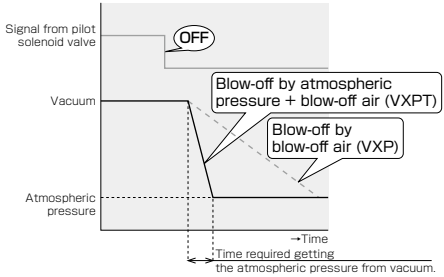
New Line Up

External Vacuum Controller with Compact Body, Lightweight and High Vacuum Cycle

External Vacuum Controller VXP/VXPT

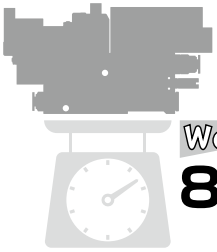
● *The 3-port specification, VXPT, has adopted a three-way vacuum supply main valve, then blow-off time is drastically shortened.*

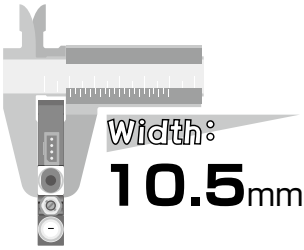
Three-port specification has been added to the lineup of external vacuum controller. By adopting a three-way vacuum supply main valve, blow-off time is drastically shortened. Since the conventional two-way valve (VXP type) operates to maintain the vacuum immediately after the main valve is shut off, only blow-off air contributes to releasing vacuum. In the newly commercialized three-port specification (VXPT type), however, the atmospheric pressure is introduced when shutting off the main valve to break vacuum using the atmospheric pressure plus blow-off air.



Characteristics

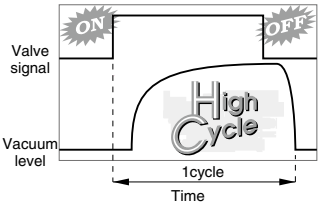
- *Lightweight and compact body meeting market needs.*





※ The above weight is the value for an ejector with a pressure sensor.

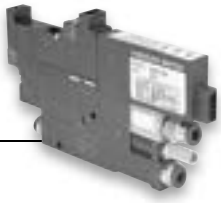
- *The response characteristics of each type are maximized, to realize a high-cycle vacuum system.*



- *Wide variety of combinations enables to meet various applications. Complex Vacuum Generator VX Series is also available. (P.188).*

- *2 installation methods are selectable. Direct-installation type is to fix the product from side using threads. The other DIN rail type is to mount the product on DIN rail. Selection according to the application is possible.*

Direct-installation type



DIN rail type

- *Vacuum switch with visibility improved LED display and one with analog output with reasonable price are selectable.*

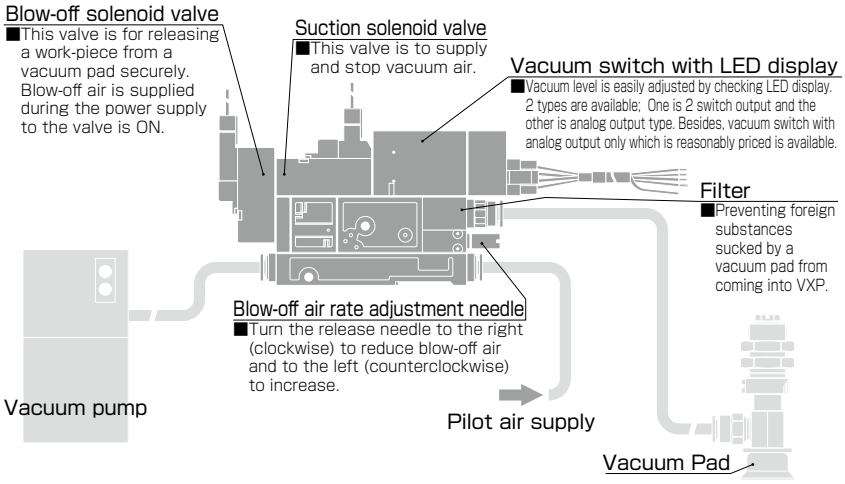
There are 2 kinds in vacuum switch with LED display. One is 2 switch output and the other is analog output type.
Connector wire is adopted which makes wiring layout easy.

- *Max. 10 mounting units in a manifold type.*

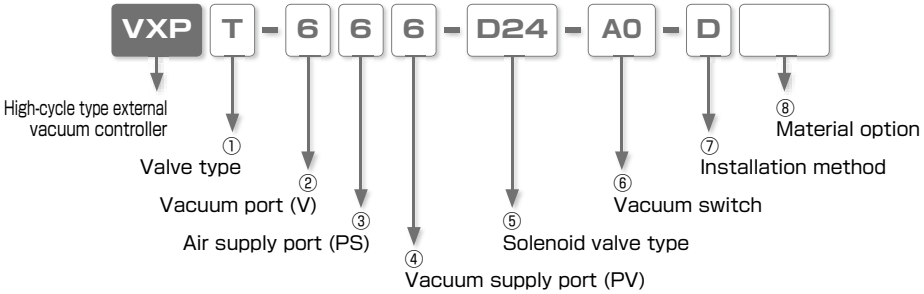
- *"Copper alloy free" and " Low level ozone proof" types are available in VXP.*

No copper alloy in metal parts. HMBR material for seal rubber.

Piping Example



Model Designation of Stand-Alone Type (Example)



① Valve type

Code	Valve type	Code	Valve type
T	3 port valve	No code	2 port valve

② Vacuum port (V) (Applicable tube size)

Code	3	4	6
Tube dia.(mm)	ø3 (Push-In Fitting)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)

③ Air supply port (PS) (Applicable tube size)

Code	3	4	6
Tube dia.(mm)	ø3 (Push-In Fitting)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)

④ Vacuum supply port (PV) (Applicable tube size)

Code	3	4	6
Tube dia.(mm)	ø3 (Push-In Fitting)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)

⑤ Solenoid valve type

Code	D24	A100
Voltage	DC24V	AC100V

⑥ Vacuum switch

Code	Switch	Code	Switch	Code	Switch
DW	Pressure sensor with LED pressure indicator (2 switch outputs)	DA	Pressure sensor with LED pressure indicator (Analog and switch output)	A0	Analog output pressure sensor (No LED)
No code	Without vacuum switch				

⑦ Installation method

Code	Installation method	Code	Installation method
D	DIN rail type	No code	Direct-installation type

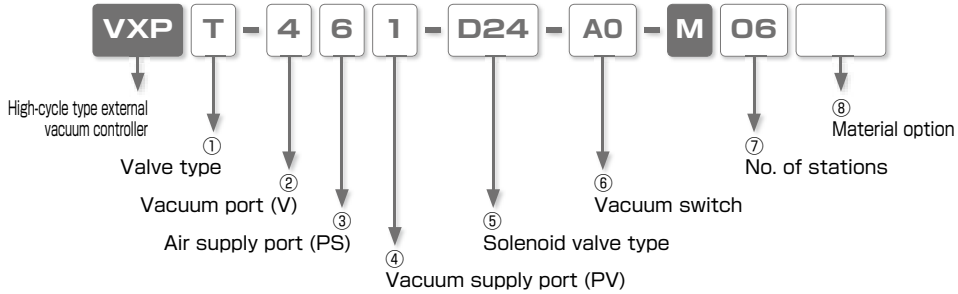
⑧ Material option

Code	No code	-S3
Material	Standard	No copper alloy & HNBR seal
Valve type	2 port valve & 3 port valve	2 port valve

※. Electric components, lead wires and vacuum/air supply ports ø3mm are not -S3 specification.

※. Double solenoid type is not available for solenoid valve.

■ Model Designation of Manifold Type (Example)



① Valve type

Code	Valve type	Code	Valve type
T	3 port valve	No code	2 port valve
K	When different valve types are mixed on a manifold (Fill in the details on Specification Order Form)		

② Vacuum port (V) (Applicable tube size)

Code	3	4	6	0
Tube dia.(mm)	ø3 (Push-In Fitting)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)	When different vacuum ports are mixed on a manifold (Fill in the details on Specification Order Form)

③ Air supply port (PS) (Applicable tube size)

Code	4	6	8	1
Tube dia.(mm)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)	ø8 (Push-In Fitting)	ø10 (Push-In Fitting)

④ Vacuum supply port (PV) (Applicable tube size)

Code	4	6	8	1
Tube dia.(mm)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)	ø8 (Push-In Fitting)	ø10 (Push-In Fitting)

⑤ Solenoid valve type

Code	D24	A100
Voltage	DC24V	AC100V

⑥ Vacuum switch

Code	Switch	Code	Switch	Code	Switch
DW	Pressure sensor with LED pressure indicator (2 switch outputs)	DA	Pressure sensor with LED pressure indicator (Analog and switch output)	A0	Analog output pressure sensor (No LED)
No code	Without vacuum switch				

⑦ No. of stations

Code	02	03	04	05	06	07	08	09	10
No. of stations	2	3	4	5	6	7	8	9	10

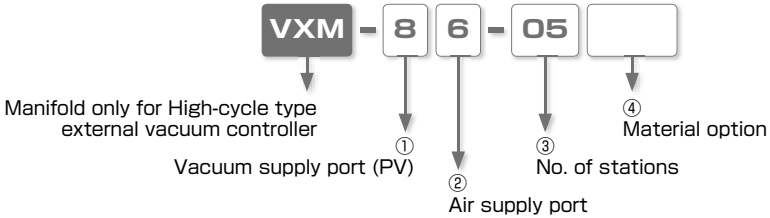
⑧ Material option

Code	No code	-S3
Material	Standard	No copper alloy & HNBR seal
Valve type	2 port valve & 3 port valve	2 port valve

※. Electric components, lead wires and vacuum/air supply ports ø3mm are not -S3 specification.

