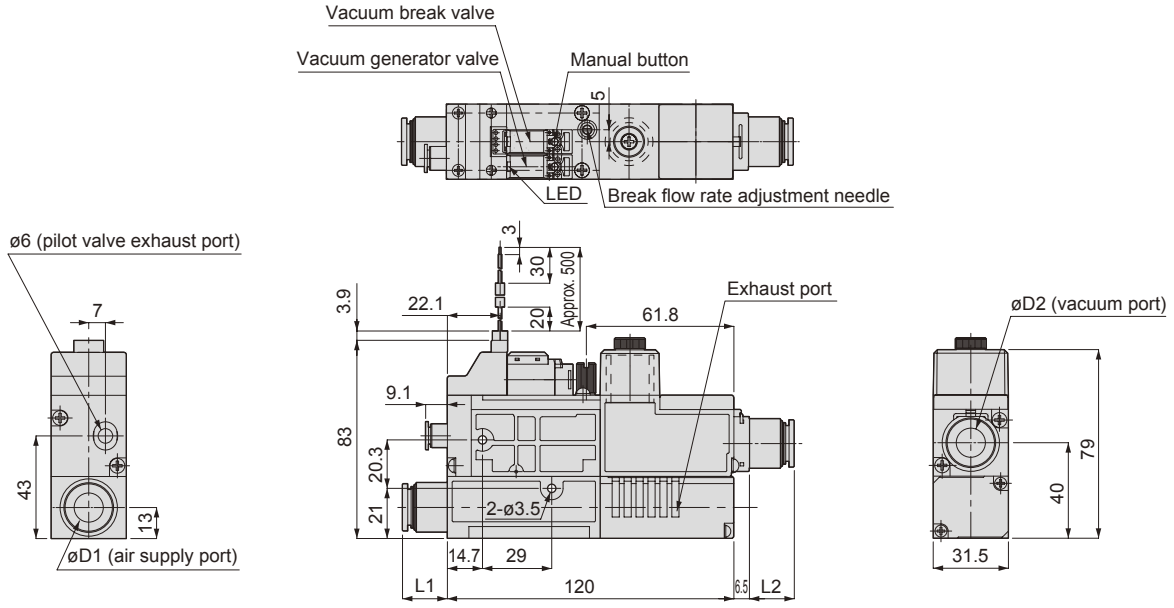
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VSZM

Dimensions (single nozzle type, atmospheric release type)

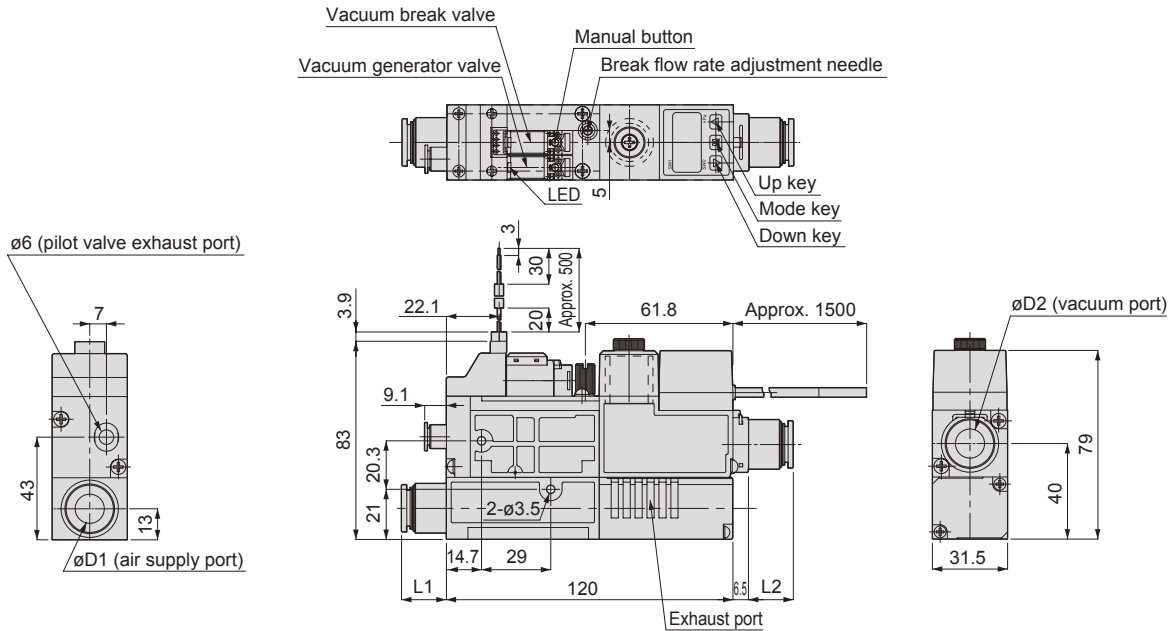
● Without vacuum switch



Unit: mm

	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

● With LED display and 2-point NPN output vacuum pressure switch

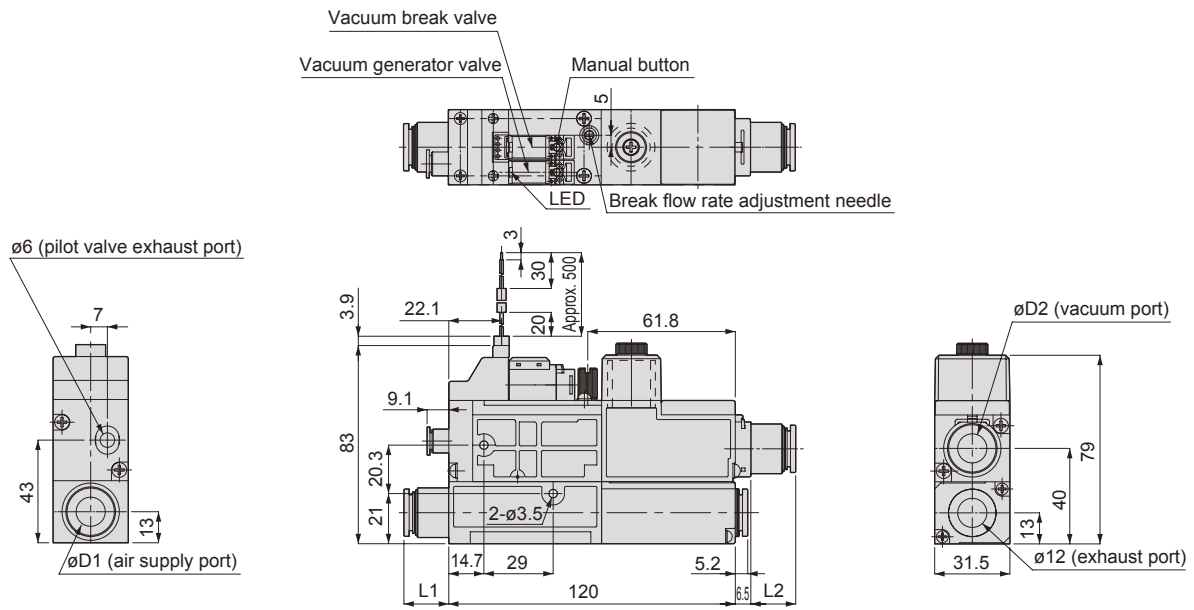


Unit: mm

	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

Dimensions (single nozzle type, common exhaust type)

