Large Size Vacuum Module: Ejector System

Series ZR

How to Order

Note for model selection

Take function plates into consideration. (Refer to page 13-3-7.)

Components

- Ejector unit + Supply valve self-holding + Vacuum switch unit
- Ejector unit + Supply valve N.C. + Vacuum switch unit
- Ejector unit + Vacuum switch unit
- Ejector unit + Filter unit

	Ejector unit nozzle dia.	Maximum vacuum pressure	Ejector exhaust	Combination of supply valve and release valve Refer to "Table (1)".	Pilot valve	Rated voltage	Electrical entry	Light/Surge voltage suppressor	Manual override	Combination of vacuum switch/Suction filter	Vacuum switch electrical entry	Unit specifications (Applicable to Series ZSE4)
ZR1	20	S	1	K1		5	M	Z		E	C	
ZR1	20	L	1	K2		5	M	Z		E	C	
ZR1	20	S	1							E	C	
ZR1	20	L	1							F		

Ejector module nozzle diameter

10	1.0 mmø
13	1.3 mmø
15	1.5 mmø
18	1.8 mmø
20	2.0 mmø

Maximum vacuum pressure

S	–84 kPa
L	–53 kPa

Ejector exhaust

Symbol	Type	Valve	Manifold
1	Built-in silencer	●	●
2	Port exhaust	●	●
3	Common exhaust	—	●

Combination of supply valve and release valve

Refer to "Table (1)" on page 13-3-5 for details.

Pilot valve

Nil	DC: 1 W (With indicator light: 1.05 W)
	AC
Y*	DC: 0.45 W (With indicator light: 0.5 W)

* 24 VDC and 12 VDC are applicable to 0.45 W.

Rated voltage

Nil	Air operated
5	24 VDC
6	12 VDC
V	6 VDC
S	5 VDC
R	3 VDC
D1	100 VAC (50/60Hz)
D2	110 VAC (50/60Hz)

Electrical entry

Nil	Air operated	
For 24, 12, 6, 3 VDC		
L	Plug connector type	Lead wire length 0.3 m
LN		Without lead wire (Applicable to only DC)
LO		Without connector
M		Lead wire length 0.3 m
MN		Without lead wire (Applicable to only DC)
MO		Without connector
G	Grommet type	Lead wire length 0.3 m (Applicable to only DC)
H		Lead wire length 0.6 m (Applicable to only DC)
100, 110 VAC (With rectifier)		
L	Plug connector type	Lead wire length 0.3 m
LO		Without connector
M		Lead wire length 0.3 m
MO		Without connector

• Refer to page 13-3-5 for part no. of lead wire with connector.

Unit specifications

Nil	With unit switching function (1)
M	SI unit only (2)

Note 1) This is no longer sold for use in Japan due to the Weight and Measure Act (implemented October, 1999).
Note 2) Fixed unit: kPa

Digital vacuum switch specifications (D1, D2, D3)

Symbol	Output specifications	Lead wire length	Applicable switch
25 (L)	NPN output	Lead wire length 0.6 (3.0)m	D1 D2
26 (L)	Analog output	Lead wire length 0.6 (3.0)m	
65 (L)	PNP output	Lead wire length 0.6 (3.0)m	
27 (L)	NPN output	Lead wire length 0.6 (3.0)m	D3
26 (L)	Analog output	Lead wire length 0.6 (3.0)m	
67 (L)	PNP output	Lead wire length 0.6 (3.0)m	

Vacuum switch electrical entry (E)

Nil	Grommet type	Lead wire length 0.6 m
L		Lead wire length 3.0 m
C	Connector type	Lead wire length 0.6 m
CL		Lead wire length 3.0 m
CN		W/o lead wire

* Refer to page 13-3-5 for part no. of lead wire with connector.

Combination of vacuum switch/Suction filter

Nil	None	
D1	Digital vacuum switch	ZSE4 + Filter
D2		ZSE4B + Filter
D3		ZSE4E + Filter
E	Vacuum switch	ZSE2 + Filter
F	Filter	

Manual override

Nil	Non-locking push type
B	Slotted locking type

Light/Surge voltage suppressor

Nil	None
Z	With light/surge voltage suppressor (Possible only solenoid valve connector type.)
S	With surge voltage suppressor

* S and Z are not available for grommet style (DC).
S is not available for AC.
DC voltage (with surge voltage suppressor)
If the polarity is incorrect at DC (surge voltage suppressor), diode or switching element may be damaged.

⚠ Caution

When using AC, the DC solenoids are operated via a rectifier. Therefore, make sure to combine the connector assembly equipped with a rectifer with the exclusive solenoids.
Using other combinations could lead to burned coils or other malfunctions.

Table (1) Combination of Supply Valve and Release Valve

Valve unit function			Components	
Operation stop	Vacuum adsorption	Vacuum release	Supply valve	Release valve
◎	◎	○	Double SOL. (VJ3233-X17)	N.C. (VJ3133)
○	○	○	N.C. (VJ3133)	N.C. (VJ3133)
○	○	○	Air operated (VJA3130)	Air operated (VJA3130)
×	○	○	N.C. (VJ3133)	
×	○	○	Air operated (VJA3130)	
×	○	○	N.O. (VJ3133)	
×	◎	◎	Double SOL. (VJ3233-X18)	
◎: Possible ○: Possible with limitations (without self-holding function) ×: Not possible			—	

Symbol	Supply valve				Release valve			
	Solenoid valve			Air operated	Solenoid valve			Air operated
	Double SOL. (VJ3233-X17)	Double SOL. (VJ3233-X18)	N.C. (VJ3133)	(VJA3130)	Double SOL. (VJ3233-X17)	Double SOL. (VJ3233-X18)	N.C. (VJ3133)	(VJA3130)
K1	●	—	—	—	—	—	●	—
K2	—	—	●	—	—	—	●	—
K3	—	—	—	●	—	—	—	●
C1	—	—	●	—	—	—	(Common with supply valve)	—
C2	—	—	—	●	—	—	—	(Common with supply valve)
C3	—	—	●	—	—	—	(Common with supply valve)	—
C4	—	●	—	—	—	(Common with supply valve)	—	—
Nil	Without valve module							

Table (2) How to Order Valve Plug Connector Assembly

DC **VJ10 — 20 — 4A —** □

100 VAC (with rectifier) **VJ10 — 36 — 1A —** □

110 VAC (with rectifier) **VJ10 — 36 — 3A —** □

Lead wire length

Nil	300 mm (Standard)
6	600 mm
10	1000 mm
15	1500 mm
20	2000 mm
25	2500 mm
30	3000 mm

How to order

When requiring a vacuum unit equipped with valves with lead wires of 600 mm or more, specify the vacuum module valves without the standard connectors and order the required connector ass'ys separately.

Example) ZR120S1-K15M□Z-EC ····· 1 pc.
＊VJ10-20-4A-6 ····· 2 pcs.

Table (3) Vacuum Switch Plug Connector Assembly

ZS — 10 — 5A — □

Lead wire length

Nil	0.6 m
30	3 m
50	5 m

How to order

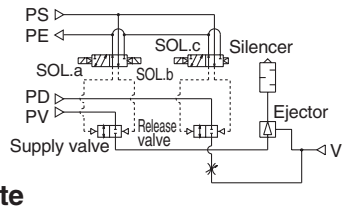
When requiring a vacuum switch with a lead wire of 5 m, indicate the part numbers of the vacuum unit switch without a lead wire connector and the 5 m lead wire connector separately.

Example) ZR1□□□-□□□□□-□CN ····· 1 pc.
＊ZS-10-5A-50 ····· 1 pc.

Ejector System/Combination of Supply Valve and Release Valve

Combination Symbol: K1

Feature: Double solenoid supply valve allows for self-holding.

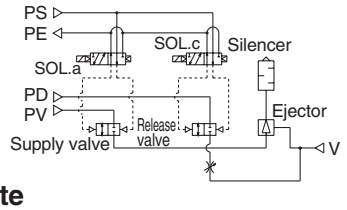


How to Operate

Operation \ Pilot valve operation	Supply valve		Release valve	Note
	SOL.a	SOL.b	SOL.c	
1. Adsorption	ON	OFF	OFF	The supply valve will hold the operation even during stoppage of power supply.
2. Vacuum release	OFF	ON	ON	
3. Operation stop	OFF	ON	OFF	

Combination Symbol: K2

Feature: Single solenoid valve is provided for supply valve.

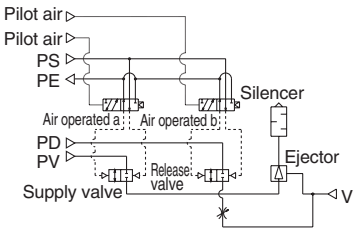


How to Operate

Operation \ Pilot valve operation	Supply valve	Release valve	Note
	SOL.a	SOL.c	
1. Adsorption	ON	OFF	When power supply is stopped, all operations will be stopped.
2. Vacuum release	OFF	ON	
3. Operation stop	OFF	OFF	

Combination Symbol: K3

Feature: Operation can be controlled by an external pilot valve.



How to Operate

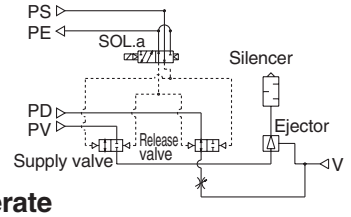
Operation \ Pilot valve operation	Supply valve	Release valve	Note
	Air operated a	Air operated b	
1. Adsorption	ON	OFF	Suitable when solenoid valves cannot be used or for centralized control using external pilot air.
2. Vacuum release	OFF	ON	
3. Operation stop	OFF	OFF	

⚠ Caution

When pipe connection is made to one port connection (PV port) only, use a function plate (ZR1-RV1). Refer to page 13-3-7 for further information.

Combination Symbol: C1

Feature: Adsorption of workpieces (when energized) and release of vacuum (when de-energized) are switched by single solenoid valve.

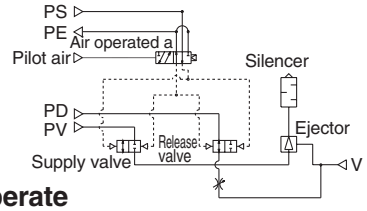


How to Operate

Operation \ Pilot valve operation	Supply valve/Release valve	Note
	SOL.a	
1. Adsorption	ON	Be careful for blowing off of workpieces or displacement of adsorption position in case of small and/or lightweight workpieces.
2. Vacuum release	OFF	

Combination Symbol: C2

Feature: Adsorption of workpieces and release of vacuum are switched by external pilot valve.

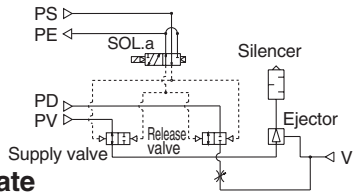


How to Operate

Operation \ Pilot valve operation	Supply valve/Release valve	Note
	Air operated a	
1. Adsorption	ON	Be careful for blowing off of workpieces or displacement of adsorption position in case of small and/or lightweight workpieces.
2. Vacuum release	OFF	

Combination Symbol: C3

Feature: Adsorption of workpieces (when de-energized) and release of vacuum (when energized) are switched by single solenoid valve.

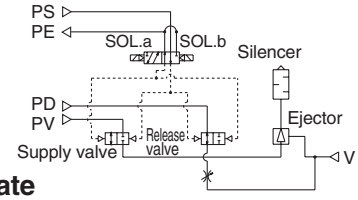


How to Operate

Operation \ Pilot valve operation	Supply valve/Release valve	Note
	SOL.a	
1. Adsorption	OFF	Be careful for blowing off of workpieces or displacement of adsorption position in case of small and/or lightweight workpieces.
2. Vacuum release	ON	

Combination Symbol: C4

Feature: Adsorption of workpieces and release of vacuum are switched by double solenoid valve.



How to Operate

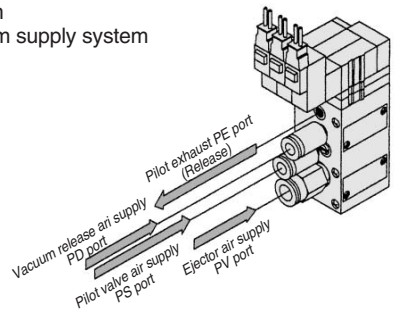
Operation \ Pilot valve operation	Supply valve/Release valve		Note
	SOL.a	SOL.b	
1. Adsorption	ON	OFF	When power supply is stopped supply valve/vacuum release valve will hold the operation.
2. Vacuum release	OFF	ON	

Function Plate/ZR1-RV□

A function plate is used when each connecting port for the valve unit is common. If a function plate is not used (standard), make individual pipe connections to PV, PS, and PD ports respectively.

