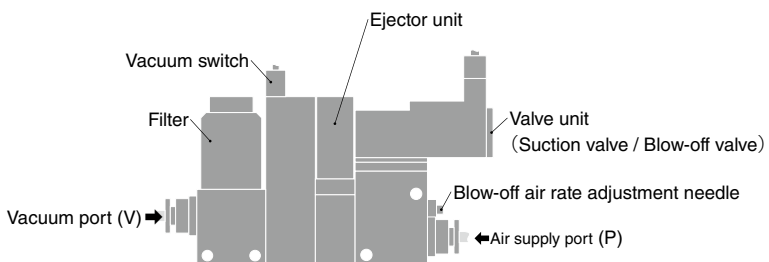


Complex Ejector focusing on basic performance Vacuum Generator **VG Series**

- *Vacuum switch and blow-off valve are united. Select the best combination in accordance with applications.*
- *There are 3 output types: 1 switch output and 1 analog output type, 2-point switch output type, and cost saving 1 analog output type.*

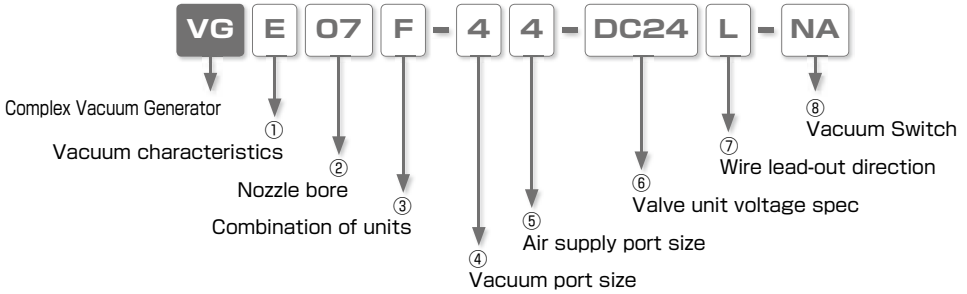


Vacuum Generator Series

Vacuum Generator VG

VACUUM GENERATOR

Model Designation (Example)



① Vacuum characteristics

Code	Performance	Code	Performance	Code	Performance
H	High-vacuum type	L	Large-flow type	E	High-vacuum at low air supply pressure type

② Nozzle bore

Code	Nozzle bore	H type		L type		E type		Air consumption
		Vacuum level, Suction flow		Vacuum level, Suction flow		Vacuum level, Suction flow		
05	0.5mm	-90kPa 7ℓ/min(ANR)		-66kPa 12ℓ/min(ANR)		-		11.5ℓ/min(ANR)
07	0.7mm	-93kPa 13ℓ/min(ANR)		-66kPa 26ℓ/min(ANR)		-90kPa 10.5ℓ/min(ANR)		23ℓ/min(ANR) (17ℓ/min(ANR))
10	1.0mm	-93kPa 27ℓ/min(ANR)		-66kPa 40ℓ/min(ANR)		-90kPa 21ℓ/min(ANR)		46ℓ/min(ANR) (34ℓ/min(ANR))

※ Supply pressure is 0.5MPa for H and L type and 0.35MPa for E type.

※ The values of air consumption in () are for E type.

※ The values in the table are representative values. Suction flow can vary by vacuum port dia. or tube length.

③ Combination of units

Code	Filter	Vacuum switch	Suction valve	Blow-off valve
A	○	—	—	—
B	○	○	—	—
E	○	—	○	○
F	○	○	○	○

④ Vacuum port size

Joint type	Push-In Fitting	
	Code	Size
	4	6
	ø4mm	ø6mm

⑤ Air supply port size

Joint type	Push-In Fitting	
	Code	Size
	4	6
	ø4mm	ø6mm

⑥ Valve unit voltage spec

Code	DC24	AC100
Voltage	DC24V	AC100V

⑦ Wire lead-out direction

Code	S	L
lead-out direction	Side	Top

⑧ Vacuum Switch (For Unit combination of B and F only)

Code	NW	NA	A
Sensor	2 Switch outputs	1 analog output and 1 switch output	1 analog output

Specification

Fluid medium	Air
Operating pressure range	0.25 ~ 0.7MPa
Operating temp. range	5 ~ 50°C
Lubrication	Not required

Suction Valve Specification

Valve type	Pilot operated poppet valve
Rated voltage	DC24V ±10% · AC100V ±10%
Power consumption	1.2W (with LED) · 1.5VA (with LED)
Effective sectional area	5 mm ²
Manual operation	Push button (non-lock)

Blow-off Valve Specification

Valve type	Direct operating poppet
Rated voltage	DC24V ±10% · AC100V ±10%
Power consumption	1.2W (with LED) · 1.5VA (with LED)
Manual operation	Push button (non-lock)

Vacuum Switch Specification

Model code	VG.....NA	VG.....NW	VG.....A	
Output Specification	1 switch output	2 switch output	1 analog output	
	1 analog output			
Power requirements	DC12 ~ 24V ±10% 24VDC ± Ripple (P-P) Max. 10%			
Current consumption (when 24VDC supplied)	Max. 17mA (1 switch: ON)	Max. 25mA (2 switches: ON)	Max. 15mA (Output current: 0mA)	
Fluid medium	Air / Inert gas			
Operating pressure range	0 ~ -100kPa			
Proof pressure	200kPa			
Operating temp. range	0 ~ 50°C (No freezing)			
Operating humidity range	35 ~ 85%RH (No dew condensation)			
Durability (※)	10 million cycles (0 ~ rated pressure)			
Switch output	No. of pressure setting	1	2	
	Switch output	NPN open collector output		
	Pressure setting range	0 ~ -100 kPa		
	Operating accuracy	±3%F.S. (at 25°C)		
	Differential response	Variable (about 1-15% of set value)	2% F.S.Max	
	Switch capacity	30V DC 80mA Max.		
	Residual voltage	Max. 0.8V		
Analog output	Output voltage	1 ~ 5V	1 ~ 5V	
	Zero point voltage	1 ±0.1V	1 ±0.2V	
	Span voltage	4 ±0.1V	4 ±0.2V	
	Lin / HYS	±0.5%F.S.以下	±0.5%F.S.以下	

* Allowable range: ± 3%F.S. of zero point voltage, Span voltage for analog output, or of switch output accuracy.



