

Integrated vacuum ejector unit that emphasizes basic performance

# VSG Series

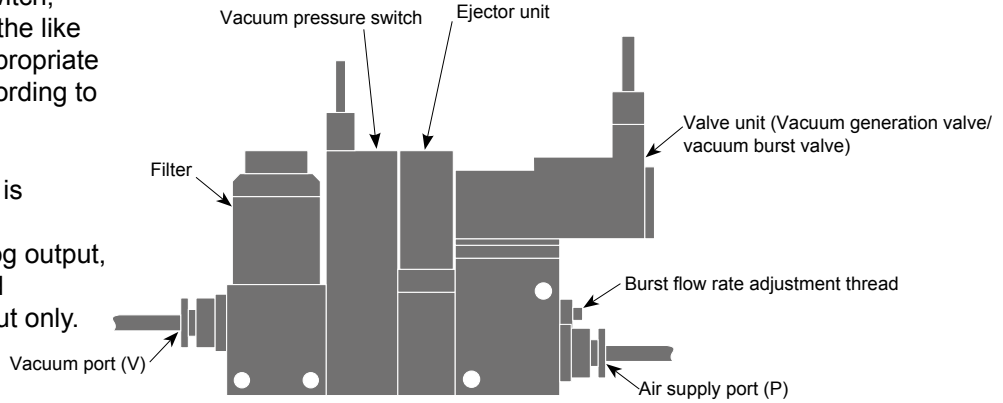
● Nozzle diameter:  $\phi 0.5$ ,  $\phi 0.7$ ,  $\phi 1.0$

The vacuum pressure switch, vacuum burst valve and the like are unitized, allowing appropriate types to be selected according to the purpose of use.



## Features

- The vacuum pressure switch, vacuum burst valve and the like are unitized, allowing appropriate types to be selected according to the purpose of use.
- Vacuum pressure switch is available in 3 output specifications: with analog output, 2-point switch output and inexpensive analog output only.



## Specifications

Descriptions	VSG
Working fluid	Air
Working pressure MPa	0.25 to 0.7
Ambient/fluid temperatures °C	5 to 50
Lubrication	Not required

## Supply valve specifications

Descriptions	Supply valve
Valve and operation	Pilot operated poppet valve
Rated voltage V	24 DC $\pm 10\%$ , 100 AC $\pm 10\%$
Power consumption	1.2 W (with LED)/1.5 VA (with LED)
Effective cross-sectional area mm <sup>2</sup>	5
Manual override	Non-locking push type

## Vacuum burst valve specifications

Descriptions	Vacuum break valve
Valve and operation	Direct acting poppet valve
Rated voltage V	24 DC $\pm 10\%$ , 100 AC $\pm 10\%$
Surge suppressor	Diode (24 VDC), bridge diode (100 VAC)
Power consumption	1.2 W (with LED)/1.5 VA (with LED)
Effective cross-sectional area mm <sup>2</sup>	0.3
Manual override	Non-locking push type

## Vacuum filter specifications

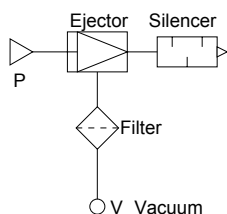
Descriptions	Vacuum filter	
Material	Element	Polyvinyl formal
	Cover	Special polyester transparent
	Body	PBT
Filtration rating $\mu\text{m}$	10	

