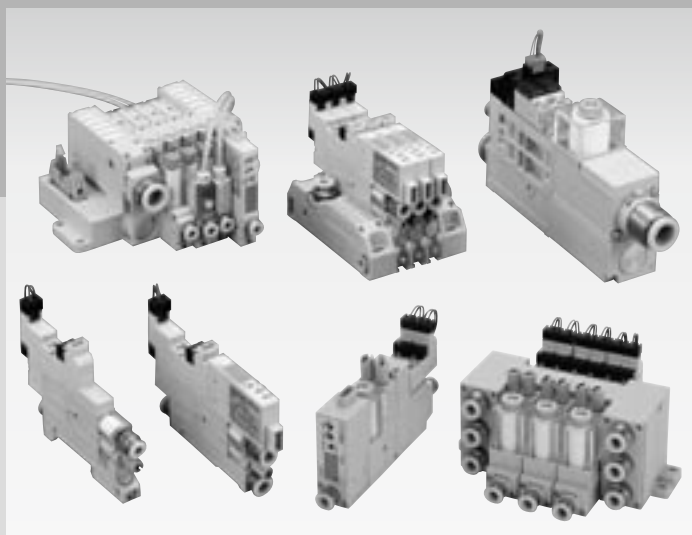


Vacuum pump system type VS*P

■ Vacuum component



CONTENTS

Series variation	166
● 20 mm width universal type (VSJP/VSJPM)	168
● 10.5 mm width universal type (VSXP/VXSPM)	184
● 31.5 mm width discrete type (VSQP)	214
● 11 mm pitch manifold dedicated type (VSZPM)	226

Vacuum pump system

VSJP
VSJPM

VSXP
VSXPM

VSQP

VSZPM

●: Provided as standard ○: Option

Model	Series	Model no.	Piping method			Components						Nozzle diameter ϕ (1/10mm)						Page
			Discrete	Manifold		Vacuum control valve	Valve for break	Vacuum switch	Vacuum filter	Silencer	Check valve	05	07	10	12	15	20	
				Individual wiring	Reduced wiring													
Vacuum pump system type Vacuum changeover unit	VSJP/VSJPM Series 20 mm width universal type unit • Enable to control air flow and pressure for vacuum break. • The vacuum break time can be shortened with the vacuum break circuit relief function. • Self hold type is standard for vacuum solenoid valve.	VSJP	●			●	●	○	●								Vacuum valve effective area 3.5mm ² (ϕ 4), 5mm ² (ϕ 6)	168
		VSJPM		●		●	●	○	●									
	VSXP/VSXPM Series 10.5 mm width universal type unit • Compact and slim vacuum unit. • Either direct fixing or DIN rail installation is possible. • High cycles are possible with 3-way vacuum valves (optional).	VSXP	●			●	●	○	●								Vacuum valve effective area 2 way valve specifications: 3.5mm ² (ϕ 4), 4.5mm ² (ϕ 6) 3 way valve specifications: 3.0mm ² (ϕ 4), 3.6mm ² (ϕ 6)	184
		VSXPM		●		●	●	○	●									
	VSQP Series 31.5 mm width dedicated unit • Large vacuum units are optimum to control high flow. • Normal open and normal close are used as standards for vacuum solenoid valve.	VSQP	●			●	●	○	●								Vacuum valve effective area 16.5mm ²	214
VSZPM Series 11 mm pitch manifold dedicated unit • Wire-saving vacuum unit for manifold. • Air consumption is reduced by suppressing valve energy consumption to 0.55 W. • Compatible with a wide range of applications and broad vacuum sensor variations.	VSZPM			●	●	●	○	●								Vacuum valve effective area 4.5mm ²	226	

Vacuum pump system

Vacuum pump system

VSJP
VSJPM

VSJP
VSJPM

VSXP
VSXPM

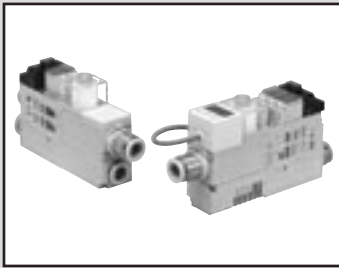
VSXP
VSXPM

VSQP

VSQP

VSZPM

VSZPM



Vacuum changeover unit ideal for controlling large flow rates

VSQP Series



Features

- This 31.5 mm wide vacuum unit is ideal for controlling large flow rates.
- A full lineup of vacuum generating valve variations (normally open, normally closed) is available.