Vacuum Generator Series

Vacuum Generator VG

VACUUM GENERATOR

Filter Specification

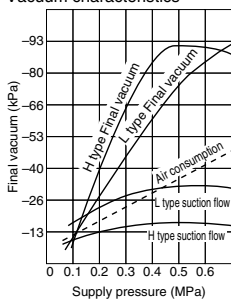
Element material	PVF (Polyvinyl formal)
Filtering capacity	10µm
Element model code	VGFE10

Characteristics

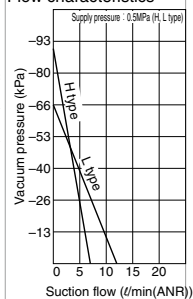
Supply pressure - Final vacuum / Suction Flow / Air Consumption

VG05, VGL05

Vacuum characteristics

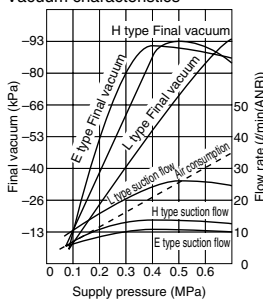


Flow characteristics

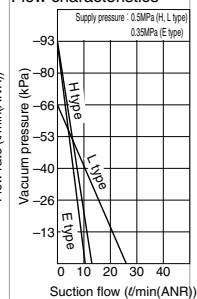


VG07, VGL07, VGE07

Vacuum characteristics

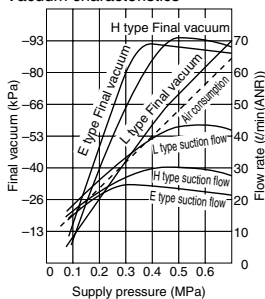


Flow characteristics

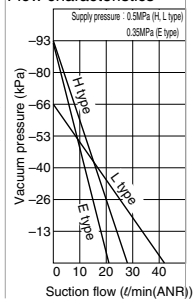


VG10, VGL10, VGE10

Vacuum characteristics



Flow characteristics



109

VH VS

VU

VUM

VY

VB

VM VC

VRL

VG

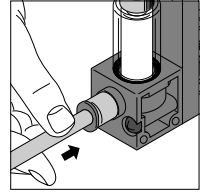
How to insert and disconnect

1. How to insert and disconnect tubes

① Tube insertion

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

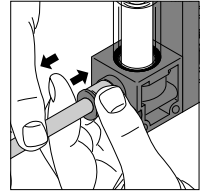
Refer to "2. Instructions for Tube Insertion" under "Common Safety Instructions for Fittings" .



② Tube disconnection

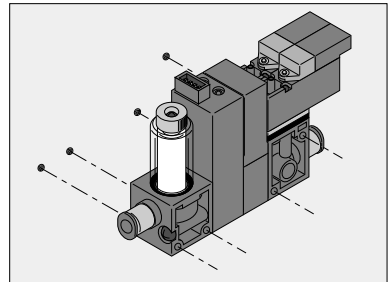
The tube is disconnected by pushing release-ring to release Lock-claws.

Make sure to stop air supply before the tube disconnection.



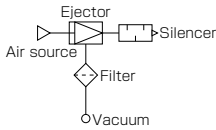
2. How to fix the product

In order to fix the vacuum generator VG, tighten M3 threads through the fixing holes on the resin body with tightening torque 0.3 to 0.35Nm. Refer to the outer dimensional drawings for the hole pitch.



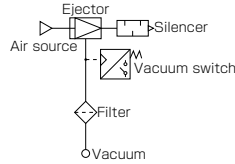
Standard Size List

Unit combination : Built-in Filter Type



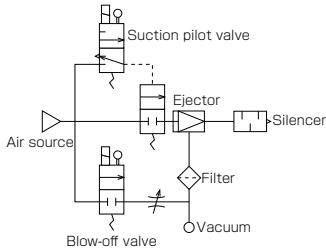
Type	Page to refer	Air supply port	Vacuum port	
			4mm	6mm
VG A Type	112	4mm	●	
		6mm		●

Unit combination: Vacuum Switch (digital type) / Built-in Filter Type



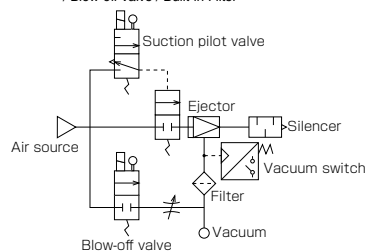
Type	Page to refer	Air supply port	Vacuum port	
			4mm	6mm
VG B Type	112	4mm	●	
		6mm		●

Unit combination: Suction Valve / Blow-off Valve / Built-in Filter Type



Type	Page to refer	Air supply port	Vacuum port	
			4mm	6mm
VG E Type	113	4mm	●	
		6mm		●

Unit combination: Vacuum Switch (digital type) / Suction Valve / Blow-off Valve / Built-in Filter



Type	Page to refer	Air supply port	Vacuum port	
			4mm	6mm
VG F Type	114	4mm	●	
		6mm		●

Applicable Tubes and Related Products

Polyurethane Tube

(Piping products catalog P.596)

■ Polyurethane Tube is for the general pneumatic piping and suitable for a compact piping.

Nylon Tube

(Piping products catalog P.608)

■ Nylon Tube is for the general pneumatic piping and suitable for a high-pressure fluid up to 1.5MPa (NB tube: 1.0MPa).

Vacuum Tube

(Piping products catalog P.612)

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

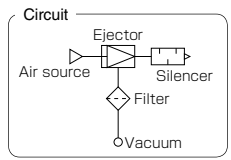
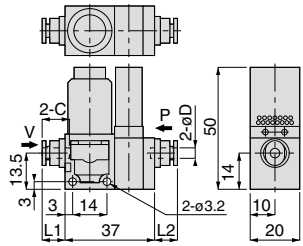
Vacuum Pads

- Vacuum Pad Standard Series . . . P.428
- Vacuum Pad Sponge Series . . . P.468
- Vacuum Pad Bellows Series . . . P.488
- Vacuum Pad Multi-Bellows Series P.508
- Vacuum Pad Oval Series P.526
- Vacuum Pad Soft Series P.550
- Vacuum Pad Soft Bellows Series . P.578
- Vacuum Pad Skidproof Series . . P.604
- Vacuum Pad Ultrathin Series . . . P.624
- Vacuum Pad Mark-free Series . . . P.642
- Vacuum Pad Long Stroke Series . P.658