### Vacuum pressure switch specifications

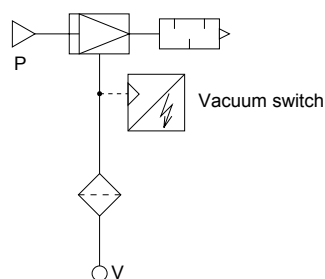
Descriptions		Vacuum pressure switch		
Model No.		VSG... -NA	VSG... -NW	VSG... -A
Output specifications		Switch output 1 points	Switch output 2 points	-
		Analog output 1 point	-	Analog output 1 point
Power supply voltage	V	12 to 24 DC $\pm 10\%$ Ripple content rate 10% (P-P) or less		
Power consumption (24 VDC)		17 mA or less (when 1 switch is ON)	25 mA or less (when 2 switches are ON)	15 mA or less (with 0 mA output current)
Working fluid		Air, inert gas		
Working pressure	kPa	-100 to 0		
Proof pressure	kPa	200		
Operating ambient temperature	$^{\circ}\text{C}$	0 to 50		
Ambient humidity		35 to 85% RH (no condensation)		
Switch output	Output points	1	2	-
	Output type	NPN transistor/open collector		
	Set pressure kPa	-100 to 0		
	Repeatability	$\pm 3\%$ F.S. (at $25^{\circ}\text{C}$ )		
	Hysteresis	Approx. 1 to 15% of set value	2% F.S. or less	-
	Switch rating	30 VDC, 80 mA or less		
	Residual voltage V	0.8 or less		
Analog output	Output voltage V	1 to 5	-	1 to 5
	Zero point voltage V	$1 \pm 0.1$	-	$1 \pm 0.1$
	Span voltage V	$4 \pm 0.1$	-	$4 \pm 0.1$
	Linearity/hysteresis	$\pm 0.5\%$ F.S. or less	-	$\pm 0.5\%$ F.S. or less

### Circuit diagram

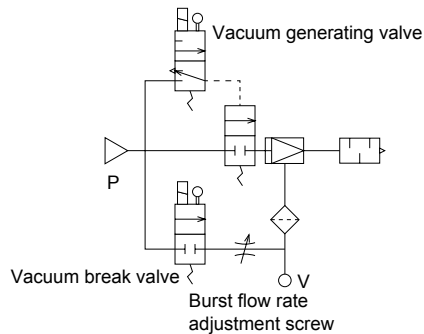
● VSG-\*A-\* (Unit combination: A)



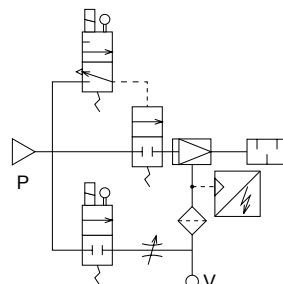
● VSG-\*B-\* (Unit combination: B)



● VSG-\*E-\* (Unit combination: E)



● VSG-\*F-\* (Unit combination: F)



Ejector system

VSY

VSHVSV  
VSBVSC

VSG

VSK  
VSKM

VSJ  
VSJM

VSN  
VSNM

VSX  
VSXM

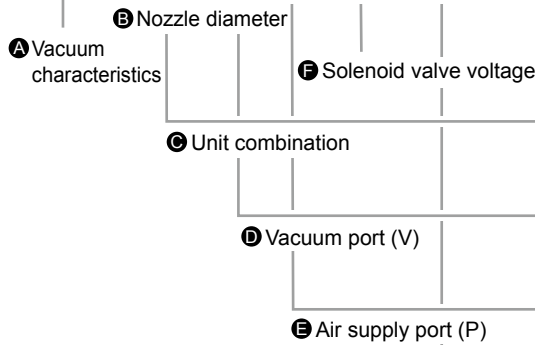
VSQ

VSZM

## How to order

● 20 mm width single dedicated vacuum ejector unit

**VSG - H 07 F - 6 6 - 3 - NW**



Code	Content
<b>A Vacuum characteristics *1</b>	
H	High vacuum/medium flow rate
L	Medium vacuum/large flow rate
E	High vacuum/low flow rate
<b>B Nozzle diameter *1, *3, *4</b>	
05	φ0.5
07	φ0.7
10	φ1.0
<b>C Unit combination *5, *6</b>	
Refer to Appendix 1 for unit combination.	
<b>D Vacuum port (V) *2, *3, *4</b>	
4	φ4 push-in fitting
6	φ6 push-in fitting
<b>E Air supply port (P) *2, *3, *4</b>	
4	φ4 push-in fitting
6	φ6 push-in fitting
<b>F Solenoid valve voltage *5</b>	
1	100 VAC
3	24 VDC
<b>G Vacuum pressure switch specifications *6</b>	
NW	NPN output 2 points
NA	NPN output 1 point + analog output
A	Analog output

## ⚠ Precautions for model No. selection

- \*1 : "E05" cannot be combined with the combination of **A** and **B**.
- \*2 : Only "44" or "66" can be selected for the combination of **D** and **E**.
- \*3 : Only "44" can be selected for **D** and **E** when **B** is "05".
- \*4 : Only "66" can be selected for **D** and **E** when **B** is "07" or "10".
- \*5 : When **C** Unit combination is "A" or "B", **F** Solenoid valve voltage cannot be selected.
- \*6 : When **C** Unit combination is "A" or "E", **G** Vacuum pressure switch specifications cannot be selected.