Specifications

Descriptions	VSQP
Working fluid	Air
Working pressure range MPa	0.3 to 0.7
Ambient temperature range °C	5 to 50
Working vacuum pressure range kPa	-100 to 0

Solenoid valve specifications

- Pilot valve

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

- Switching valve

Descriptions	Valve for vacuum supply	Valve for vacuum break
Actuation	Air pressure 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)	16.5mm ² (0.89)	3.5mm ² (0.19)

Vacuum switch specifications

Descriptions	Vacuum switch
Working pressure range	-100 to 100kPa
Withstanding pressure	200kPa
Storage temperature range	-20 to 70°C
Operating temperature range	-10 to 50°C
Operation 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
Pressure setting point	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.
Indicator	2 1/2 digit 7 segment LED display
Number of displays	4 times/sec.
Display precision	±1%F.S.
Temperature characteristics	±0.3%F.S. (0 to 50°C, 25°C reference)

Vacuum pump system

Vacuum filter specifications

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

VSJP
VSJPM

VSXP
VSXPM

VSQP

Vacuum break function

Descriptions	Vacuum break function
Break air flow	0 to 50 l/min. (ANR) at supply pressure 0.5MPa.

VSZPM

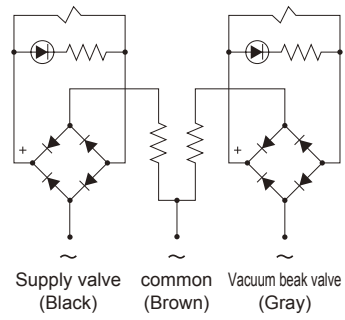
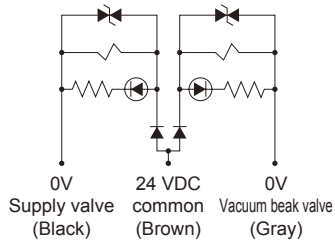
Valve lead wire color

Descriptions	Black	Gray	Blue	Brown
24 VDC specifications	Vacuum generation (-)	Vacuum break (-)	-	24 VDC (+ common)
100 VAC specifications	Vacuum generation (-)	Vacuum break (-)	-	common

Electric circuit (solenoid valve)