※1. Double solenoid type is not available for solenoid valve as same as VXP Stand-alone type.
※2. When 10 or more stations on a unit is required, contact us in advance.

Model Designation of Manifold-base Only (Example)



① Vacuum supply port (PV) (Applicable tube size)

Code	4	6	8	1
Tube dia.(mm)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)	ø8 (Push-In Fitting)	ø10 (Push-In Fitting)

② Air supply port (PS) (Applicable tube size)

Code	4	6	8	1
Tube dia.(mm)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)	ø8 (Push-In Fitting)	ø10 (Push-In Fitting)

③ No. of stations

Code	02	03	04	05	06	07	08	09	10
No. of stations	2	3	4	5	6	7	8	9	10

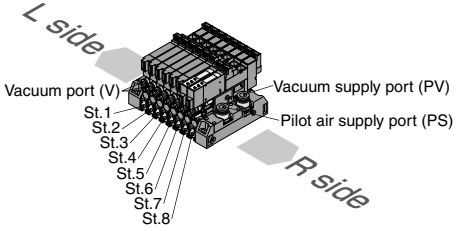
④ Material option

Code	No code	-S3
Material	Standard	No copper alloy & HNBR seal

Specification Order Form Example of Manifold type

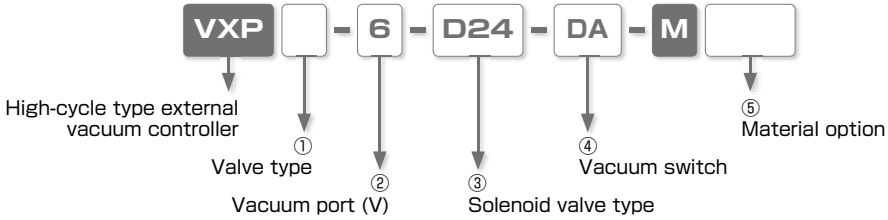
Vacuum generator type		Valve type ①		Vacuum port(V) ②	Air supply port (PS) ③	Vacuum supply port (PV) ④		Solenoid valve type ⑤		Vacuum switch ⑥		No. of stations ⑦	Material option ⑧
VXP		K	–	0	1	1	–	D24	–	K	–	08	
L	St. 1	T	–	4			–		–	A0	–		
	St. 2	T	–	4			–		–	A0	–		
	St. 3	T	–	4			–		–	A0	–		
→	St. 4	T	–	4			–		–	A0	–		
St. no.	St. 5	T	–	4			–		–	A0	–		
	St. 6	T	–	4			–		–	A0	–		
←	St. 7		–	6			–		–	DA	–		
	St. 8		–	6			–		–	DA	–		
	St. 9		–				–		–		–		
R	St. 10		–				–		–		–		

Manifold Type Example



※ Station no. is arranged St.1, St.2 ··· St.10 from L side.

Model Designation of Mounting Unit Type (Example)



① Valve type

Code	Valve type	Code	Valve type
T	3 port valve	No code	2 port valve

② Vacuum port (V) (Applicable tube size)

Code	3	4	6
Tube dia.(mm)	ø3 (Push-In Fitting)	ø4 (Push-In Fitting)	ø6 (Push-In Fitting)

③ Solenoid valve type

Code	D24	A100
Voltage	DC24V	AC100V

④ Vacuum switch

Code	Switch	Code	Switch	Code	Switch
DW	Pressure sensor with LED pressure indicator (2 switch outputs)	DA	Pressure sensor with LED pressure indicator (Analog and switch output)	A0	Analog output pressure sensor (No LED)
No code	Without vacuum switch				

⑤ Material option

Code	No code	-S3
Material	Standard	No copper alloy & HNBR seal
Valve type	2 port valve & 3 port valve	2 port valve

※. Electric components, lead wires and vacuum/air supply ports ø3mm are not -S3 specification.

Vacuum Controller **VXP/VXPT** Series Specification Order Form

To: NIHON PISCO CO., Ltd.

Name:

Order No.:

Date:

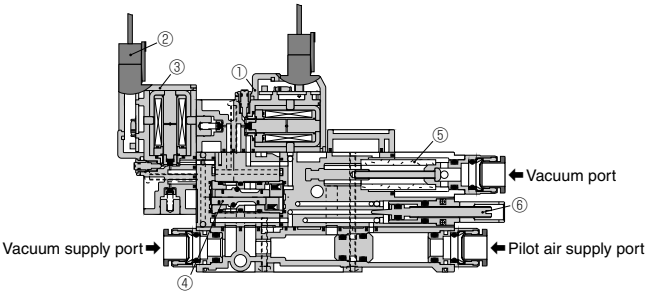
Request EX-W PISCO Date: Quantity:

Valve type		Valve type ①		Vacuum port (V) ②	Air supply port (PS) ③	Vacuum supply port (PV) ④		Solenoid valve type ⑤		Vacuum switch ⑥		No. of stations ⑦	Material option ⑧
VXP			–				–		–		–		
L side	St. 1		–				–		–		–		
⬆	St. 2		–				–		–		–		
	St. 3		–				–		–		–		
	St. 4		–				–		–		–		
St. no.	St. 5		–				–		–		–		
	St. 6		–				–		–		–		
	St. 7		–				–		–		–		
	St. 8		–				–		–		–		
⬇	St. 9		–				–		–		–		
R side	St. 10		–				–		–		–		

※1. Refer to the example on page 343 to fill in the form.
※2. Copy this page and use.
※3. Use this specification order form when ordering different specifications of mounting units.
※4. -S3 specification is not selectable for 3 port specification and a type with vacuum port size with ø3mm.

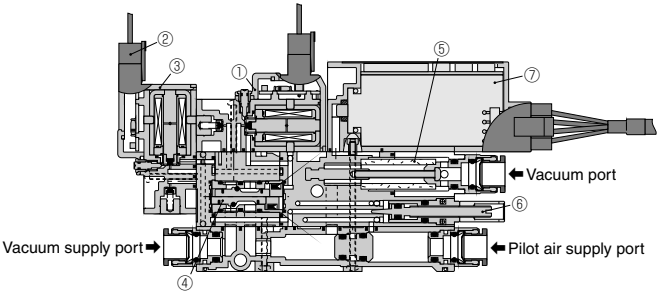
Construction

Example).VXP-□□□-D24-D□ (2 port valve stand-alone type, Without vacuum switch)



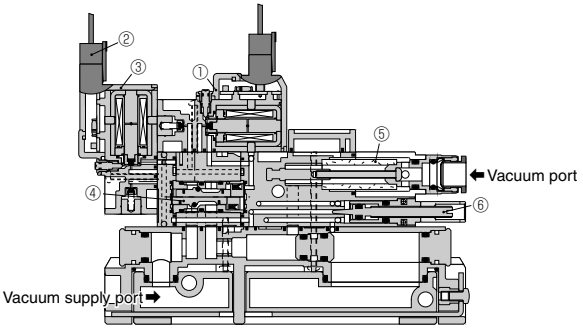
No.	Part name
①	Pilot valve for vacuum supply
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Filter element
⑥	Blow-off air rate adjustment needle

Example).VXP-□□□-D24 (2 port valve stand-alone type, With vacuum switch)



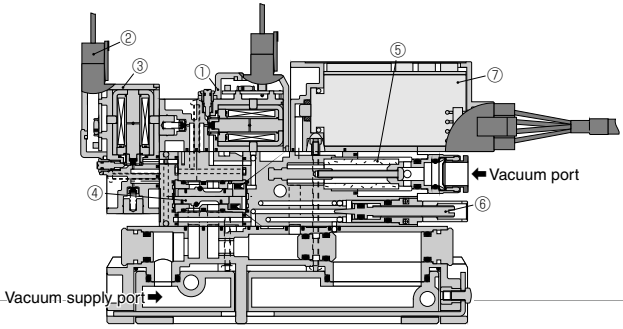
No.	Part name
①	Pilot valve for vacuum supply
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Filter element
⑥	Blow-off air rate adjustment needle
⑦	Sensor unit

Example).VXP□-□□□-□-M□ (2 port valve manifold type, Without vacuum switch)



No.	Part name
①	Pilot valve for vacuum supply
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Filter element
⑥	Blow-off air rate adjustment needle

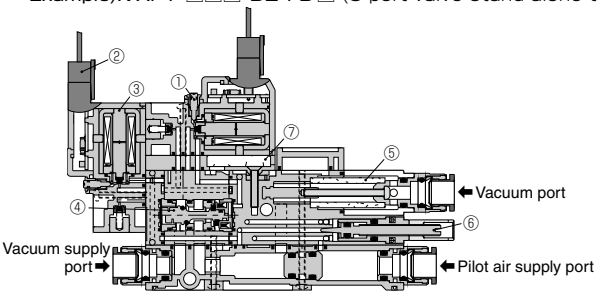
Example).VXP□-□□□-□-D□-M□ (2 port valve manifold type, With vacuum switch)



No.	Part name
①	Pilot valve for vacuum supply
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Filter element
⑥	Blow-off air rate adjustment needle
⑦	Sensor unit