## ● Maintenance part model No.

· Replacement filter element

## VSG-E

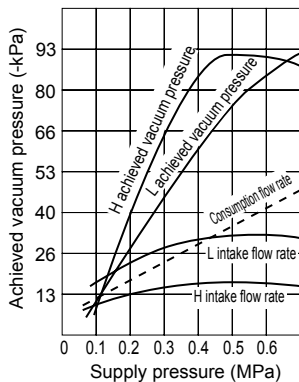
## Vacuum characteristics

## Appendix 1

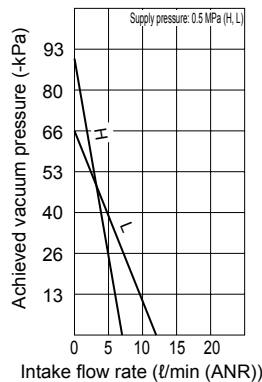
Unit combination				
Code	Filter	Vacuum pressure switch with LED display	Vacuum generating valve	Vacuum break valve
A	●	-	-	-
B	●	●	-	-
E	●	-	●	●
F	●	●	●	●

## ● VSG-05

### Vacuum characteristics

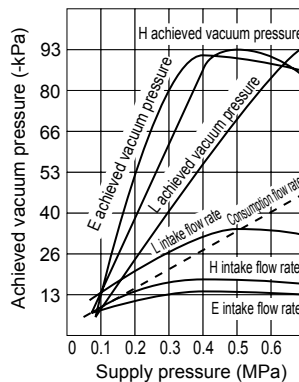


### Flow characteristics

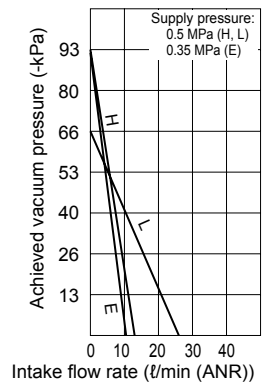


## ● VSG\*07

### Vacuum characteristics

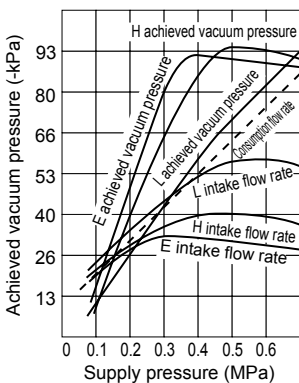


### Flow characteristics

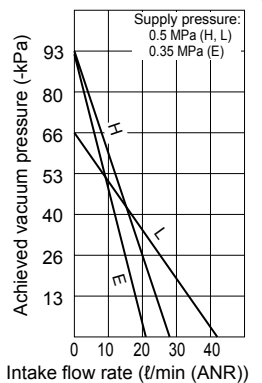


## ● VSG\*10

### Vacuum characteristics



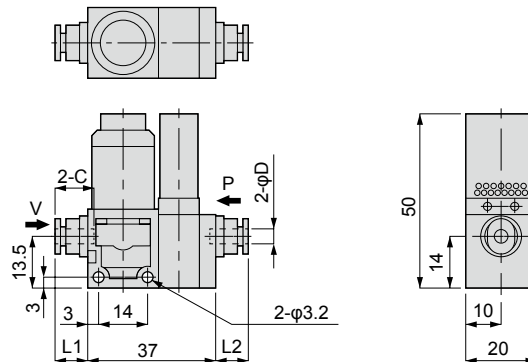
### Flow characteristics



- Supply pressure with the characteristics described above occurs at vacuum generation.
- Achieved vacuum pressure with the characteristics described above produces abnormal noise (soft clicking sound) at supply pressure just before reaching the peak value. When this abnormal noise occurs, the characteristics become unstable and operation becomes louder. Reset the supply pressure, as it may affect the sensor, etc., and cause trouble.
  - Ex. 1: Source pressure is 0.5 MPa with the H type vacuum ejector. During vacuum ejector operation, supply pressure drops to 0.43 MPa due to pressure drop, and abnormal noise is generated. → Reset supply pressure to 0.5 MPa during vacuum ejector operation.