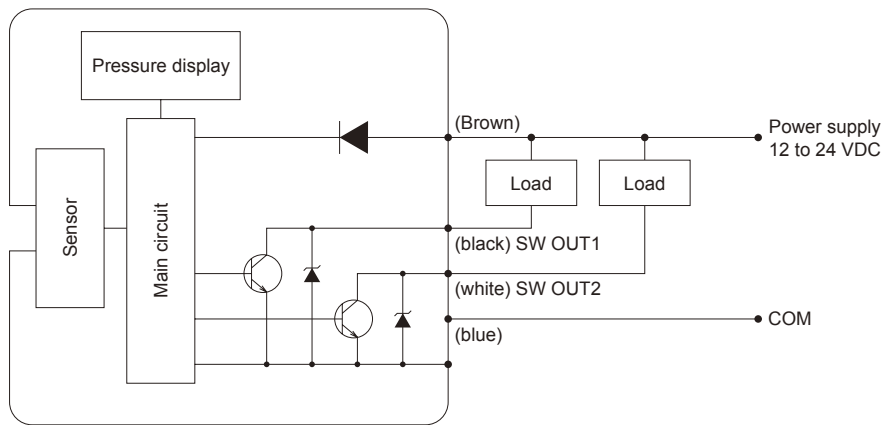
● 24 VDC

● 100 VAC



Vacuum pump system

Vacuum switch electrical circuit diagram



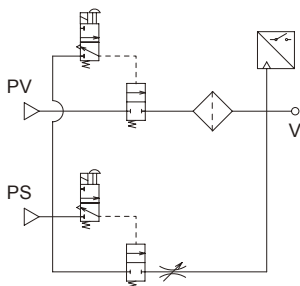
VSJP
VSJPM

VSXP
VSXPM

VSQP

VSZPM

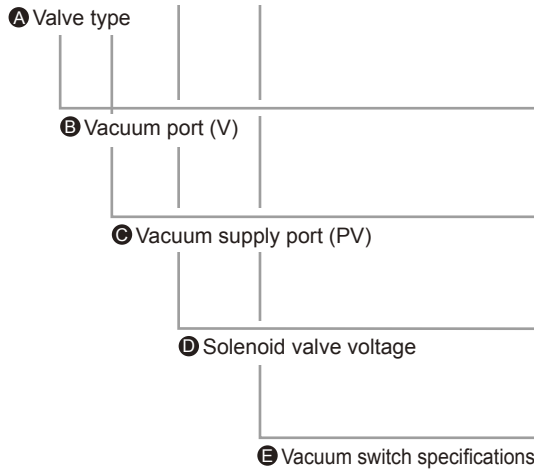
Circuit diagram



How to order

- 3.15 mm width discrete vacuum ejector unit

VSQP - B 10 10 - 3 - SW



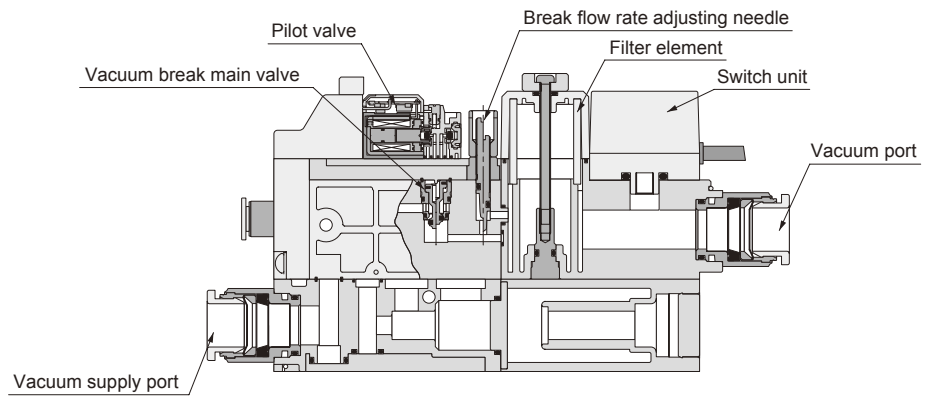
Symbol	Descriptions
A Valve type	
A	Normally open type
B	Normally closed type
B Vacuum port (V)	
10	ø10 push-in joint
12	ø12 push-in joint
C Vacuum supply port (PV)	
10	ø10 push-in joint
12	ø12 push-in joint
D Solenoid valve voltage	
1	100 VAC
3	24 VDC
E Vacuum switch specifications	
Blank	Without vacuum switch
SW	2-point NPN output with LED display

