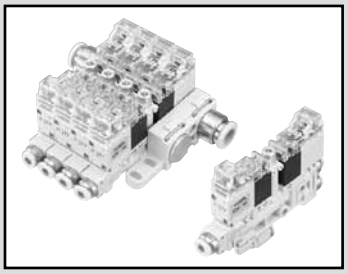


Compact ejector unit that achieves high speed and stable response

VSN Series

● Nozzle diameter: φ0.4, φ0.5, φ0.6

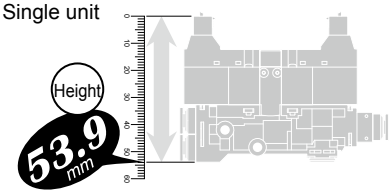
RoHS

Features

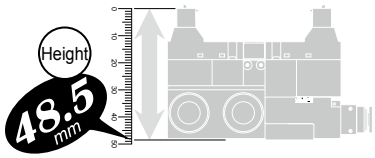
Ideal for restricted mounting space.

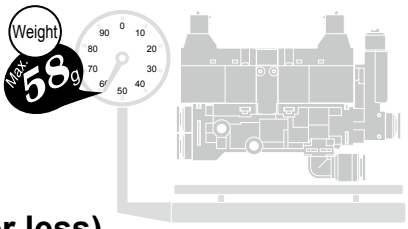
Compact and lightweight vacuum ejector unit. The product height is notably reduced.

● Single unit



● Manifold

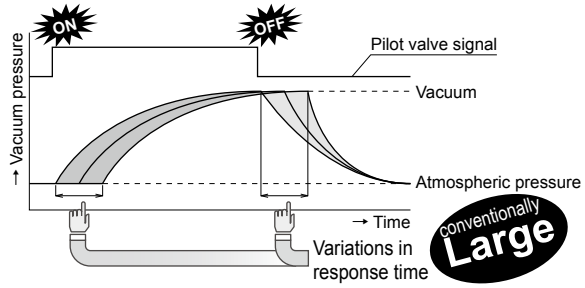




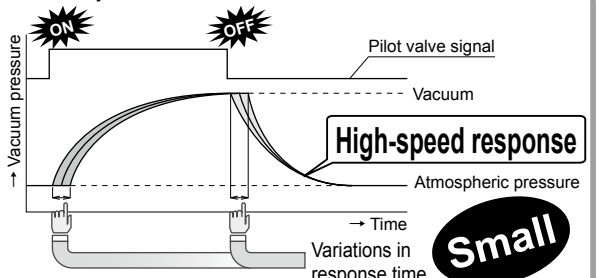
Achieves fast and stable response. (ON/OFF = 5 msec or less)

Direct acting valve is used for the main valve.

● Conventional vacuum ejector unit

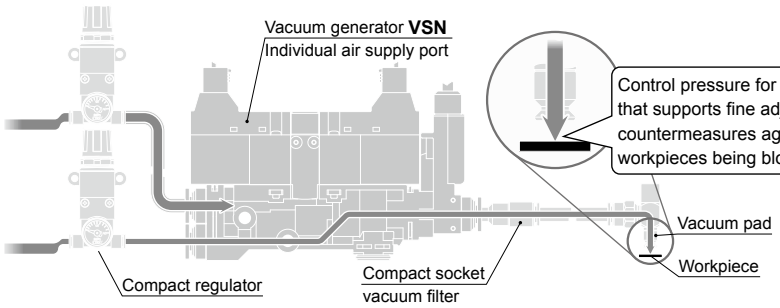


● Vacuum ejector unit **VSN**

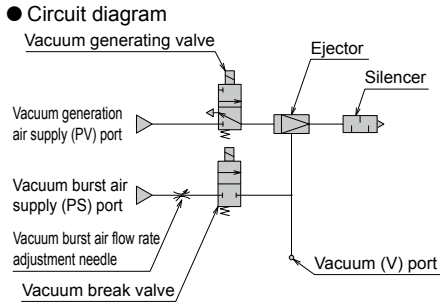


Gently removes small workpieces at vacuum burst.

Vacuum burst air supply port is made independent (optional). Therefore, pressure regulation by external regulator becomes possible in addition to the conventional flow rate adjustment, enabling easy adjustment of the vacuum burst air.



● Circuit diagram

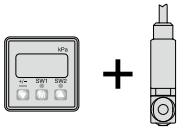
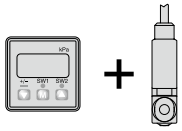


Common supply ports are also available.

* Supply port: The air supply port is common for vacuum generation and vacuum burst.

Four types of analog outputs are available for the pressure sensor.

Analog output sensor for negative pressure, Separated digital pressure display + Analog output sensor for negative pressure, Analog output sensor for compound pressure and Separated digital pressure display + Analog output sensor for compound pressure.

	For negative pressure	For compound pressure
Analog switch		
Separated digital pressure display + analog switch		

Vacuum burst air flow rate of 20 ℓ/min is secured.

Vacuum filter is externally mounted (separately purchased).

Miniaturization of the product does away with the inconvenience of replacing the filter.

* This product is not equipped with a vacuum filter.
For longer product service life, be sure to use CKD's vacuum filter (see below) for vacuum piping.

VSFU Compact union φ4	**VSFJ** Socket φ4
	
Model/VSFU	Model/VSFJ
VSFU-2-44	VSFJ-44

Specifications

Descriptions		Vacuum ejector unit VSN
Working fluid		Air
Working pressure	MPa	0 to 0.55
Ambient/fluid temperatures	°C	5 to 50
Ambient humidity		35 to 85% RH (no condensation)
Degree of protection		IEC standards IP40 or equivalent
Vibration/impact resistance	m/s^2	50 or less/150 or less

Ejector characteristics

Model No.	Nozzle diameter (mm)	Rated supply pressure (MPa)	Achieved vacuum pressure (-kPa)	Intake flow rate (ℓ/min [ANR])	Consumption flow rate (ℓ/min [ANR])
VSN-E04	0.4	0.35	90.4	2	6
VSN-H05	0.5	0.5		7	11.5
VSN-E05		0.35		3	8
VSN-H06	0.6	0.5		9.5	16
VSN-E06		0.35		4.5	12

Note : Values in table are representative values. Suction flow rate differs with the vacuum piping conditions (vacuum port size, pipe length).

Valve specifications

Descriptions \ Unit		Vacuum ejector unit VSN	
		Vacuum generating valve	Vacuum break valve
Valve and operation		Direct acting poppet valve	
Rated voltage	V	24 DC	
Voltage fluctuation range		±10%	
Surge suppressor		Equipped with surge suppressor	
Power consumption	W	When starting: 2.2 When holding: 0.6 (energy-saving circuit built in)	
Operation indicator		Green LED	
Working pressure	MPa	0 to 0.55	0 to 0.55
Valve		Normally closed	
Response time (*1)	ms	Both vacuum generation (OFF → ON) and vacuum stop (ON → OFF) are 5 or less	
Wiring method and lead wire length		Connector: 500 mm	
		Red lead wire: +24 VDC, black lead wire: -0 V	

*1 : Response time is the time until pressure change is detected at the vacuum port when rated pressure and rated voltage are supplied. Vacuum achievement time at the pipe end (workpiece) and vacuum burst time differ depending on conditions such as ejector characteristics, capacity (vacuum pipe length), vacuum burst flow rate, etc.

Vacuum burst function

Descriptions		
Break air flow rate	ℓ/min (ANR)	0 to 20 (Indicates the value when air is supplied at 0.5 MPa.)

Note : Variable with vacuum burst air flow rate adjustment needle.

Vacuum pressure switch specifications

Vacuum pressure switch specifications

Descriptions		Negative pressure specifications (-V1□)	Compound pressure specifications (-R1)
Power supply voltage V		10.8 to 30 DC (including ripple)	
Current consumption mA		20 or less	
Pressure sensitive element		Diffused semiconductor pressure sensor	
Working pressure kPa		-100 to 0	-100 to 300
Proof pressure kPa		200	600
Storage temperature °C		-20 to 70 (atmospheric pressure, humidity: 65% RH or less)	
Operating temperature °C		-10 to 60 (no condensation)	
Operating humidity		35 to 85% RH (no condensation)	
Degree of protection		IEC standards IP40 or equivalent	
Analog output	Output voltage V	1 to 5	
	Zero point voltage V	1 ±0.04 (= at atmospheric pressure)	1 ±0.1 (= -100 kPa)
	Max pressure point voltage V	4.6 ±0.04 (= -100 kPa)	5 ±0.1 (= at 300 kPa)
	Linearity/hysteresis	±0.5% F.S. or less (at Ta = 25°C)	
	Temperature characteristics	±2% F.S. or less (0 to 50°C, Ta = 25°C)	
	Output current mA	0.195 or less (load resistance: 10 kΩ or less)	1 or less (load resistance: 5 kΩ or less)
	Output impedance kΩ	1	-

Separated digital display specifications (-V2□, -R2)