- Carry out piping or equipment selection with 3 times the effective cross-sectional area of the nozzle diameter cross-sectional area as a guideline. Satisfactory vacuum characteristics cannot be obtained if adequate supply air flow rate is not maintained.
  - (A soft clicking sound occurs at set pressure. Insufficient intake flow rate, insufficient achievement of achieved vacuum pressure, etc.)
  - Ex. 2: Abnormal noise occurs even when pressure is 0.5 MPa with H type vacuum ejector during vacuum ejector operation. → Insufficient supply air flow rate. (Supply air flow rate is restricted in front of the vacuum ejector by piping resistance, etc., and supply air flow rate satisfying the properties is not obtained. → Select piping components that can secure the required effective cross-sectional area.)
  - Ex. 3: For vacuum ejector with 1.0mm nozzle diameter, cross-sectional area is  $0.5^2 \times \pi = 0.785 \text{ mm}^2 \times 3 = 2.35 \text{ mm}^2$ . Therefore, carry out piping and equipment selection that ensures an effective cross-sectional area of 2.3mm<sup>2</sup> or greater.

## Dimensions

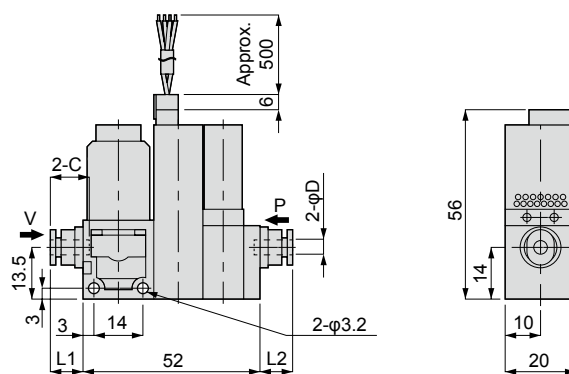
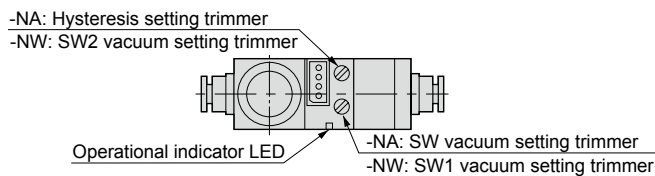
### ● VSG-\*A-\* (Unit combination: A)



Unit: mm

Model No.	Tube O.D. φD	L1	L2	C	Nozzle diameter (mm)	Achieved vacuum pressure (-kPa)	Intake flow rate (l/min (ANR))	Air consumption rate (l/min (ANR))	Weight (g)
VSG-H 05A-44	4	9.9	9.4	11.2	0.5	90	7	11.5	47
VSG-H 07A-66	6	12.3	11.8	11.9	0.7	93	13	23	49
VSG-H 10A-66					1		27	46	
VSG-L 05A-44	4	9.9	9.4	11.2	0.5	66	12	11.5	46
VSG-L 07A-66	6	12.3	11.8	11.9	0.7		26	23	48
VSG-L 10A-66					1		40	46	
VSG-E 07A-66	6	12.3	11.8	11.9	0.7	90	10.5	17	48
VSG-E 10A-66					1		21	34	