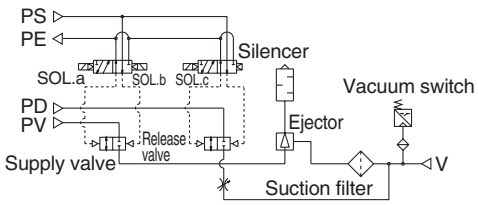
Without Function Plate (Standard)

Applicable system: Ejector system
External vacum supply system



Pipe connection

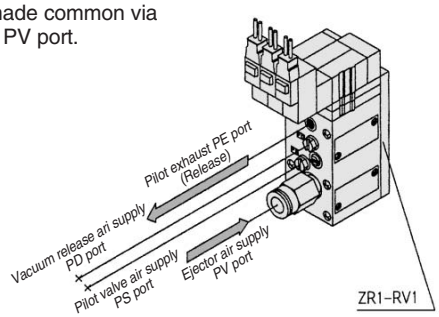
Circuit diagram



With Function Plate/Applicable to Ejector System Only

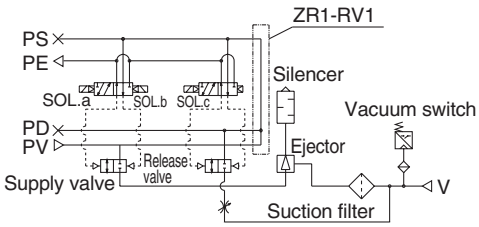
When ZR1/RV1 (PV⇔PS⇔PD) is Selected

Since PV, PS and PD ports are made common via the function plate, pipe only to the PV port.



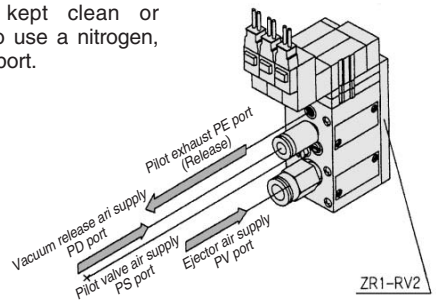
Pipe connection

Circuit diagram



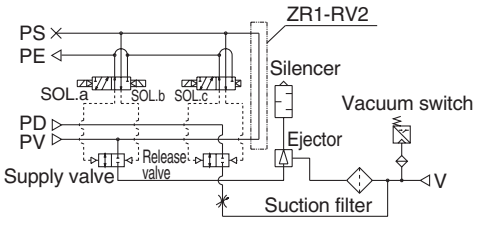
When ZR1/RV2 (PV⇔PS/PD) is Selected

When the work should be kept clean or contaminant-free, it is possible to use a nitrogen, dry air, etc. connection to the PD port.



Pipe connection

Circuit diagram



How to Order Function Plate Unit

ZR1 — RV [1]

Piping specifications

Symbol	Indication	PV port	PS port	PD port
1	PV ↔ PS ↔ PD	Common		
2	PV ↔ PS/PD	Common		Individual

How to order

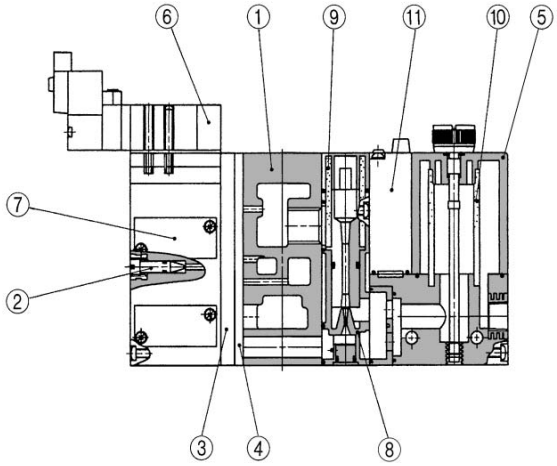
Indicate the model numbers of the vacuum module and the function plate.

Example) ZR120S1-K15MZ-EC ····· 1 pc.
＊ZR1-RV1 ····· 1 pc.

⚠ Caution

Length of assembling screw varies when adding function plate.
Prepare mounting screw for assembling unit among parts list posted on the last page of catalog.

Construction



Component Parts

No.	Description	Material	Note
①	Manifold base	Aluminum	
②	Release flow rate adjustment needle	Stainless steel	
③	Function plate	PBT	Refer to page 13-3-7.
④	Individual spacer	PBT	Refer to page 13-3-22.
⑤ Note)	Filter case	Polycarbonate	

Note) Precautions on handling the filter case
1. The case is made of polycarbonate. Therefore, do not use it with or expose it to the following chemicals: paint thinner, carbon tetrachloride, chloroform, acetic ester, aniline, cyclohexane, trichloroethylene, sulfuric acid, lactic acid, water soluble cutting oil (alkalinic), etc.
2. Do not expose it to direct sunlight.

Replacement Parts

No.	Description	Material	Part no.
⑥	Pilot valve assembly	—	Refer to (1) below.
⑦	Valve body assembly	—	Refer to (2) below.
⑧	Ejector assembly	—	Refer to (3) below.
⑨	Silencer element	PVF	Refer to (4) below.
⑩	Filter element	PVF	ZR1-FZ (30 μm)
⑪	Vacuum switch	—	ZSE2-OR-15-□
			ZSE4□-00-□□-□-X105

(1) How to Order Pilot Valves

Combination Symbol	Components		Model
	Supply valve	Release valve	
K1	Double solenoid valve N.C. (VJ3233)	Single solenoid valve N.C. (VJ3133)	Refer to "How to Order" below. ZR1-VJ3233-□□□□-X17
C4	Double solenoid valve N.O. (VJ3233)	Double solenoid valve N.O. (VJ3233)	Refer to "How to Order" below. ZR1-VJ3233-□□□□-X18
K3	Air operated N.C (VJA3130)	Air operated N.O (VJA3130)	ZR1-VJA3130

How to Order Solenoid Valves/Air Operated Valves

Air operated

ZR1 − VJA3130

Solenoid valve

ZR1 − VJ3233 □ − 5 M Z □ − X17 / X18

- Pilot valve
- Voltage
- Electrical entry
- With light/surge voltage suppressor
- Manual operation

∗ Refer to page 13-3-4 for detailed specifications of each code.

(2) How to Order Valve Body Assembly

ZR1 − VD K1 □ 5 M Z □

- K1: Combination of supply valve and release valve
- □: Pilot valve
- 5: Voltage
- M: Electrical entry
- Z: With light/surge voltage suppressor
- □: Manual operation

∗ Refer to page 13-3-4 for detailed specifications of each code.

(3) How to Order Ejector Assembly

ZR1 − WD 10 S 1

Nozzle diameter

10	1.0 mmø
13	1.3 mmø
15	1.5 mmø
18	1.8 mmø
20	2.0 mmø

Maximum vacuum pressure

S	−84 kPa
L	−53 kPa

Ejector exhaust

1	Built-in silencer
2	Port exhaust
3	Common exhaust

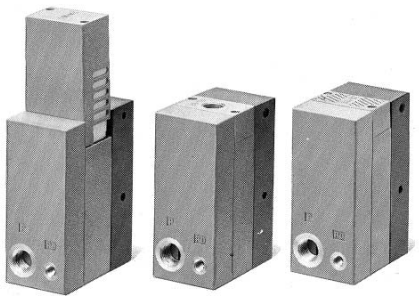
(4) How to Order Silencer Element

ZR1 − SZ 10

Nozzle diameter

10	1.0 mmø
13	1.3 mmø
15	1.5 mmø
18	1.8 mmø
20	2.0 mmø

Ejector Unit/Series ZR1



Model/Max. Vacuum Pressure –84 kPa (S: Standard type)

Model	Nozzle dia. (mmø)	Maximum suction flow rate (ℓ/min (ANR))	Air consumption (ℓ/min (ANR))	Weight (With bracket) (kg)
ZR1-W10S□	1.0	22	46	0.132
ZR1-W13S□	1.3	38	78	0.134
ZR1-W15S□	1.5	54	95	0.136
ZR1-W18S□	1.8	62	150	0.154
ZR1-W20S□	2.0	84	185	0.156

Model/Max. Vacuum Pressure –53 kPa (L: Large flow type)

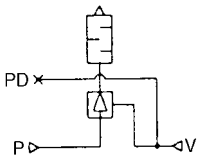
Model	Nozzle dia. (mmø)	Maximum suction flow rate (ℓ/min (ANR))	Air consumption (ℓ/min (ANR))	Weight (With bracket) (kg)
ZR1-W10L□	1.0	42	46	0.133
ZR1-W13L□	1.3	52	78	0.133
ZR1-W15L□	1.5	74	95	0.135
ZR1-W18L□	1.8	88	150	0.155
ZR1-W20L□	2.0	105	185	0.154

Common Specifications

Maximum operating pressure	0.7 MPa
Supply pressure range	0.2 to 0.55 MPa
Standard supply pressure	0.45 MPa
Operating temperature range	5 to 50°C
Model (Ejector exhaust method)*	Code 1: Built-in silencer — For unit and manifold
	Code 2: Individual exhaust — For unit and manifold
Standard accessory	Bracket

* How to Order: Code 1 and 2 are the suffixes in the ordering number to indicate the exhaust method.
Note) If not operating within the specified range of pressure and temperature, trouble may result.

JIS Symbol



How to Order

ZR1−W 20 S 1

Nozzle diameter

10	1.0 mmø
13	1.3 mmø
15	1.5 mmø
18	1.8 mmø
20	2.0 mmø

Maximum vacuum pressure

S	–84 kPa
L	–53 kPa

Ejector exhaust

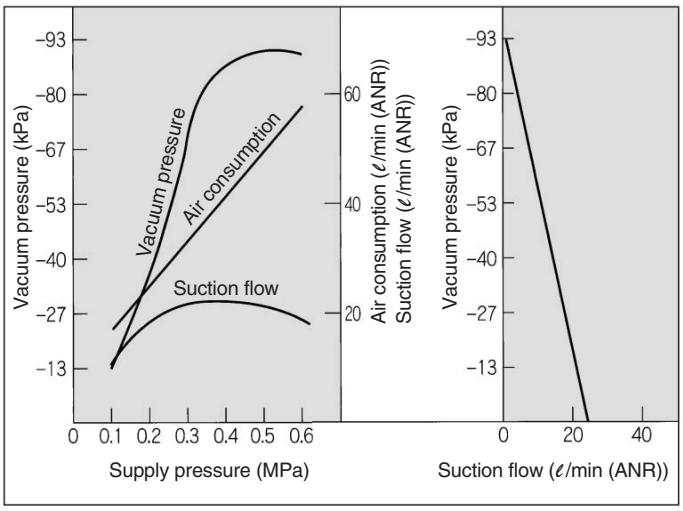
1	Built-in silencer
2	Individual exhaust*

* Port size:
RC 1/8 (Nozzle dia. 1.0 to 1.5 mmø)
RC 1/4 (Nozzle dia. 1.8, 2.0 mmø)

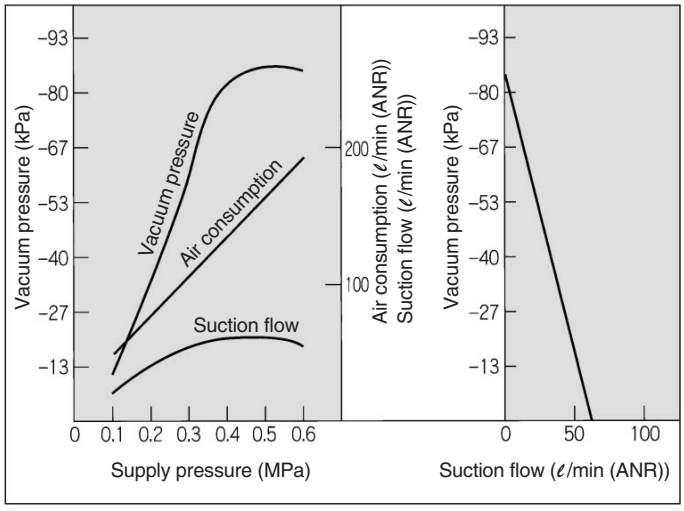
Ejector Unit/Standard Type (S): Max. Vacuum Pressure –84 kPa