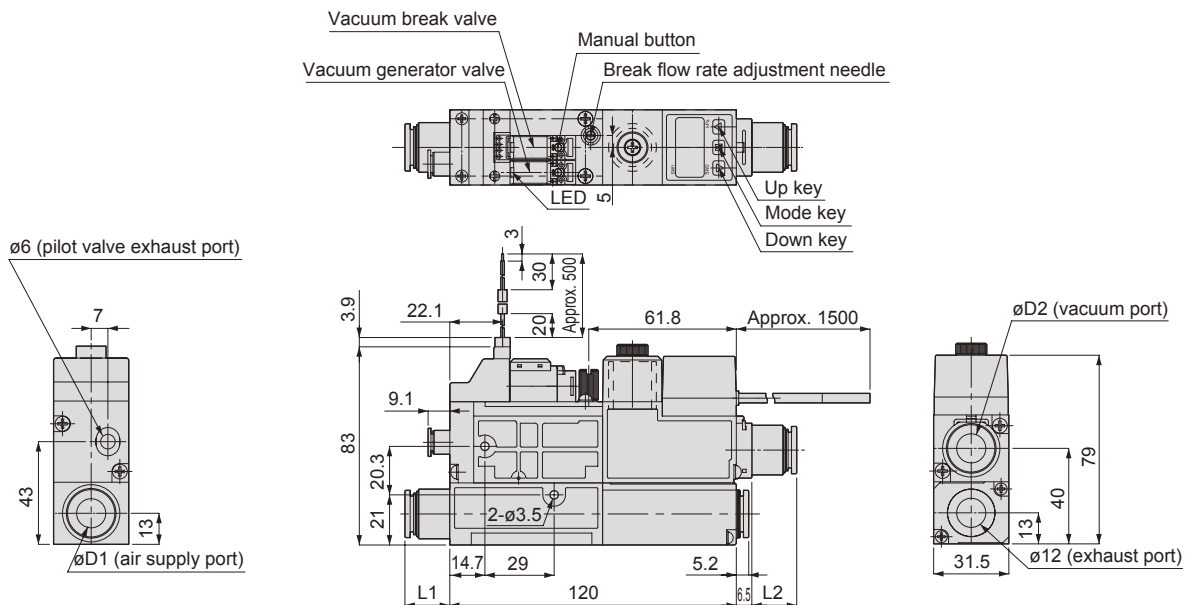
● Without vacuum switch



Unit: mm

	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

● With LED display and 2-point NPN output vacuum pressure switch



Unit: mm

	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

Ejector system

VSY

VSH·VSU
VSB·VSC

VSG

VSK
VSKM

VSJ
VSJM

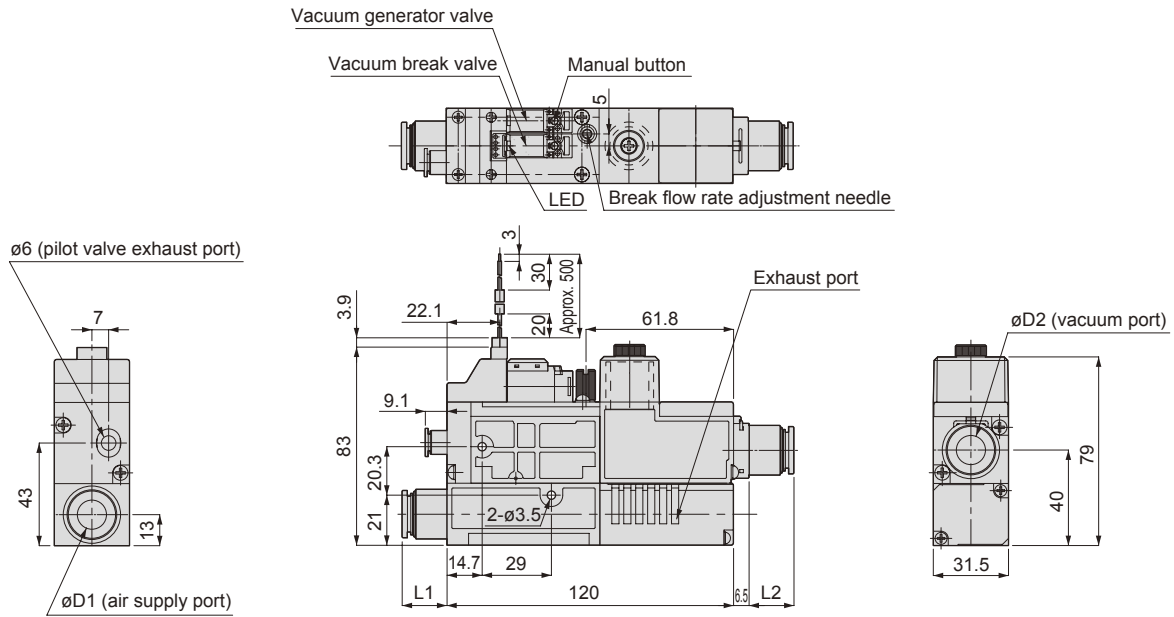
VSX
VSXM

VSQ

VSZM

Dimensions (2 step nozzle type, atmospheric release type)