### ● VSG-\*B-\* (Unit combination: B)



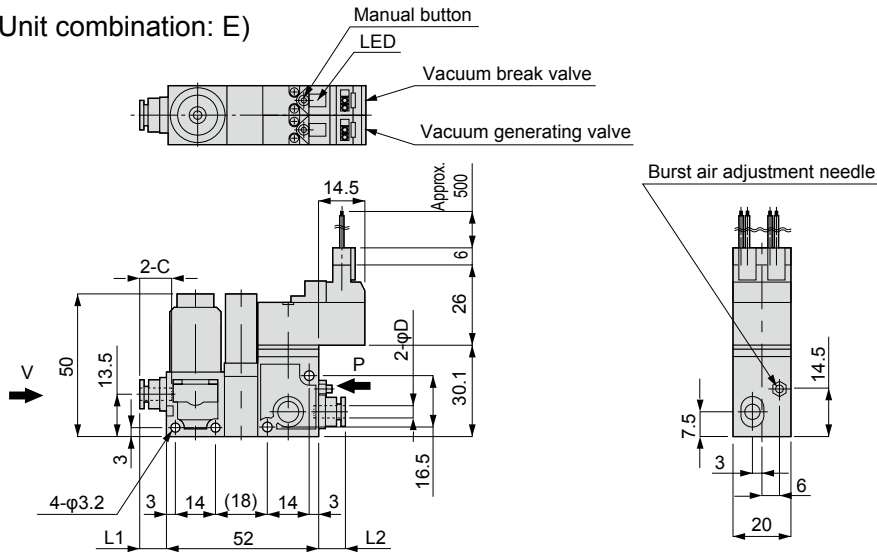
Note : The operational indicator LED and vacuum setting trimmer are not included with the analog output (-A).

Unit: mm

Model No.	Tube O.D. φD	L1	L2	C	Nozzle diameter (mm)	Achieved vacuum pressure (-kPa)	Intake flow rate (l/min (ANR))	Air consumption rate (l/min (ANR))	Weight (g)
VSG-H 05B-44-□	4	9.9	9.4	11.2	0.5	90	7	11.5	74
VSG-H 07B-66-□	6	12.3	11.8	11.9	0.7	93	13	23	75
VSG-H 10B-66-□					1		27	46	
VSG-L 05B-44-□	4	9.9	9.4	11.2	0.5	66	12	11.5	73
VSG-L 07B-66-□	6	12.3	11.8	11.9	0.7		26	23	75
VSG-L 10B-66-□					1		40	46	
VSG-E 07B-66-□	6	12.3	11.8	11.9	0.7	90	10.5	17	75
VSG-E 10B-66-□					1		21	34	

## Dimensions

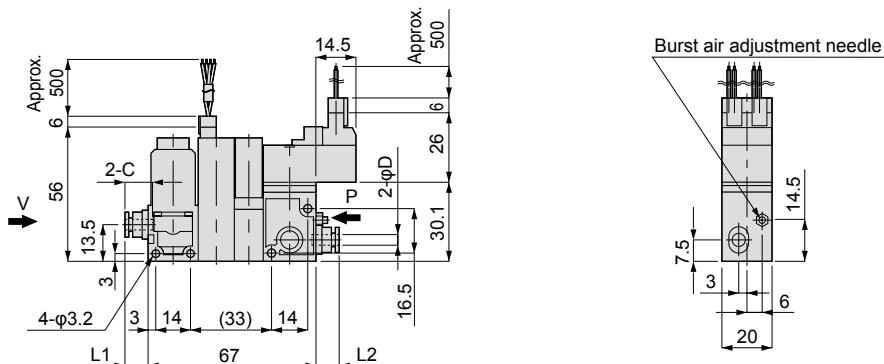
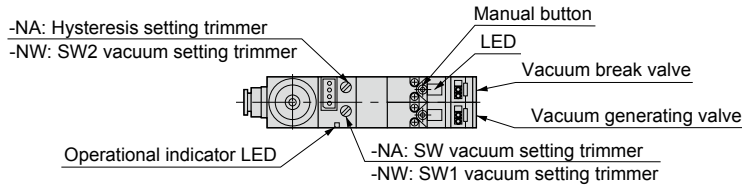
### ● VSG-\*E-\* (Unit combination: E)



Unit: mm

Model No.	Tube O.D. φD	L1	L2	C	Nozzle diameter (mm)	Achieved vacuum pressure (-kPa)	Intake flow rate (l/min (ANR))	Air consumption rate (l/min (ANR))	Weight (g)
VSG-H 05E-44-□	4	9.9	7.9	11.2	0.5	90	7	11.5	99
VSG-H 07E-66-□	6	12.3	10.3	11.9	0.7	93	13	23	100
VSG-H 10E-66-□					1		27	46	101
VSG-L 05E-44-□	4	9.9	7.9	11.2	0.5	66	12	11.5	99
VSG-L 07E-66-□	6	12.3	10.3	11.9	0.7		26	23	101
VSG-L 10E-66-□					1		40	46	100
VSG-E 07E-66-□	6	12.3	10.3	11.9	0.7	90	10.5	17	101
VSG-E 10E-66-□					1		21	34	100

### ● VSG-\*F-\* (Unit combination: F)



Note : The operational indicator LED and vacuum setting trimmer are not included with the analog output (-A).