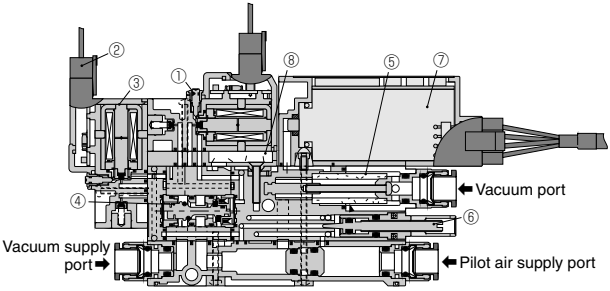
Construction

Example).VXPT-□□□-D24-D□ (3 port valve stand-alone type, Without vacuum switch)



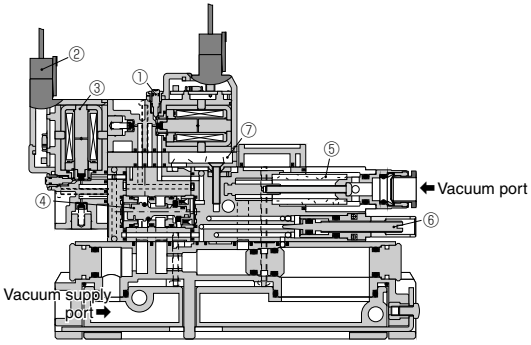
No.	Part name
①	Pilot valve for vacuum supply
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Filter element
⑥	Blow-off air rate adjustment needle
⑦	Filter element for valve

Example).VXPT-□□□-D24 (3 port valve stand-alone type, With vacuum switch)



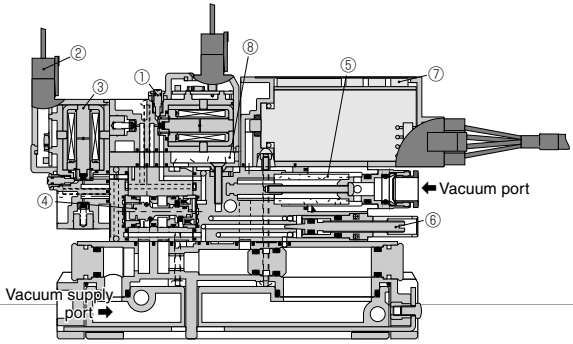
No.	Part name
①	Pilot valve for vacuum supply
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Filter element
⑥	Blow-off air rate adjustment needle
⑦	Sensor unit
⑧	Filter element for valve

Example).VXPT-□□□-□-M□ (3 port valve manifold type, Without vacuum switch)



No.	Part name
①	Pilot valve for vacuum supply
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Filter element
⑥	Blow-off air rate adjustment needle
⑦	Filter element for valve

Example).VXPT-□□□-□-D□-M□ (3 port valve manifold type, With vacuum switch)



No.	Part name
①	Pilot valve for vacuum supply
②	Connector
③	Blow-off pilot valve
④	Valve unit
⑤	Filter element
⑥	Blow-off air rate adjustment needle
⑦	Sensor unit
⑧	Filter element for valve

Specification (Supply pressure)

Fluid medium	Air
Operating pressure range	0.3 ~ 0.7 MPa
Operating temp. range	5 ~ 50°C
Operating vacuum range	0 ~ -100kPa
Protective structure	IEC standard IP40 equiv.

Solenoid valve

Pilot valves

Item	Suction solenoid valve		Blow-off solenoid valve	
Operating system	Direct operation			
Valve construction	Elastic seal, Poppet valve			
Rated voltage	DC24V	AC100V	DC24V	AC100V
Allowable voltage range	DC24V ±10%	AC100V ±10%	DC24V ±10%	AC100V ±10%
Surge protection circuit	Surge absorber	Diode bridge	Surge absorber	Diode bridge
Power consumption	1.2W (With LED)	1.5VA (LWith LED)	1.2W (With LED)	1.5VA (With LED)
Manual operation	Non-lock push-button type			
Operation indicator	Coil excitation: Red LED ON			
Wire connection method	Connector (Cable length: 500mm)			
	Red：DC24V Black：COM	Blue	Red：DC24V Black：COM	Blue

Switchover valve (VXP type)

Item	Suction main valve
Operating system	Pneumatic operation by pilot valve
Valve construction	Elastic seal, Poppet valve
Proof pressure	1.05MPa
Valve unit type	Normally closed
Lubrication	Not required
Effective sectional area	Air supply port size (PS) ø4mm: 3.5mm², Air supply port size (PS)ø6mm: 4.5mm²
Response time(※)	Normally closed / Vacuum generation (OFF → ON): 7msec, Vacuum operation stop(ON → OFF): 16msec

※. Response time is the time which a pressure change in vacuum port is detected by rated supply pressure (0.5MPa) and rated voltage. Vacuum arrival time and blow-off time up to a vacuum cup depend on ejector, tube length, blow-off air rate, etc.

Main valve (VXPT type)

Item	Suction main valve
Operating system	Pneumatic operation by pilot valve
Valve construction	Elastic seal, Poppet valve
Proof pressure	1.05MPa
Valve unit type	Normally closed
Lubrication	Not required
Effective sectional area	Vacuum supply port size (PV) ø4mm: 3.0mm², Vacuum supply port size (PV) ø6mm: 3.6mm²
Response time(※)	Normally closed / Vacuum generation (OFF → ON): 7msec, Vacuum operation stop(ON → OFF): 16msec

※ . The response time is the time elapsed, at a supply pressure of 0.5MPa and the rated supply voltage, before a change in pressure is detected at the vacuum port. The time required to reach vacuum and the time required to break the vacuum, both measured at the end of the piping (at the work piece),depends on factors such as the volume (piping length) and vacuum breaking (blow-off) air flow.

Vacuum switch

Specification	Vacuum switch with LED display		Vacuum switch without LED display
	2 switch output (–DW)	1 switch output 1 analog output (–DA)	Analog output only (–A0)
Factory default pressure	-50kPa(SW1)、-10kPa(SW2)	-50kPa	
Current consumption	40mA or less		15mA or less
Pressure detection	Diffused semiconduction pressure switch		
Operating pressure range	-100 ~ 0kPa		
Pressure setting range	-99 ~ 0kPa		
Proof pressure	0.2MPa		
Operating temp. range	0 ~ 50°C (No freezing)		
Operating humidity range	35 ~ 85%RH (No dew condensation)		
Power requirements	12 ~ 24VDC ± 10% Ripple (P-P) 10% max.		
Protective structure	IEC standard IP40 equiv		
No. of pressure setting	2	1	
Operating accuracy	±3%F.S. max. (at Ta=25°C)		
Differential response	Fixed(2%F.S. max.)	Variable (About 0-15% of setting value)	
Switch output	NPN open collector output: 30V 80mA max. Residual voltage 0.8V max.		
Analog output		Output voltage	1 ~ 5V
		Zero-point voltage	1±0.1V
		Span voltage	4±0.1V
		Output current	1mA max. (Load resistance: 5kΩ max.)
		LIN／HYS	±0.5%F.S. max.
Display	0 ~ -99kPa (2-digit red LED display)		
Display frequency	About 4 times / sec.		
Indication accuracy	±3%F.S. ±2 digit		
Sensor resolution	1 digit		
Operation indicator	SW1: Red LED turns ON when pressure is above setting.	Red LED turns ON when pressure is above setting.	
	SW2: Green LED turns ON when pressure is above setting.		
Function	1. MODE switch (ME / S1 / S2)	1. MODE switch (ME / SW)	
	2. S1 setting trimmer (2/3-rotation trimmer)	2. SW setting trimmer (2/3-rotation trimmer)	
	3. S2 setting trimmer (2/3-rotation trimmer)	3. HYS setting trimmer (About 0-15% of setting value)	

Filter specification

Element material	PVF（Polyvinyl formal）
Filtering capacity	10μm
Filter area	502mm^2
Replacement element model code	VXV010B30

Blow-off air rate

Type	Stand-alone DIN rail type	Manifold type
VXP	0 ~ 11.0ℓ/min[ANR]	
VXPT	0 ~ 7.5ℓ/min[ANR]	

※. The above value is 0.5Mpa of supply pressure.

Stand-Alone Type Weight List

Model code	Unit combinations	Weight(g)
VXP-□□□-□-D□	2 port valve, Pressure sensor with LED display	85
VXP-□□□-□-A0	2 port valve, Pressure sensor with analog output only	82
VXP-□□□-□	2 port valve, without pressure sensor	75
VXPT-□□□-□-D□	3 port valve, Pressure sensor with LED display	88
VXPT-□□□-□-A0	3 port valve, Pressure sensor with analog output only	85
VXPT-□□□-□	3 port valve, without pressure sensor	78

※1. Add 5g for DIN rail type to the above weights.

Manifold Type Weight List

Model code	Mounting unit combinations	Weight(g)
VXP-□□□-□□-D□-M02	2 port valve, Vacuum pressure sensor with LED display, 2 stations	340
VXPT-□□□-□□-D□-M02	3 port valve, Vacuum pressure sensor with LED display, 2 stations	350

※1. Add 95g/station for 2 port valve type. Add 100g/station for 3 port valve type.

※2. The above table represents the weight of pressure sensor with LED display type. Vacuum pressure sensor with analog output type (no indicator) is 3g/station lighter than the above weights. Without vacuum pressure sensor type is 10g/station lighter than the above weights.