VG A Type Built-in Filer Type



A-Type
RoHS compliant



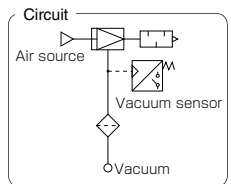
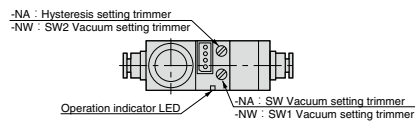
Unit : mm

Model code	Tube O.D. øD	L1	L2	C	Nozzle Bore (mm)	Final vacuum (-kPa)	Suction flow (l/min(ANR))	Air consumption (l/min(ANR))	Weight (g)	CAD file name
VGH05A-44	4	9.6	9.1	10.9	0.5	90	7	11.5	47	VVG-001
VGH07A-66	6	12.1	11.6	11.7	0.7	93	13	23	49	
VGH10A-66	6	12.1	11.6	11.7	1	93	27	46	48	
VGL05A-44	4	9.6	9.1	10.9	0.5	66	12	11.5	46	
VGL07A-66	6	12.1	11.6	11.7	0.7	66	26	23	48	
VGL10A-66	6	12.1	11.6	11.7	1	66	40	46	47	
VGE07A-66	6	12.1	11.6	11.7	0.7	90	10.5	17	48	
VGE10A-66	6	12.1	11.6	11.7	1	90	21	34	48	

VG Vacuum Sensor (digital type) / Built-in Filter Type



B-Type
RoHS compliant



Unit : mm

※ 1 analog output type does not have Operation indicator LED and Vacuum Setting Trimmer.

Model code	Tube O.D. øD	L1	L2	C	Nozzle Bore (mm)	Final vacuum (-kPa)	Suction flow (l/min(ANR))	Air consumption (l/min(ANR))	Weight (g)	CAD file name
VGH05B-44-□	4	9.6	7.6	10.9	0.5	90	7	11.5	74	VVG-001
VGH07B-66-□	6	12.1	10.1	11.7	0.7	93	13	23	75	
VGH10B-66-□	6	12.1	10.1	11.7	1	93	27	46	75	
VGL05B-44-□	4	9.6	7.6	10.9	0.5	66	12	11.5	73	
VGL07B-66-□	6	12.1	10.1	11.7	0.7	66	26	23	75	
VGL10B-66-□	6	12.1	10.1	11.7	1	66	40	46	74	
VGE07B-66-□	6	12.1	10.1	11.7	0.7	90	10.5	17	75	
VGE10B-66-□	6	12.1	10.1	11.7	1	90	21	34	74	

Vacuum Generator Series

Vacuum Generator VG

VACUUM GENERATOR

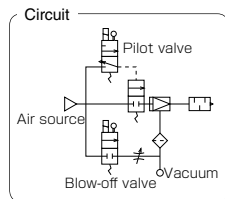
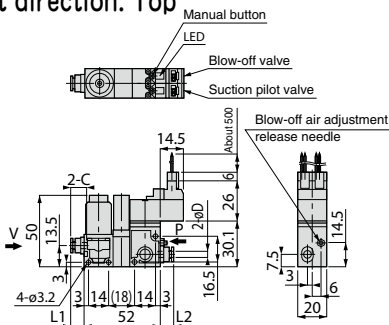
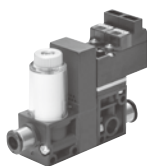


Suction Pilot Valve / Blow-off Valve / Built-in Filter Type



RoHS compliant

Cable lead-out direction: Top



Unit : mm

Model code	Tube O.D. øD	L1	L2	C	Nozzle Bore (mm)	Final vacuum (-kPa)	Suction flow (ℓ /min(ANR))	Air consumption (ℓ /min(ANR))	Weight (g)	CAD file name
VGH05E-44-□L	4	9.6	7.6	10.9	0.5	90	7	11.5	99	VVG-001
VGH07E-66-□L	6	12.1	10.1	11.7	0.7	93	13	23	100	
VGH10E-66-□L					1		27	46	101	
VGL05E-44-□L	4	9.6	7.6	10.9	0.5	66	12	11.5	99	
VGL07E-66-□L	6	12.1	10.1	11.7	0.7		26	23	101	
VGL10E-66-□L					1		40	46	100	
VGE07E-66-□L	6	12.1	10.1	11.7	0.7	90	10.5	17	101	
VGE10E-66-□L					1		21	34	100	

113

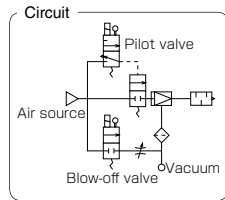
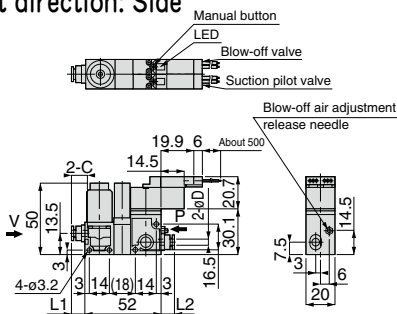
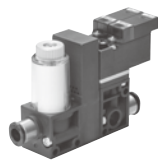


Suction Pilot Valve / Blow-off Valve / Built-in Filter Type



RoHS compliant

Cable lead-out direction: Side



Unit : mm

Model code	Tube O.D. øD	L1	L2	C	Nozzle Bore (mm)	Final vacuum (-kPa)	Suction flow (ℓ /min(ANR))	Air consumption (ℓ /min(ANR))	Weight (g)	CAD file name
VGH05E-44-□S	4	9.6	7.6	10.9	0.5	90	7	11.5	99	VVG-001
VGH07E-66-□S	6	12.1	10.1	11.7	0.7	93	13	23	100	
VGH10E-66-□S					1		27	46	101	
VGL05E-44-□S	4	9.6	7.6	10.9	0.5	66	12	11.5	99	
VGL07E-66-□S	6	12.1	10.1	11.7	0.7		26	23	101	
VGL10E-66-□S					1		40	46	100	
VGE07E-66-□S	6	12.1	10.1	11.7	0.7	90	10.5	17	101	
VGE10E-66-□S					1		21	34	100	



Characteristic chart page



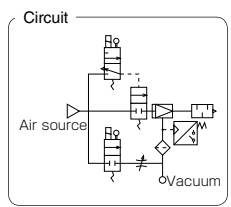
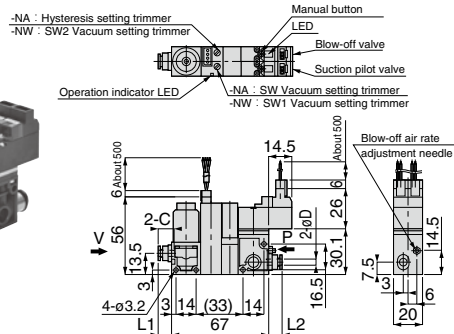
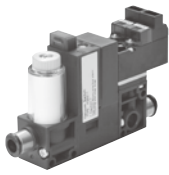
CAD data is available at PISCO website.