Unit: mm

Model No.	Tube O.D. φD	L1	L2	C	Nozzle diameter (mm)	Achieved vacuum pressure (-kPa)	Intake flow rate (l/min (ANR))	Air consumption rate (l/min (ANR))	Weight (g)
VSG-H 05F-44-□-□	4	9.9	7.9	11.2	0.5	90	7	11.5	125
VSG-H 07F-66-□-□	6	12.3	10.3	11.9	0.7	93	13	23	128
VSG-H 10F-66-□-□					1		27	46	127
VSG-L 05F-44-□-□	4	9.9	7.9	11.2	0.5	66	12	11.5	127
VSG-L 07F-66-□-□	6	12.3	10.3	11.9	0.7		26	23	
VSG-L 10F-66-□-□					1		40	46	
VSG-E 07F-66-□-□	6	12.3	10.3	11.9	0.7	90	10.5	17	128
VSG-E 10F-66-□-□					1		21	34	

### Safety precautions

Refer to Intro Page 15 for general precautions for vacuum system components.

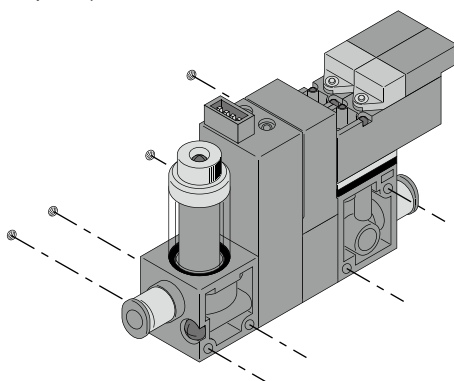
### CAUTION

- Be careful when the piping resistance or required burst flow rate is large. It may cause malfunction due to insufficient burst flow rate. Be sure to check the specifications thoroughly.

## Usage methods

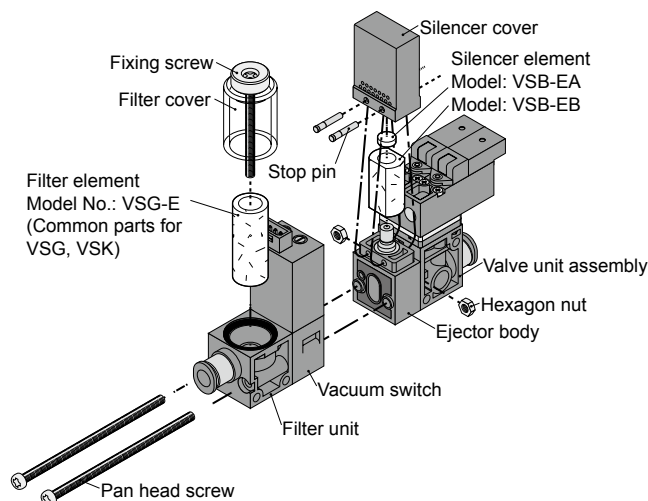
### 1. Fixing method

To fix the vacuum ejector unit VSG, fasten M3 screws through the fixing holes on the resin body. (Refer to the dimensions for the fixing hole pitch.)



### 2. How to replace the element

Remove the fixing screws to replace the filter element. After replacing the filter element and checking that the filter packing has not fallen out, securely fix it with tightening torque of 0.18 to 0.22 N·m.

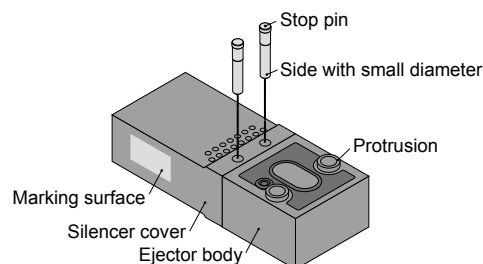


#### Replacing the silencer element

- Remove the 2 pan head screws and 2 stop pins that connect the unit.
  - Be careful not to lose the 2 hex nuts.