Descriptions		Separated digital display
Power supply voltage V		10.8 to 26.4 DC
Current consumption mA		40 max. (no load)
Repeatability		±0.1% F.S. ±1 digit or less
Hysteresis		Adjustment is possible
Responsivity ms		2.5 or less (malfunction prevention function: select from 25, 100, 250, 500, 1000 or 1500)
Output short-circuit protection		Yes
Pressure display	Display unit	kPa
	Display magn. resolution	0.1
	Display frequency	5 times/second
	Display accuracy	±1% F.S. ±1 digit or less
	Operational indicator lamp	Orange 1 & 2 indicator lamps
	Digital display	Main display: 2 colors (red, green), sub-display: orange
Sensor input specifications	Voltage input signal V	1 to 5
	Input impedance MΩ	1
Switch output	Output points	2-point output (OUT1, OUT2)
	Output method	NPN open collector
	Switch rating	30 VDC 125 mA max.
	Internal voltage drop V	1.5 or less
Analog output	Output voltage V	1 to 5 ±2.5% F.S. or less
	Linearity	±1% F.S. or less
	Output impedance KΩ	1
Environmental resistance	Degree of protection	IEC standards IP40 or equivalent
	Storage temperature °C	-10 to 60 (no condensation or freezing)
	Operating temperature °C	0 to 50
	Operating humidity	35 to 85% RH (no freezing)
	Withstand voltage	1000 VAC 1 minute (between lead wire and case)
	Insulation resistance	50 MΩ or more (500 VDC) (between lead wire and case)
	Vibration resistance	Compound amplitude 1.5 mm or 100 m/s^2, 10 to 55 Hz, 2 hours each in X, Y, Z directions
	Shock resistance	100 m/s^2, 2 hours each in X, Y, Z directions
Temperature characteristics		±0.5% F.S. (0 to 50°C, base temperature: 25°C)

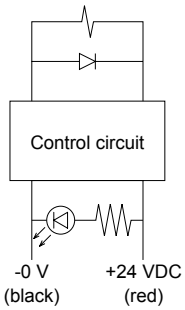
Weight table

Model No.	Unit contents	Weight (g)
VSN-□□-□□□S-3-□	Single unit, individual air supply port, atmospheric release, with sensor	56
VSN-□□-□□□S-3	Single unit, individual air supply port, atmospheric release, without sensor	53
VSN-□□-□□□J-3-□	Single unit, individual air supply port, common exhaust, with sensor	58
VSN-□□-□□□J-3	Single unit, individual air supply port, common exhaust, without sensor	55
VSN-□□-□□NS-3-□	Single unit, common air supply port, atmospheric release, with sensor	54
VSN-□□-□□NS-3	Single unit, common air supply port, atmospheric release, without sensor	51
VSN-□□-□□NJ-3-□	Single unit, common air supply port, common exhaust, with sensor	56
VSN-□□-□□NJ-3	Single unit, common air supply port, common exhaust, without sensor	53
VSNM-□□-□□NS-3-2-□	Manifold, individual/common air supply port, with sensor	171
VSNM-□□-□□NS-3-2	Manifold, individual/common air supply port, without sensor	164

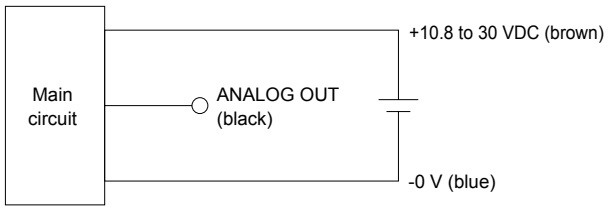
■ For the manifold, with each station increase, the unit with sensor becomes heavier by 47 grams and the unit with no sensor becomes heavier by 43 grams. Example: The weight of vacuum ejector unit, with sensor, quadruple manifold is 171 + (2 × 47) = 265 g → Weight of double manifold: 171 g with the weight of 2 units with sensor: 94 g.

Electric circuit Fig.

● Solenoid valve



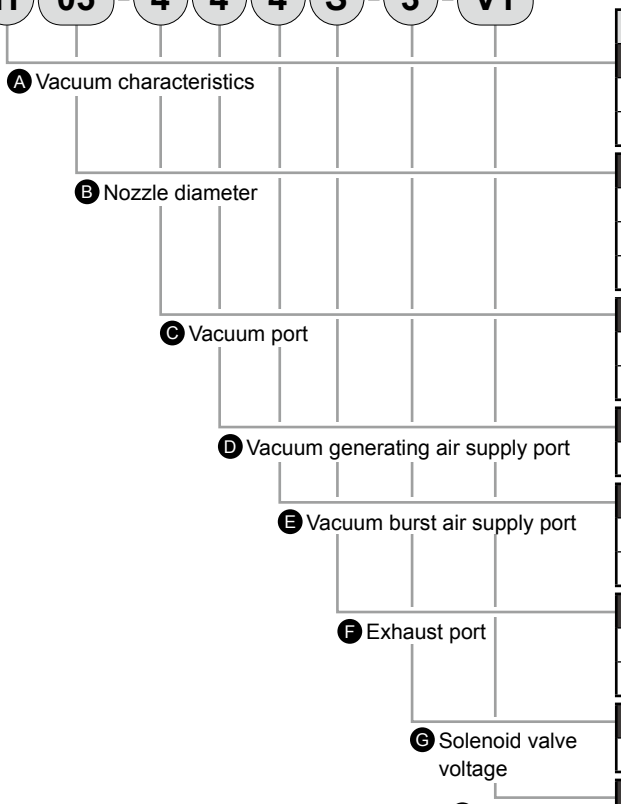
● Vacuum pressure switch



How to order

- 10.3 mm wide compact vacuum unit (ejector system compatible)
- Vacuum ejector unit single

VSN - H 05 - 4 4 4 S - 3 - V1



Code	Content
Ⓐ Vacuum characteristics *1	
H	High vacuum/medium flow rate
E	High vacuum/low flow rate
Ⓑ Nozzle diameter *1	
04	φ0.4
05	φ0.5
06	φ0.6
Ⓒ Vacuum port (V)	
4	φ4 straight push-in fitting
4L	φ4 elbow push-in fitting
Ⓓ Vacuum generating air supply port (PV)	
4	φ4 straight push-in fitting
Ⓔ Vacuum burst air supply port (PS)	
4	φ4 straight push-in fitting
N	Common for vacuum generation/vacuum burst air
Ⓕ Exhaust port (EX) *1	
S	Atmospheric release with silencer
J	φ6 push-in fitting common exhaust
Ⓖ Solenoid valve voltage	
3	24 VDC
Ⓗ Vacuum pressure switch specifications	
Blank	Without vacuum pressure switch
V1C0	Negative pressure analog output/connector lead wire 500 mm
V1C1	Negative pressure analog output/connector lead wire 1,000 mm
V1C2	Negative pressure analog output/connector lead wire 2,000 mm
V1C3	Negative pressure analog output/connector lead wire 3,000 mm
V2C0	Separated LED display + (-'ve) press analog output/connector lead wire 500 mm
V2C1	Separated LED display + (-'ve) press analog output/connector lead wire 1,000 mm
V2C2	Separated LED display + (-'ve) press analog output/connector lead wire 2,000 mm
V2C3	Separated LED display + (-'ve) press analog output/connector lead wire 3,000 mm
R1	Compound pressure analog output/grommet lead wire 3,000 mm
R2	Separated LED display + Compound pressure analog output/grommet lead wire 3,000 mm

⚠ Precautions for model No. selection

*1: The combinations of Ⓐ and Ⓑ are "E04", "H05", "E05", "H06" and "E06" only.

● Maintenance parts

· Spare silencer element

VSN-E

· Dedicated bracket (common to VSN and VSNP)

VSN-B

· Separated digital display

VSN-SED-31N

· Sensor connection connector (e-con)

VSN-EC

How to order

- 10.3 mm wide compact vacuum unit (ejector system compatible)
- Vacuum ejector unit manifold

VSNM -H 05 -4 4 4 S -3 -10 -V1

Ⓐ Vacuum characteristics
Ⓑ Nozzle diameter
Ⓒ Vacuum port
Ⓓ Vacuum generating air supply port
Ⓔ Vacuum burst air supply port
Ⓕ Exhaust port
Ⓖ Solenoid valve voltage
Ⓗ Manifold station
Ⓘ Vacuum pressure switch specifications

With the manifold, exhaust air is led into the ejector not in operation and output from the vacuum port. Contact CKD when exhaust air lead-in has adverse effects.

Code	Content
Ⓐ Vacuum characteristics *1, *2	
H	High vacuum/medium flow rate
E	High vacuum/low flow rate
Z	For mixed specs (indicate breakdown on specs sheet.)
Ⓑ Nozzle diameter *1, *2	
04	φ0.4
05	φ0.5
06	φ0.6
00	For mixed specs (indicate breakdown on specs sheet.)
Ⓒ Vacuum port (V) *2	
4	φ4 straight push-in fitting
4L	φ4 elbow push-in fitting
CX	For mixed specs (indicate breakdown on specs sheet.)
Ⓓ Vacuum generating air supply port (PV)	
Refer to Appendix 1 for the air supply port for vacuum generation.	
Ⓔ Vacuum burst air supply port (PS)	
Refer to Appendix 2 for vacuum burst air supply port.	
Ⓕ Exhaust port (EX)	
S	Atmospheric release with silencer
Ⓖ Solenoid valve voltage	
3	24 VDC
Ⓗ Manifold station No.	
2	2 stations
to	to
10	10 stations
Ⓘ Vacuum pressure switch specifications *2	
Blank	Without vacuum pressure switch
V1C0	Negative pressure analog output/connector lead wire 500 mm
V1C1	Negative pressure analog output/connector lead wire 1,000 mm
V1C2	Negative pressure analog output/connector lead wire 2,000 mm
V1C3	Negative pressure analog output/connector lead wire 3,000 mm
V2C0	Separated LED display + (-'ve) press analog output/connector lead wire 500 mm
V2C1	Separated LED display + (-'ve) press analog output/connector lead wire 1,000 mm
V2C2	Separated LED display + (-'ve) press analog output/connector lead wire 2,000 mm
V2C3	Separated LED display + (-'ve) press analog output/connector lead wire 3,000 mm
R1	Compound pressure analog output/grommet lead wire 3,000 mm
R2	Separated LED display + Compound pressure analog output/grommet lead wire 3,000 mm
Z	For mixed specs (indicate breakdown on specs sheet.)