At 0.45 MPa

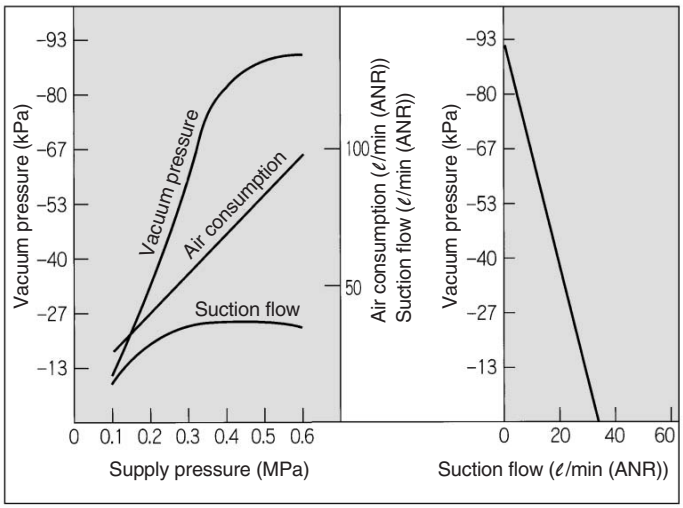
ZR1-W10S1



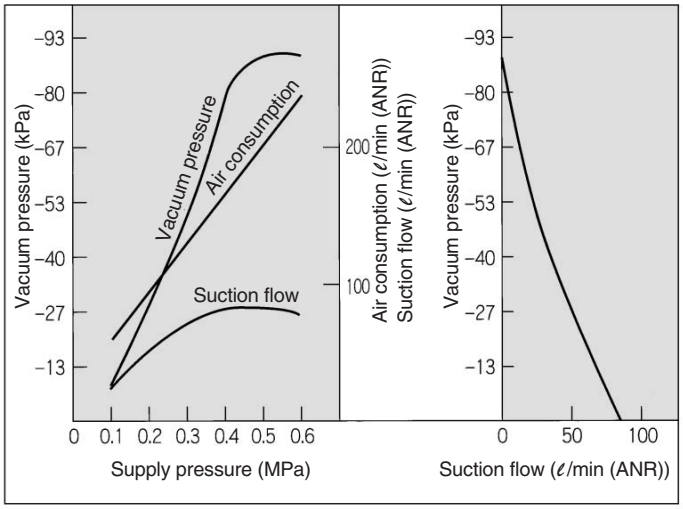
ZR1-W18S1



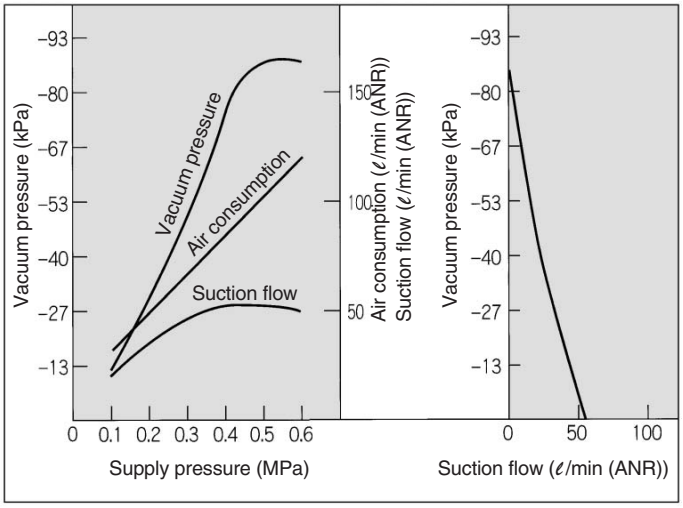
ZR1-W13S1



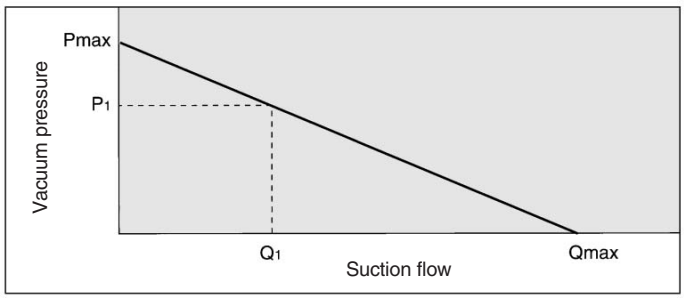
ZR1-W20S1



ZR1-W15S1



How to Read Flow Characteristics Graph



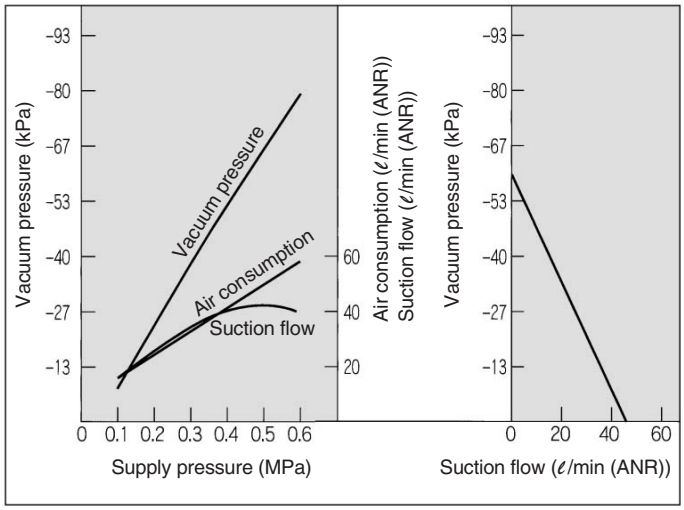
Flow characteristics are expressed in ejector vacuum pressure and suction flow. If suction flow rate changes, the vacuum pressure will also be changed. Normally this relationship is expressed in ejector standard use. In graph, Pmax is max. vacuum pressure and Qmax is maximum suction flow. The values are specified according to catalog use. Changes in vacuum pressure are expressed in the below order.

1. When ejector suction port is covered and made airtight, suction flow becomes 0 and vacuum pressure is at maximum value (Pmax).
2. When suction port is opened gradually, air can flow through, (air leakage), suction flow increases, but vacuum pressure decreases. (condition P1 and Q1)
3. When suction port is opened further, suction flow moves to maximum value (Qmax), but vacuum pressure is near 0 (atmospheric pressure).
   When vacuum port (vacuum piping) has no leakage, vacuum pressure becomes maximum, and vacuum pressure decreases as leakage increases. When leakage value is the same as max. suction flow, vacuum pressure is near 0. In the case when ventirative or leaky work should be adsorbed, please note that vacuum pressure will not be high.

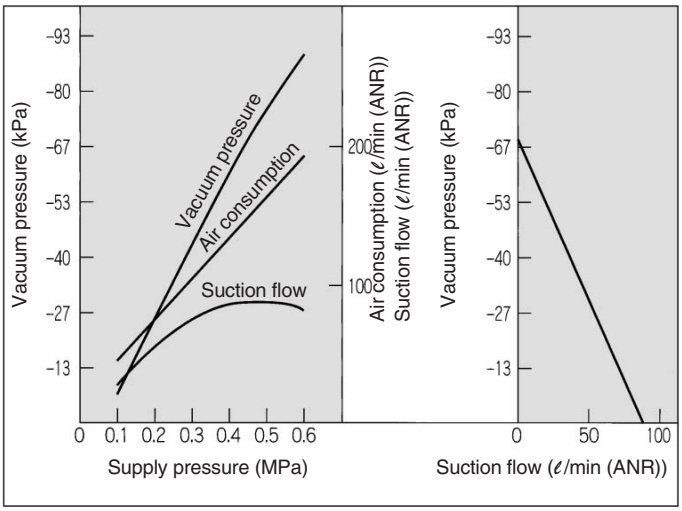
Ejector Unit/Large Flow Type (L): Max. Vacuum Pressure –53 kPa

At 0.45 MPa

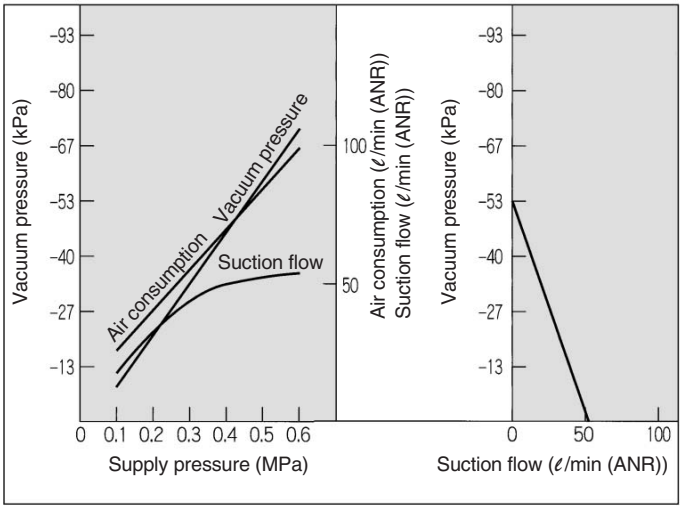
ZR1-W10L1



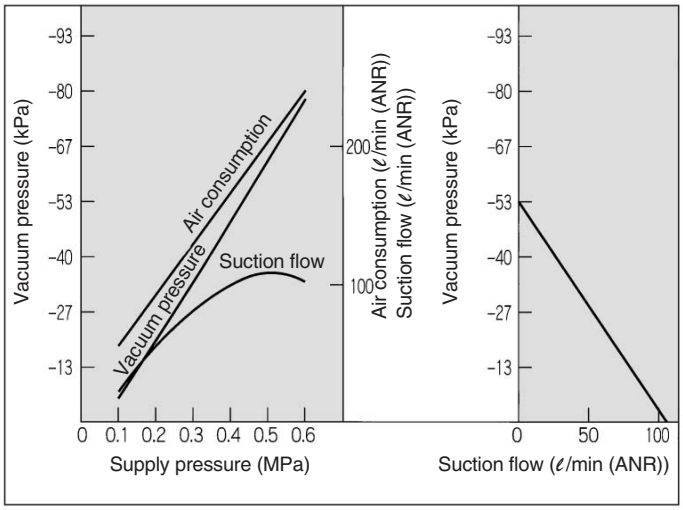
ZR1-W18L1



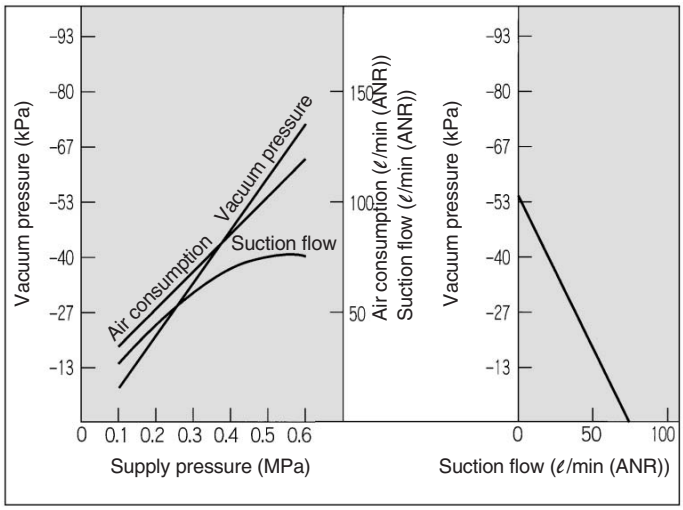
ZR1-W13L1



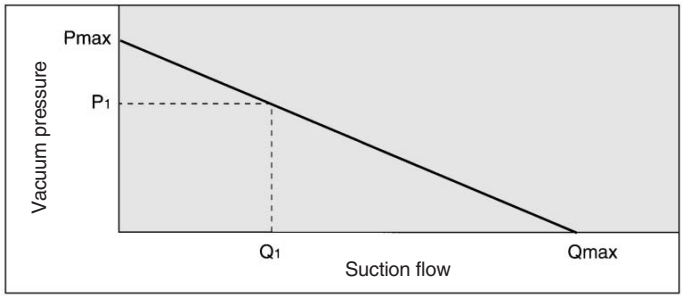
ZR1-W20L1



ZR1-W15L1



How to Read Flow Characteristics Graph



Flow characteristics are expressed in ejector vacuum pressure and suction flow. If suction flow rate changes, the vacuum pressure will also be changed. Normally this relationship is expressed in ejector standard use. In graph, Pmax is max. vacuum pressure and Qmax is maximum suction flow. The values are specified according to catalog use. Changes in vacuum pressure are expressed in the below order.