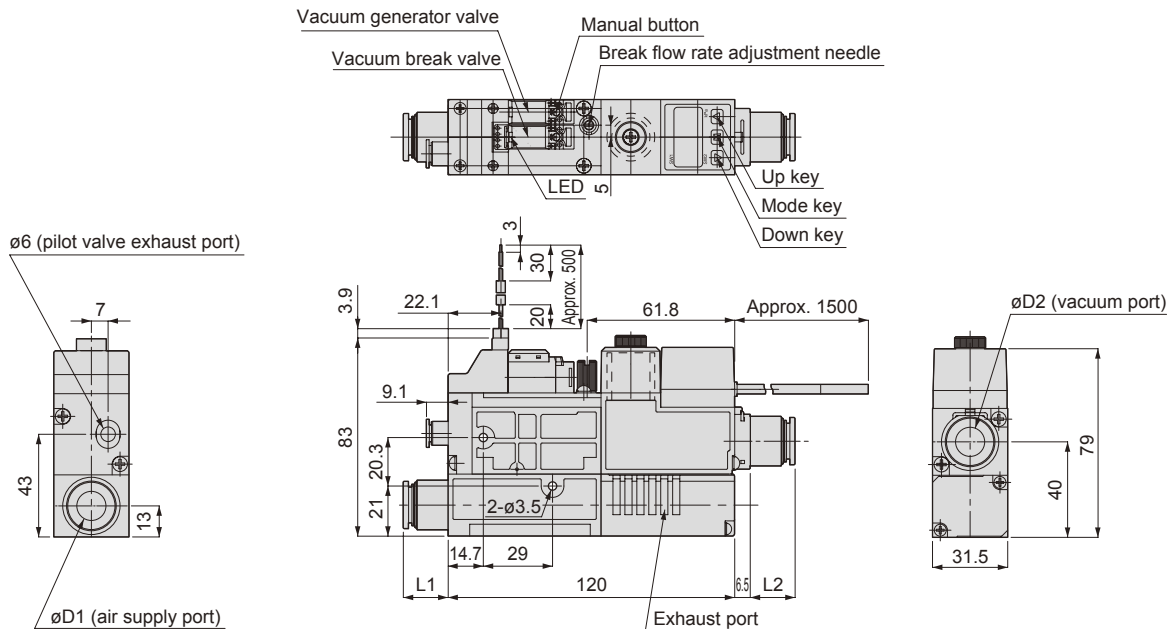
● Without vacuum switch



Unit: mm

	O.D. øD1	L1	O.D. øD2	L2
Air supply port	6	11.1	-	-
	8	12.2	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7

● With LED display and 2-point NPN output vacuum pressure switch

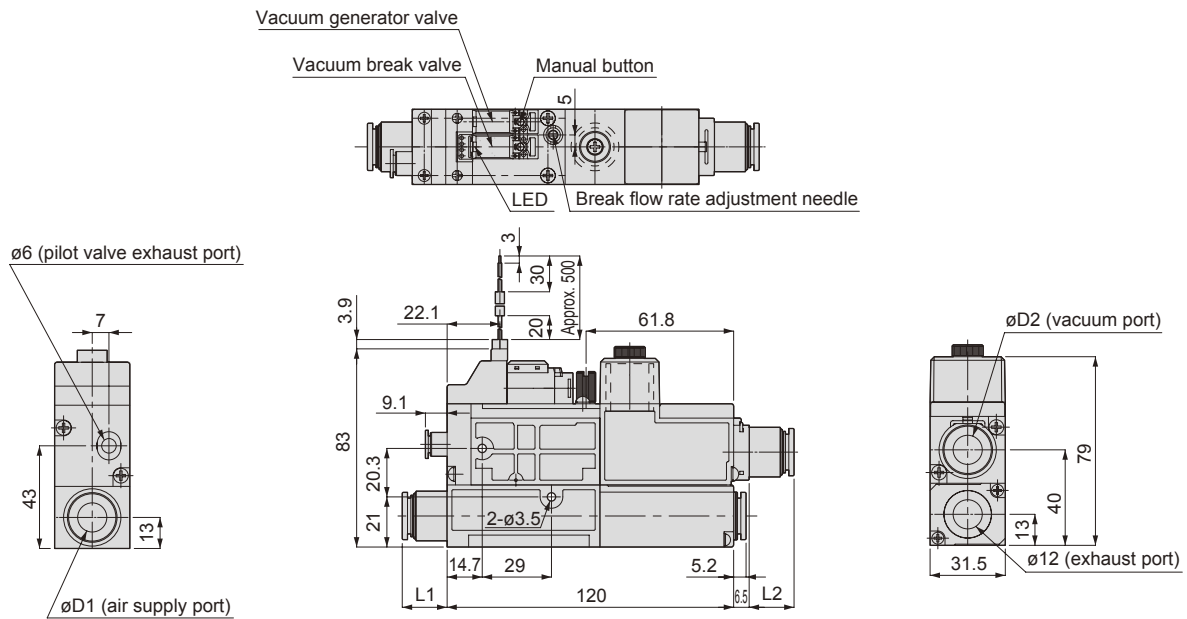


Unit: mm

	O.D. øD1	L1	O.D. øD2	L2
Air supply port	6	11.1	-	-
	8	12.2	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7

Dimensions (2 step nozzle type, common exhaust type)