⚠ Precautions for model No. selection

*1: The combinations of Ⓐ and Ⓑ are "E04", "H05", "E05", "H06", "E06" and "Z00" only.
*2: Be sure to fill in the "mix manifold specifications sheet" in the case of mixed specifications. Refer to page 110 for details.

Appendix 1

Ⓓ Vacuum generating air supply port (PV)							
Port shape		Straight fitting			Elbow fitting		
Fitting size (mm)		φ4	φ6	φ8	φ4	φ6	φ8
Code	R side only	4R	6R	8R	4LR	6LR	8LR
	Both sides	4	6	8	4L	6L	8L
	L side only	4H	6H	8H	4LH	6LH	8LH

Appendix 2

Ⓔ Vacuum burst air supply port (PS)							
Port shape		Straight fitting			Elbow fitting		
Fitting size (mm)		φ4	φ6	φ8	φ4	φ6	φ8
Code	R side only	4R	6R	8R	4LR	6LR	8LR
	Both sides	4	6	8	4L	6L	8L
	L side only	4H	6H	8H	4LH	6LH	8LH
	Common for vacuum generation/vacuum burst	N					

● Maintenance parts

· Spare silencer element
VSNM-E

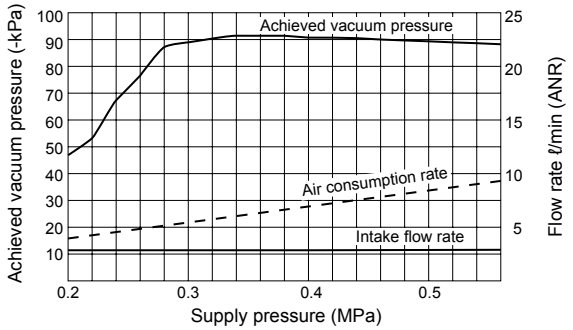
· Separated digital display
VSN-SED-31N

· Sensor connection connector (e-con)
VSN-EC

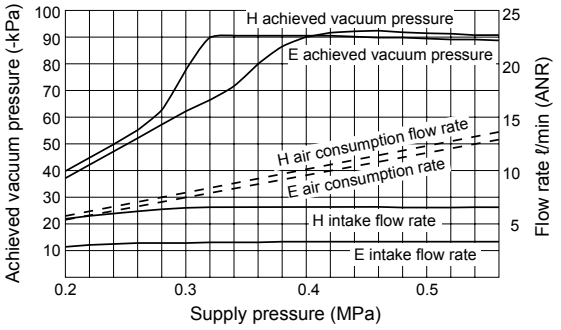
Vacuum characteristics

Supply pressure - achieved vacuum pressure, intake flow rate, consumption flow rate

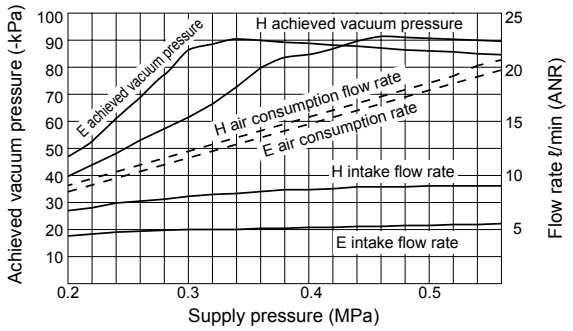
● VSN-E04



● VSN-H05, VSN-E05



● VSN-H06, VSN-E06

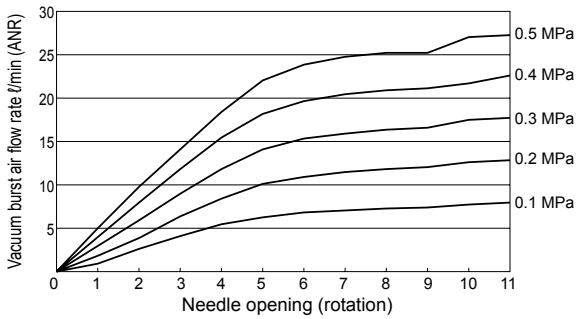


1. Supply pressure with the characteristics described above occurs at vacuum generation.
2. Achieved vacuum pressure with the characteristics described above produces abnormal noise (soft clicking sound) at supply pressure just before reaching the peak value. When this abnormal noise occurs, the characteristics 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.
3. 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, 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 0.6 mm nozzle diameter, cross-sectional area is $0.3^2 \times \pi = 0.282\ mm^2 \times 3 = 0.84\ mm^2$. Therefore, carry out piping and equipment selection that ensures an effective cross-sectional area of 0.9 mm^2 or greater.