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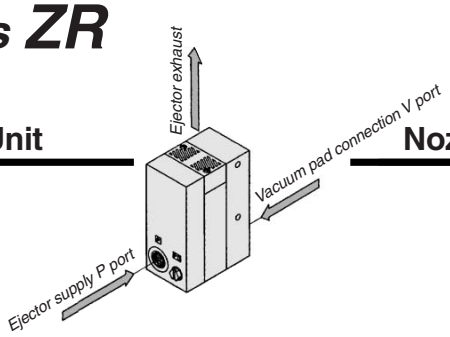
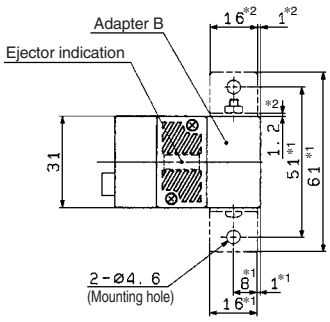
Ejector Unit



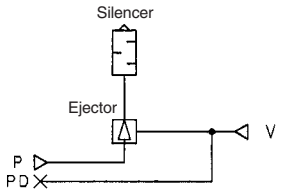
Nozzle Dia./ø1.0, ø1.3, ø1.5, ø1.8, ø2.0 mm

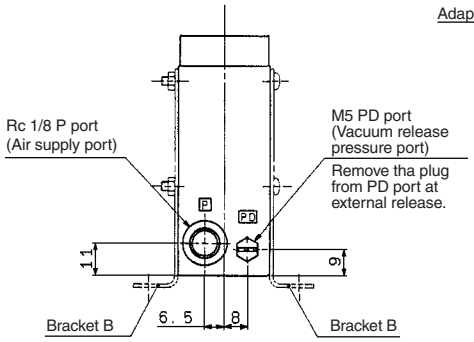
Nozzle dia./ø1.0, ø1.3, ø1.5 mm

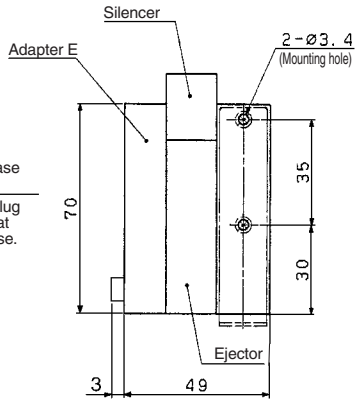
ZR1-W$^{10}_{13}_{15}$□1

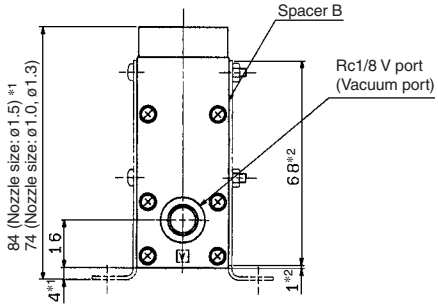


Circuit diagram



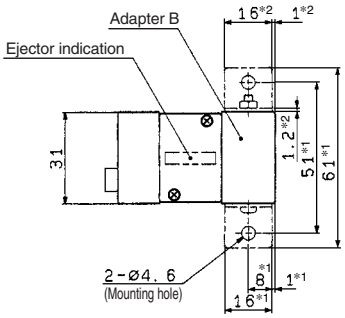


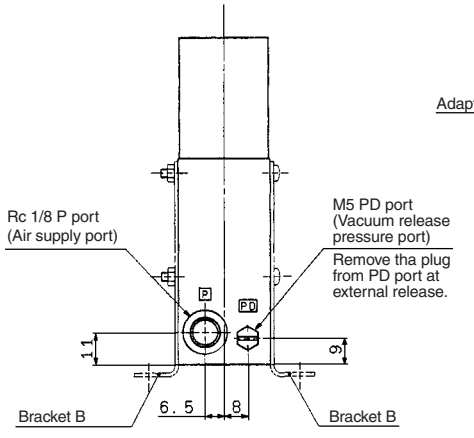


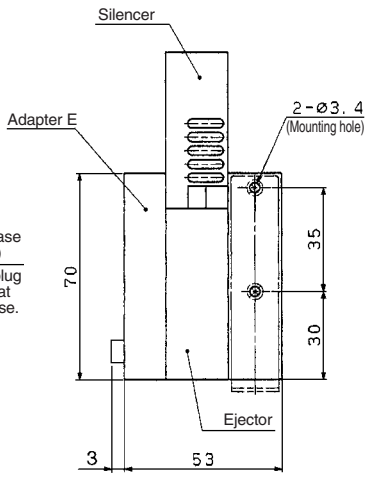


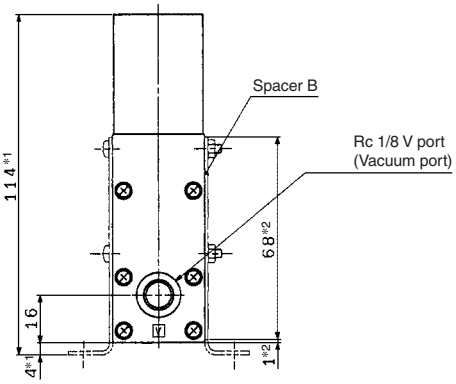
Nozzle dia./ø1.8, ø2.0 mm

ZR1-W$^{18}_{20}$□1









Note) *1 Dimensions for mounting bracket B
*2 Dimensions for mounting spacer B
Spacer B is used to leave space for maintenance (for replacement of silencer etc.) on side mounting.
Bracket B part no.: P3270154
(Standard accessory)
Spacer B part no. : P3270157

Vacuum Pressure Switch Unit/Pressure Switch for Vacuum: ZSE2-0R-15□

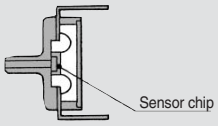
Quick response: 10 mS

Compact size: 39H x 20W x 15D (except the connecting portion)

Improved wiring: Connector style

Uses a carrier diffusion semiconductor pressure sensor

Pressure detector
(A carrier diffusion semiconductor pressure sensor is used.)



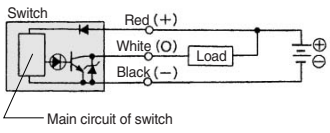
Specifications

Vacuum pressure switch part no.	ZSE2-0R-15□
Fluid	Air
Setting pressure range	0 to –101 kPa
Hysteresis	3% or less
Temperature characteristics	±3% Full span (5 to 40°C) ±5% Full span (0 to 60°C)
Operating voltage	12 to 24 VDC (Ripple ±10% or less)
Output	Open collector 30 V, 80 mA
Indicator light	Lights up when ON
Current consumption	17 mA or less (when 24 VDC is ON)
Max. operating pressure	0.2 MPa*
Operating temperature range	5 to 50°C

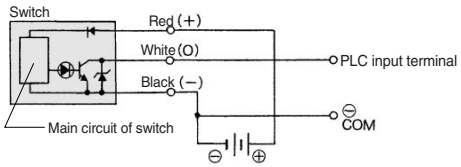
* When using ejector system, instantaneous pressure up to 0.5 MPa will not damage the switch.
Note) If not operating within the specified range of pressure and temperature, trouble may result.

Wiring

ZSE2 connection



Connection with PLC at negative COM terminal



How to Order

ZSE2 — 0R — 15 L

Switch specifications/Voltage
Solid state/12 to 24 VDC

Piping specifications

Nil	Grommet type	Lead wire length 0.6 m
L		Lead wire length 3 m
C	Connector type	Lead wire length 0.6 m
CL		Lead wire length 3 m
CN		W/o lead wire

With Connector/How to Order

- **Without lead wire (housing and 3 sockets)** ····· ZS-10-A
- **With lead wire** ····· ZS-10-5A-□

Lead wire length

Nil	0.6 m
30	3 m
50	5 m

Note) When requiring a switch with lead wire of 5 m, indicate separately the model numbers of the connector type switch without lead wire and the connector assembly with 5 m lead wire.

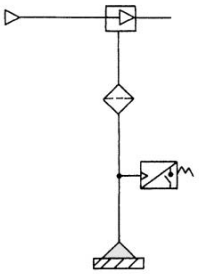
Example) ZSE2-0R-15CN ····· 1 pc.
ZS-10-5A-50 ····· 1 pc.

Vacuum Pressure Switch Unit/Pressure Switch for Vacuum: ZSE2-0R-15□

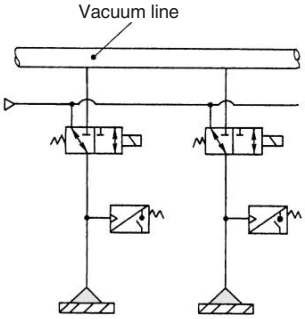
Guidelines for Use of Vacuum Pressure Switch Unit

System circuit for work adsorption

Ejector style

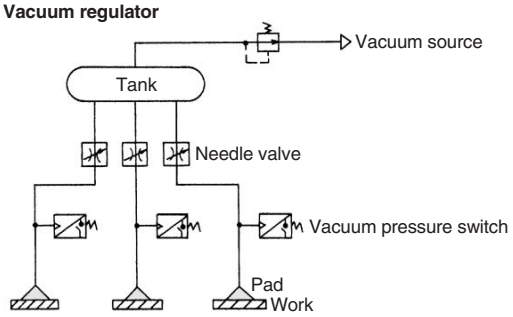


External vacuum supply style



When pads and switches are common to one vacuum source, sometimes there is a possibility, depending on the number of adsorption and non-adsorption applications at each point in time, that the switches will not work within the range of set pressures due to pressure variations from the vacuum source. In particular, when small diameter nozzles are used for adsorption, the switches are greatly influenced by pressure variations. In order to remedy this situation, the following circuit is recommended.

Vacuum regulator



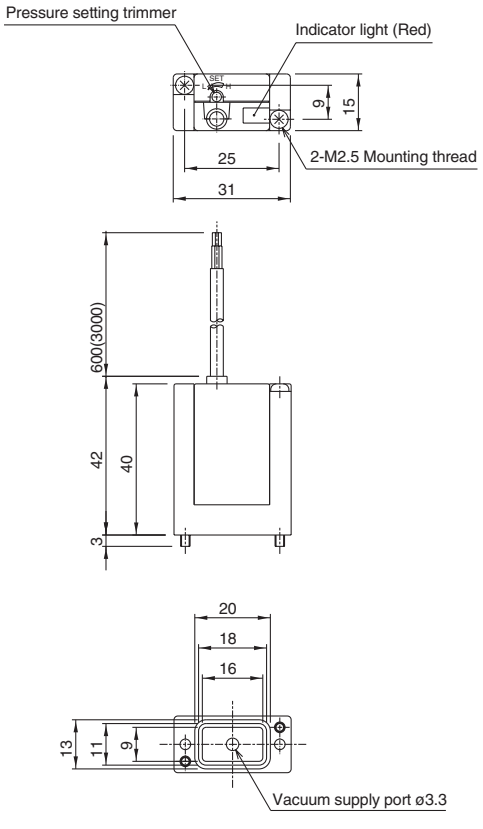
- Adjust the needle valve to reduce the pressure fluctuation between picking and non-picking.
- Stabilize the source pressure by providing a tank and a vacuum regulator.
- Provide a vacuum switch valve to individual lines. Thus, in the case of an error, each valve can be turned OFF to minimize the influences on other pads.

Set pressure

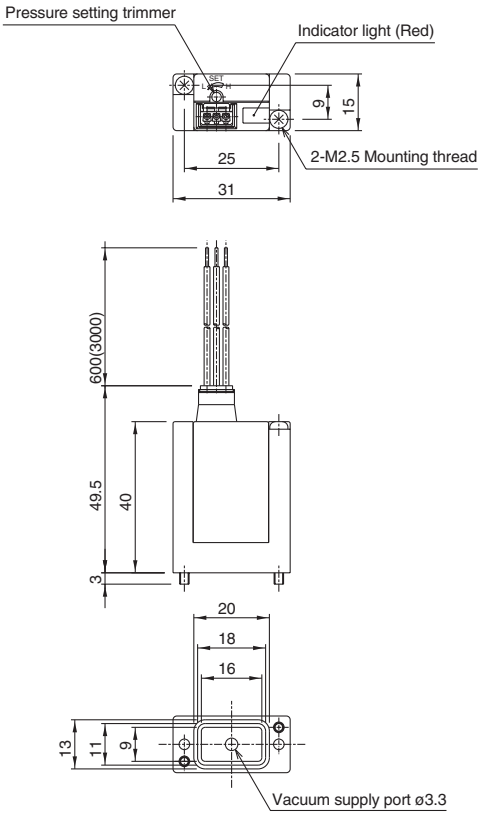
When it is used for work adsorption, set the pressure so that adsorption is complete and reliable. Sometimes the switch will turn ON even when adsorption is not complete.