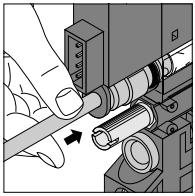
How to insert and disconnect

1. How to insert and disconnect tubes

① Tube insertion

Insert a tube into Push-In Fitting of the External Vacuum Controller VXP/VXPT up to the tube end. Lock-claws bites the tube to fix it automatically and the elastic sleeve seals around the tube.

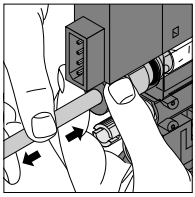
Refer to "2. Instructions for Tube Insertion" under "Common Safety Instructions for Fittings" .



② Tube disconnection

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

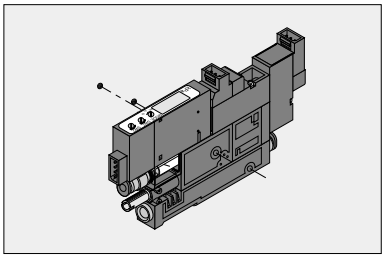
Make sure to stop air supply before the tube disconnection.



2 How to fix body

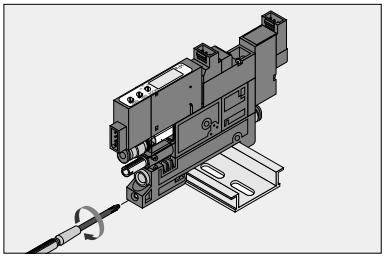
① Direct-installation type

Tighten M3 threads with tightening torque 0.3-0.35Nm through the 2 fixing holes on the resin body. Refer to the outer dimensional drawings of the hole pitch.



② DIN rail type

Mount the product on a DIN rail and tighten DIN rail fixing screw with tightening torque 0.1-0.15Nm using a proper Phillips screwdriver. When shaking or physical impact on DIN rail is expected, attach commercialized metal stoppers on both sides to fix Din rail.



Applicable Tube and Related Products

Polyurethane Tube (1. Piping products catalog P.596)

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

Nylon Tube (1. 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 (1. Piping products catalog P.612)

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

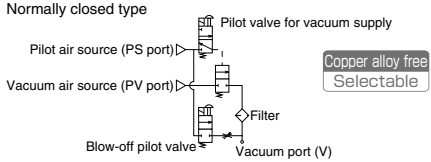
Vacuum Pads

- 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

Standard Size List

2 port valve, Direct-installation type or DIN rail, Without vacuum pressure sensor

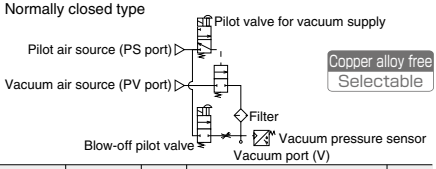
Normally closed type



Type	Page to refer	Vacuum port	Air supply port 3mm	4mm	6mm	Vacuum supply port
VXP	354	3mm	●	●	●	3mm
						4mm
						6mm
		4mm	●	●	●	3mm
						4mm
						6mm
		6mm	●	●	●	3mm
						4mm
						6mm

2 port valve, Direct-installation or DIN rail, 2 switch output with LED display

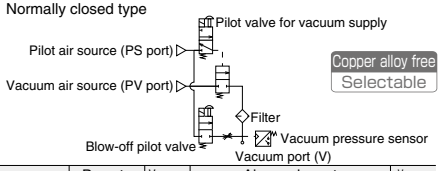
Normally closed type



Type	Page to refer	Vacuum port	Air supply port 3mm	4mm	6mm	Vacuum supply port
VXP	355	3mm	●	●	●	3mm
						4mm
						6mm
		4mm	●	●	●	3mm
						4mm
						6mm
		6mm	●	●	●	3mm
						4mm
						6mm

2 port valve, Direct-installation type or DIN rail, 1 switch output and 1 analog output with LED display

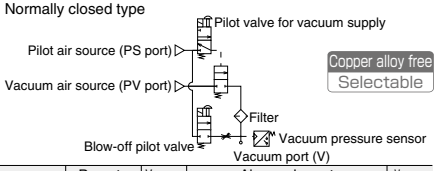
Normally closed type



Type	Page to refer	Vacuum port	Air supply port 3mm	4mm	6mm	Vacuum supply port
VXP	356	3mm	●	●	●	3mm
						4mm
						6mm
		4mm	●	●	●	3mm
						4mm
						6mm
		6mm	●	●	●	3mm
						4mm
						6mm

2 port valve, Direct-installation type or DIN rail, analog output pressure sensor

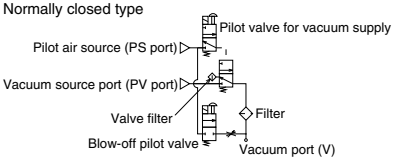
Normally closed type



Type	Page to refer	Vacuum port	Air supply port 3mm	4mm	6mm	Vacuum supply port
VXP	357	3mm	●	●	●	3mm
						4mm
						6mm
		4mm	●	●	●	3mm
						4mm
						6mm
		6mm	●	●	●	3mm
						4mm
						6mm

3 port valve, Direct-installation type or DIN rail, Without vacuum pressure sensor

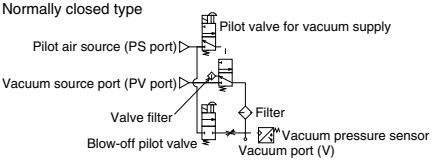
Normally closed type



Type	Page to refer	Vacuum port	Air supply port 3mm	4mm	6mm	Vacuum supply port
VXPT	358	3mm	●	●	●	3mm
						4mm
						6mm
		4mm	●	●	●	3mm
						4mm
						6mm
		6mm	●	●	●	3mm
						4mm
						6mm

3 port valve, Direct-installation type or DIN rail, 2 switch output with LED display

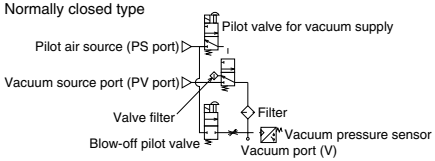
Normally closed type



Type	Page to refer	Vacuum port	Air supply port 3mm	4mm	6mm	Vacuum supply port
VXPT	359	3mm	●	●	●	3mm
						4mm
						6mm
		4mm	●	●	●	3mm
						4mm
						6mm
		6mm	●	●	●	3mm
						4mm
						6mm

3 port valve, Direct-installation type or DIN rail, 1 switch output and 1 analog output with LED display

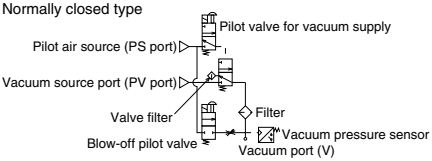
Normally closed type



Type	Page to refer	Vacuum port	Air supply port 3mm	4mm	6mm	Vacuum supply port
VXPT	360	3mm	●	●	●	3mm
						4mm
						6mm
		4mm	●	●	●	3mm
						4mm
						6mm
		6mm	●	●	●	3mm
						4mm
						6mm

3 port valve, Direct-installation type or DIN rail, Analog output pressure sensor

Normally closed type



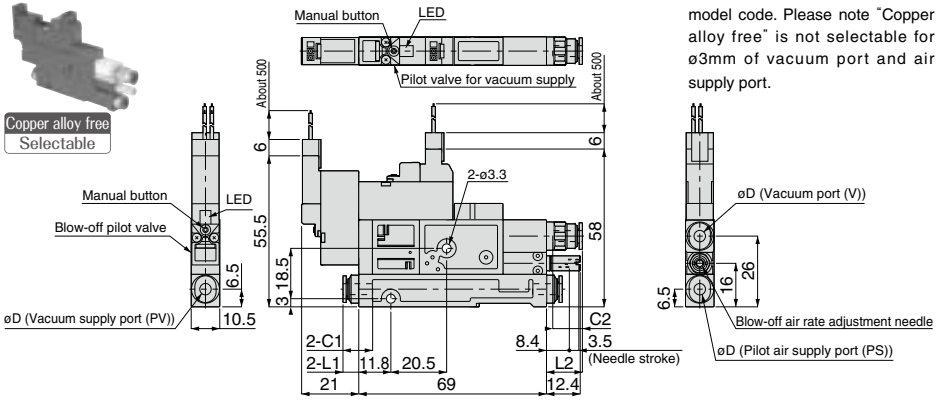
Type	Page to refer	Vacuum port	Air supply port 3mm	4mm	6mm	Vacuum supply port
VXPT	361	3mm	●	●	●	3mm
						4mm
						6mm
		4mm	●	●	●	3mm
						4mm
						6mm
		6mm	●	●	●	3mm
						4mm
						6mm

VXP 2 port valve, Direct-installation type

CAD -2D-

Model code : VXP-□□□-□

※ . When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for ø3mm of vacuum port and air supply port.