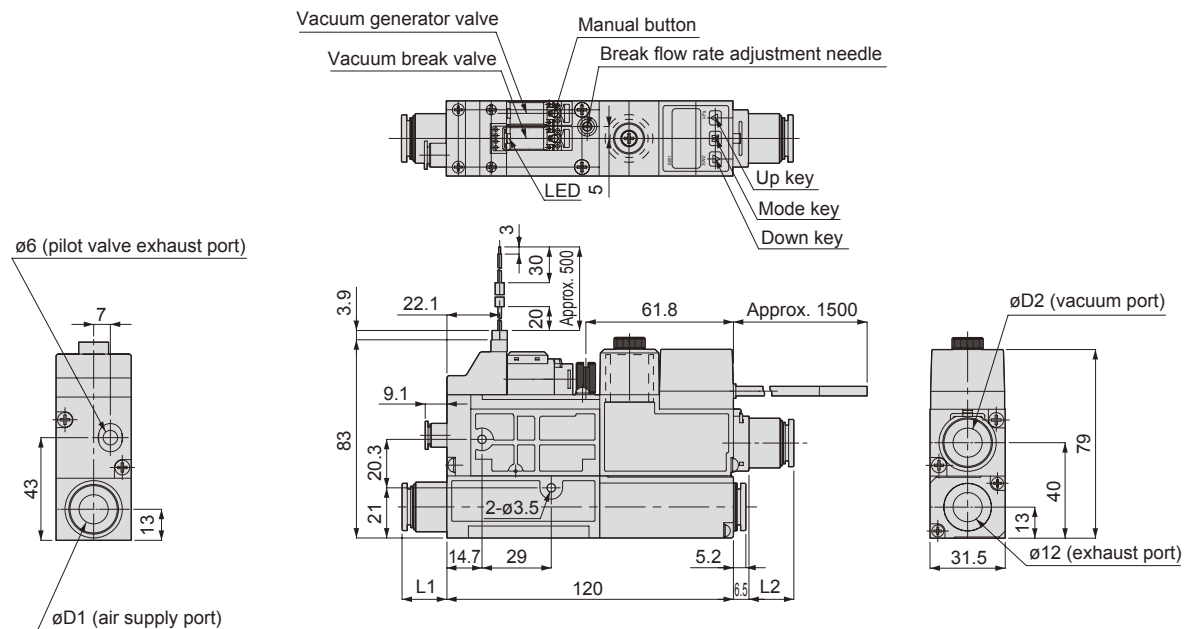
● Without vacuum switch



Unit: mm

	O.D. øD1	L1	O.D. øD2	L2
Air supply port	6	11.1	-	-
	8	12.2	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7

● With LED display and 2-point NPN output vacuum pressure switch



Unit: mm

	O.D. øD1	L1	O.D. øD2	L2
Air supply port	6	11.1	-	-
	8	12.2	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7

Ejector system

VSY

VSH·VSU
VSB·VSC

VSG

VSK
VSKM

VSJ
VSJM

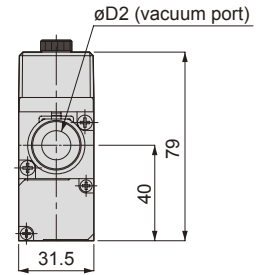
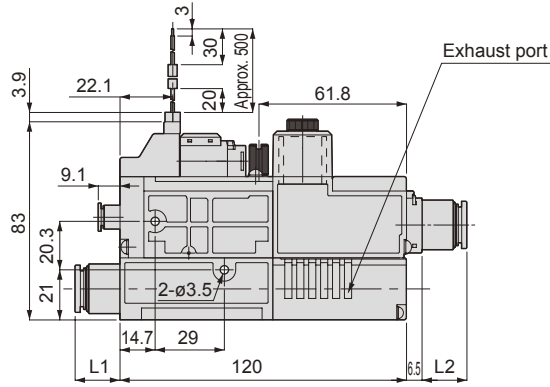
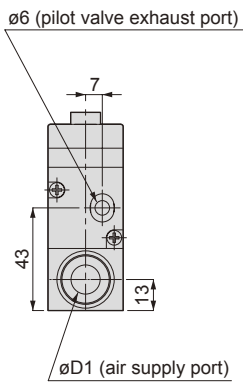
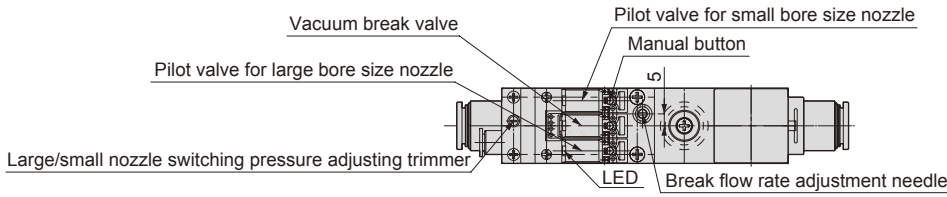
VSX
VSXM

VSQ

VSZM

Dimensions (twin nozzle types, atmospheric release type)

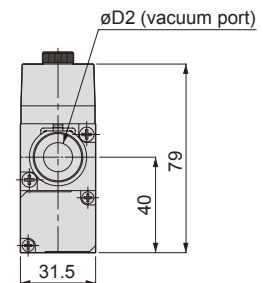
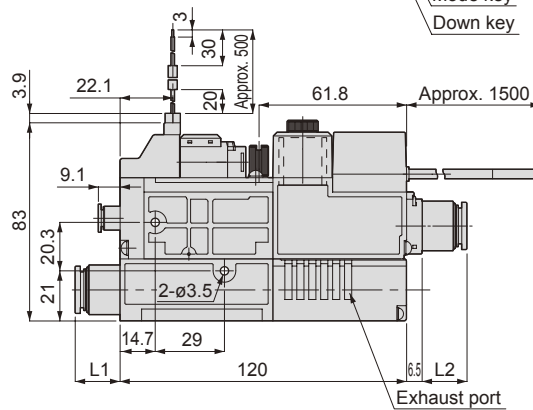
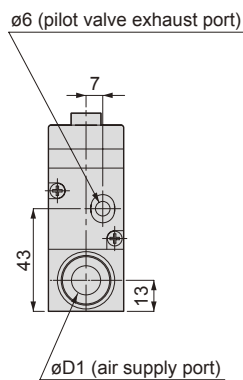
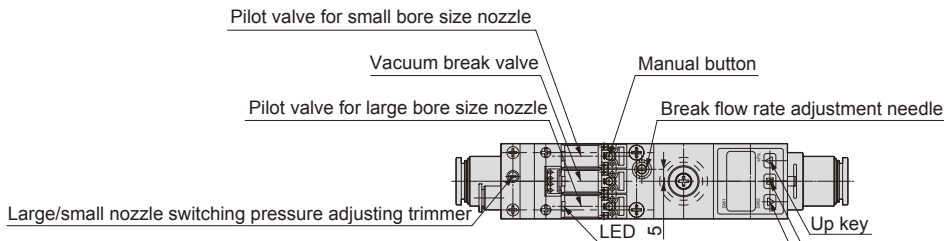
● Without vacuum switch