Vacuum Pressure Switch: ZSE2-0R-15□

ZSE2-0R-15
ZSE2-0R-15L

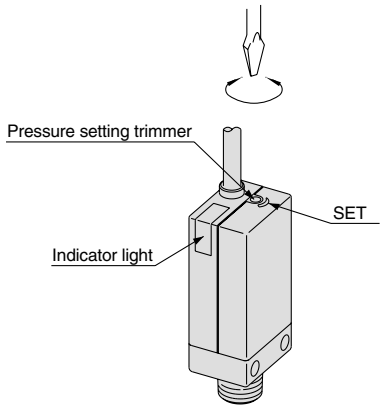


ZSE2-0R-15C
ZSE2-0R-15CL
ZSE2-0R-15CN

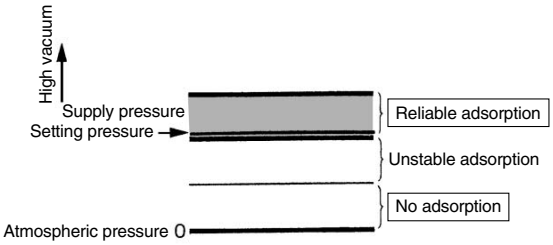


How to Set Vacuum Pressure

- Pressure trimmer selects the ON pressure. Clockwise rotation increases high vacuum set point.

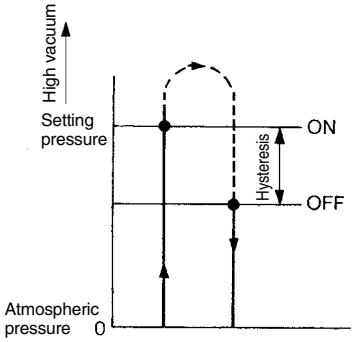


- When using the switch to confirm correct adsorption, the set pressure should be as low as possible, but not so low that a false confirmation signal is given when adsorption is incomplete.



Hysteresis

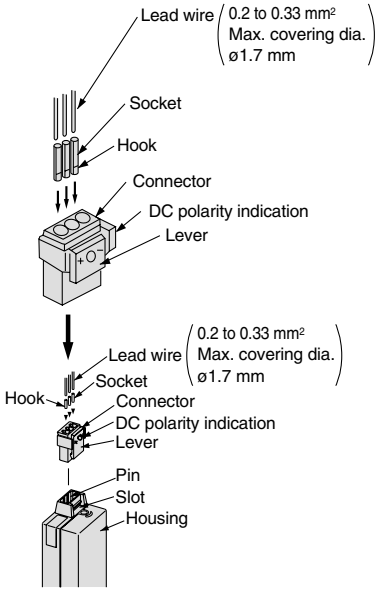
Hysteresis is the actual pressure variance from set pressure occuring when the output signal turns from ON to OFF. The set pressure is the pressure selected to switch from OFF to ON mode.



How to Use Connector

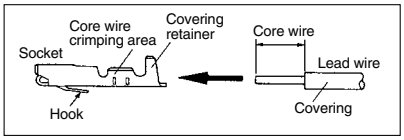
1. Attaching and detaching connectors

- When assembling the connector to the switch housing, push the connector straight onto the pins until the level locks into the housing slot.
- When removing the connector from the switch housing, push the lever down to unlock it from the slot and then withdraw the connector straight off of the pins.



2. Crimping of lead wires and sockets

Strip 3.2 to 3.7 mm at the end of the lead wires, insert the ends of core wires evenly into the sockets, and then crimp with a crimping tool. When this is done, take care that the coverings of the lead wires do not enter the core wire crimping area. (Crimping tool: model no. DXT170-75-1)



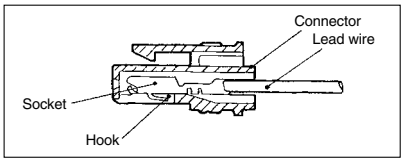
3. Attaching and detaching of socket to connector with lead wire

• Attaching

Insert the sockets into the square holes of the connector (with +, 1, 2, – indication), and continue to push the sockets all the way in until they lock by hooking into the seats in the connector. (When they are pushed in their hooks open and they are locked automatically.) Then confirm that they are locked by pulling lightly on the lead wires.

• Detaching

To detach a socket from a connector, pull out the lead wire while pressing the socket's hook with a stick having a thin tip (about 1 mm). If the socket will be used again, first spread the hook outward.



⚠ Precautions

Be sure to read before handling. Refer to page 13-15-3 to 13-15-4 for Safety Instructions and Common Precautions on the products mentioned in this catalog, and 13-1-5 for Precautions on every series.

Mounting

⚠ Warning

1. Do not drop or bump.

Do not drop, bump or apply excessive impact (1000 m/s²) when handling. Even if the switch body is not damaged, the switch may suffer internal damage that will lead to malfunction.

2. Hold the product from the body side when handling.

The tensile stregth of the power cord is 49 N, and pulling it with a force greater than this can cause failure. Hold by the body when handling.

Vacuum Pressure Switch Unit/Pressure Switch for Vacuum: ZSE4-00-□□-□-X105

Digital Vacuum Switch Specifications: Series ZSE4

Digital Vacuum Pressure Switch

Part no.		ZSE4-00-□□-□-X105	ZSE4B-00-□□-□-X105	ZSE4E-00-□□-□-X105
Display		LCD	LCD with backlight	LED
Pressure setting range		–101 to 0 kPa	–101 to 10 kPa	
Maximum operating pressure		200 KPa		
Operation indicator light (Lights up when ON)		Green		OUT1: Green OUT2: Red
Response frequency		200 Hz (5 ms)		
Hysteresis	Hysteresis mode	Variable (3 digits or more)		Variable (can be set from 0)
	Window comparator mode	Fixed (3 digits)		
Fluid		Air, Non-corrosive gas		
Temperature characteristics		±3% F.S. or less		
Repeatability		±1% F.S. or less		
Operating voltage		12 to 24 VDC (Ripple ±10% or less)		
Current consumption		25 mA or less	45 mA or less	–26, –27: 50 mA or less –67: 60 mA or less
Pressure indication		3 1/2 digits (Letter height 8 mm)		
Self-diagnostic function		Over current(1), Over pressure, Data error, Confirmation of pressure at zero clear		
Operating temperature range		0 to 50°C (With no condensation)		
Noise resistance		500 Vp-p, Pulse width: 1 m S, Start up: 1 nS		
Withstand voltage		1000 VAC(50/60 Hz) for 1 min. between lead wires and body		
Insulation resistance		2 MΩ (at 500 VDC) between lead wires and body		
Vibration resistance		2 hrs. each in X, Y, Z directions at smaller of 10 to 500 Hz with amplitude 1.5 mm, or acceleration 10 G		
Impact resistance		100 G in X, Y, Z directions, 3 times each		

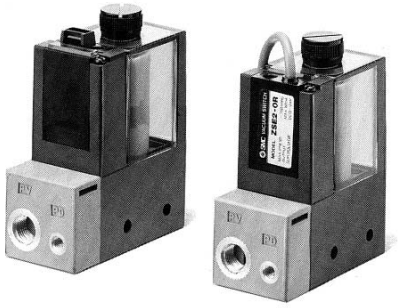
Note) Not available on analog output type.

Output Specifications

ZSE4 ZSE4B	–25 (L)	1 output NPN open collector 30 V, 80 mA or less
	–26 (L)	Analog output (1 to 5 V)
	–67 (L)	1 output PNP open collector 80 mA or less
ZSE4E	–26 (L)	Analog output (1 to 5 V)
	–27 (L)	2 outputs NPN open collector 30 V, 80 mA or less
	–67 (L)	2 outputs PNP open collector 80 mA or less

Vacuum Switch + Suction Filter Unit: ZR1-F□□

Combination unit of vacuum pressure switch for vacuum pressure detection and suction filter to protect the unit from dust and contamination.



Filter case

⚠ Caution

1. The case is made of polycarbonate. Therefore, do not use it with or expose it to the following chemicals: paint thinner, carbon tetrachloride, chloroform, acetic ester, aniline, cyclohexane, trichloroethylene, sulfuric acid, lactic acid, watersoluble cutting oil (alkalinic), etc.
2. Do not expose it to direct sunlight.

Specifications

Unit no.		ZR1-F□□
Suction filter	Operating pressure range	Vacuum to 100 kPa
	Operating temperature range	5 to 50°C
	Filtration degree	30 μm
Filtration material		PVF
Vacuum pressure switch		Refer to page 13-3-13 regarding vacuum switch.
Standard option		Bracket A

Note) If not operated within the specified range of pressure and temperature, trouble may be caused.

Combination of Vacuum Switch + Suction Filter

Combination symbol	Suction filter	Vacuum switch	Weight (with bracket A) (kg)
E	●	●	0.15
F	●	None*	0.15

* Adapter A is attached on vacuum switch mounting area.

How to Order

ZR1 — F [E] [L] — [ ]

Combination of vacuum switch + suction filter

Nil	None	
D1	Digital vacuum switch	ZSE4 + Filter
D2		ZSE4B + Filter
D3		ZSE4E + Filter
E	Vacuum switch	ZSE2 + Filter
F	Filter	

Unit specifications

Nil	With unit switching function (1)
M	SI unit only (2)

Note 1) This is no longer sold for use in Japan due to the Weight and Measure Act (implemented October, 1999).
Note 2) Fixed unit: kPa

How to order
When requiring a switch with lead wire of 5 m, indicate separately the model numbers of a vacuum switch unit without a lead wire connector and the 5 m lead wire connector.

Ex.) ZR1□□□-□□□□□-□CN ····· 1 pc.
ZS-10-5A-50 ····· 2 pcs.

Digital vacuum switch specifications (D1, D2, D3)

Symbol	Output specifications	Lead wire length	Applicable switch
25 (L)	NPN output	Lead wire length 0.6 (3.0) m	D1 D2
26 (L)	Analog output	Lead wire length 0.6 (3.0) m	
65 (L)	PNP output	Lead wire length 0.6 (3.0) m	
27 (L)	NPN output	Lead wire length 0.6 (3.0) m	D3
26 (L)	Analog output	Lead wire length 0.6 (3.0) m	
67 (L)	PNP output	Lead wire length 0.6 (3.0) m	

(1) Lead wire length for vacuum switch connector assembly

ZS — 10 — 5A — [ ]

Lead wire length

Nil	0.6 m
30	3 m
50	5 m

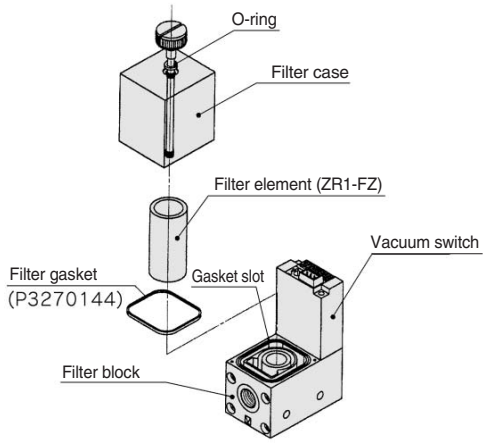
Vacuum switch electrical entry (E)

Nil	Grommet type	Lead wire length 0.6 m
L		Lead wire length 3.0 m
C	Connector type	Lead wire length 0.6 m
CL		Lead wire length 3.0 m
CN		W/o lead wire

* Refer to "Table (1)" for part numbers for lead wire with connector.

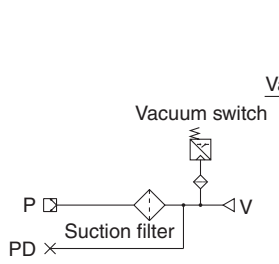
How to Replace Elements

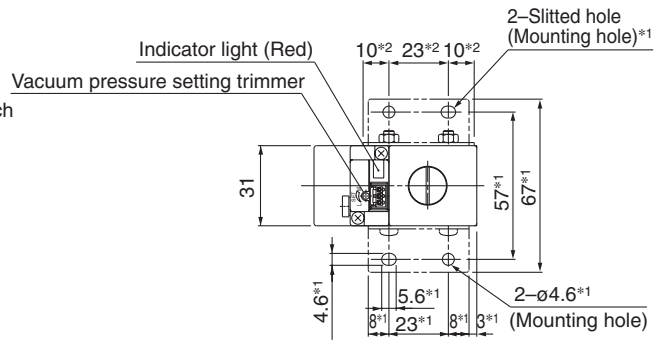
When an element becomes clogged, adsorption performance and response times are degraded. Stop operation and replace element. (Element no. ZR1-FZ). Please ensure that gasket is in slot before re-installation.