- Model no.
- Filter element

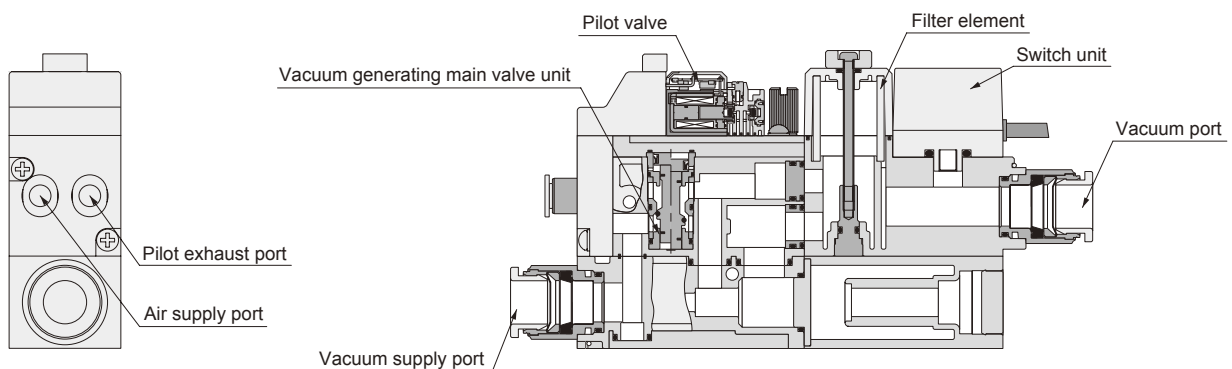
VSQ-E

Internal structure drawing

- Break circuit



- Vacuum circuit



Vacuum pump system

VSJP
VSJPM

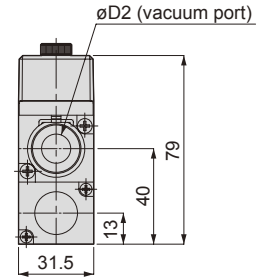
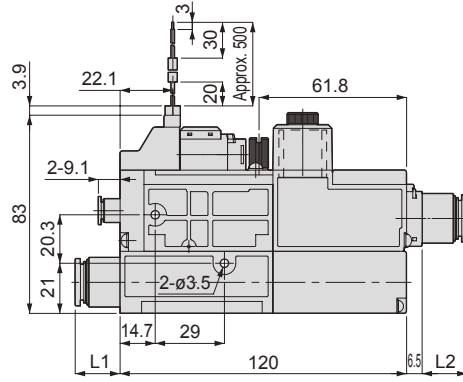
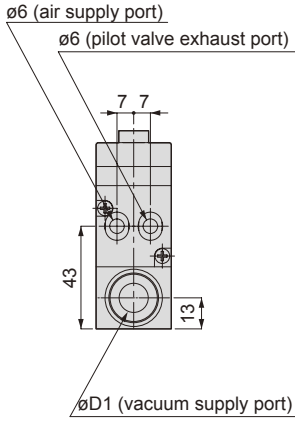
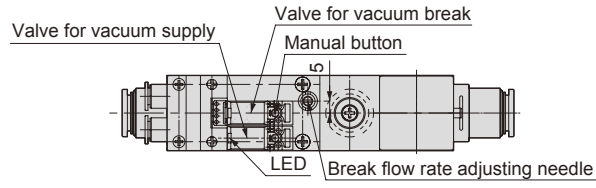
VSXP
VSXPM

VSQP

VSZPM

Dimensions

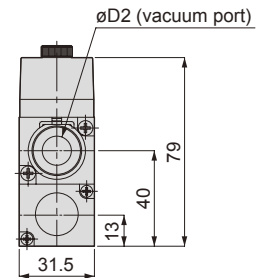
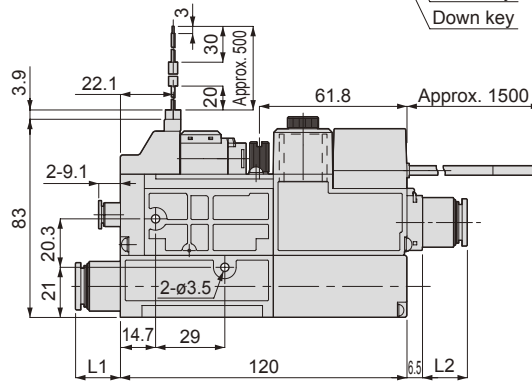
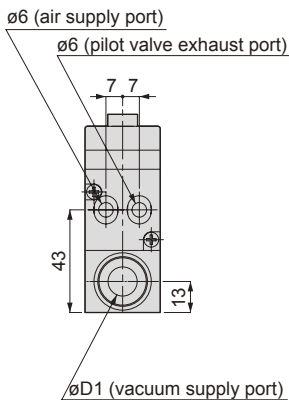
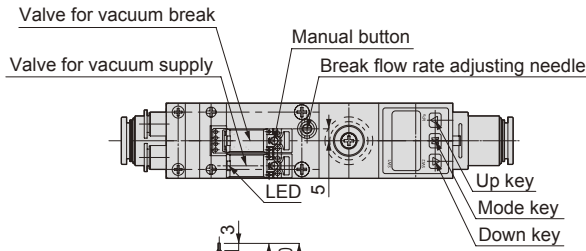
● Without vacuum switch