#### After replacing the silencer element

- Install the silencer cover on the ejector body and insert 2 stop pins from the ejector body side with protrusions, so that the side with smaller stop pin diameter faces toward the ejector body as shown on the right. Make sure that the packing of each unit does not fall out when connecting the units. Using a suitable Phillips screwdriver, secure the pan-head screws and hex nuts with tightening torque of 0.35 to 0.4 N·m.



Ejector system

VSY

VSHVSU  
VSBVSC

VSG

VSK  
VSKM

VSJ  
VSJM

VSN  
VSNM

VSX  
VXXM

VSQ

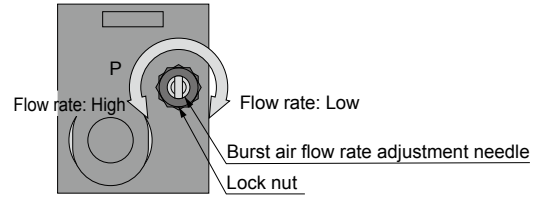
VSZM

## Usage methods

### 3. How to adjust the burst valve

#### How to adjust the burst air

- The burst air flow rate is decreased by turning the burst air adjustment needle to the right (clockwise) and increased by turning it to the left (counterclockwise).
- \* Once the burst air is adjusted, be sure to tighten the lock nut so that the setting will not waver.



### 4. How to attach and remove individual plug-in connectors

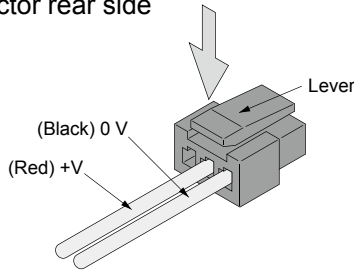
#### How to attach individual plug-in connectors

- To attach an individual plug-in connector, simply insert it until it stops.

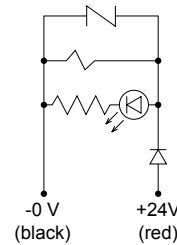
#### How to remove individual plug-in connectors

- To remove the individual plug-in connector, pull it out while pushing the lever at the rear side of the connector in the direction of the arrow.

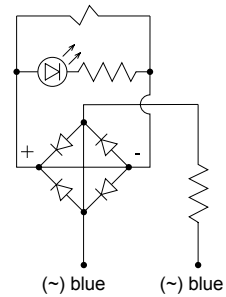
#### Connector rear side



#### ● 24 VDC



#### ● 100 VAC



### 5. How to handle the vacuum pressure switch

#### 1. Pressure setting

- (1) Energization (supply DC power after confirming the wiring.)
- (2) Turn the hysteresis setting trimmer (HYS) fully counterclockwise to set hysteresis to minimum. (Vacuum pressure switch with analog output (-NA) only)
 

Note: If the vacuum pressure is unstable, the output will also become unstable if the hysteresis is minimized.
- (3) Align to the desired setting value by adjusting the pressure setting trimmer (S1 or S2, SW).
 

Note: Use a vacuum gauge or check the set pressure when adjusting the machine.
- (4) Apply pressure and confirm actual operation.
  - (For vacuum pressure switch with analog output (-NA))
 

Switch output (SW): Operation indicator lamp (red LED) turns ON at set pressure or greater.
  - (For vacuum pressure switch with 2-point switch output (-NW))
 

Switch output 1 (S1): Operation indicator lamp (red LED) turns ON at set pressure or greater.

Switch output 2 (S2): Operation indicator lamp (green LED) turns ON at set pressure or greater.