Vacuum Sensor (digital type) / Suction Pilot Valve / Blow-off Valve / Built-in Filter
Type Cable lead-out direction: Top



RoHS compliant



*1 analog output type does not have Operation indicator LED and Vacuum Setting Trimmer.

Unit : mm

Model code	Tube O.D. øD	L1	L2	C	Nozzle Bore (mm)	Final vacuum (-kPa)	Suction flow (l/min(ANR))	Air consumption (l/min(ANR))	Weight (g)	CAD file name
VGH05F-44-□L-□	4	9.6	7.6	10.9	0.5	90	7	11.5	125	VVG-001
VGH07F-66-□L-□	6	12.1	10.1	11.7	0.7	93	13	23	128	
VGH10F-66-□L-□					1		27	46	127	
VGL05F-44-□L-□	4	9.6	7.6	10.9	0.5	66	12	11.5	127	
VGL07F-66-□L-□	6	12.1	10.1	11.7	0.7		26	23		
VGL10F-66-□L-□					1	40	46			
VGE07F-66-□L-□	6	12.1	10.1	11.7	0.7	90	10.5	17	128	
VGE10F-66-□L-□					1		21	34		

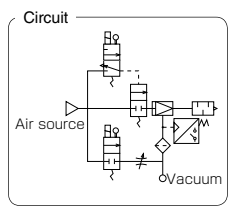
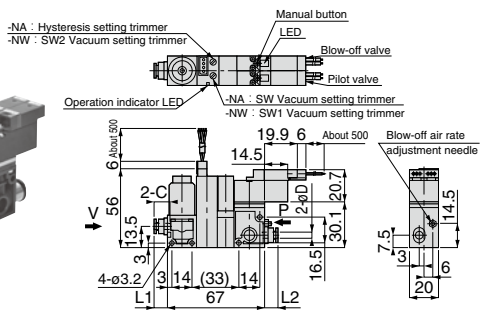
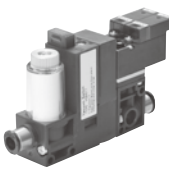
114



Vacuum Sensor (digital type) / Suction Pilot Valve / Blow-off Valve / Built-in Filter Type
Cable lead-out direction: Side



RoHS compliant



*1 analog output type does not have Operation indicator LED and Vacuum Setting Trimmer.

Unit : mm

Model code	Tube O.D. øD	L1	L2	C	Nozzle Bore (mm)	Final vacuum (-kPa)	Suction flow (l/min(ANR))	Air consumption (l/min(ANR))	Weight (g)	CAD file name
VGH05F-44-□S-□	4	9.6	7.6	10.9	0.5	90	7	11.5	125	VVG-001
VGH07F-66-□S-□	6	12.1	10.1	11.7	0.7	93	13	23	128	
VGH10F-66-□S-□					1		27	46	127	
VGL05F-44-□S-□	4	9.6	7.6	10.9	0.5	66	12	11.5	127	
VGL07F-66-□S-□	6	12.1	10.1	11.7	0.7		26	23		
VGL10F-66-□S-□					1	40	46			
VGE07F-66-□S-□	6	12.1	10.1	11.7	0.7	90	10.5	17	128	
VGE10F-66-□S-□					1		21	34		



Characteristic chart page



CAD data is available at PISCO website.

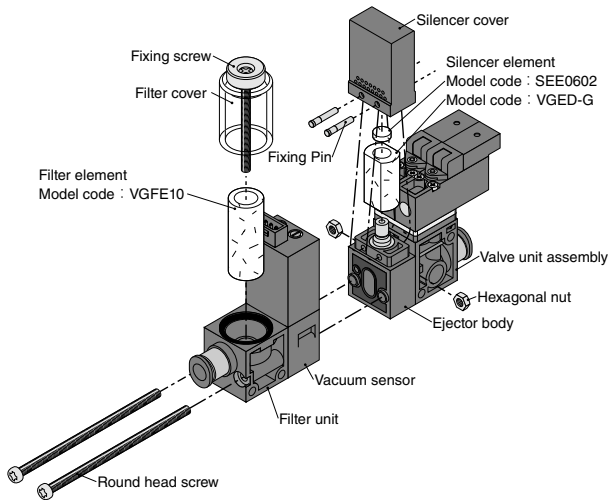
Before using PISCO products, be sure to read "Safety Instructions" and "Safety Instruction Manual" on page 35-39, "Common Safety Instructions for Vacuum Series" on page 47-49 and "Common Safety Instructions for Vacuum Generator VG & VK" on page 105.

Warning

1. Attention should be paid when pipe resistance is large or a large amount of blow-off air rate is required. Insufficient blow-off air may cause troubles. Make sure to evaluate PISCO products by actual system.
2. The coil in a pilot valve generates heat under the following ① - ③ conditions. Heating may be a cause of dropping life cycle, malfunctions and burn or may affect negatively on peripheral machines due to the heat. Contact us when the power is applied to the vacuum generator under the following conditions:
 - ① The power is continuously ON for over 2 hours.
 - ② High-cycle operation.
 - ③ Even when intermittent running of the generator is carried out, the total operation time per day is longer than non-operation time.

Replacement Element

- Remove the fixing screws to replace filter elements. Make sure not to lose the filter seal ring after the replacement and tighten the screws with tightening torque 0.18-0.22Nm.



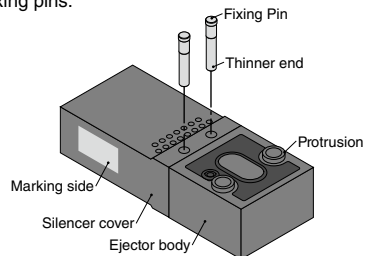
■ Replacement of Silencer Elements

Replace elements after removing 2 round head screws and 2 fixing pins.