Unit: mm

	O.D. øD1	L1	O.D. øD2	L2
Air supply port	10	14.7	-	-
	12	18.8	-	-
	16	23.9	-	-
Vacuum port	-	-	10	14.7
	-	-	12	18.8
	-	-	16	23.9

● 2 point NPN output vacuum switch with LED display



Unit: mm

	O.D. øD1	L1	O.D. øD2	L2
Air supply port	10	14.7	-	-
	12	18.8	-	-
	16	23.9	-	-
Vacuum port	-	-	10	14.7
	-	-	12	18.8
	-	-	16	23.9

Vacuum pump system
 VSJP VSJPM
 VSXP VSXPM
VSQP
 VSZPM

Safety precautions

Refer to Intro 13 for general precautions of vacuum 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 your nearest CKD sales office when using energizing continuously for long times.
- Check that the leakage current is 1mA or less when operating valves. Malfunctions may result from the leakage current and cause problems.
- Vacuum leaks are tolerated with vacuum holding function of the vacuum changeover unit. Provide separate safety measures if the vacuum must be held for a long time.
- Do not use this vacuum switch in fluids or in an atmosphere with corrosive substances.
- Do not use this vacuum switch in an atmosphere containing fluids or flammable or explosive gases. This product does not have an explosion proof structure, so there is a risk of fires and explosions.
- Do not use this vacuum switch for applications that generate heat exceeding the working temperature range. The switch may fail.
- Turn the power OFF before wiring. Confirm the read wire color during wiring, and confirm terminal number, etc., and do not shorten output terminal, power supply terminal or common terminal. If shortened, sensor may malfunction.

CAUTIONS

- Compressed air contains large amounts of drainage (water, oxidized oil, tar, foreign matter, etc.). The drainage may adversely affect performance. Dehumidify air with an after cooler and dryer and improve air quality.
- Do not use the lubricator.
- Rust etc. in the pipe may result in operation faults. Install a 5 μm or smaller filter preceding the supply port. Flush pipes before use and at 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 changeover unit in environments with corrosive or flammable gas. Do not use this unit for fluids.
- This product is not water proof and dust proof. Avoid using this product where it could be subject to water, oil or dust.
- Avoid sucking in dust, salt or iron chip, etc.
- Do not operate the vacuum break valve while generating vacuum.
- When replacing the supply/vacuum port's cartridge joint, remove all matter on the seal, and insert the lock pin securely.
- 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 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.

Vacuum pump system

VSJP
VSJPM

VSXP
VSXPM

VSQP

VSZPM

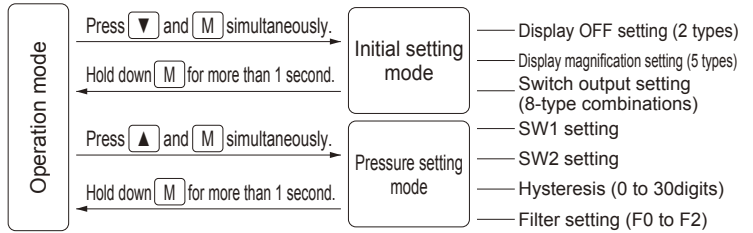
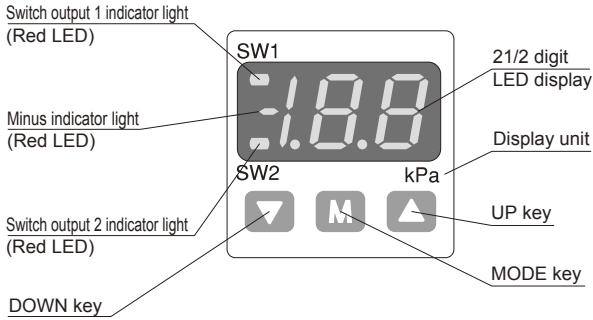
How to use

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.