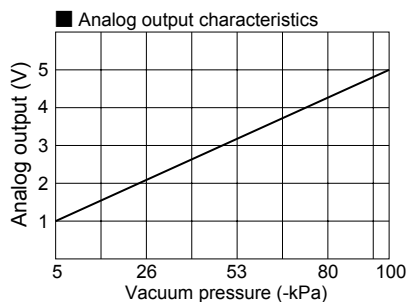
#### 2. Hysteresis setting (Vacuum pressure switch with analog output (-NA) only)

- (1) Hysteresis can be adjusted by the hysteresis setting trimmer (HYS).
- (2) Hysteresis adjusting range is approx. 1 to 15% of the set value. Hysteresis increases when the trimmer is rotated clockwise.
- (3) Hysteresis confirmation
 

Gradually raise and lower the pressure around the set pressure, and read the ON/OFF value of the operation indicator lamp using the vacuum gauge. Hysteresis is the difference between the pressure indication values in ON and OFF states.
- (4) Hysteresis adjustment application examples
  - When the pressure is pulsating and the output cuts out at fine intervals, increase the hysteresis.
  - When setting the allowable range of pressure drop.

## Usage methods

### 3. Output characteristics of vacuum pressure switch with analog output (-A)



### 4. Wiring and piping

- (1) Be sure to turn the power OFF before wiring.
- (2) When wiring, be sure to check the color and terminal output of the lead wire.
- (3) For connection, refer to the connection method in Figure 1.
- (4) Do not apply high tensile force or bending force to the extraction cable.
- (5) The cable may detach from the connector. When detaching the cable, hold the connector part and pull out the cable while pressing the stopper. Since load is applied to the switch base when detaching or attaching, we recommend that you avoid attaching and detaching whenever possible.

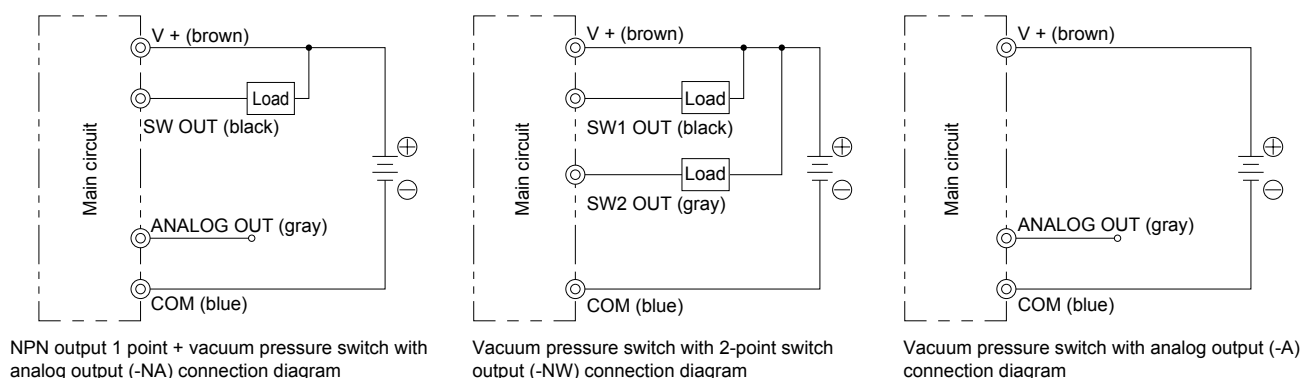


Figure 1. Connection method

### 5. Precautions

- (1) This product does not have a drip-proof/dust-proof structure. Avoid using in places where the product is exposed to dripping water, oil or dust.
- (2) This product does not have an explosion-proof structure. Do not use in flammable or explosive gases, fluids, or atmospheres.
- (3) Do not use where the heat generated exceeds the operating temperature range. It risks damaging the switch.
- (4) Do not apply pressures of 0.2 MPa or greater when positive pressure is applied, such as at vacuum burst.
- (5) Do not use in atmospheres or gases containing corrosive substances.
- (6) Keep the working fluid as clean as possible.
- (7) Use a stable DC power supply.
- (8) For a relay, solenoid valve, etc., connected to an output terminal or power supply terminal, install a surge voltage absorption circuit. Avoid usage where current may exceed 80 mA.
- (9) When using a unit power supply such as switching power supply, ground the F.G. (frame ground).
- (10) Do not short-circuit the output terminal (black and gray) and other terminals.
- (11) Do not apply excessive external force to the switch body.
- (12) Wiring or application that applies noise or the like may cause damage.
- (13) When setting the pressure and hysteresis, use the supplied screwdriver and gently rotate within the rotation range of the trimmer, without applying excessive force.