※ Make sure not to lose 2 hexagonal nuts.

■ Procedures After Replacing Silencer Element

As the right figure shows, attach the silencer cover to the ejector body and insert thinner end of 2 fixing pins into the holes from the side with protrusion of the ejector body. Make sure all seal materials of each unit are fit before assembling the units. Use a screwdriver to appropriately tighten the round head screw and the hexagonal nut with 0.35-0.4Nm of the tightening torque.



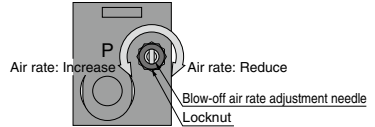
■ Adjusting Method of Blow-off Air

■ Adjusting Method of Blow-off Air

- Turn the release needle in the clockwise direction to reduce blow-off air and counter-clockwise to increase.

※ After adjustment of the blow-off air rate, make sure to tighten the locknut to prevent the setting from changing with attentions to the following ① and ②.

- ① Without turning the needle, finger-tighten the lock nut clockwise until it touches needle-guide. Then tighten the nut by turning 20 ~ 30° more by using proper tool.
- ② Be careful not to damage the thread by over tightening.



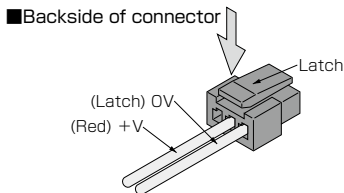
■ Attaching / Detaching Individual Plug-in Connector

■ Attaching / Detaching Individual Plug-in Connector

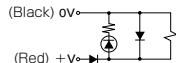
- Insert the connector into the socket until it stops.

■ Connector Detaching Method

- Pull out the connector while pushing the latch to the arrowed direction.

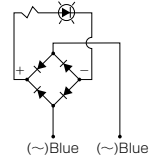


■ DC24V



Note) () is the lead color.

■ AC100V



■ Manual of Vacuum Sensor

1. Pressure Adjustment

- ① Turn on the power (Apply DC power to the vacuum sensor after making sure the correct wiring).
- ② Fully turn the hysteresis setting trimmer (HYS) in the counter-clockwise direction in order to minimize the hysteresis setting. (Vacuum sensor with analog output (Code: -NA) only)
Note) When vacuum level is not stable, minimized hysteresis make the output unstable.
- ③ Adjust the vacuum setting trimmer (S1 / S2 and SW) to meet the required value.
Note) Use a vacuum gauge or check in the actual system for setting pressure.
- ④ Apply the air pressure and check the operation.

(In case of Vacuum sensor with analog output (Code: -NA))

Switch output (SW): Operation indicator (Red LED) turns ON more than the set pressure.

(Vacuum sensor with 2 switch output (Code: -NW))

Switch output 1 (S1): Operation indicator (Red LED) turns ON more than the set pressure.

Switch output 2 (S2): Operation indicator (Green LED) turns ON more than the set pressure.

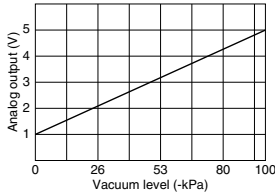
2. Differential response setting (Vacuum sensor with analog output (Code: -NA) only)

- ① Differential response setting can be adjusted by the hysteresis setting trimmer (HYS).
- ② Differential response setting range is regulated within about 0-15% of the set value. Differential response setting becomes large when the trimmer is turned in the clockwise direction.
- ③ Confirmation of Hysteresis
Gradually increase and decrease the supply pressure around the set pressure value and read the value from a vacuum gauge when operation indicator lamp turns ON/OFF. The difference in the displayed values is taken as differential response.
- ④ Hysteresis adjustment is useful for the following cases:
 - Increase differential response when pressure pulsates with output repeatedly showing small on/off movements.
 - When an allowable range is to be set for the lowering of pressure.



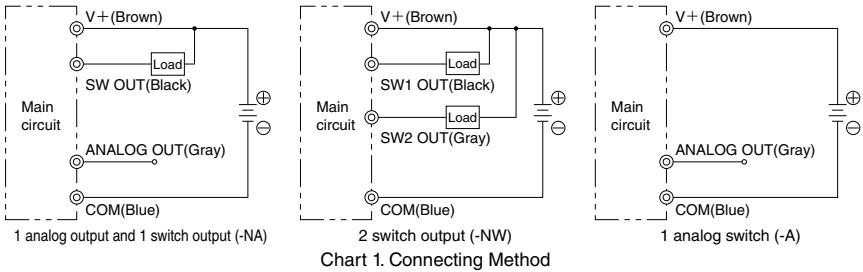
3. Output Characteristics of 1 analog switch (Code: -A).

■ Analog output characteristics



4. Wiring / Piping

- (1) Be sure to shut off the power supply before wiring.
- (2) In conducting the wiring, distinguish the wire colors and confirm the terminal output.
- (3) Refer to Chart 1. Connecting Method for wiring.
- (4) Do not give excessive tension or bending to the drawer cable.
- (5) The cable can be connected or disconnected from connector. In case of disconnection, please hold connector and pull out the cable while pushing stop bar. Avoid connection and disconnection unless it is absolutely necessary, for it will put burdens on the sensor board.



5. Safety Instructions

- ① Do not use the vacuum generator in location where it may be exposed to water, oil drop or dust, since it is not the drip/dust proof.
- ② Do not use the vacuum generator in location where it may be exposed to inflammable or explosive gas, liquid or atmosphere, since it is not an explosive-proof.
- ③ Do not use the sensor in atmosphere exceeding the range of application temperature or causing heat as the vacuum generator malfunction may result.
- ④ When the positive pressure such as blow-off air is applied to the sensor, do not apply the pressure more than 0.2MPa constantly.
- ⑤ Do not use it in an ambience of gas containing a corrosive substance.
- ⑥ Compressed air contains many kinds of drains such as water, oxidized oil, tar and other foreign substances. Dehumidify the compressed air by using an after-cooler or a dryer and improve the air quality, since those drains seriously impair the performance of the vacuum generator.
- ⑦ Supply a stable DC power to the product.
- ⑧ Add a surge absorption circuit to relays or solenoid valves, etc. which are to be connected with output terminal and source terminal. Avoid any use which involves over 80mA in current.
- ⑨ Ground FG terminal when using a unit power source such as switching current.
- ⑩ Output terminals (lead wire color: black and gray) and other terminals should not be short circuited.
- ⑪ Do not apply excessive external impact on the sensor.
- ⑫ Wiring or ways by which noise is caused may cause troubles.
- ⑬ When adjusting pressure and the hysteresis setting, use the accompanied flathead screwdriver. Do not apply an excessive force on the trimmer and slowly turn it within its rotation limits.