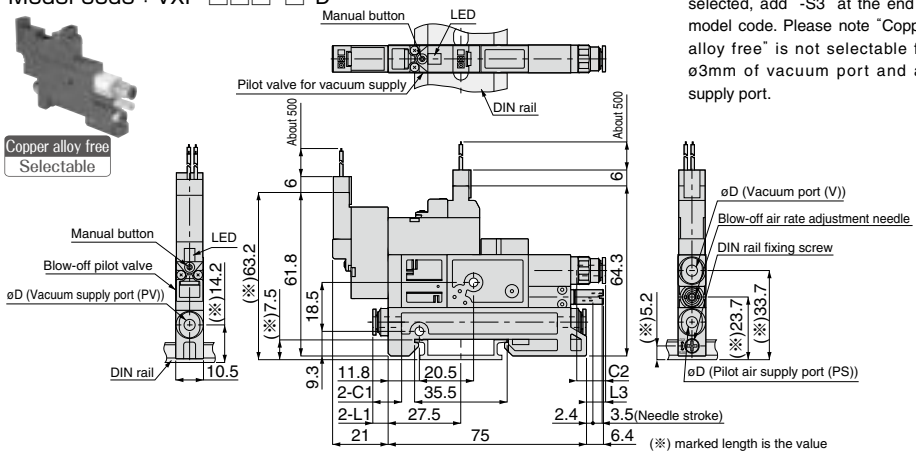


VXP 2 port valve, DIN rail type

CAD -2D-

Model code : VXP-□□□-□-D

※ . When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for ø3mm of vacuum port and air supply port.



(※) marked length is the value with DIN rail height 7.5mm.

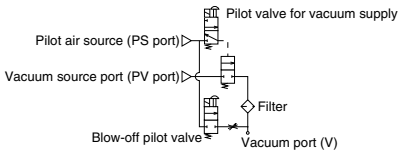
Unit: mm

Common dimension list on this page

Applicable tube O.D(øD)	C1	C2	L1	L2	L3	CAD file name
3	10.9	10.4	5.8	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-009
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VXP-□□□-□(-D)(Normally closed type)



CAD -2D- CAD data is available at PISCO website.

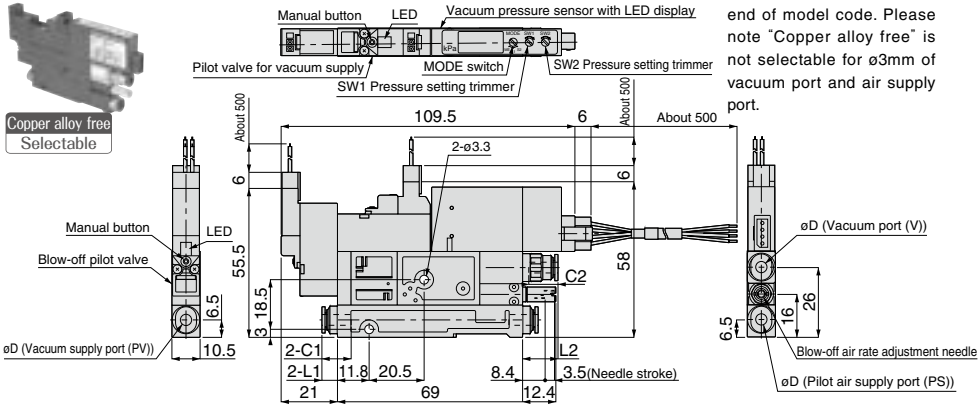
VXP 2 port valve, 2 switch output with LED display, Direct-installation type

CAD 2D

Model code : VXP-□□□-□-DW

※. When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for ø3mm of vacuum port and air supply port.

Copper alloy free Selectable



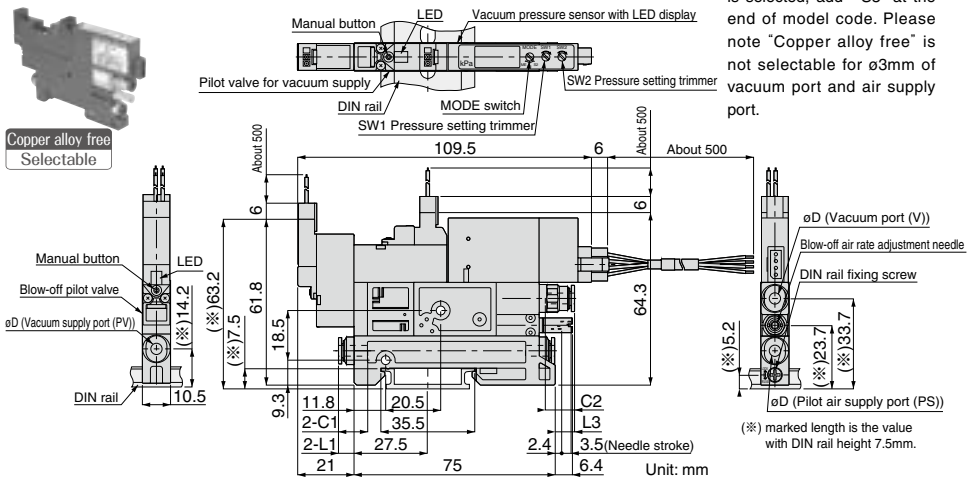
VXP 2 port valve, 2 switch output with LED display, DIN rail type

CAD 2D

Model code : VXP-□□□-□-DW-D

※. When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for ø3mm of vacuum port and air supply port.

Copper alloy free Selectable



(※) marked length is the value with DIN rail height 7.5mm.

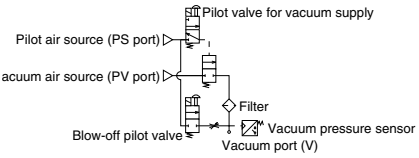
Unit: mm

Common dimension list on this page

Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	10.9	10.4	5.8	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-010
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VXP-□□□-□-DW(-D)(Normally closed type)



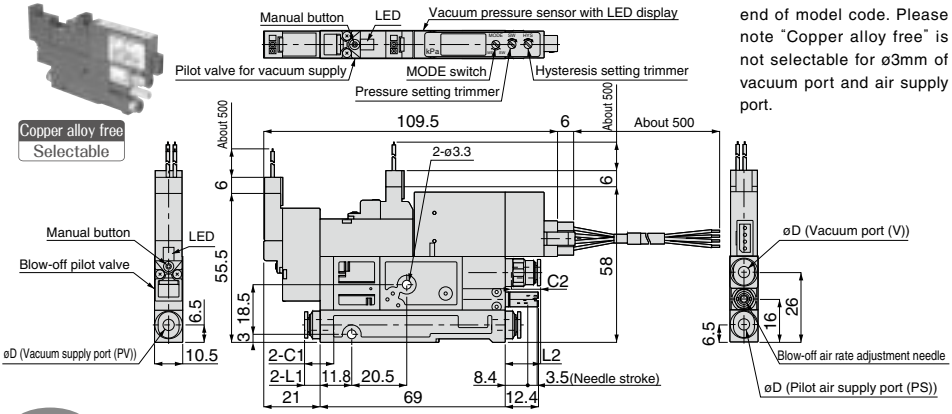
CAD 2D CAD data is available at PISCO website.

VXP 2 port valve, 1 switch output and 1 analog output with LED display. Direct-installation type

CAD 2D

Model code : VXP-□□□-□-DA

※ . When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for ø3mm of vacuum port and air supply port.

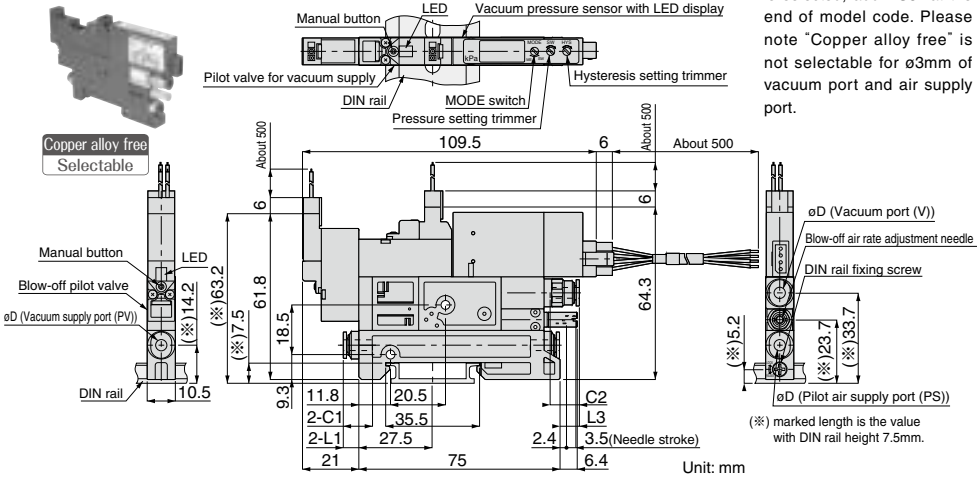


VXP 2 port valve, 1 switch output and 1 analog output with LED display, DIN rail type

CAD 2D

Model code : VXP-□□□-□-DA-D

※ . When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for ø3mm of vacuum port and air supply port.



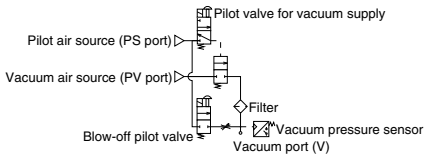
Unit: mm

Common dimension list on this page

Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	10.9	10.4	5.8	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-011
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VXP-□□□-□-DA(-D)(Normally closed type)



CAD 2D CAD data is available at PISCO website.