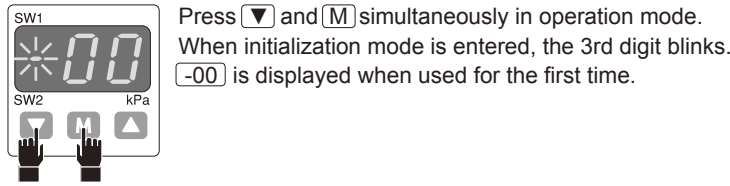
2. Vacuum sensor parts and operation procedures

Vacuum pump system

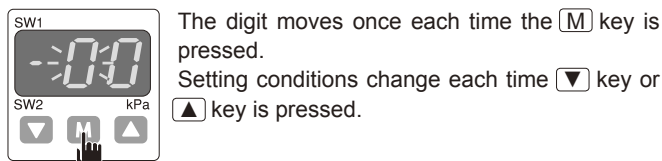


3. Vacuum switch initialization mode

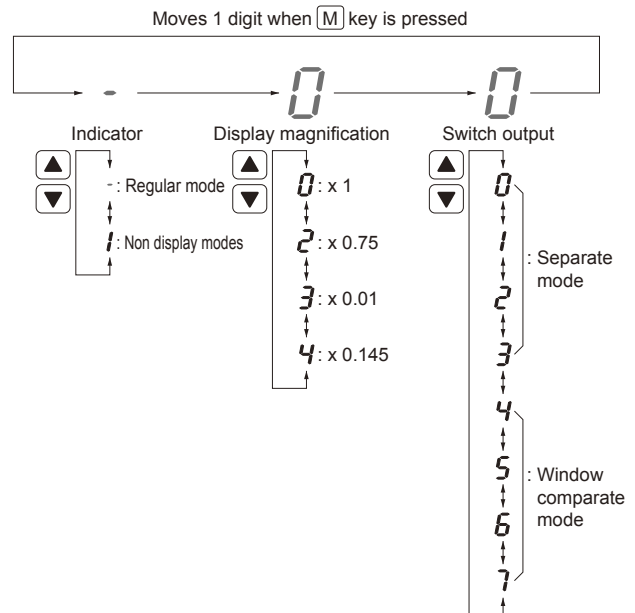
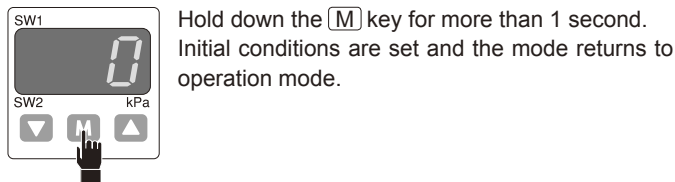
■ Enter initialization mode.



■ Set initial conditions



■ Exit initialization mode



How to use

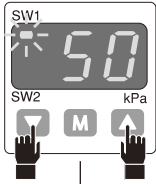
4. Vacuum switch pressure setting mode

■ Enter pressure setting mode.



Press **▼** and **M** 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.



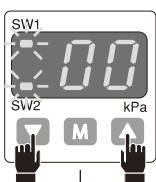
"Setting 1 (P1)"
The SW1 LED blinks.
Set setting 1 (P1) with the **▼** key or **▲** key.
(50) is displayed when used for the first time.
Note 1) Pressure is set within displayed range.
Note 2) If window comparator mode is selected, the setting satisfies this equation: $P1 \leq P2-2H$.

Press **M** key.



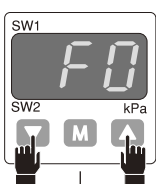
"Setting 2 (P2)"
The SW2 LED blinks.
Set the setting 2 (P2) with **▼** key or **▲** key.
(50) is displayed when used for the first time.
Note 1) Pressure is set within displayed range.
Note 2) If window comparator mode is selected, the setting satisfies this equation: $P1 \leq P2-2H$.

Press **M** key.



"Setting hysteresis (H)"
SW1 and SW2 LEDs blink.
Set the setting hysteresis with **▼** 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: $P1 \leq P2-2H$.

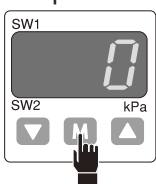
Press **M** key.



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

Press **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.