SAFETY Instructions

This safety instructions aim to prevent personal injury and damage to properties by requiring proper use of PISCO products.

Be certain to follow ISO 4414 and JIS B 8370

ISO 4414 : Pneumatic fluid power...Recommendations for the application of equipment to transmission and control systems.

JIS B 8370 : General rules and safety requirements for systems and their components.

This safety instructions is classified into "Danger", "Warning" and "Caution" depending on the degree of danger or damages caused by improper use of PISCO products.



Danger

Hazardous conditions. It can cause death or serious personal injury.



Warning

Hazardous conditions depending on usages. Improper use of PISCO products can cause death or serious personal injury.



Caution

Hazardous conditions depending on usages. Improper use of PISCO products can cause personal injury or damages to properties.



Warning

1. Selection of pneumatic products

- ① A user who is a pneumatic system designer or has sufficient experience and technical expertise should select PISCO products.
- ② Due to wide variety of operating conditions and applications for PISCO products, carry out the analysis and evaluation on PISCO products. The pneumatic system designer is solely responsible for assuring that the user's requirements are met and that the application presents no health or safety hazards. All designers are required to fully understand the specifications of PISCO products and constitute all systems based on the latest catalog or information, considering any malfunctions.

2. Handle the pneumatic equipment with enough knowledge and experience

- ① Improper use of compressed air is dangerous. Assembly, operation and maintenance of machines using pneumatic equipment should be conducted by a person with enough knowledge and experience.

3. Do not operate machine / equipment or remove pneumatic equipment until safety is confirmed.

- ① Make sure that preventive measures against falling work-pieces or sudden movements of machine are completed before inspection or maintenance of these machine.
- ② Make sure the above preventive measures are completed. A compressed air supply and the power supply to the machine must be off, and also the compressed air in the systems must be exhausted.
- ③ Restart the machines with care after ensuring to take all preventive measures against sudden movements.

Disclaimer

1. PISCO does not take any responsibility for any incidental or indirect loss, such as production line stop, interruption of business, loss of benefits, personal injury, etc., caused by any failure on use or application of PISCO products.
2. PISCO does not take any responsibility for any loss caused by natural disasters, fires not related to PISCO products, acts by third parties, and intentional or accidental damages of PISCO products due to incorrect usage.
3. PISCO does not take any responsibility for any loss caused by improper usage of PISCO products such as exceeding the specification limit or not following the usage the published instructions and catalog allow.
4. PISCO does not take any responsibility for any loss caused by remodeling of PISCO products, or by combinational use with non-PISCO products and other software systems.
5. The damages caused by the defect of Pisco products shall be covered but limited to the full amount of the PISCO products paid by the customer.



SAFETY INSTRUCTION MANUAL

PISCO products are designed and manufactured for use in general industrial machines. Be sure to read and follow the instructions below.

Danger

1. Do not use PISCO products for the following applications.
 - ① Equipment used for maintaining / handling human life and body.
 - ② Equipment used for moving / transporting human.
 - ③ Equipment specifically used for safety purposes.

Warning

1. Do not use PISCO products under the following conditions.
 - ① Beyond the specifications or conditions stated in the catalog, or the instructions.
 - ② Under the direct sunlight or outdoors.
 - ③ Excessive vibrations and impacts.
 - ④ Exposure / adhere to corrosive gas, inflammable gas, chemicals, seawater, water and vapor. *
 - * Some products can be used under the condition above(④), refer to the details of specification and condition of each product.
2. Do not disassemble or modify PISCO products, which affect the performance, function, and basic structure of the product.
3. Turn off the power supply, stop the air supply to PISCO products, and make sure there is no residual air pressure in the pipes before maintenance and inspection.
4. Do not touch the release-ring of push-in fitting when there is a working pressure. The lock may be released by the physical contact, and tube may fly out or slip out.
5. Frequent switchover of compressed air may generate heat, and there is a risk of causing burn injury.
6. Avoid any load on PISCO products, such as a tensile strength, twisting and bending. Otherwise, there is a risk of causing damage to the products.
7. As for applications where threads or tubes swing / rotate, use Rotary Joints, High Rotary Joints or Multi-Circuit Rotary Block only. The other PISCO products can be damaged in these applications.
8. Use only Die Temperature Control Fitting Series, Tube Fitting Stainless SUS316 Series, Tube Fitting Stainless SUS316 Compression Fitting Series or Tube Fitting Brass Series under the condition of over 60°C (140° F) water or thermal oil. Other PISCO products can be damaged by heat and hydrolysis under the condition above.
9. As for the condition required to dissipate static electricity or provide an antistatic performance, use EG series fitting and antistatic products only, and do not use other PISCO products. There is a risk that static electricity can cause system defects or failures.
10. Use only Fittings with a characteristic of spatter-proof such as Anti-spatter or Brass series in a place where flame and weld spatter is produced. There is a risk of causing fire by sparks.
11. Turn off the power supply to PISCO products, and make sure there is no residual air pressure in the pipes and equipment before maintenance. Follow the instructions below in order to ensure safety.
 - ① Make sure the safety of all systems related to PISCO products before maintenance.
 - ② Restart of operation after maintenance shall be proceeded with care after ensuring safety of the system by preventive measures against unexpected movements of machines and devices where pneumatic equipment is used.
 - ③ Keep enough space for maintenance when designing a circuit.
12. Take safety measures such as providing a protection cover if there is a risk of causing damages or fires on machine / facilities by a fluid leakage.