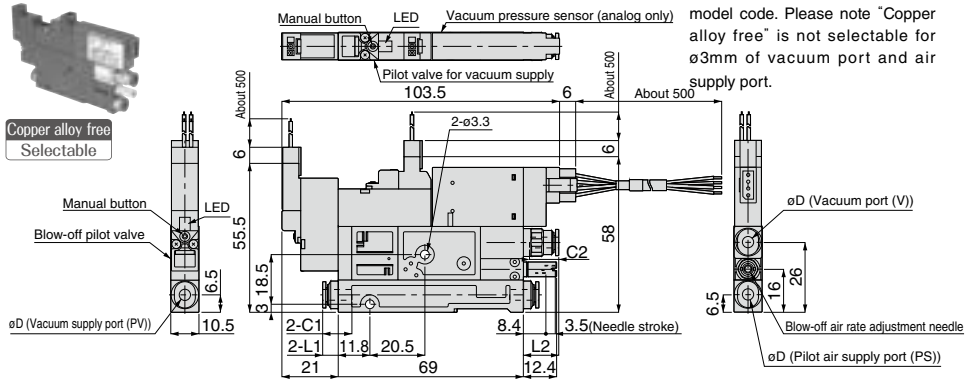
VXP 2 port valve, Analog output, Direct-installation type

CAD 2D

Model code : VXP-□□□-□-A0

※ . When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for ø3mm of vacuum port and air supply port.

Copper alloy free Selectable



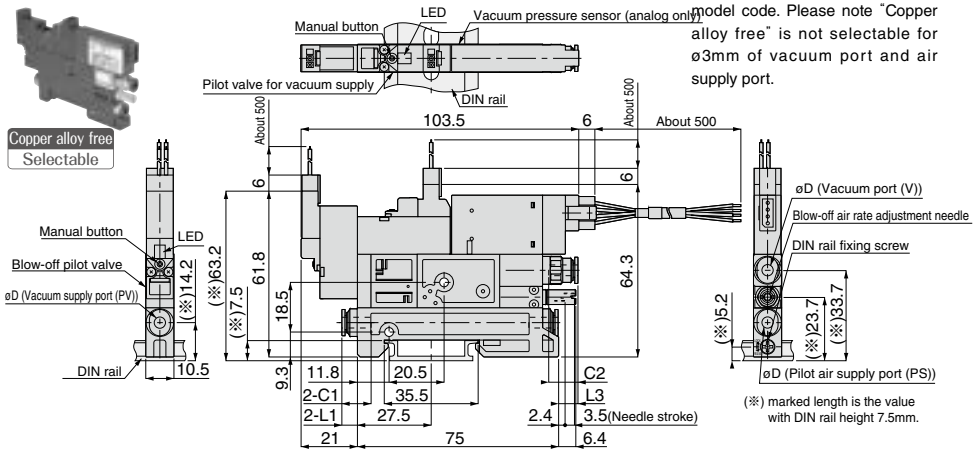
VXP 2 port valve, Analog output, DIN rail type

CAD 2D

Model code : VXP-□□□-□-A0-D

※ . When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for ø3mm of vacuum port and air supply port.

Copper alloy free Selectable



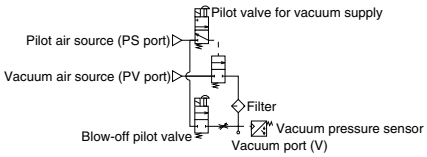
Unit: mm

Common dimension list on this page

Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	10.9	10.4	5.8	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-012
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VXP-□□□-□-A0(-D)(Normally closed type)

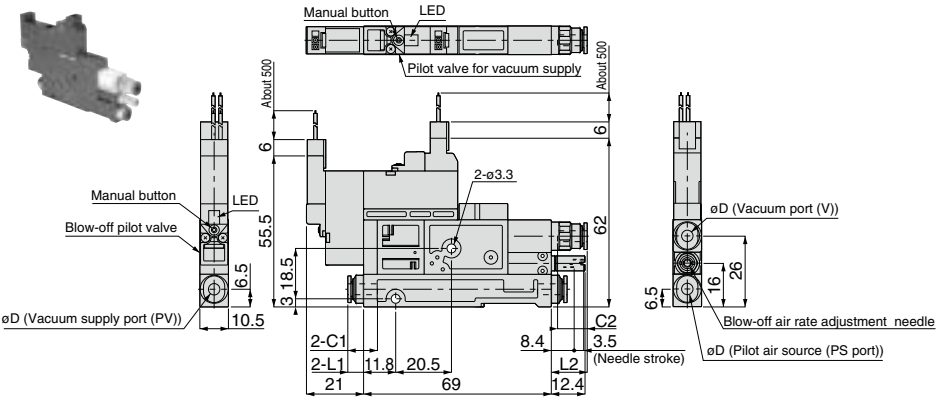


CAD 2D CAD data is available at PISCO website.

VXPT 3 port valve, Direct-installation type

CAD -2D-

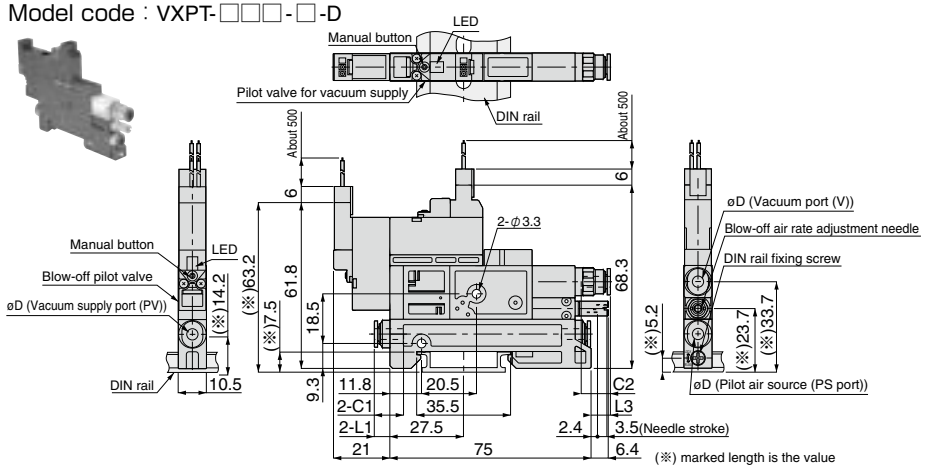
Model code : VXPT-□□□-□



VXPT 3 port valve, DIN rail type

CAD -2D-

Model code : VXPT-□□□-□-D



(※) marked length is the value with DIN rail height 7.5mm.

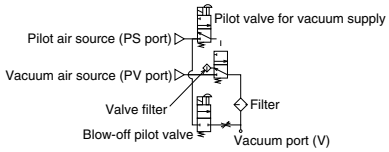
Unit: mm

Common dimension list on this page

Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	10.9	10.4	5.8	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-013
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VXPT-□□□-□(-D)(Normally closed type)

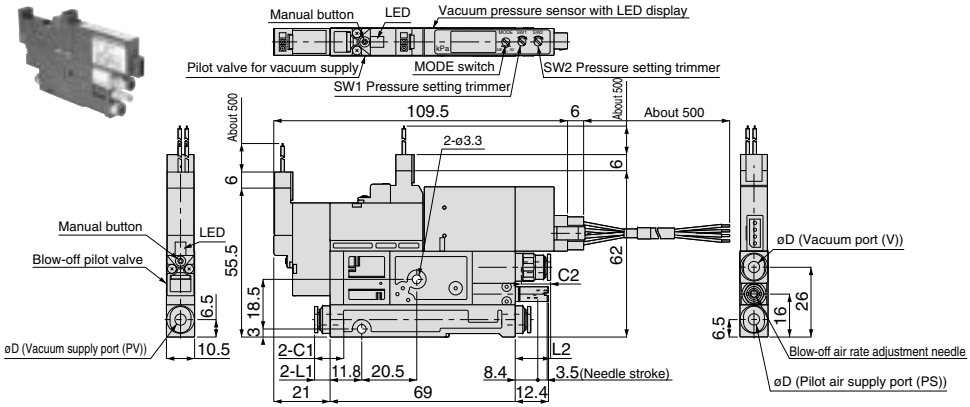


CAD -2D- CAD data is available at PISCO website.

VXPT 3 port valve, 2 switch output with LED display, Direct-installation type

CAD 2D

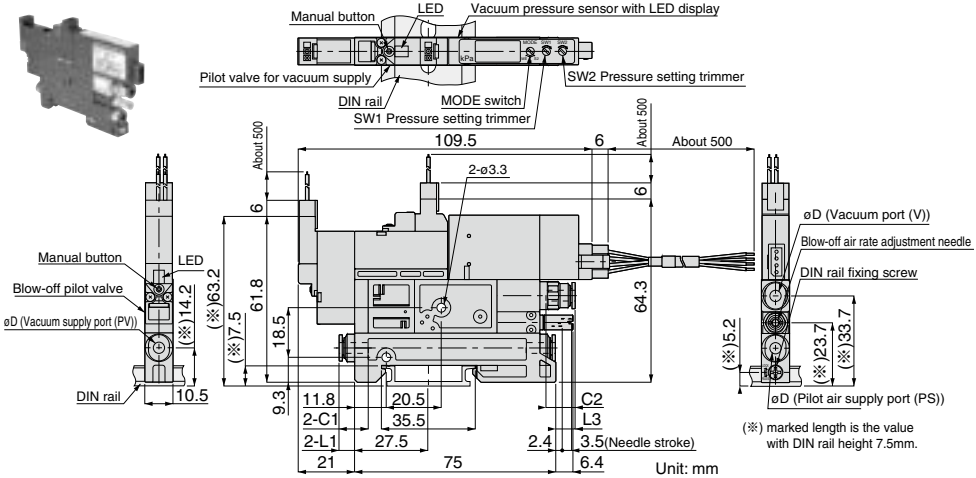
Model code : VXPT-□□□-□-DW



VXPT 3 port valve, 2 switch output with LED display, DIN rail type

CAD 2D

Model code : VXPT-□□□-□-DW-D



(※) marked length is the value with DIN rail height 7.5mm.