Vacuum pump system

VSJP
VSJPM

VSXP
VSXPM

VSQP

VSZPM

How to use

5. Vacuum switch function

■ Display OFF

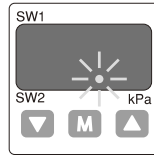
If no keys are pressed for 10 seconds, display turns OFF and the LED display turns OFF. The LED display turns ON again if a key is pressed while the LED is OFF.

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

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

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

* See the explanation on initialization mode (page 220) for details on setting display OFF mode.



■ Display magnification

Display magnification is selected from ranges at right.

* See the explanation on initialization mode (page 220) 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

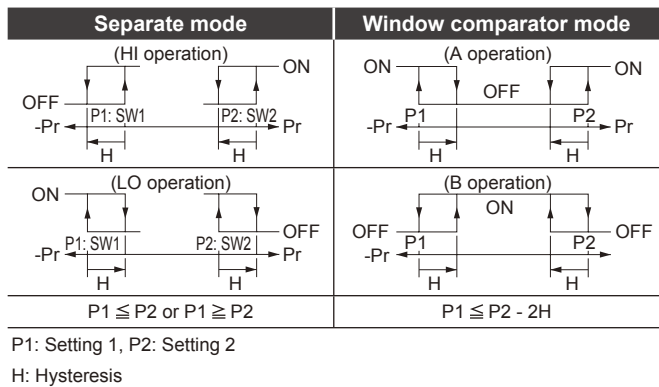
Switch output is selected from the following table:

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 220) 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 (25ms, 250ms) are selectable.

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 221) for details on setting digital filters.

How to use

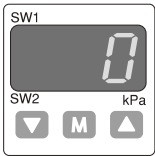
6. Adjusting the vacuum switch zero point, error display

■ Adjust the zero point.

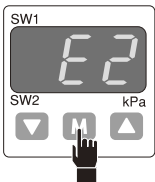


Release pressure applied on the pressure port to atmospheric pressure (state with no pressure applied).
Press \blacktriangledown and \blacktriangle simultaneously in operation mode.
 OA blinks when zero point adjustment is started.

■ Quit zero point adjustment.



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



E2 is displayed if pressure is applied during zero point adjustment. Press the M key for more than one second, and reset E2 .
Release pressure applied to the pressure port to atmospheric pressure, and adjust the zero point again.

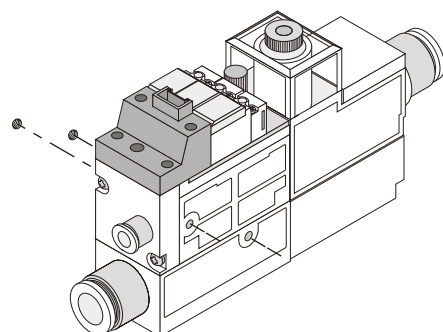
■ Take the following measures if an error occurs:

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 M key to reset E2 . 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.

7. Fixing method

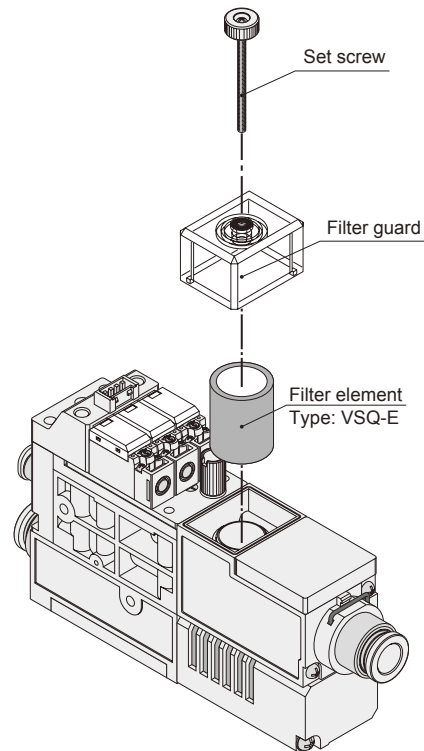
Fix the vacuum unit VSQP with M3 screws using the fixing holes on the resin body. (Refer to dimensions for a pitch of a installation hole.)



How to use

8. Replacing the filter element

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



9. 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.