Unit: mm

	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

● With LED display and 2-point NPN output vacuum pressure switch

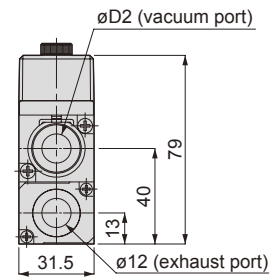
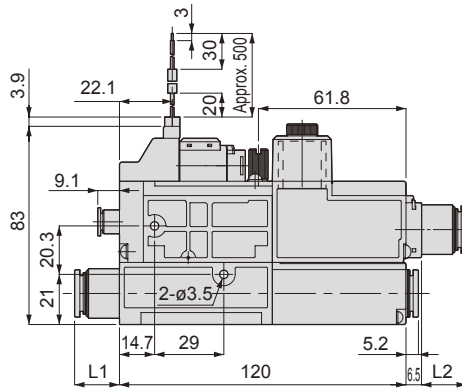
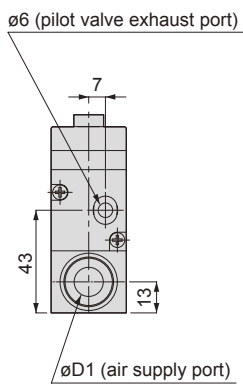
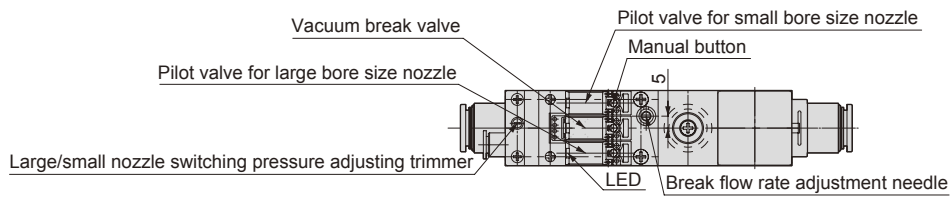


Unit: mm

	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

Dimensions (twin nozzle types, common exhaust type)

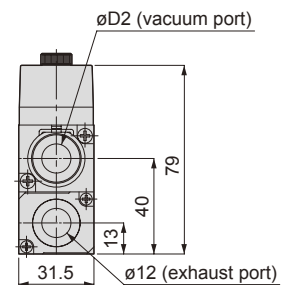
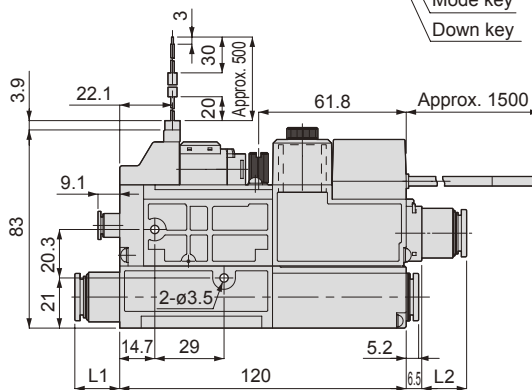
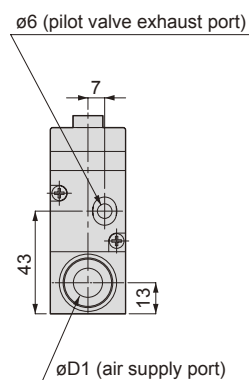
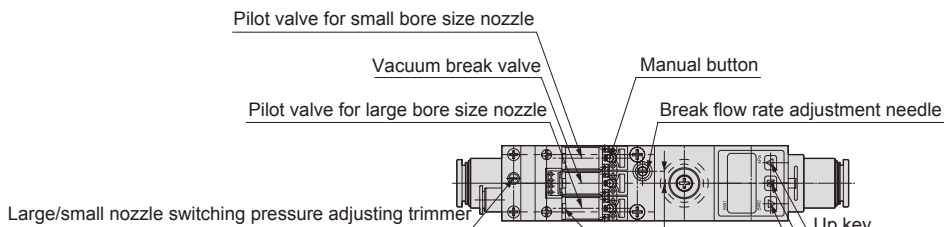
● Without vacuum switch



Unit: mm

	O.D. $\phi D1$	L1	O.D. $\phi D2$	L2
Air supply port	8	12.2	-	-
	10	14.7	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7

● With LED display and 2-point NPN output vacuum pressure switch



Unit: mm

	O.D. $\phi D1$	L1	O.D. $\phi D2$	L2
Air supply port	8	12.2	-	-
	10	14.7	-	-
Vacuum port	-	-	8	12.2
	-	-	10	14.7

Ejector system

VSY

VSH·VSU
VSB·VSC

VSG

VSK
VSKM

VSJ
VSJM

VSX
VSXM

VSQ

VSZM

Safety precautions

Refer to Intro 13 for general precautions of the pneumatic system components.

WARNING

- The working temperature range is 5 °C to 50 °C. Do not use this product under other temperature conditions.
- When continuously energizing the pilot valve for a long time, heat generated from the coil could cause burns or adversely affect peripheral devices. Contact CKD when energizing the pilot valve for a long time.
- When using a self-holding type, the switching valve location is neutral when the pilot air supply is stopped and then restarted, including when first used after delivery. When restarting the pilot supply, issue a signal to the pilot valve or switch the valve manually.
- Check that leakage current is 1 mA or less when operating the valve. Malfunctions could result from the leakage current and cause accidents.
- Do not use this vacuum unit in fluids or in an atmosphere with corrosive substances.
- Do not use this vacuum unit in an atmosphere containing fluids or flammable or explosive gasses. This product is not explosion proof, and it could cause fire and an explosion.
- Do not use this vacuum unit for applications that generate heat exceeding the working temperature range. The switch could be damaged.
- Connect cable after the power turned OFF. Check the lead wire color and terminal numbers when wiring, and check that the output terminal, power terminal and common terminal are not short-circuited. The switch may fail if these terminals are short-circuited.

CAUTION

- Compressed air contains large amount of drainage (water, oxidized oil, tar, foreign matter, etc.) that may adversely affect performance. Dehumidify air with an after cooler or dryer and improve air quality.
- Do not use a lubricator.
- Rust, etc., in piping may result in operation faults. Install a 5 um or smaller filter preceding the supply port. Flush pipes before use and at an appropriate cycle.
- Do not apply excessive tension or bending to the pilot valve or vacuum switch leads. Wires or connectors may break.
- Avoid using this vacuum ejector in environments with corrosive or flammable gas. Do not use this unit for fluids.
- This product does not have a drip proof or dustproof structure. Avoid using it where it could be subject to water, oil or dust.
- Avoid sucking in dust, salt or iron chips, etc.
- Do not operate the vacuum break valve while generating vacuum.
- When replacing the cartridge joint at the supply or vacuum port, remove all matter adhered to the seal, and accurately insert the pin.
- Keep the piping for the vacuum, common exhaust, pilot exhaust, and supply as short as possible. The vacuum component's true performance may not be attained if there is piping resistance.
- Use a stable DC power supply.
- Insert a surge voltage absorption circuit in the relay or solenoid valve, etc., connected to the output terminal or power terminal. Avoid uses in which the current exceeds the rating.
- Ground the FG terminal when using the unit power, such as the switching power.
- Do not short-circuit the output terminal with other terminals.
- Do not apply an excessive load on the component as it could break.
- Wiring or uses that apply a load on the nozzle, etc., could result in damage.
- When using the twin-nozzle, provide a margin between the vacuum during workpiece suction and for the large/small nozzle switching pressure switch's setting value. If the vacuum and setting value are the same, the large/small bore size pilot valve may operate in sequence.