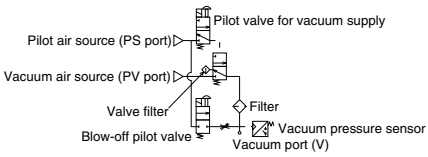
Unit: mm

Common dimension list on this page

Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	10.9	10.4	5.8	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-014
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VXPT-□□□-□-DW(-D)(Normally closed)

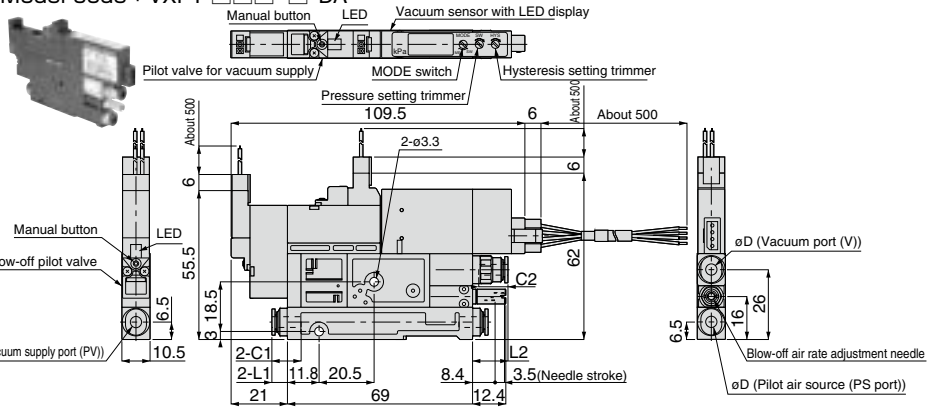


CAD 2D CAD data is available at PISCO website.

VXPT 3 port valve / 1 switch output and 1 analog output with LED display / Direct-installation type

CAD -2D-

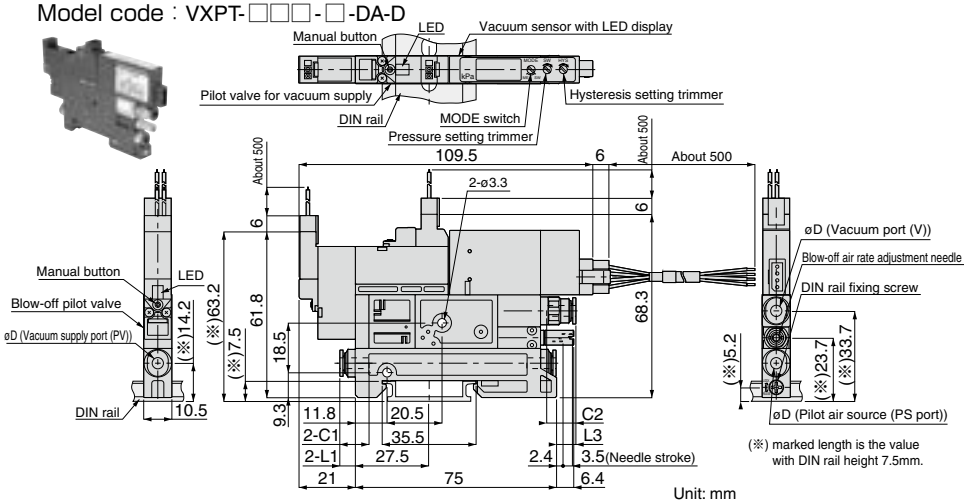
Model code : VXPT-□□□-□-DA



VXPT 3 port valve / 1 switch output and 1 analog output with LED display / DIN rail

CAD -2D-

Model code : VXPT-□□□-□-DA-D



(※) marked length is the value with DIN rail height 7.5mm.

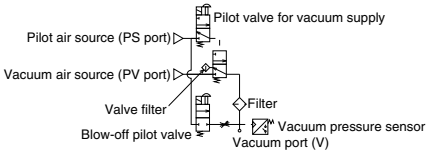
Unit: mm

Common dimension list on this page

Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	10.9	10.4	5.8	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-015
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VXPT-□□□-□-DA(-D)(Normally closed type)

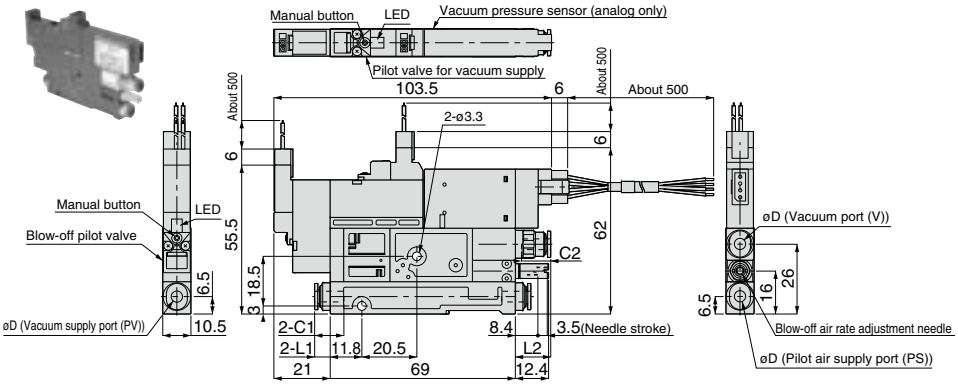


CAD -2D- CAD data is available at PISCO website.

VXPT 3 port valve, Analog output, Direct-installation type

CAD 2D

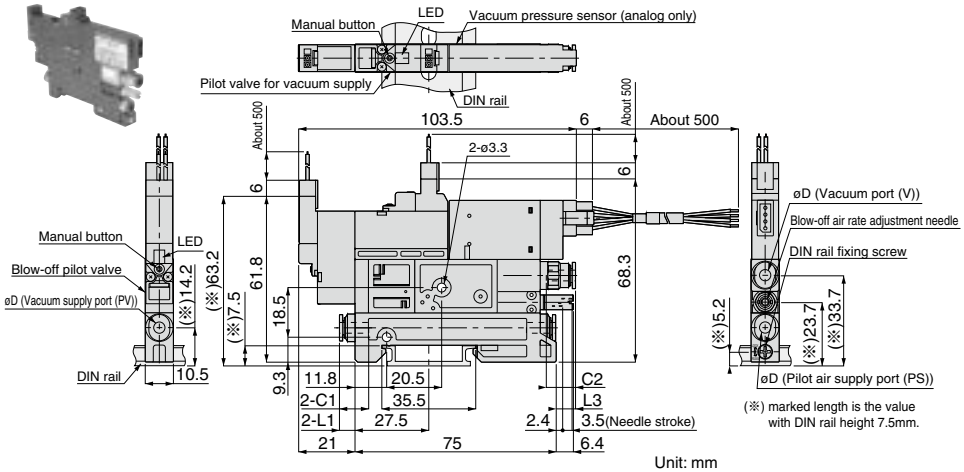
Model code : VXPT-□□□-□-A0



VXPT 3 port valve, Analog output, DIN rail type

CAD 2D

Model code : VXPT-□□□-□-A0-D



(※) marked length is the value with DIN rail height 7.5mm.

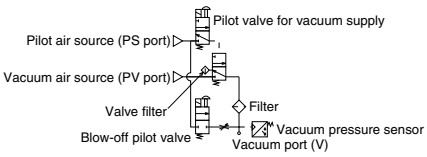
Unit: mm

Common dimension list on this page

Applicable tube O.D.(øD)	C1	C2	L1	L2	L3	CAD file name
3	10.9	10.4	5.8	13.2	7.2	-
4	10.9	10.9	5.8	13.2	7.2	VVX-016
6	11.7	11.7	8.7	13.5	7.5	

Common circuit diagram on this page

VXPT-□□□-□-AO(-D)(Normally closed type)



CAD 2D CAD data is available at PISCO website.

VXP-M 2 port valve, Manifold type

CAD -2D-

Model code	CAD file name
VXP□-□□□-□-□-M□	VVX-025, 026, 027, 028

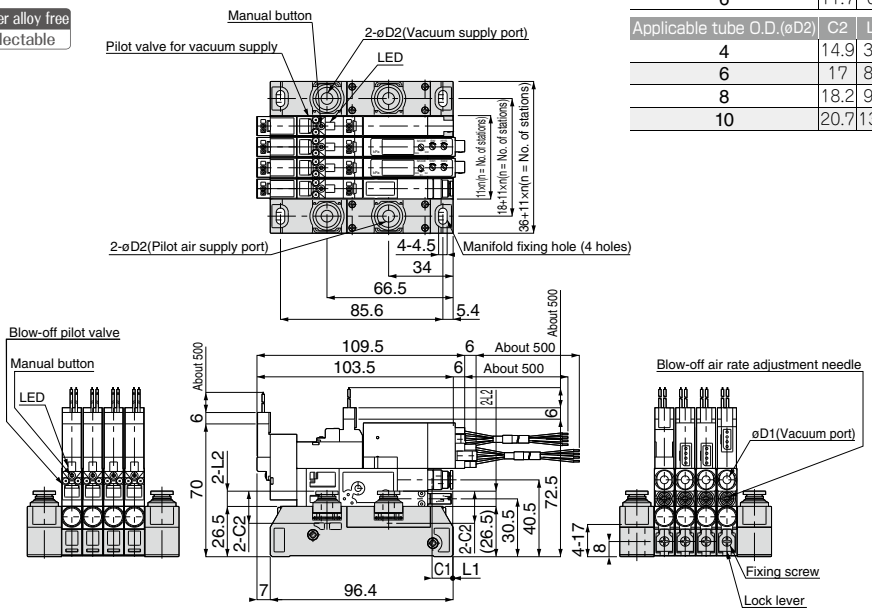
※. When "Copper alloy free" is selected, add "-S3" at the end of model code. Please note "Copper alloy free" is not selectable for ø3mm of vacuum port.