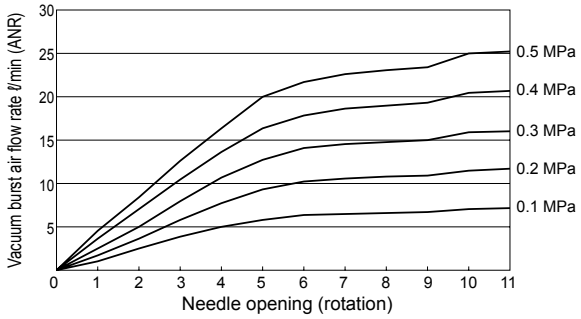
Vacuum characteristics

Vacuum burst air flow rate characteristics

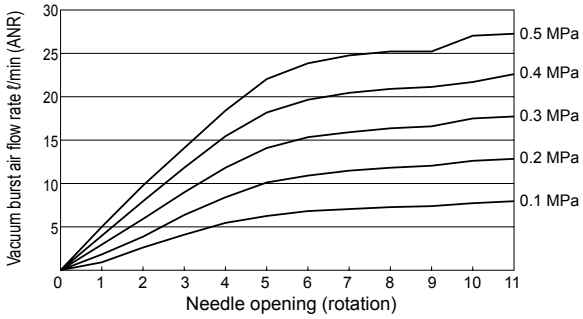
● VSN-E04



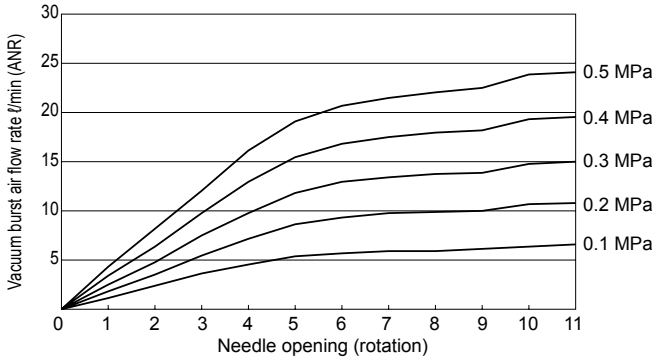
● VSN-H05



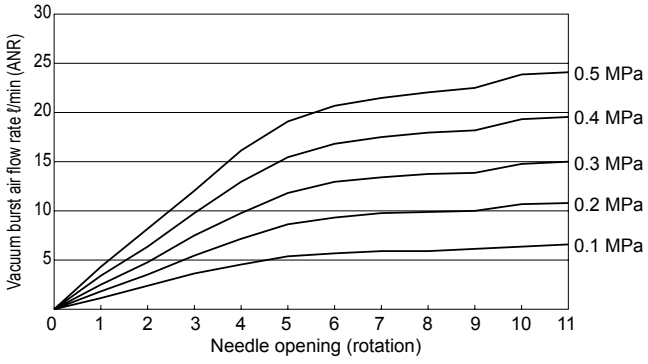
● VSN-E05



● VSN-H06



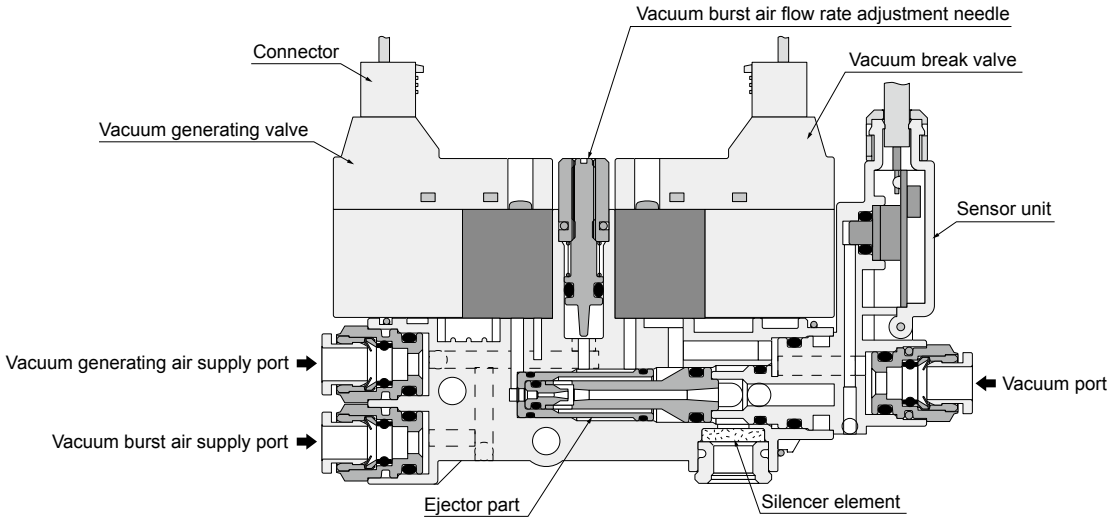
● VSN-E06



Internal structure

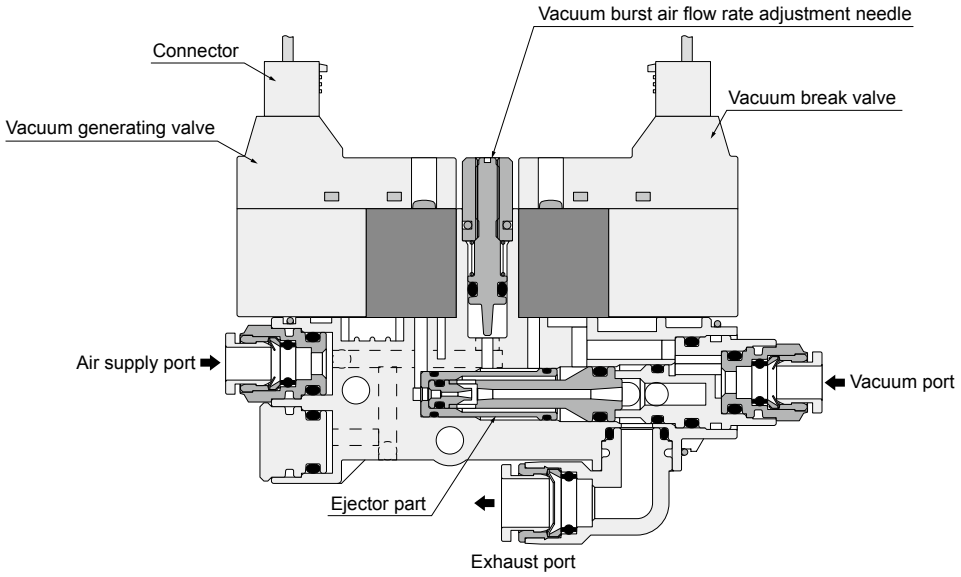
● Vacuum ejector single unit

· Individual air supply port, atmospheric release, with vacuum pressure switch



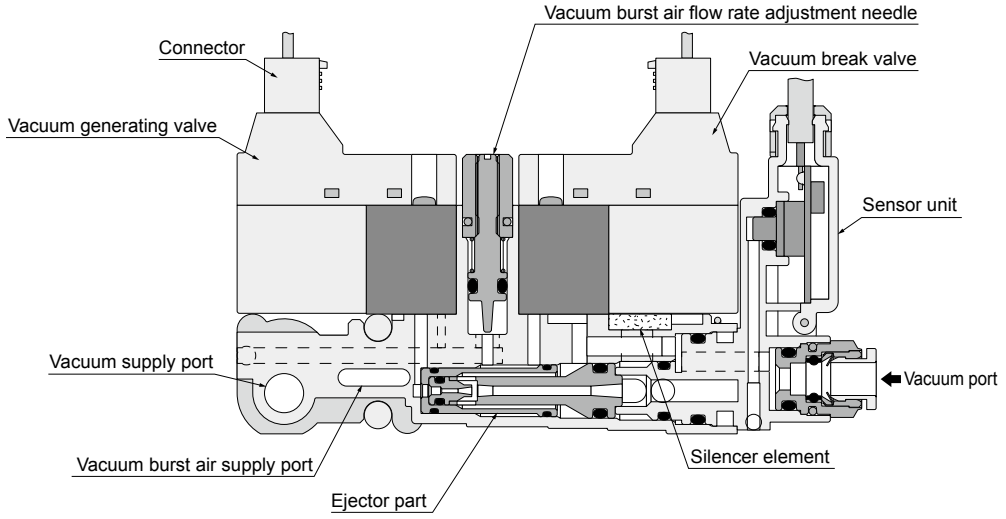
● Vacuum ejector single unit

· Common air supply port, common exhaust, without vacuum pressure switch



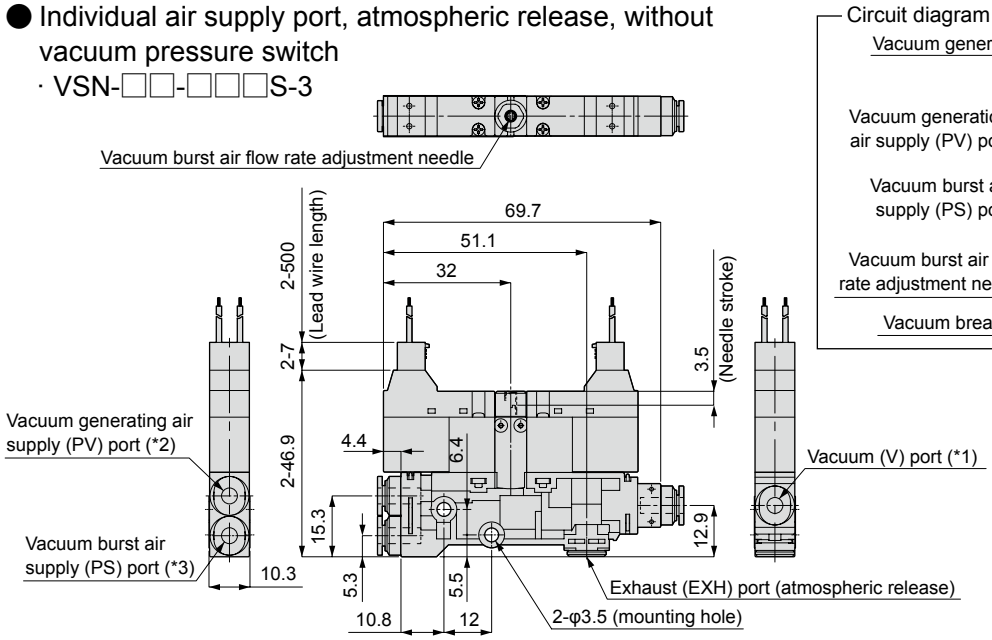
● Vacuum ejector unit manifold

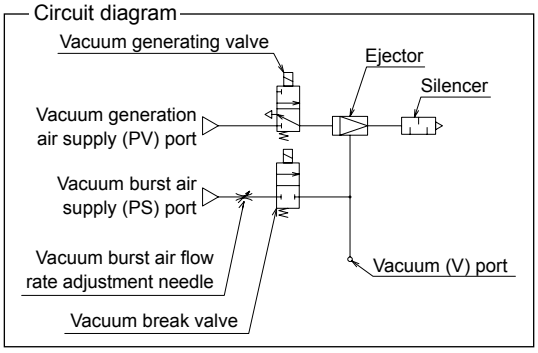
· With vacuum pressure switch



Dimensions (single unit)

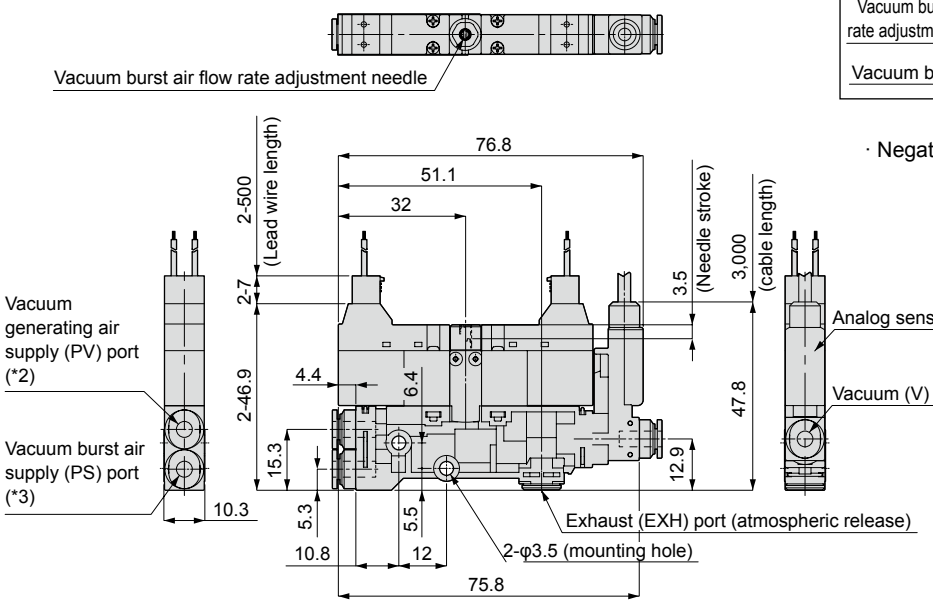
● Individual air supply port, atmospheric release, without vacuum pressure switch
· VSN-□□-□□□S-3