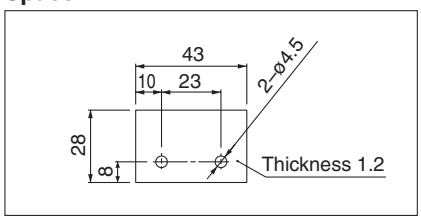
Dimensions: ZR1-F□□

Circuit diagram
ZR1-FE□

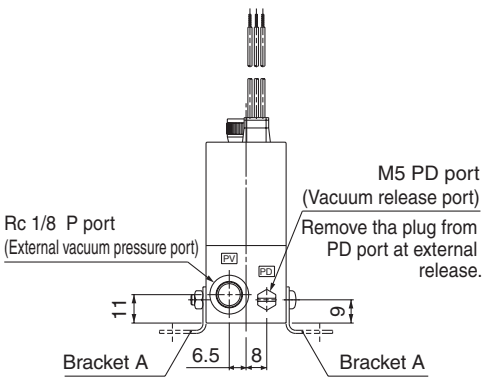


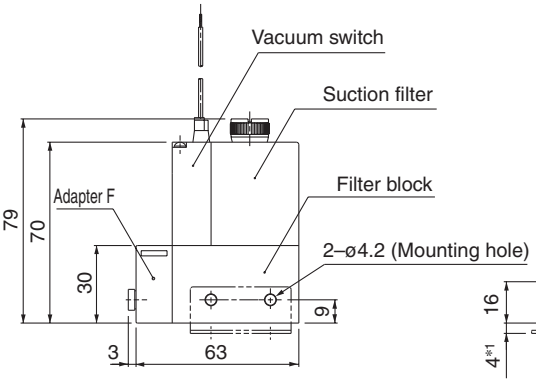


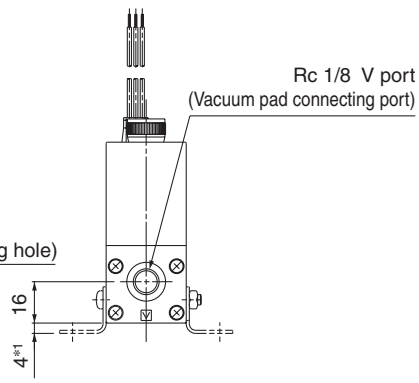
Spacer A



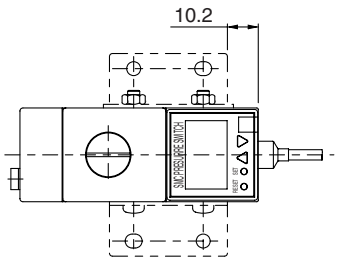
Spacer A is used to leave space for maintenance (for replacement of filter element etc.) on side mounting.

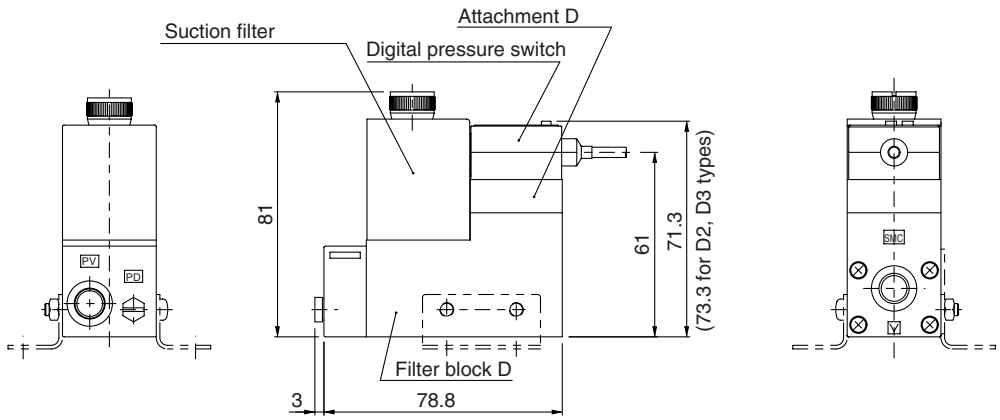






ZR1- D1 D2 D3 **□-□**





Note) * 1 Dimensions for mounting bracket A * 2 Dimensions for mounting spacer A
Bracket A part no. : P3270153 (Standard accessory)
Spacer A part no. : P3270156

Suction Filter: ZR1-FX

ZR1-FX is to be used alone and cannot be combined with other units.

Specifications

Model	ZR1-FX
Operating pressure range	Vacuum to 0.5 MPa
Operating temperature range	5 to 50°C
Filtration efficiency	30 μm
Element	PVF
Weight (With bracket)	0.1 kg

Note) If not operated within the specified range of pressure and temperature, trouble may be caused.

Filter case

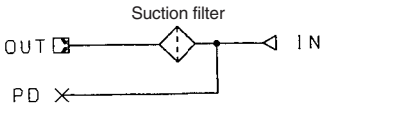
⚠ Caution

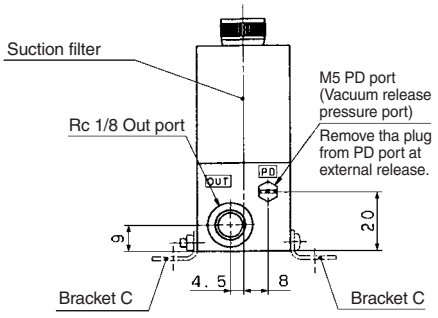
1. The case is made of polycarbonate. Therefore, do not use it with or expose it to the following chemicals: paint thinner, carbon tetrachloride, chloroform, acetic ester, aniline, cyclohexane, trichloroethylene, sulfuric acid, lactic acid, water-soluble cutting oil (alkalinic), etc.

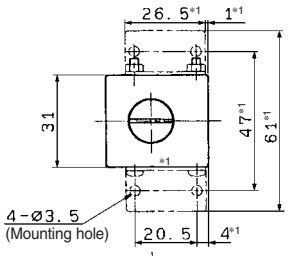
2. Do not expose it to direct sunlight.

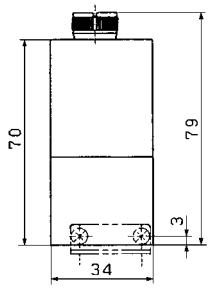
Dimensions: ZR1-FX

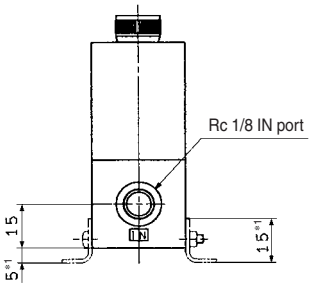
Circuit diagram





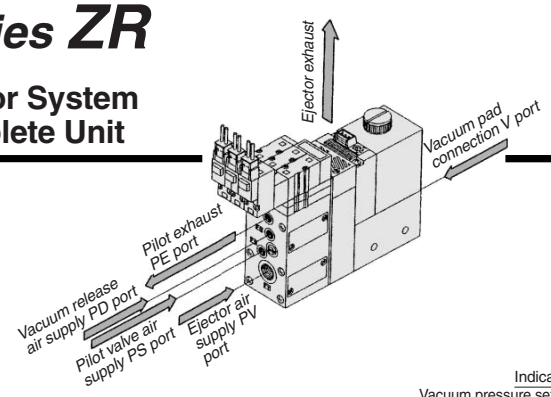






Note) ∗1 Dimensions for mounting bracket C
Bracket C part no. : P3270155

Ejector System Complete Unit



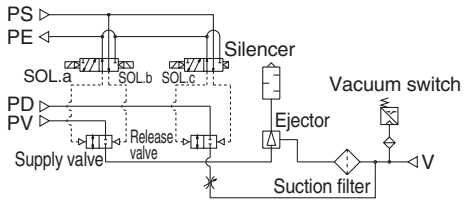
<Components>

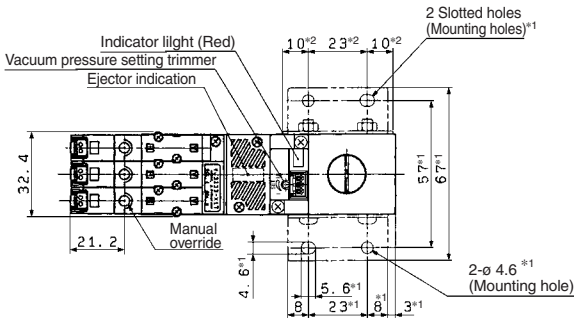
Ejector + Valve + Vacuum Switch + Filter

Nozzle dia./ø1.0, ø1.3, ø1.5 mm

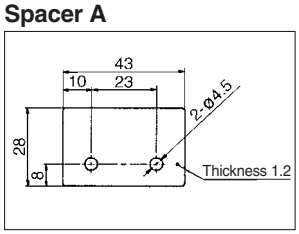
ZR1$^{10}_{13}_{15}$□1-K1□M□□-E□

Circuit diagram

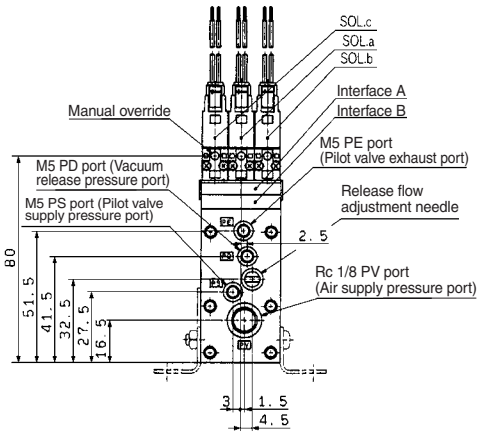


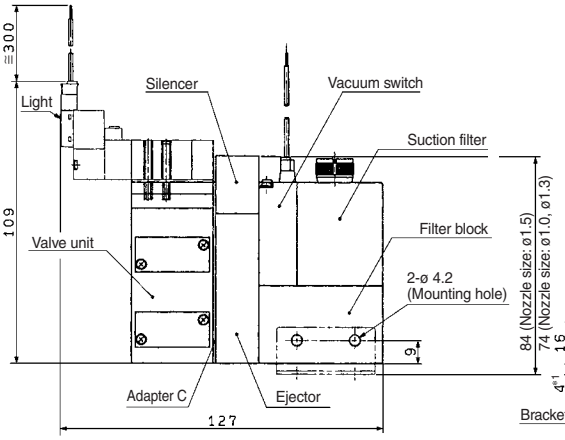


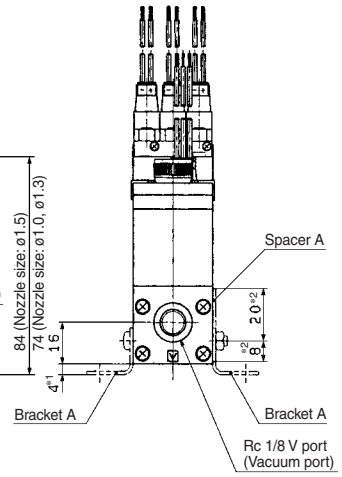
Spacer A



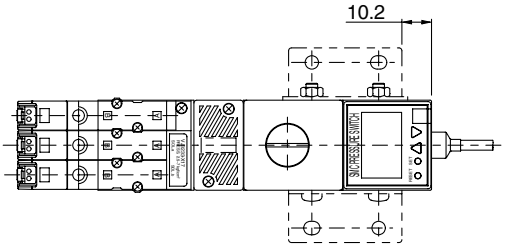
Spacer A is used to leave space for maintenance (for replacement of filter element etc.) on side mounting.