Copper alloy free
Selectable

Unit: mm

Applicable tube O.D.(øD1)	C1	L1
3	10.4	0.2
4	10.9	0.2
6	11.7	-0.1

Applicable tube O.D.(øD2)	C2	L2
4	14.9	3.5
6	17	8.1
8	18.2	9.6
10	20.7	13.2



VXPT·M 3 port valve, Manifold type

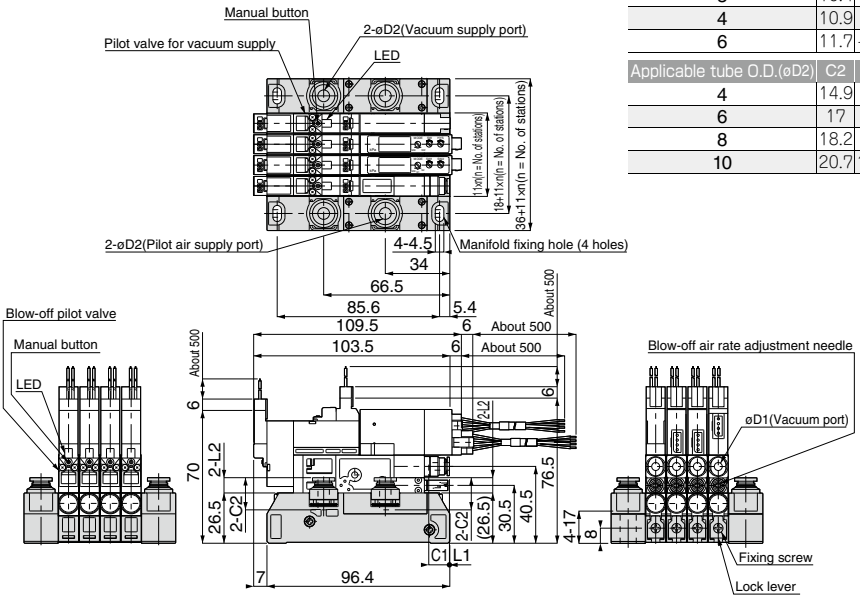
CAD 2D

Model code	CAD file name
VXPT-□□□-□-□-M□	VVX-029, 030, 031, 032

Unit: mm

Applicable tube O.D.(øD1)	C1	L1
3	10.4	0.2
4	10.9	0.2
6	11.7	-0.1

Applicable tube O.D.(øD2)	C2	L2
4	14.9	3.5
6	17	8.1
8	18.2	9.6
10	20.7	13.2



CAD 2D CAD data is available at PISCO website.

⚠ Detailed Safety Instructions

Before using PISCO products, be sure to read “Safety Instructions” and “Safety Instruction Manual” on page 35-39 and “Common Safety Instructions for Vacuum Series” on page 47-49.

Warning

1. The compressed air is dangerous if mishandled. It is recommended that a person having enough knowledge and experience carry out the assembling or maintenance of a machine or a device using pneumatic equipments.
2. At maintenance check of the product, shut electrical power supply and the air supply, and make sure to vent the residual pressure in the air circuit in advance. When installing or removing of a unit to/from a manifold, make sure to shut off air supply and to exhaust the residual pressure in the air circuit first.
3. The product is not explosive-proof. Do not use in the environments containing flammable or explosive gases or liquid. Please avoid using in a condition that a pressure of 0.1MPa or higher is continuously supplied to vacuum circuit.
4. The coil in a pilot solenoid valve generates heat under the following ① to ③ conditions. The heat may cause dropping life cycle, malfunctions and burn or may affect negatively on peripheral machines.
   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.
5. When the electricity is applied to valves continuously for a long time, the coils generate heat. It may cause dropping life cycle, malfunctions, getting burnt or damaging peripheral machines due to the heat.

Caution

1. The product shall be used within the operating pressure range. Otherwise, there are risks of damage or deformation.
2. In case of External Vacuum Controller VXP, air supply shortage and insufficient exhaust port capacity by increasing number of station units may cause the trouble such as vacuum performance drop. Allowable station numbers of simultaneous operation differs by operation conditions. Please contact PISCO for details in advance.
3. Although manifold type is the open to air exhaust by individual unit, the exhaust air from a vacuum-generating unit may be leaked to the vacuum port of other non-operating units. If this is any problem about it, please contact PISCO sales office.

⚠ Safety Rules for Use

■ Pressure setting method of Vacuum Switch
→ Refer to the method for VX on page 217.

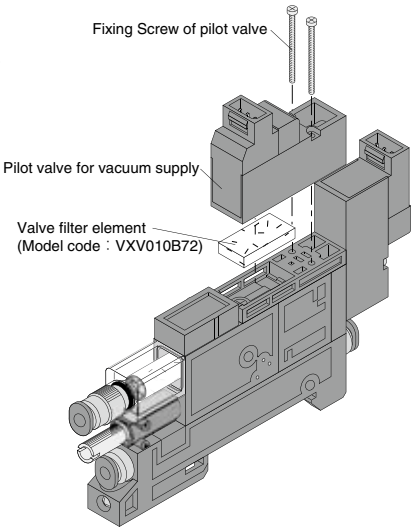
■ Safety Instructions for Vacuum Sensor with LED display
→ Refer to the instructions for VX on page 218.

■ Blow-off air adjustment method
→ Refer to the method for VX on page 218.

■ How to replace Filter elements
→ Refer to the method on page 219.

■ How to replace Valve Filter Elements

■ Remove a pilot valve for vacuum supply in order to replace the filter element. Make sure not to lose seal rubbers of the valve after the replacement. Tighten the screws firmly with the tightening torque 0.2 to 0.25Nm.



■ How to replace Mounting Units of Manifold type
→ Refer to the method for VX on page 220.

■ How to replace Silencer Elements of Manifold type
→ Refer to the method of VX on page 221.

⚠ 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···Recomendations 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.

※. This safety instructions are subject to change without notice.

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℃ (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

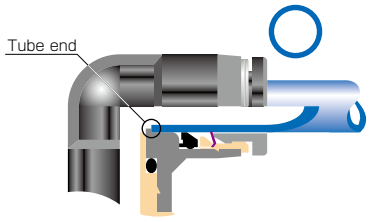
1. Remove dusts or drain before piping. They may get into the peripheral machine / facilities and cause malfunction.
2. When inserting an ultra-soft tube into push-in fitting, make sure to place an Insert Ring into the tube edge. There is a risk of causing the escape of tube and a fluid leakage without 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.

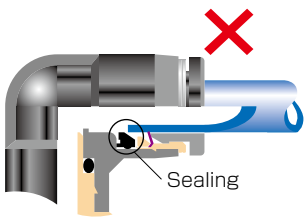
● Table 1. Tube O.D. Tolerance

mm size	Nylon tube	Polyurethane tube
ø1.8mm	—	±0.05mm
ø3mm	—	±0.15mm
ø4mm	±0.1mm	±0.15mm
ø6mm	±0.1mm	±0.15mm
ø8mm	±0.1mm	±0.15mm
ø10mm	±0.1mm	±0.15mm
ø12mm	±0.1mm	±0.15mm
ø16mm	±0.1mm	±0.15mm

inch size	Nylon tube	Polyurethane tube
ø1/8	±0.1mm	±0.15mm
ø5/32	±0.1mm	±0.15mm
ø3/16	±0.1mm	±0.15mm
ø1/4	±0.1mm	±0.15mm
ø5/16	±0.1mm	±0.15mm
ø3/8	±0.1mm	±0.15mm
ø1/2	±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.





Tube is not fully inserted up to tube end.

   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;
①Shear drop of the lock-claws edge
②The 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	0.7N·m		POM
	M5 × 0.8	1 ~ 1.5N·m		
	M6 × 0.75	0.8 ~ 1N·m		
	M8 × 0.75	1 ~ 2N·m		
Taper pipe thread	R1/8	4.5 ~ 6.5N·m	White	—
	R1/4	7 ~ 9N·m		
	R3/8	12.5 ~ 14.5N·m		
	R1/2	20 ~ 22N·m		
Unified thread	No.10-32UNF	1.0 ~ 1.5N·m	—	SUS304、NBR
National pipe thread taper	1/16-27NPT	4.5 ~ 6.5N·m	White	—
	1/8-27NPT	4.5 ~ 6.5N·m		
	1/4-18NPT	7 ~ 9N·m		
	3/8-18NPT	12.5 ~ 14.5N·m		
	1/2-14NPT	20 ~ 22N·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.

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.