⚠ Caution

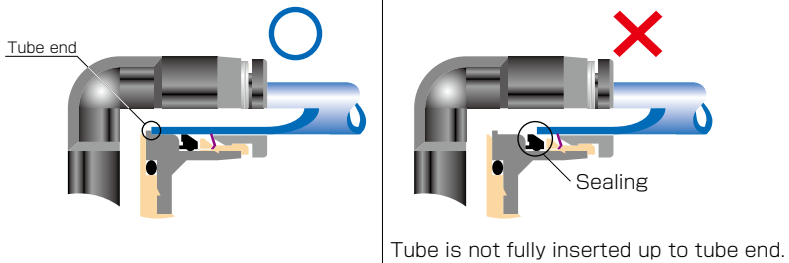
1. Remove dusts or drain before piping. They may get into the peripheral machine / facilities and cause malfunction.
2. When inserting an ultra-soft tube into push-in fitting, make sure to place an Insert Ring into the tube edge. There is a risk of causing the escape of tube and a fluid leakage without using an Insert Ring.
3. The product incorporating NBR as seal rubber material has a risk of malfunction caused by ozone crack. Ozone exists in high concentrations in static elimination air, clean-room, and near the high-voltage motors, etc. As a countermeasure, material change from NBR to HNBR or FKM is necessary. Consult with PISCO for more information.
4. Special option "Oil-free" products may cause a very small amount of a fluid leakage. When a fluid medium is liquid or the products are required to be used in harsh environments, contact us for further information.
5. In case of using non-PISCO brand tubes, make sure the tolerance of the outer tube diameter is within the limits of Table 1.

● Table 1. Tube O.D. Tolerance

mm size	Nylon tube	Polyurethane tube	inch size	Nylon tube	Polyurethane tube
ø1.8mm	—	± 0.05mm	ø1/8	± 0.1mm	± 0.15mm
ø3mm	—	± 0.15mm	ø5/32	± 0.1mm	± 0.15mm
ø4mm	± 0.1mm	± 0.15mm	ø3/16	± 0.1mm	± 0.15mm
ø6mm	± 0.1mm	± 0.15mm	ø1/4	± 0.1mm	± 0.15mm
ø8mm	± 0.1mm	± 0.15mm	ø5/16	± 0.1mm	± 0.15mm
ø10mm	± 0.1mm	± 0.15mm	ø3/8	± 0.1mm	± 0.15mm
ø12mm	± 0.1mm	± 0.15mm	ø1/2	± 0.1mm	± 0.15mm
ø16mm	± 0.1mm	± 0.15mm	ø5/8	± 0.1mm	± 0.15mm

6. Instructions for Tube Insertion

- ① Make sure that the cut end surface of the tube is at right angle without a scratch on the surface and deformations.
- ② When inserting a tube, the tube needs to be inserted fully into the push-in fitting until the tubing edge touches the tube end of the fitting as shown in the figure below. Otherwise, there is a risk of leakage.



- ③ After inserting the tube, make sure it is inserted properly and not to be disconnected by pulling it moderately.
- ※ When inserting tubes, Lock-claws may be hardly visible in the hole, observed from the front face of the release-ring. But it does not mean the tube will surely escape. Major causes of the tube escape are the followings;
- ① Shear drop of the lock-claws edge
 - ② The problem of tube diameter (usually small)
- Therefore, follow the above instructions from ① to ③, even lock-claws is hardly visible.

7. Instructions for Tube Disconnection

- ① Make sure there is no air pressure inside of the tube, before disconnecting it.
- ② Push the release-ring of the push-in fitting evenly and deeply enough to pull out the tube toward oneself. By insufficient pushing of the release-ring, the tube may not be pulled out or damaged by scratch, and tube shavings may remain inside of the fitting, which may cause the leakage later.

8. Instructions for Installing a fitting

- ① When installing a fitting, use proper tools to tighten a hexagonal-column or an inner hexagonal socket. When inserting a hex key into the inner hexagonal socket of the fitting, be careful so that the tool does not touch lock-claws. The deformation of lock-claws may result in a poor performance of systems or an escape of the tube.
- ② Refer to Table 2 which shows the recommended tightening torque. Do not exceed these limits to tighten a thread. Excessive tightening may break the thread part or deform the gasket and cause a fluid leakage. Tightening thread with tightening torque lower than these limits may cause a loosened thread or a fluid leakage.
- ③ Adjust the tube direction while tightening thread within these limits, since some PISCO products are not rotatable after the installation.

● Table 2: Recommended tightening torque / Sealock color / Gasket materials

Thread type	Thread size	Tightening torque	Sealock color	Gasket materials
Metric thread	M3 × 0.5	0.7N·m	—	SUS304 NBR
	M5 × 0.8	1.0 ~ 1.5N·m		
	M6 × 1	2 ~ 2.7N·m		
	M3 × 0.5	0.5 ~ 0.6N·m		POM
	M5 × 0.8	1 ~ 1.5N·m		
	M6 × 0.75	0.8 ~ 1N·m		
Taper pipe thread	M8 × 0.75	1 ~ 2N·m	White	—
	R1/8	7 ~ 9N·m		
	R1/4	12 ~ 14N·m		
	R3/8	22 ~ 24N·m		
Unified thread	R1/2	28 ~ 30N·m	—	SUS304, NBR
	No.10-32UNF	1.0 ~ 1.5N·m		
National pipe thread taper	1/16-27NPT	7 ~ 9N·m	White	—
	1/8-27NPT	7 ~ 9N·m		
	1/4-18NPT	12 ~ 14N·m		
	3/8-18NPT	22 ~ 24N·m		
	1/2-14NPT	28 ~ 30N·m		

※ These values may differ for some products. Refer to each specification as well.

9. Instructions for removing a fitting

- ① When removing a fitting, use proper tools to loosen a hexagonal-column or an inner hex bolt.
- ② Remove the sealant stuck on the mating equipment. The remained sealant may get into the peripheral equipment and cause malfunctions.

10. Arrange piping avoiding any load on fittings and tubes such as twist, tensile, moment load, shaking and physical impact. These may cause damages to fittings, tube deformations, bursting and the escape of tubes.



Common Safety Instructions for Vacuum Series

Before selecting or using PISCO products, read the following instructions. Read the detailed instructions for individual series.