How to use

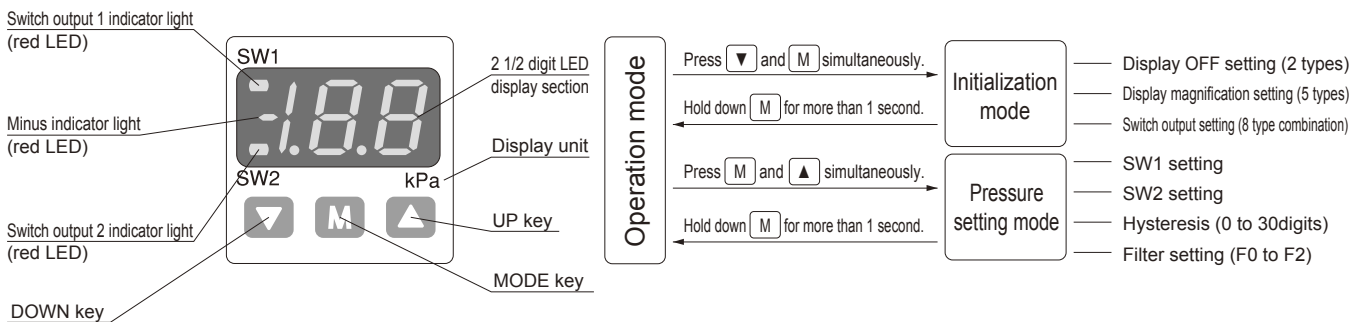
1. Using the valve

- Energizing (Check wiring, and turn power ON.)
- Energize the lead of the solenoid valve to be operated (black: vacuum, gray: vacuum break). The valve starts operating.

2. Using the twin-nozzle type valve

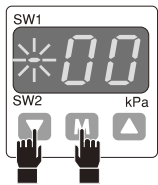
- When using the twin-nozzle type valve, apply constant voltage to the brown and blue leads.
- Adjust the reference vacuum pressure setting with the large/small nozzle switching pressure adjusting trimmer.
- * The large/small nozzle switching is controlled with an internal circuit when the vacuum generation valve is energized.

3. Vacuum switch parts and operation procedures



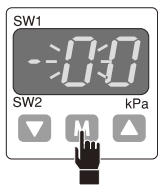
4. Vacuum sensor initialization mode

■ Enter initialization mode.



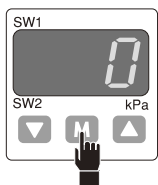
Press the \downarrow key and M key simultaneously in operation mode.
When initialization mode is entered, the 3rd digit blinks.
-00 is displayed when used for the first time.

■ Set initial conditions

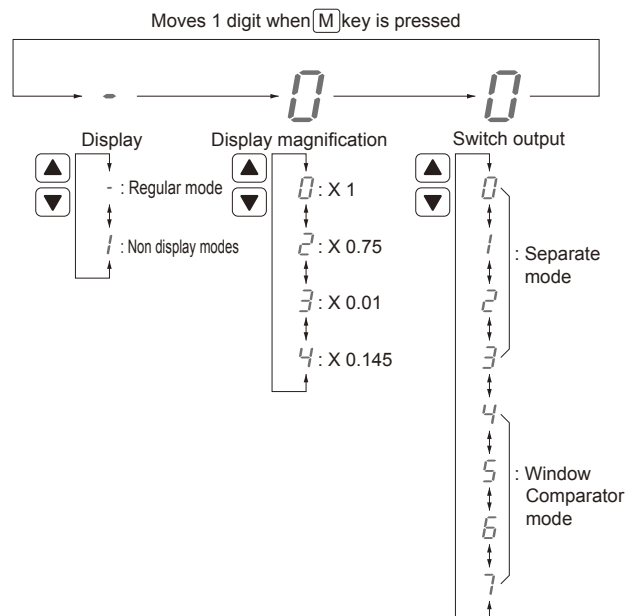


The digit moves once each time the M key is pressed. The settable digit blinks.
Setting conditions change each time the \downarrow key or \uparrow key is pressed.

■ Exit initialization mode.



Hold down the M key for more than 1 second. Initial conditions are set, and the mode returns to operation mode.



Ejector system

VSY

VSH•VSU
VSB•VSC

VSG

VSK
VSKM

VSJ
VSJM

VSX
VSXM

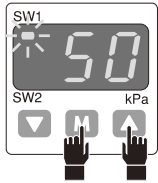
VSQ

VSZM

How to use

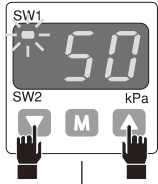
5. Vacuum sensor pressure setting mode

■ Enter pressure setting mode.



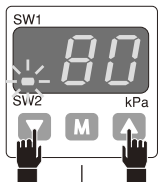
Press the **M** key and **▲** key simultaneously in operation mode.
When pressure setting mode is entered, SW1 blinks and the setting 1 value is displayed.
(50) is displayed when used for the first time.

■ Set pressure.



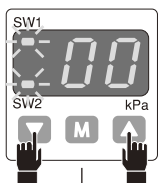
"Setting 1 (P1)"
The SW1 LED blinks.
Set setting 1 (P1) with the **▼** key or **▲** key.
(50) is displayed when used for the first time.)
Note 1) Pressure is set within displayed range.
Note 2) If window comparator mode is selected, the setting satisfies this equation: $P1 \leq P2-2H$.

Press the **M** key.



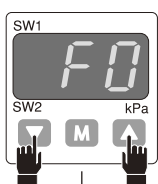
"Setting 2 (P2)"
The SW2 LED blinks.
Set setting 2 (P2) with the **▼** key or **▲** key.
(50) is displayed when used for the first time.)
Note 1) Pressure is set within displayed range.
Note 2) If window comparator mode is selected, the setting satisfies this equation: $P1 \leq P2-2H$.

Press the **M** key.



"Setting hysteresis (H)"
SW1 and SW2 LEDs blink.
Set hysteresis (H) with the **▼** key or **▲** key.
(00) is displayed when used for the first time.)
Note 1) Hysteresis is set within 30 digits.
Note 2) If window comparator mode is selected, the setting satisfies this equation: $P1 \leq P2-2H$.