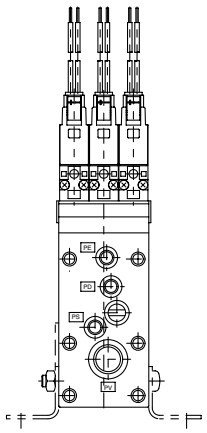


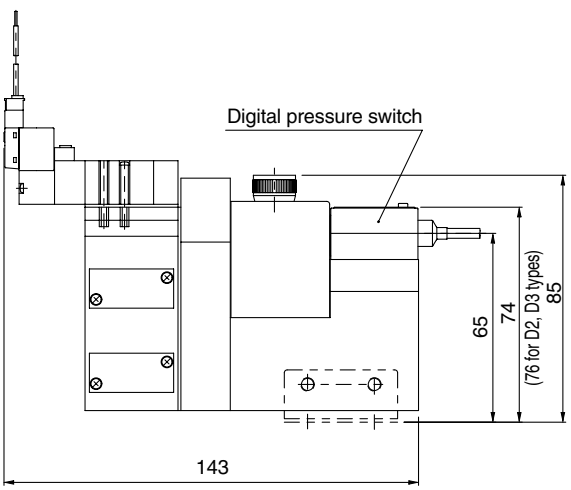


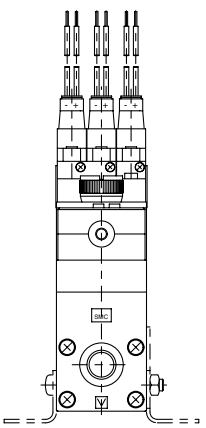


ZR1$^{10}_{13}_{15}$1-K1□M□□-$^{D1}_{D2}_{D3}$□-□





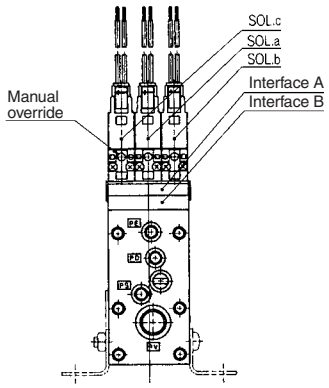


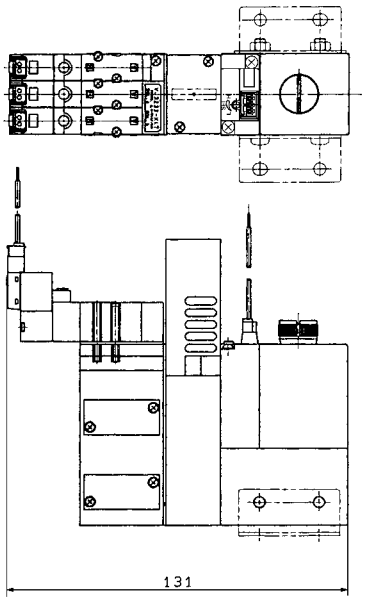


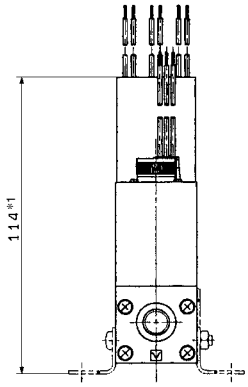
Nozzle dia./ø1.8, ø2.0 mm

ZR1$^{18}_{20}$□1-K1□M□□-E□

Note) ∗1 Dimensions for mounting bracket A
∗2 Dimensions for mounting spacer A
Bracket A part no. : P3270153
(Standard accessory)
Spacer A part no. : P3270156

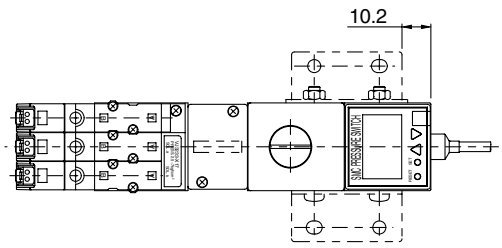


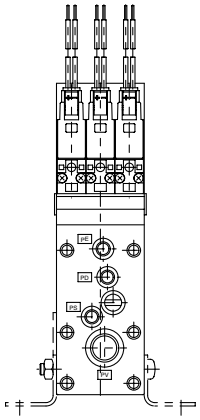


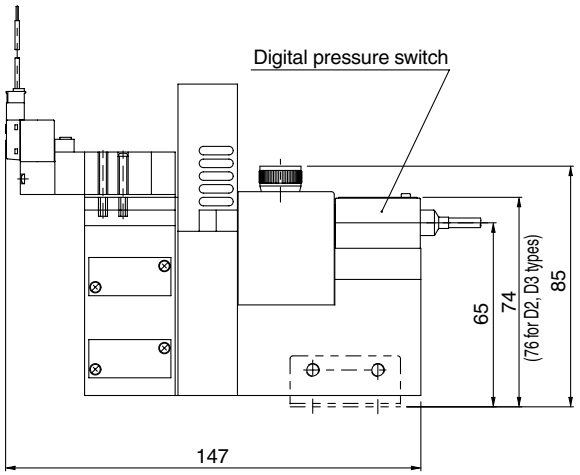


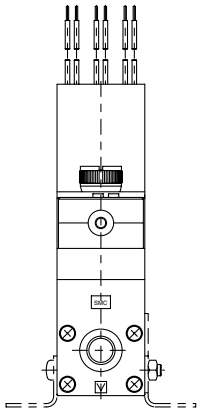
∗ Dimensions not indicated are identical to the top drawing.

ZR1 $^{18}_{20}$ 1-K1□M□□-$^{D1}_{D2}_{D3}$□-□

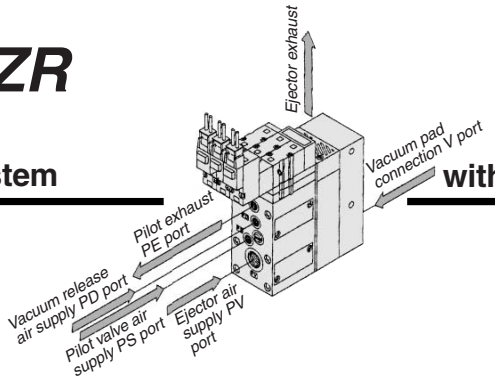






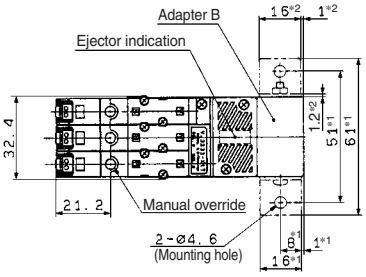


Ejector System with Valve

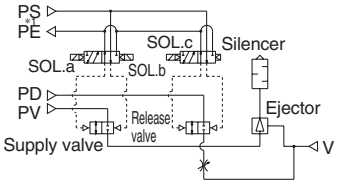


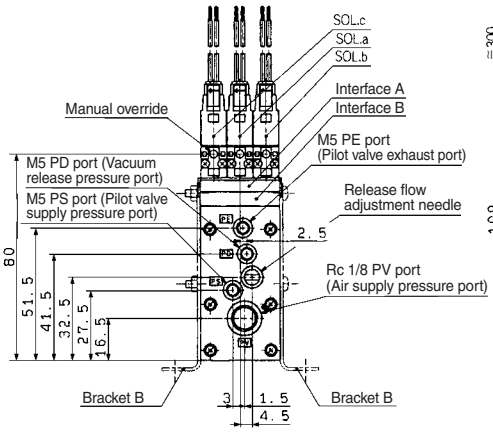
Nozzle dia./ø1.0, ø1.3, ø1.5 mm

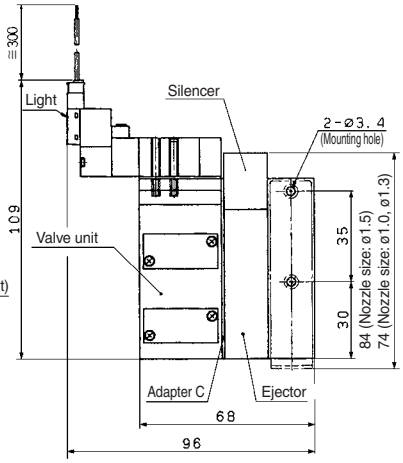
ZR1$^{10}_{13}_{15}$□1-K1□M□□□

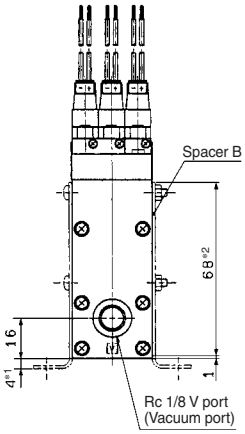


Circuit diagram

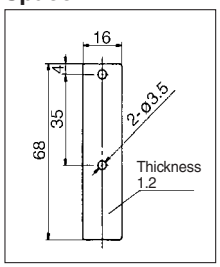








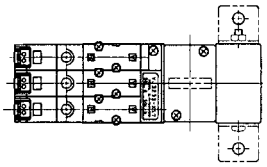
Spacer B



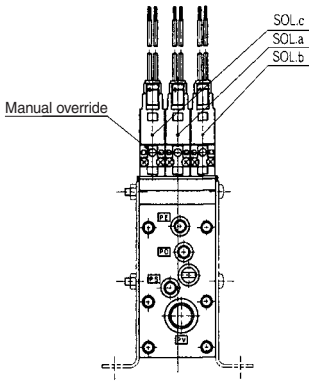
Spacer B is used to leave space for maintenance (for replacing filter element etc.) on side mounting.

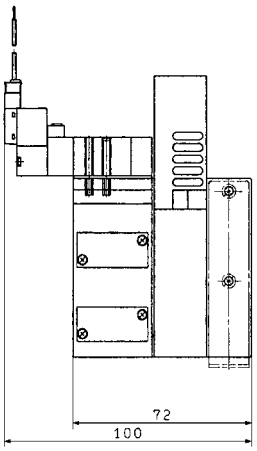
Nozzle dia./ø1.8, ø2.0 mm

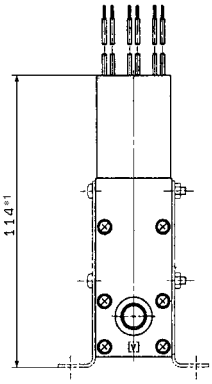
ZR1$^{18}_{20}$□1-K1□M□□-□



Note) ∗1 Dimensions for mounting bracket B
∗2 Dimensions for mounting spacer B
Bracket B part no. : P3270154
(Standard accessory)
Spacer B part no. : P3270157

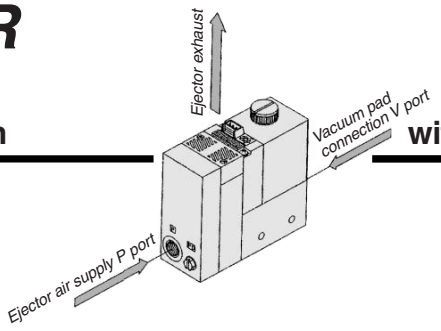




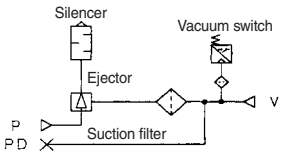


∗ Dimensions not indicated are identical to the top drawing.

Ejector System without Valve

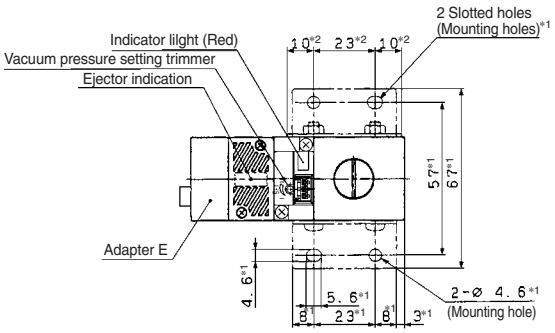


Circuit diagram

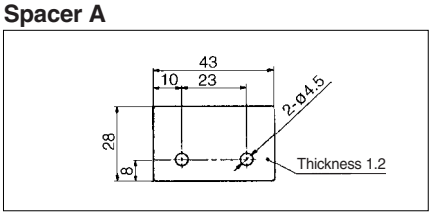


Nozzle dia./ø1.0, ø1.3, ø1.5 mm

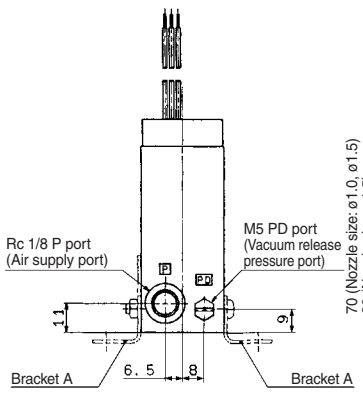
ZR1 10/13/15 □1-E□

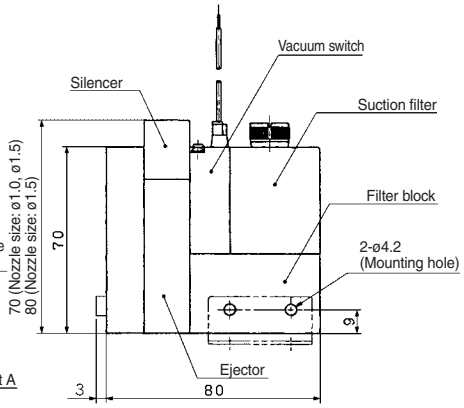


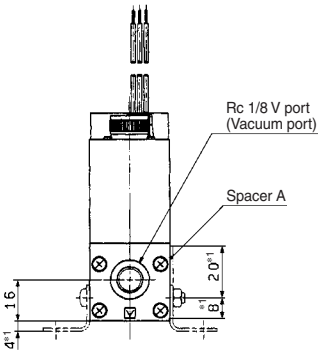
Spacer A



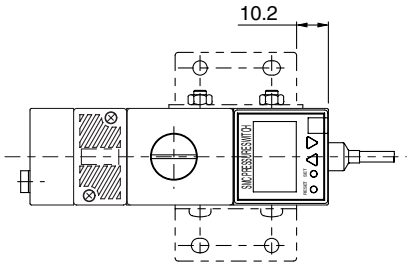
Spacer A is used to leave space for maintenance (for replacement of filter element etc.) on side mounting.