Warning

1. If there is a risk of dropping work-pieces during vacuum suction, take a safety measure against the falling of them.
2. Avoid supplying more than 0.1MPa pressure constantly in a vacuum circuit. Since vacuum generators are not explosive-proof, there is a risk of damaging the products.
3. Pay attention to drop of vacuum pressure caused by problems of the supplied air or the power supply. Decrease of suction force may lead to a danger of falling work-piece so that safety measure against the falling of them is necessary.
4. When more than 2 vacuum pads are plumbed on a single ejector and one of them has a suction problem such as vacuum leak, there is a risk of releasing work-pieces from the other pad due to the drop of the vacuum pressure.
5. Do not use in the way by which exhaust port is blocked or exhaust resistance is increased. Otherwise, there is a risk of no vacuum generation or a drop of the vacuum pressure.
6. Do not use the product in the circumstance of corrosive gas, inflammable gas, explosive gas, chemicals, seawater and vapor or do not expose the product to those. Never allow the product to suck those things.
7. Provide a protective cover on the products when it is exposed to sunlight.
8. Carry out clogging check for silencer element in an ejector and a vacuum filter periodically. Clogged element will be a cause to impair the performance or a cause of troubles.
9. Before replacing the element, thoroughly read and understand the method of filter replacement in the catalog.
10. Make sure the correct port of the vacuum generator by this catalog or marking on the products when plumbing. Wrong plumbing can be a risk to damage the product.
11. Supply clean air without sludge or dusts to an ejector. Do not lubricate by a lubricator. There is a risk of malfunction or performance impairing by impurities and oil contained in the compressed air.
12. Do not apply extreme tension, twist or bending forces on a lead wire. Otherwise, it may cause a wire breaking.
13. Locknut needs to be tightened firmly by hand. Do not use any tool to tighten. In case of using tools to tighten the locknut, it may damage the locknut or the product. Inadequate tightening may loosen the locknut and the initial setting can be changed.
14. Do not force the product to rotate or swing even its resin body is rotatable. It may cause damage to the product and a fluid leakage.
15. Do not supply an air pressure or a dry air to the products over the necessary amount. There is a risk of deteriorating rubber materials and malfunction due to oil.
16. Keep the product away from water, oil drops or dusts. These may cause malfunction. Take a proper measure to protect the product before the operation.

17. Do not use the product in the environment of inflammable or explosive gas / fluid. It can cause a fire or an explosion hazard.
18. Do not use the product in the circumstance of corrosive gas, inflammable gas, explosive gas, chemicals, seawater and vapor or do not expose the product to those. Otherwise, it may be a cause of malfunction.
19. Do not clean or paint the products by water or a solvent.

⚠ Caution

1. Operating pressure range in the catalog is the values during ejector operation. Secure the described value of the supplied air, taking a drop of the pressure into consideration. Insufficient pressure, which does not satisfy the spec, may cause abnormal noise, unstable performance and may negatively affect sensors, bringing troubles at last.
2. Effective cross-section area of the air supply side needs to be three times as large as effective cross-section area of the nozzle bore. When arranging piping or selecting PISCO products, secure required effective cross-section area. Insufficient supply pressure may be a cause to impair performance.
3. A Shorter distance of plumbing with a wider bore is preferable at vacuum system side. A long plumbing with a small bore may result in slow response time at the time of releasing work-piece as well as in failure to secure adequate suction flow rate.
4. Plumb a vacuum switch and an ejector with vacuum switch at the end of vacuum system as much as possible. A long distance between a vacuum switch and a vacuum system end may increase plumbing resistance which may lead to a high vacuum level at the sensor even when no suctioning and a malfunction of vacuum switch. Make sure to evaluate the products in an actual system.
5. Refer to "4. Instructions for Installing a fitting" and "5. Instructions for Removing a fitting" under "Common Safety Instructions for Fittings" , when installing or removing Fittings.
6. Refer to "Common Safety Instructions for Pressure Sensors" and "Detailed Safety Instructions" for the handling of digital vacuum switch sensor.
7. Refer to "Common Safety Instructions for Mechanical Vacuum Sensor" for the handling of mechanical vacuum switch.
8. The material of plastic filter cover for VG, VK, VJ, VZ and VX series is PCTG. Avoid the adherence of Chemicals below to the products, and do not use them under those chemical environments.

● Table Chemical Name

Chemical Name
Thinner
Carbon tetrachloride
Chloroform
Acetate
Aniline
Cyclohexane
Trichloroethylene
Sulfuric acid
Lactic acid
Water soluble cutting oil (alkaline)

* There are more chemicals which should be avoided. Contact us for the use under chemical circumstance.

VACUUM GENERATOR
EXTERNAL VACUUM CONTROLLER
VACUUM PAD
VACUUM ACCESSORIES
48
VH-VS
VU
VUM
VY
VB
VM-VC
VRL
VG
VK
VJ
VX
VQ
VZ
VN

9. The material of plastic filter cover for VQ and VFU series is PA. Avoid the adherence of chemicals below to the products, and do not use them under those chemical environments.

● Table Chemical Name

Chemical Name
Methanol
Ethanol
Nitric acid
Sulfuric acid
Hydrochloric acid
Lactic acid
Acetone
Chloroform
Aniline
Trichloroethylene
Hydrogen peroxide

* There are more chemicals which should be avoided. Contact us for the use under chemical circumstance.



Common Safety Instructions for Vacuum Generator VG and VK Series

Before selecting or using PISCO products, read the following instructions. Read the detailed instructions for individual series.

Warning

1. For the operation of the valve, make sure that the leakage current is less than 1mA. Leakage current larger than that may cause malfunction.
2. The Vacuum Generator with retention function or check valve function permits some vacuum leakage, so provide an appropriate safety measure when vacuum retention for long period of time is required.
3. Long continuous power supply to the valve may raise the temperature of the coil. Heat may cause damaging product life, malfunction, and burns or may adversely affect the peripheral machines. Consult PISCO about such applications.

Caution

1. Do not give an excessive tensile strength and bending on a lead wire. Otherwise, breaking wire or damage on connector may be caused.
2. When manifold type is selected, dropping the performance or having an effect to other vacuum ports can be caused depending on number of stations or a combination of mounting units. Contact us for any unclear points.
3. Compressed air contains many kinds of drains such as water, oxidized oil, tar and other foreign substances. Dehumidify the compressed air by using an after-cooler or a dryer and improve the air quality, since those drains seriously impair the performance of the vacuum generator.
4. Do not use lubricators.
5. Since pipe rust cause malfunctions, a filter finer than 5 μ m should be placed right before the air supply port.
6. Do not use the vacuum generator under the condition of corrosive and/or flammable gases. Also do not use these gasses as a fluid medium.
7. Do not operate blow-off solenoid valve during vacuum generating.
8. When replacing vacuum port cartridge, first remove any foreign matter clinging to them and the surrounding areas, then firmly insert pins into cartridges.
9. For handling and setting of vacuum switch, please read instruction manual carefully.
10. For adjustment of vacuum blow-off air flow or blow-off time of air-timer operated blow-off valve on VK Series, read the instructions carefully.