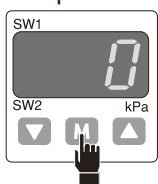
Press the **M** key.



"Setting the digital filter"
Set the digital filter with the **▼** key or **▲** key.
F0: Without filter F1: 25ms filter F2: 250ms filter
(F0) is displayed when used for the first time.)

Press the **M** key.

■ Exit pressure setting mode.



Hold down the **M** key for more than 1 second.
Pressure conditions are set, and the mode returns to operation mode.

Ejector system

VSQ

VSH·VSU
VSB·VSC

VSG

VSK
VSKM

VSJ
VSJM

V SX
V SXM

VSQ

VSZM

How to use

6. Vacuum switch functions

Display OFF

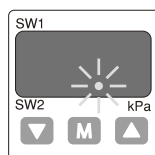
If no keys are pressed for 10 seconds, display turns OFF, and the LED display turns OFF. The LED display turns ON again if a key is pressed while the LED is OFF.

Note 1) The decimal point below blinks during display OFF mode.

Note 2) Switch output and switch output indicator lamp function even during display OFF mode.

Note 3) Air is not displayed during display OFF mode.

* See the explanation on initialization mode (page 137) for details on setting display OFF mode.



Display magnification

Display magnification is selected from ranges at right.

* See the explanation on initialization mode (page 137) for details on setting display OFF mode.

Selected number	Pressure range	
	Display magnification	Display range
0	X 1 (kPa)	-100 to 100
2	X 0.75 (cmHg)	-75 to 75
3	X 0.01 (bar)	-1.00 to 1.00
4	X 0.145 (psi)	-14.5 to 14.5

Switch output

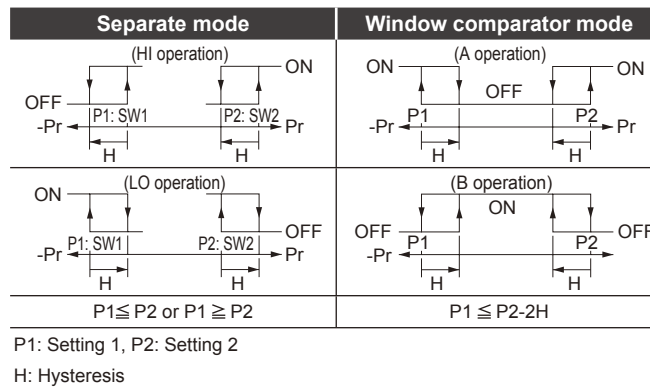
Switch output is selected from the following table.

Note 1) Setting 1 and SW1, and setting 2 and SW2 operate together in separate mode.

Note 2) SW1 and SW2 operate with the common minimum (Setting 1) and maximum (setting 2) in window comparator mode.

* See the explanation on initialization mode (page 137) for details on setting switch output.

Output	SW1				SW2			
	Separate		Window comparator		Separate		Window comparator	
	HI	LO	A	B	HI	LO	A	B
Operation	HI	LO	A	B	HI	LO	A	B
Selected number	0	○			○			
	1	○				○		
	2		○		○			
	3		○			○		
	4			○			○	
	5		○					○
	6			○				○
	7			○				○
	Setting 1		Lower limit: setting 1 Upper limit: setting 2		Setting 2		Lower limit: setting 1 Upper limit: setting 2	
	Note 1		Note 2		Note 1		Note 2	



Digital filter

Two digital filters (25 ms, 250 ms) is selected.

Use this when pressure fluctuates greatly, and display cannot be read easily.

Note 1) The selected digital filter is applied to pressure display and switch output.

* See the explanation on pressure setting mode (page 137) for details on setting the digital filter.

Ejector system

VSY

VSH·VSU
VSB·VSC

VSG

VSK
VSKM

VSJ
VSJM

VSX
VSXM

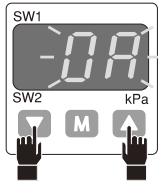
VSQ

VSZM

How to use

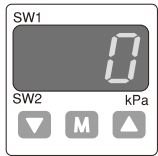
7. Adjusting the vacuum switch zero point, error display

■ Adjust the zero point.

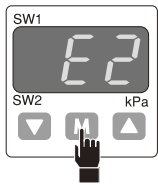


Release pressure applied on the pressure port to atmospheric pressure (state with no pressure applied). Press the key and key simultaneously in operation mode. blinks when zero point adjustment is started.

■ Quit zero point adjustment.



Release the key and key while is blinking. After one second, the zero point is adjusted, and display returns to operation mode.



is displayed when pressure is applied during zero point adjustment. Press the key for more than one second, and reset . Release pressure applied to the pressure port to atmospheric pressure, and adjust the zero point again.

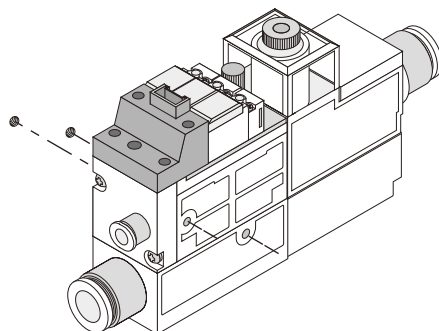
■ Take the following measures if an error occurs.

Error display	Descriptions	Remedy
	Overload current is flowing. (The LED for SW1 or SW2, where the overload is detected, blinks.)	Turn power OFF, and check the state of the load.
	Pressure is applied during zero point adjustment.	Press the key to reset . Release pressure applied on pressure port to atmospheric pressure, and adjust the zero point again.
	110% of the rated pressure range is exceeded. (When 111 kPa is displayed with 102R)	Check applied pressure.
	Applied pressure exceeds the maximum of display pressure range.	Check applied pressure.
	Applied pressure is less than the minimum of the display pressure range.	Check applied pressure.

* An error is not displayed when display OFF mode is selected.