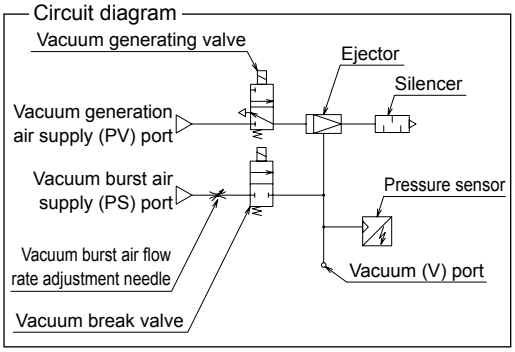




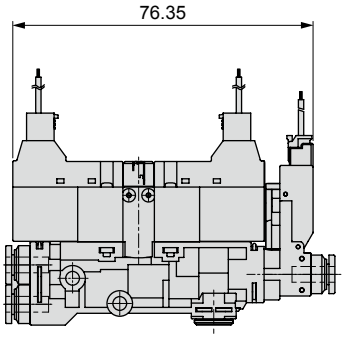
● Individual air supply port, atmospheric release, with vacuum pressure switch
· VSN-□□-□□□S-3-V□□□/R□

· Compound pressure analog output switch (R□)





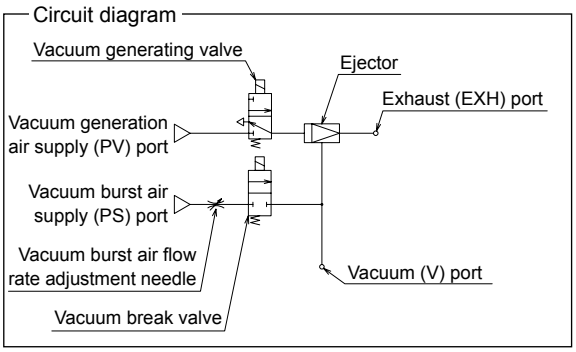
· Negative pressure analog output switch (V□□□)

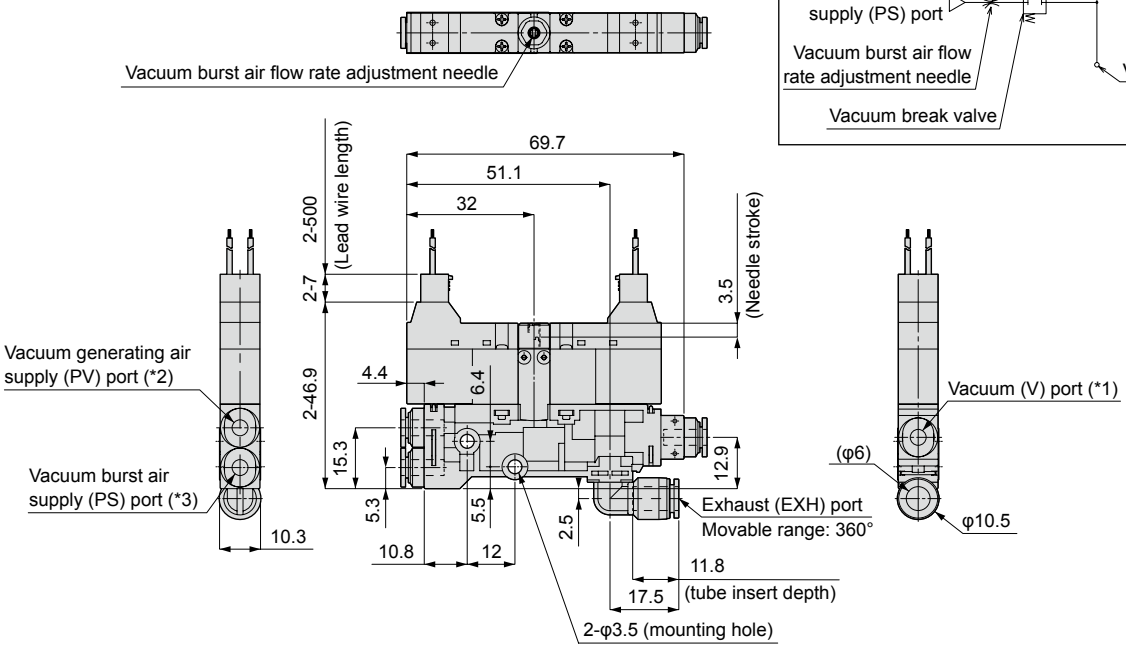


*1 : For vacuum (V) port dimensions, refer to Table 1 on page 99.
*2 : For vacuum generation air supply port (PV) dimensions, refer to Table 2 on page 99.
*3 : For vacuum burst air supply (PS) port dimensions, refer to Table 2 on page 99.

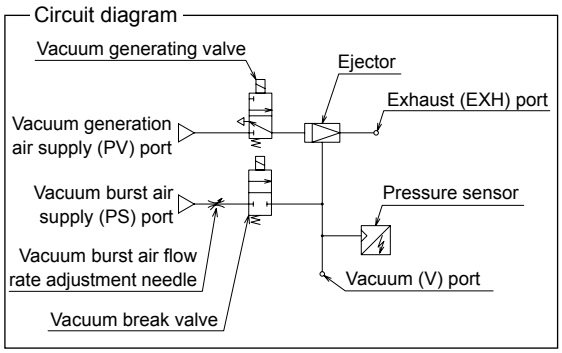
Dimensions (single unit)

● Individual air supply port, common exhaust, without vacuum pressure switch
· VSN-□□-□□□J-3

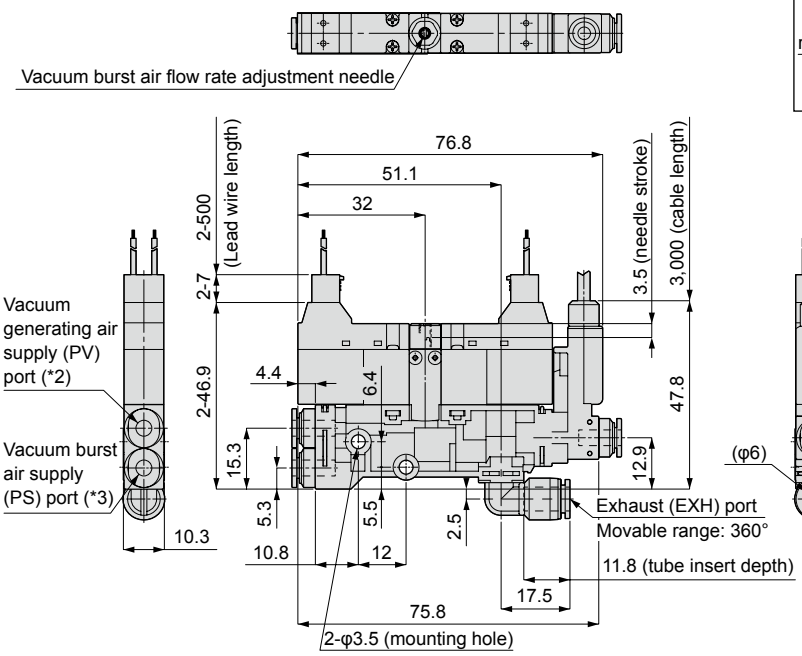




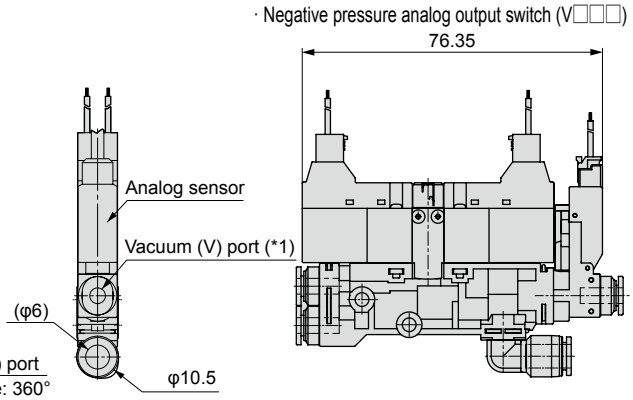
● Individual air supply port, common exhaust, with vacuum pressure switch
· VSN-□□-□□□J-3-V□□□/R□



· Compound pressure analog output switch (R□)



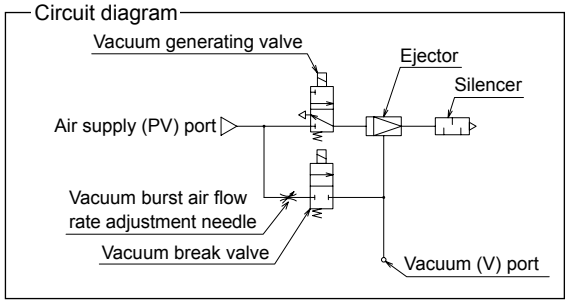
· Negative pressure analog output switch (V□□□)

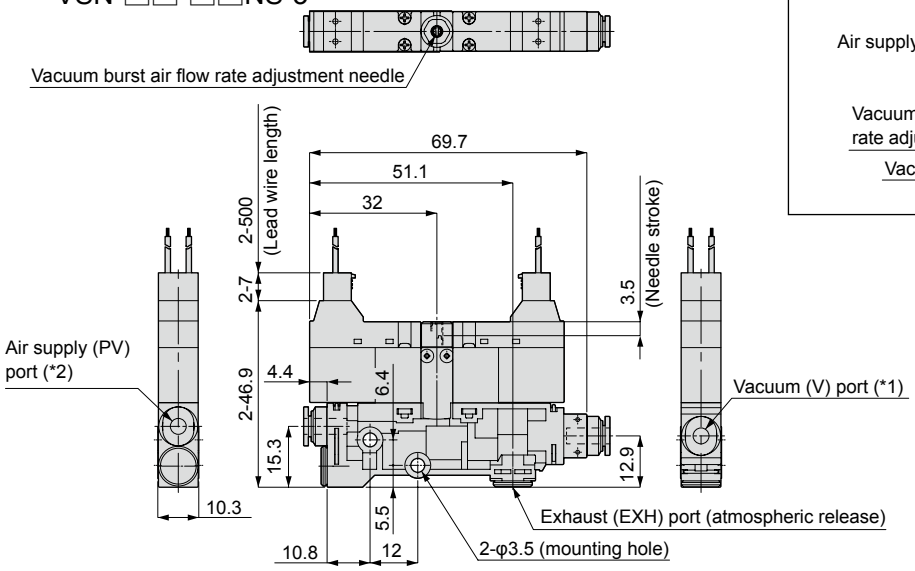


*1 : For vacuum (V) port dimensions, refer to Table 1 on page 99.
*2 : For vacuum generation air supply port (PV) dimensions, refer to Table 2 on page 99.
*3 : For vacuum burst air supply (PS) port dimensions, refer to Table 2 on page 99.