8. Fixing method

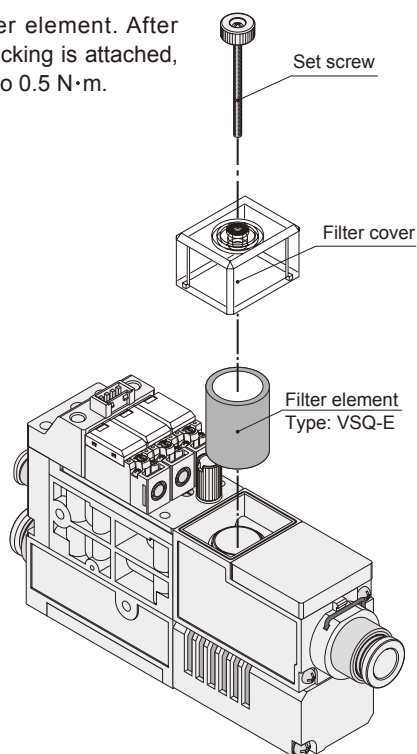
Fix the vacuum unit VSQ with M3 screws using the fixing holes on the resin body. (Refer to external dimension drawings for fixing hole pitch)



How to use

9. Replacing the filter element

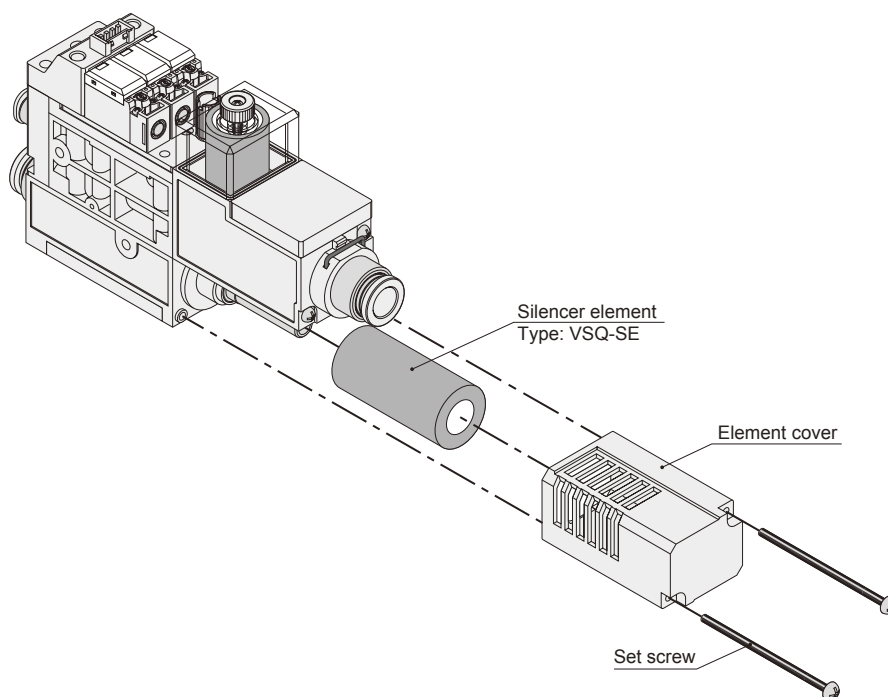
Remove the set screw, and replace the filter element. After replacing the element, confirm that the filter packing is attached, and securely fix with a tightening torque of 0.3 to 0.5 N·m.



10. Replacing the silencer element

Replace the silencer element as follows.

- ① Remove the two element cover set screws.
- ② Remove the element.
- ③ Insert the element, attach the element cover, and securely tighten with a tightening torque of 0.4 to 0.5 N·m.



Ejector system

VSY

VSH·VSU
VSB·VSC

VSG

VSK
VSKM

VSJ
VSJM

VSX
VSXM

VSQ

VSZM

How to use

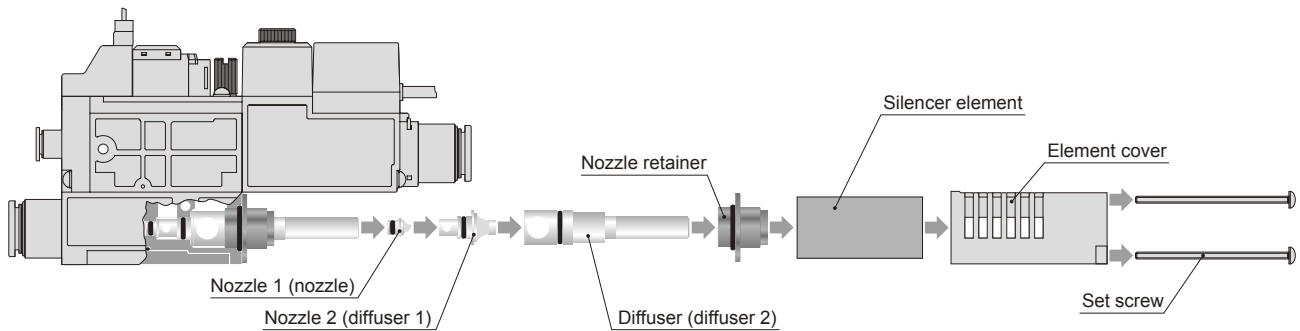
11. Replacing and cleaning the nozzle and diffuser

Replace and clean the nozzle and diffuser as follows.

- ① Using a suitable Phillips screwdriver, remove the two-element cover set screws, and remove the element cover.
- ② -1. For single nozzle type: Pull out parts in the order of the nozzle retainer, diffuser, and nozzle 1.
- ② -2. For twin nozzle types: Pull out parts in the order of the nozzle retainer, diffuser, nozzle 2, and nozzle 1.
- ② -3. For 2 step nozzle type: Pull out parts in the order of nozzle retainer, diffuser 2, diffuser 1, and nozzle.
- ③ -1. For single nozzle type: Remove all matter on the inner side of nozzle 1 and diffuser and the seal with compressed air or by wiping it off.
- ③ -2. For twin-nozzle: Remove all matter on the inner side of nozzles 1 and 2 and the diffuser and the seal with compressed air or by wiping it off.
- ③ -3. For two-step nozzle: Remove all matter on the inner side of the nozzle and diffusers 1 and 2 and the seal with compressed air or by wiping it off.

(Note) Do not scratch the inside of the nozzle and diffuser or the seal.

- ④ -1. For single-nozzle: Insert parts into the unit in the order of nozzle 1, diffuser, and nozzle retainer.
- ④ -2. For twin-nozzle: Insert parts into the unit in the order of nozzle 1, nozzle 2, diffuser, and nozzle retainer.
- ④ -3. For two-step nozzle: Insert parts into the unit in the order of nozzle, diffuser 1, diffuser 2, and nozzle retainer.
- ⑤ Mount the element cover, and securely fix it with the set screws.



* Parts in () are for the two-step nozzle.

12. Replacing the cartridge joint

Replace the cartridge joint as follows.

- ① Pull out the set pin with a flat-tip screwdriver, etc.
- ② Pull the cartridge out in the connection direction.

(Note) Before installing the cartridge in the unit, check that no dirt or lint, etc., is caught on the O-ring.