Dimensions (single unit)

● Common air supply port, atmospheric release, without vacuum pressure switch
· VSN-□□-□□NS-3

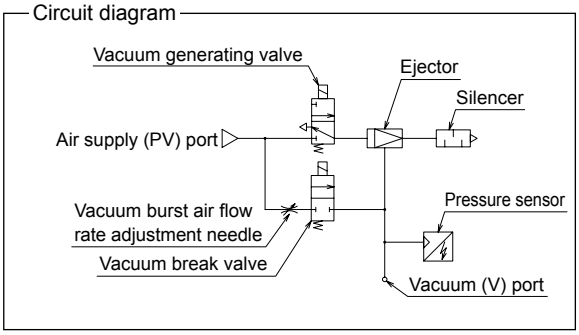


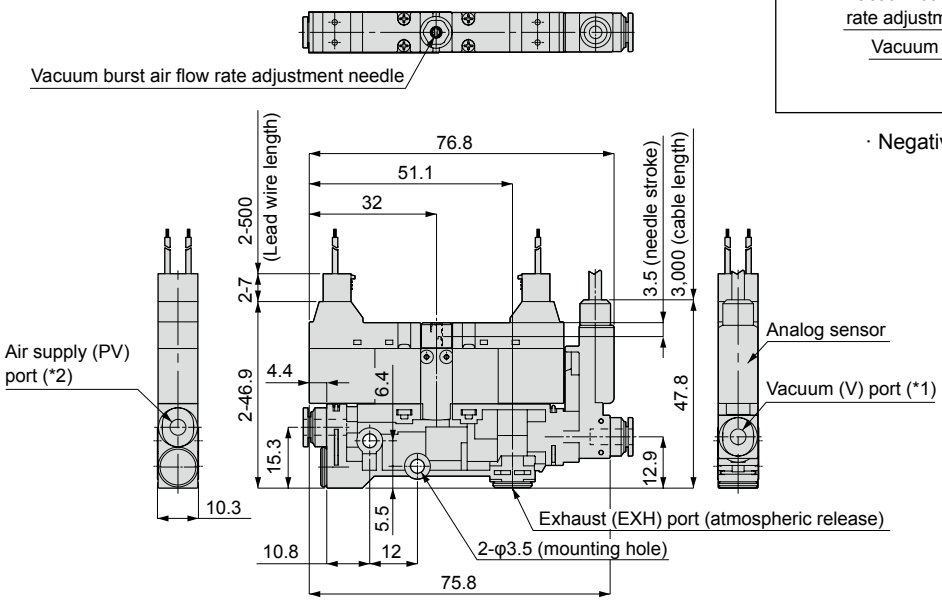


*1 : For vacuum (V) port dimensions, refer to Table 1 on page 99.
*2 : For air supply (PV) port dimensions, refer to Table 2 on page 99.

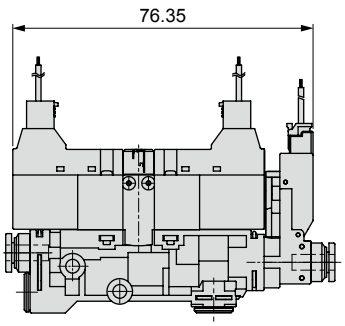
● Common air supply port, atmospheric release, with vacuum pressure switch
· VSN-□□-□□NS-3-V□□□/R□

· Compound pressure analog output switch (R□)





· Negative pressure analog output switch (V□□□)

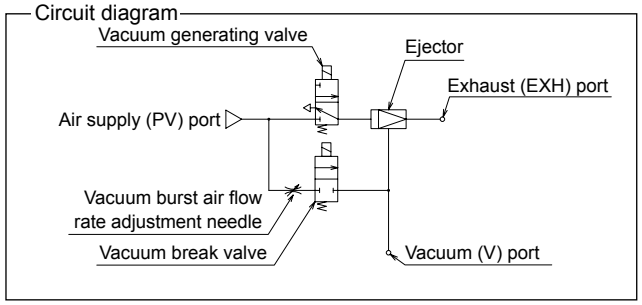


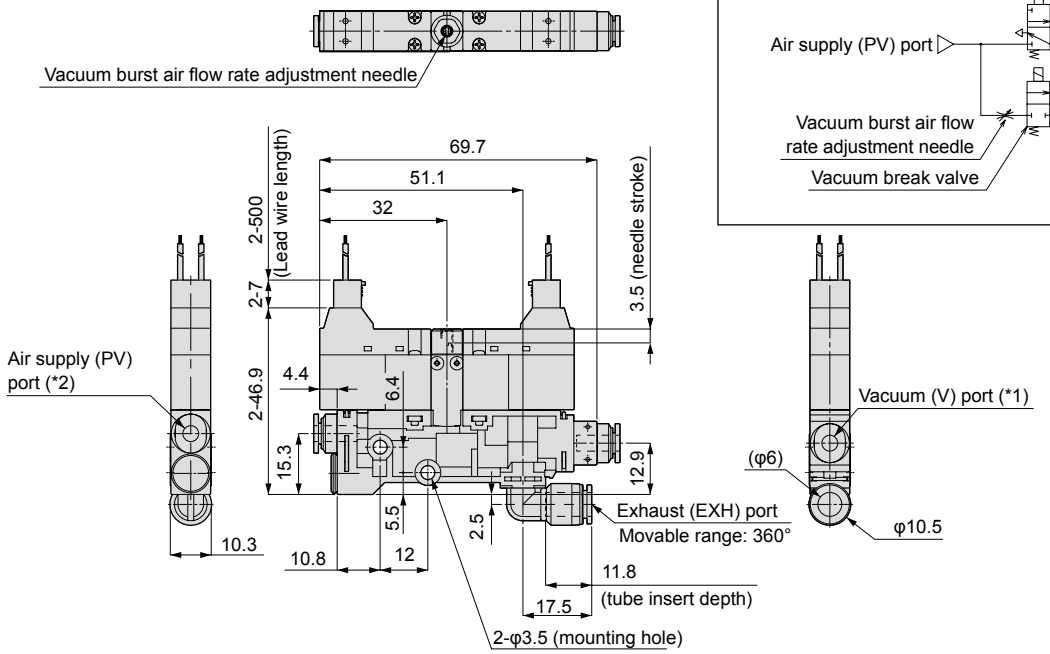
*1 : For vacuum (V) port dimensions, refer to Table 1 on page 99.
*2 : For air supply (PV) port dimensions, refer to Table 2 on page 99.

Dimensions (single unit)

● Common air supply port, common exhaust, without vacuum pressure switch

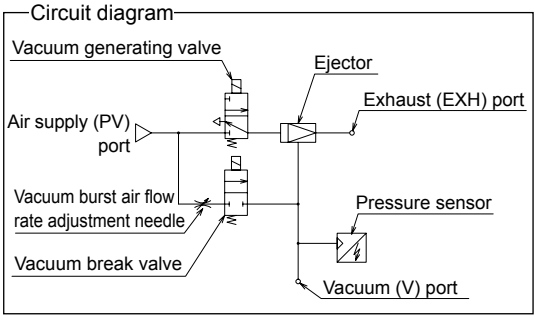
· VSN-□□-□□NJ-3



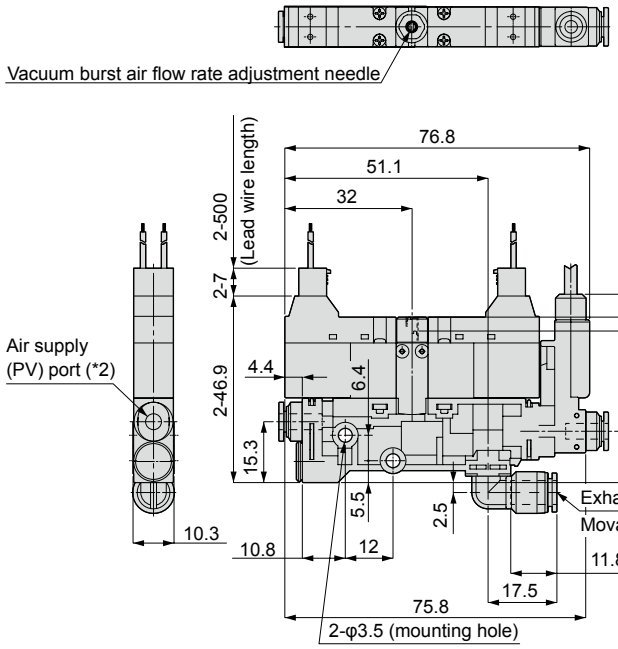


● Common air supply port, common exhaust, with vacuum pressure switch

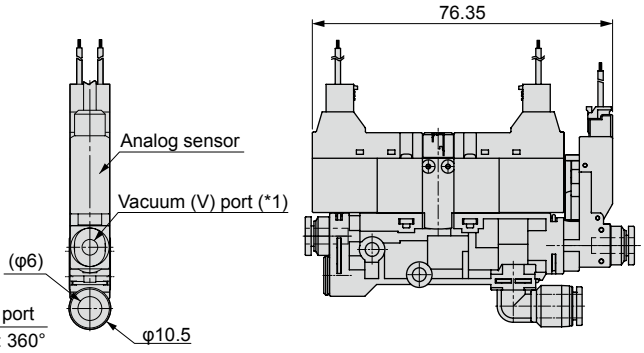
· VSN-□□-□□NJ-3-V□□□/R□



· Compound pressure analog output switch (R□)



· Negative pressure analog output switch (V□□□)



*1 : For vacuum (V) port dimensions, refer to Table 1 on page 99.

*2 : For air supply (PV) port dimensions, refer to Table 2 on page 99.

Dimensions

● Single unit fitting dimensions

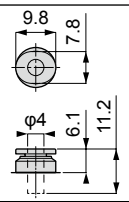
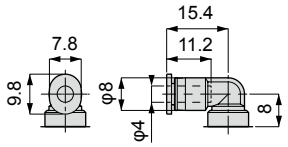
	
φ4 straight push-in fitting	φ4 elbow push-in fitting

Table 1: Vacuum port push-in fitting shape

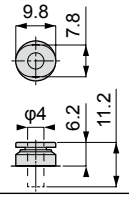
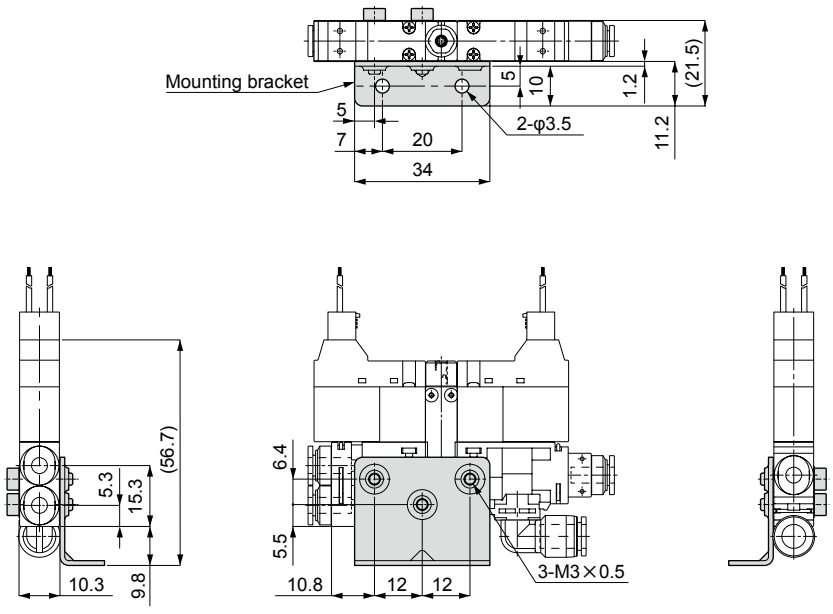

4 (φ4 straight)

Table 2: Supply port push-in fitting shape

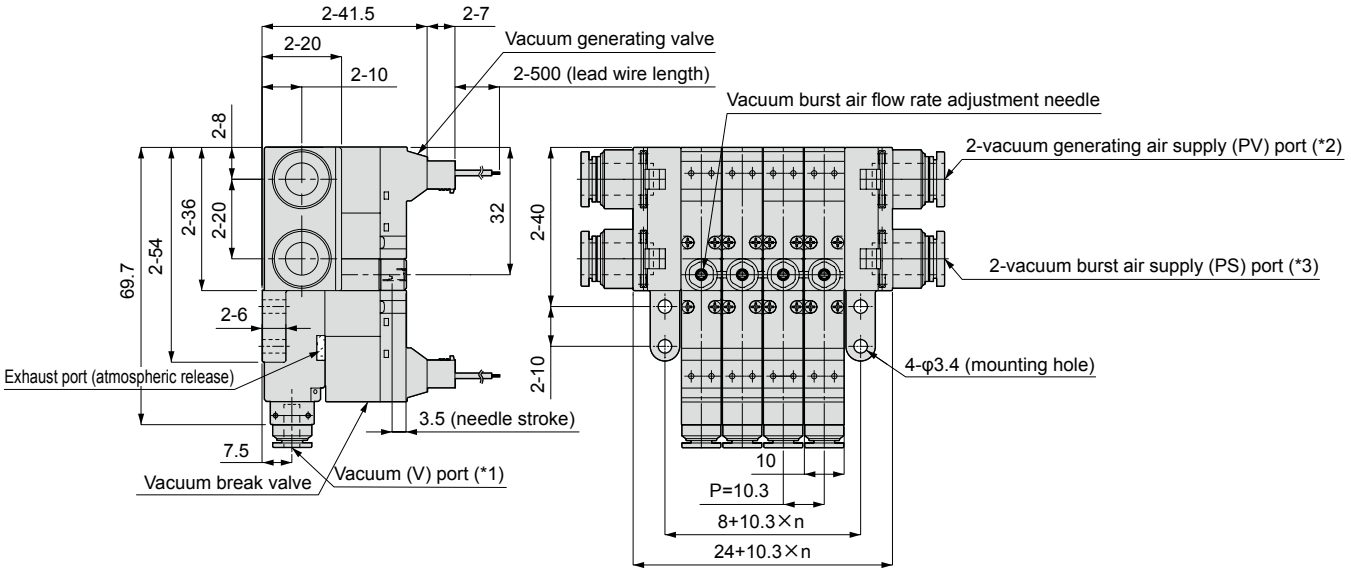
● Dedicated bracket for single unit
· VSN-B



Dimensions (manifold)

● Individual air supply port, without vacuum pressure switch

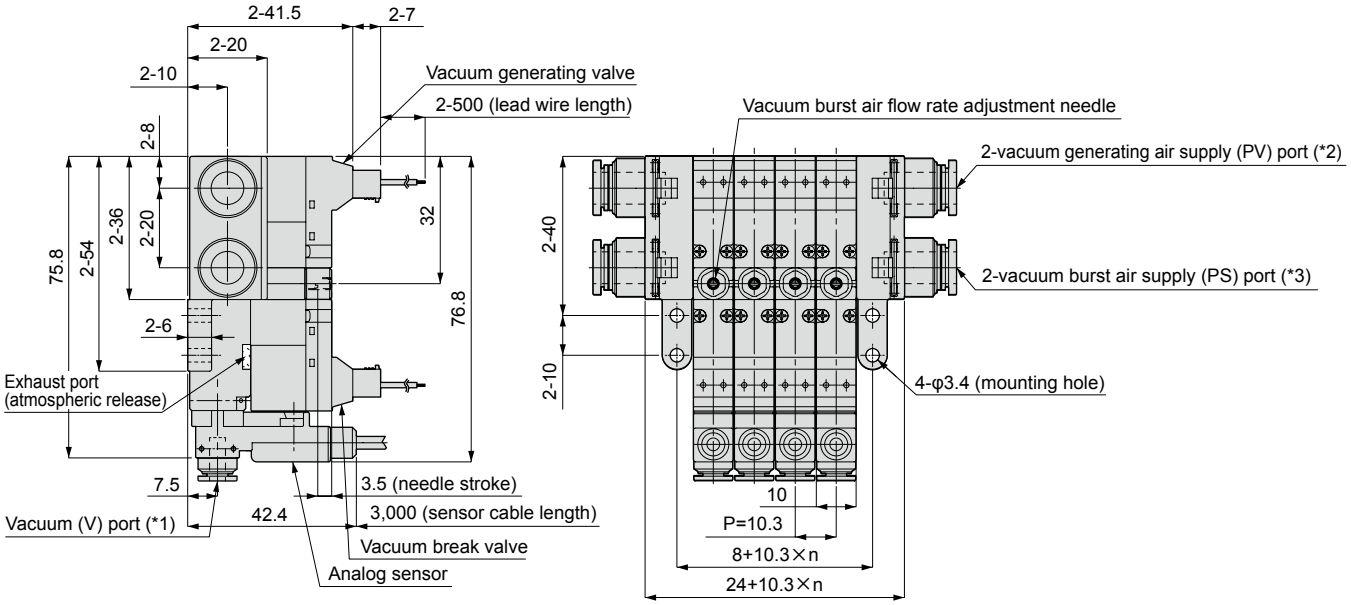
· VSNM-□□-□□□S-3-□



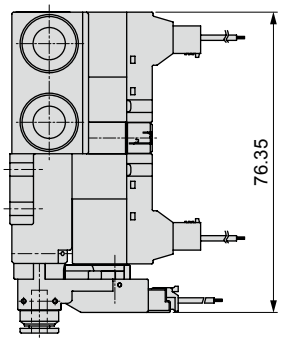
● Individual air supply port, with vacuum pressure switch

· VSNM-□□-□□□S-3-□-V□□□/R□

· Compound pressure analog output switch (R□)



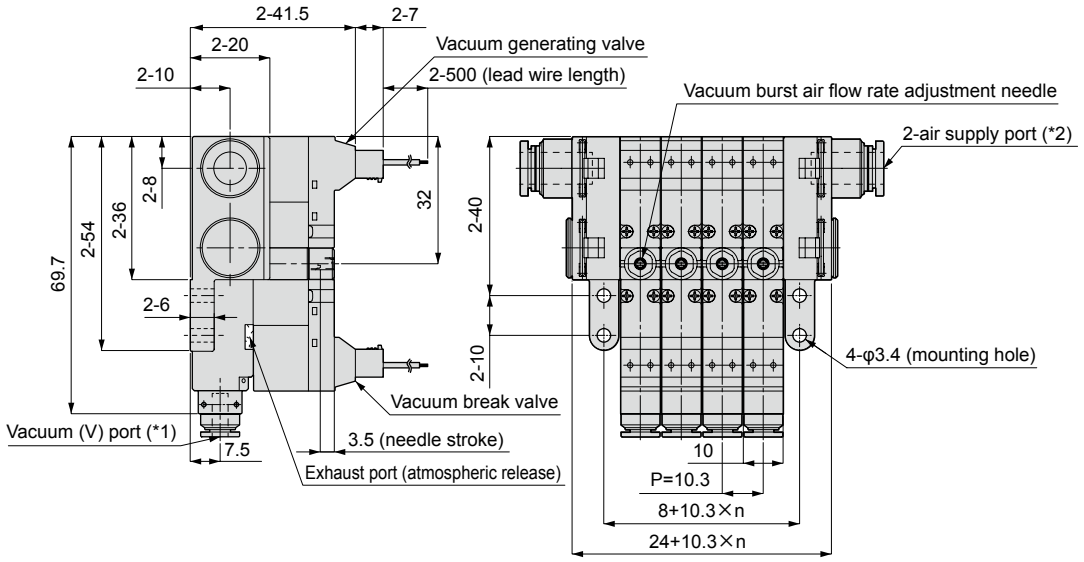
· Negative pressure analog output switch (V□□□)



*1 : For vacuum port dimensions, refer to Table 1 on page 102.
*2 : For vacuum generation air supply port (PV) dimensions, refer to Table 2 on page 102.
*3 : For vacuum burst air supply port dimensions, refer to Table 2 on page 102.

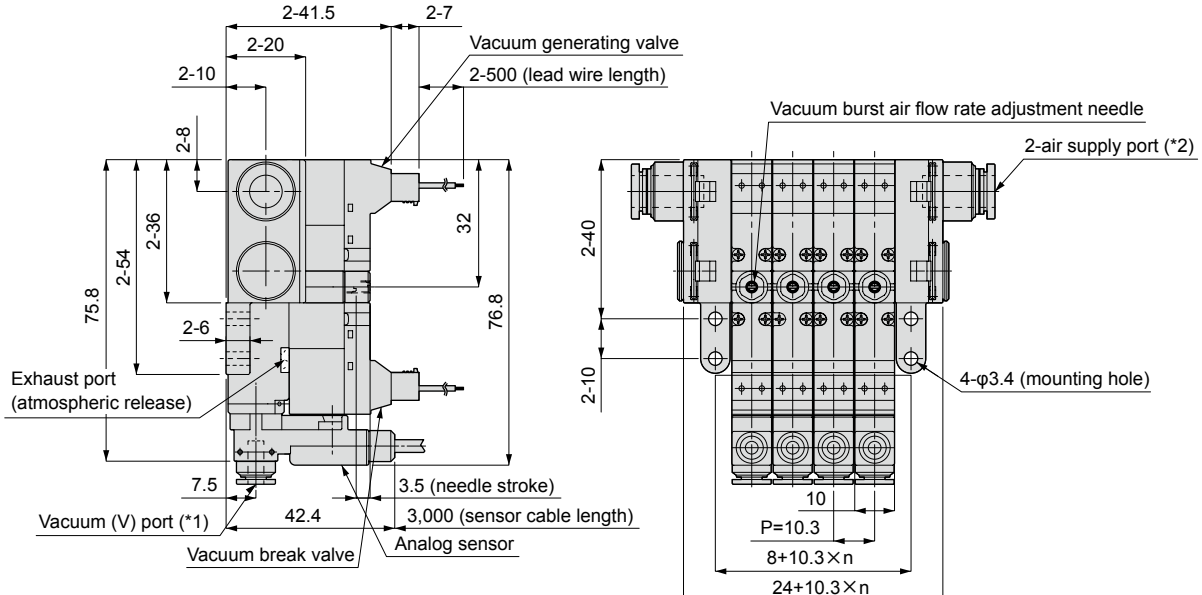
Dimensions (manifold)

● Common air supply port, without vacuum pressure switch
· VSNM-□□-□□NS-3-□

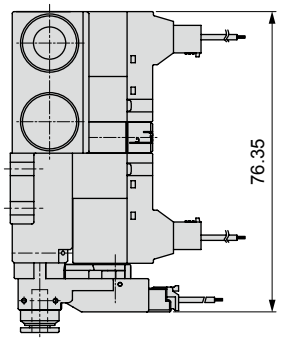


● Common air supply port, with vacuum pressure switch
· VSNM-□□-□□NS-3-□-V□□□/R□

· Compound pressure analog output switch (R□)



· Negative pressure analog output switch (V□□□)



*1 : For vacuum port dimensions, refer to Table 1 on page 102.
*2 : For air supply port dimensions, refer to Table 2 on page 102.

Dimensions (manifold)

● Manifold fitting dimensions

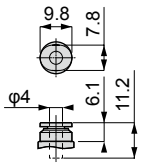
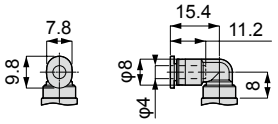
	
φ4 straight push-in fitting	φ4 elbow push-in fitting

Table 1: Vacuum port push-in fitting shape

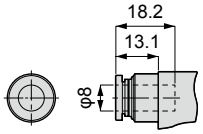
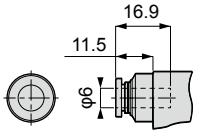
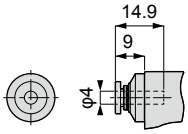
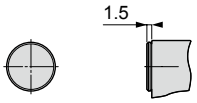
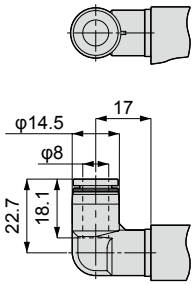
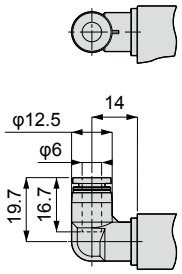
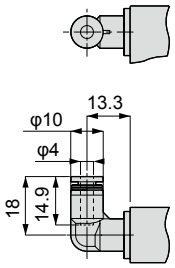
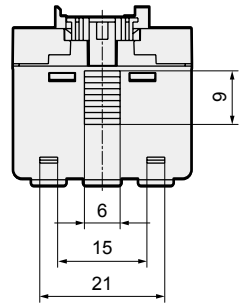
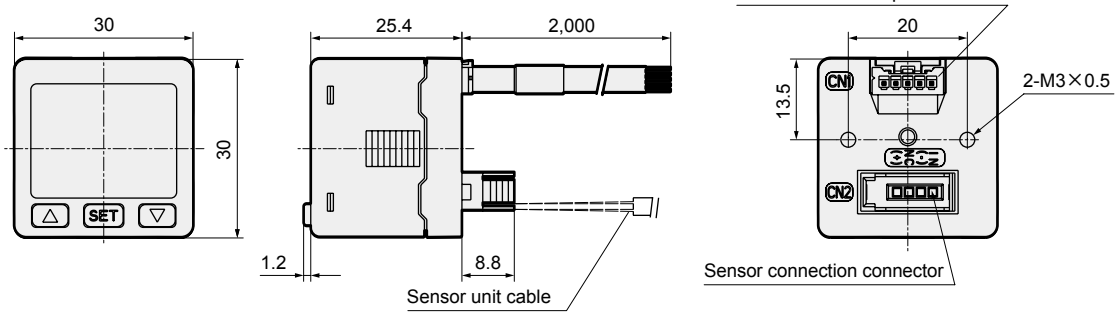
			
φ8 straight push-in fitting	φ6 straight push-in fitting	φ4 straight push-in fitting	Plug
			
φ8 elbow push-in fitting	φ6 elbow push-in fitting	φ4 elbow push-in fitting	

Table 2: Supply port push-in fitting shape

Dimensions

● Separated digital display





· Power line and output wiring specifications

Line color	Content
Brown	Power supply (10.8 to 26.4 VDC)
Orange	Analog output (1 to 5 V)
White	OUT2 output
Black	OUT1 output
Blue	COMMON

· Sensor unit connection wiring specifications

Line color	Content
Brown	DC+
Blue	DC-
Black	IN

* Refer to page 109 for the wiring method of the sensor connector.