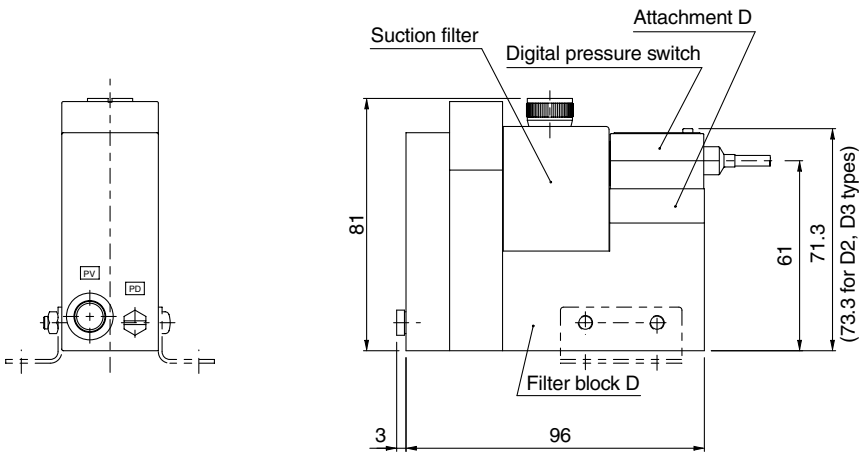






ZR1 10/13/15 - D1/D2/D3 □-□

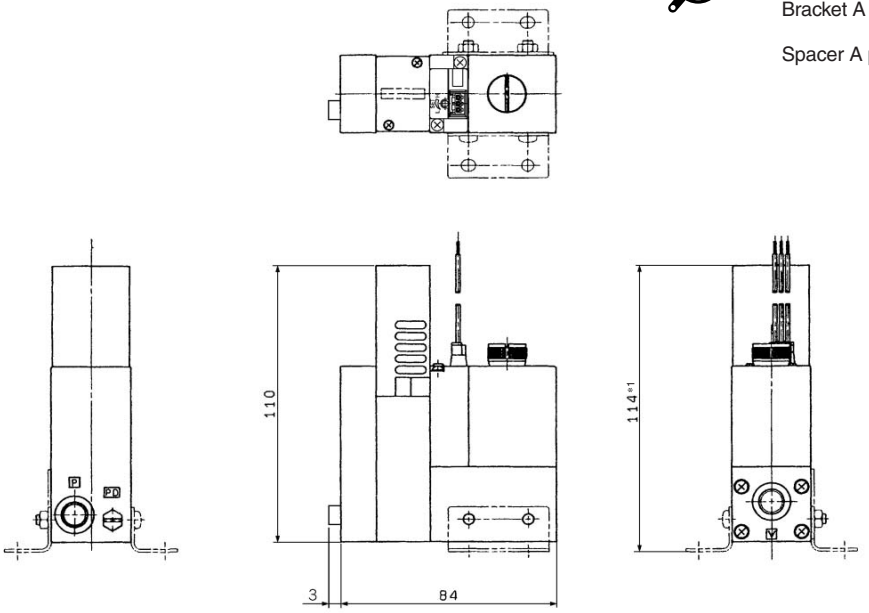




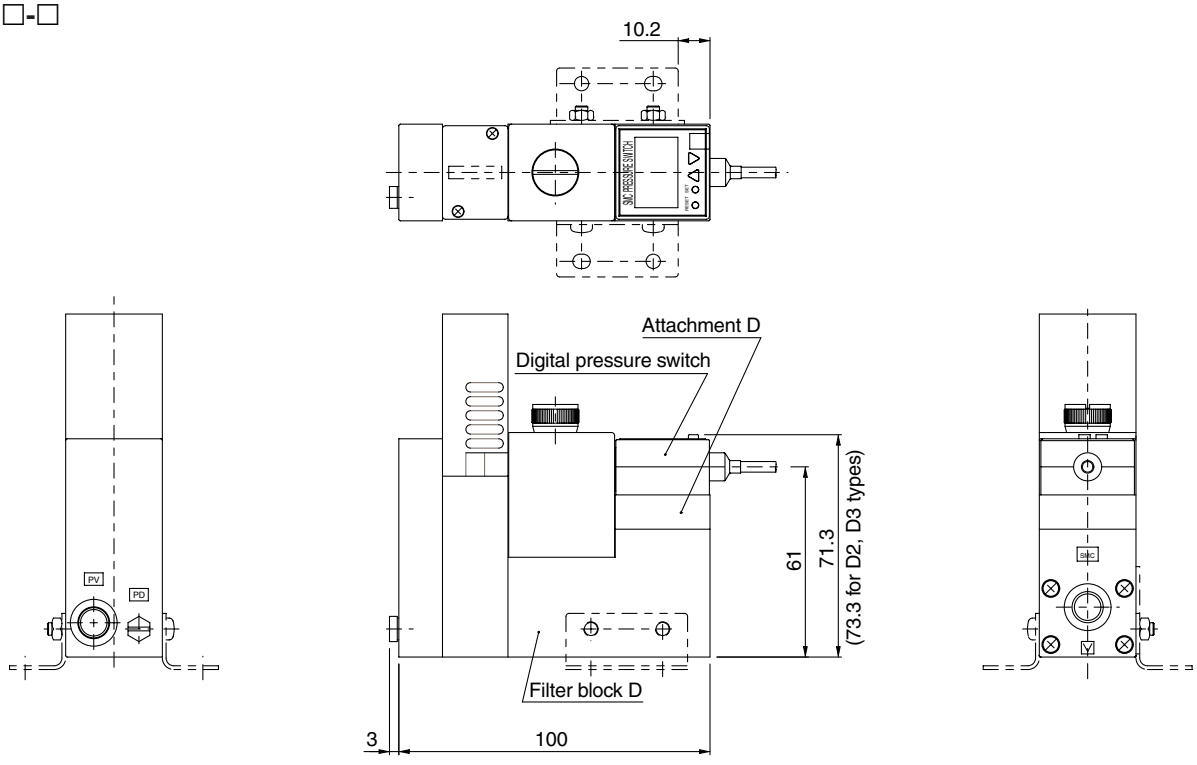
Nozzle dia./ø1.8, ø2.0 mm

ZR1$^{18}_{20}$□1-E□

Note) ∗1 Dimensions for mounting bracket A
∗2 Dimensions for mounting spacer A
Bracket A part no.: P3270153
(Standard accessory)
Spacer A part no.: P3270156

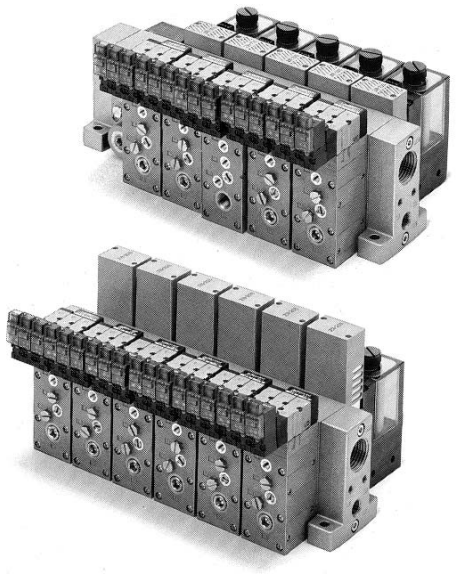


ZR1$^{18}_{20}$-$^{D1}_{D2}_{D3}$□-□



∗ Dimensions not indicated are identical to C1 type.

Ejector System/Manifold Specifications



Specifications

Max. number of units	6 stations	
Port	Port size	Function
PV port	Rc 1/8	Air supply for ejector
PS port	M5	Air supply for pilot valve
PD port	M5	Air supply for release
EXH port	Rc 1/2	Common exhaust
Weight	Basic weight for one station is 0.28 kg. Additional weight per one station is 0.12 kg.	

Notes) When using 3 or more stations with ZR120□□ manifold, utilize PV port as supply port on both sides.
When using 3 or more stations with ZR120□ 3 manifold, utilize EXH port as exhaust port on both sides.

Manifold Air Supply

Supply port location \ Manifold / Port	Left			Right		
	PV	PS	PD	PV	PS	PD
L (Left side)	○	○	○	●	●	●
R (Right side)	●	●	●	○	○	○
B (Both sides)	○	○	○	○	○	○

Air supply to ○ port
Blank plug attached to ● port
Note) Blank plug is attached on all ports of valve unit.

Individual Spacer

Part no.	Port	Function
ZR1-R1	PV	Possible to set the air supply pressure individually
	PS	Possible to set the pilot valve air supply pressure individually
	PD	Possible to set the release valve supply pressure individually
	PE	Possible to set the pilot valve exhaust individually

Individual spacer is used when the connecting port of each unit is not common for the manifold connecting port. Mixed specifications of common and individual unit connecting ports for each unit is possible on manifolds with this individual spacer.

How to Order Manifold

Indicate separately the model number of the manifold and the vacuum units, function plates, individual spacers and blank plates to be included.

<Manifold base>

ZZR1 [06] [ ] [R]

Stations

01	1
⋮	⋮
06	6

Port location

R	Right side
L	Left side
B	Both sides

∗ Viewed from the front side of valve unit, confirm the port location on the right and/or left side.

Thread type

Nil	Rc
F	G
T	NPTF

Example)
ZZR106-R ····· 1 pc. (Manifold base only)
∗ZR120S1-K15MZ-EC ··· 5 pcs. (Unit)
∗ZR1-BM1 ····· 1 pc. (Blank plate)
∗ZR1-R1-3 ····· 1 pc. (Individual spacer)

With reference from valve side, the third station from right side

<Function plate>

ZR1 − RV [1] [1]

Piping specifications

Symbol	Symbol	PV port	PS port	PD port
1	PV ⟷ PS ⟷ PD	Common		
2	PV ⟷ PS/PD	Common		Individual

Arrangement (Right valve station which is looked from valve side is first station.)

1	1 station only
⋮	⋮
6	6 stations only
A	All stations

∗ If more than one spacer is required, specify all spacers.
Example) Attached to the first and third stations
∗ZR1-RV1-1
∗ZR1-RV1-3
∗ZR1-R1-A··3
↑ Fill the number

<Individual spacer>

ZR1 − R1 − [1]

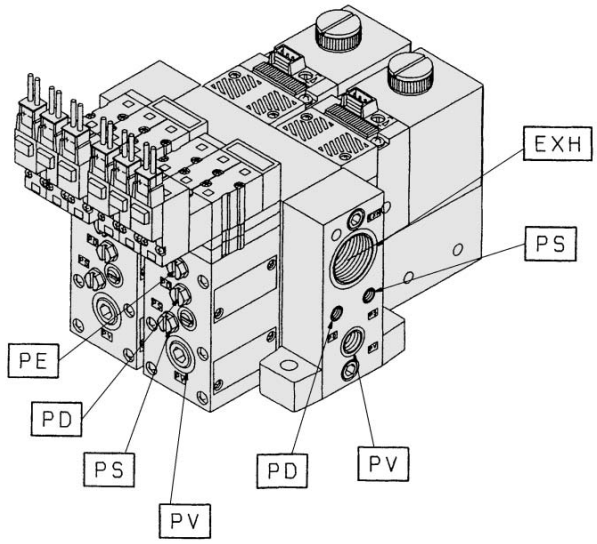
Arrangement (Right valve station which is looked from valve side is first station.)

1	1 station only
⋮	⋮
6	6 stations only
A	All stations

∗ If more than one spacer is required, specify all spacers.
Example) Attached to the first and third stations
∗ZR1-R1-1
∗ZR1-R1-3

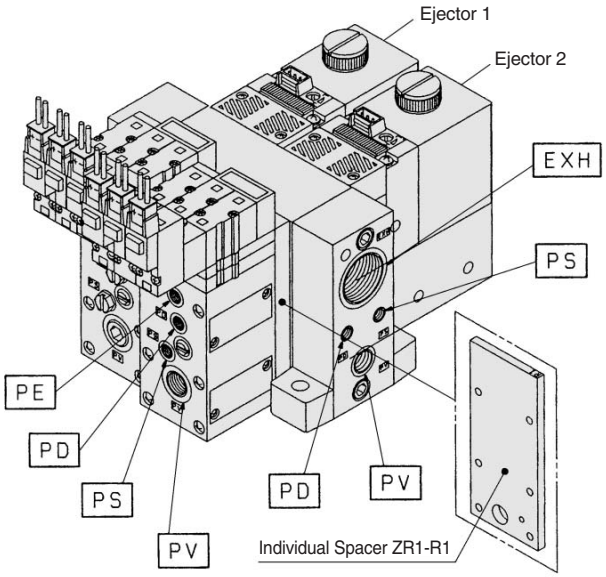
Manifold/System Circuit Example

When not using individual air pressure supply



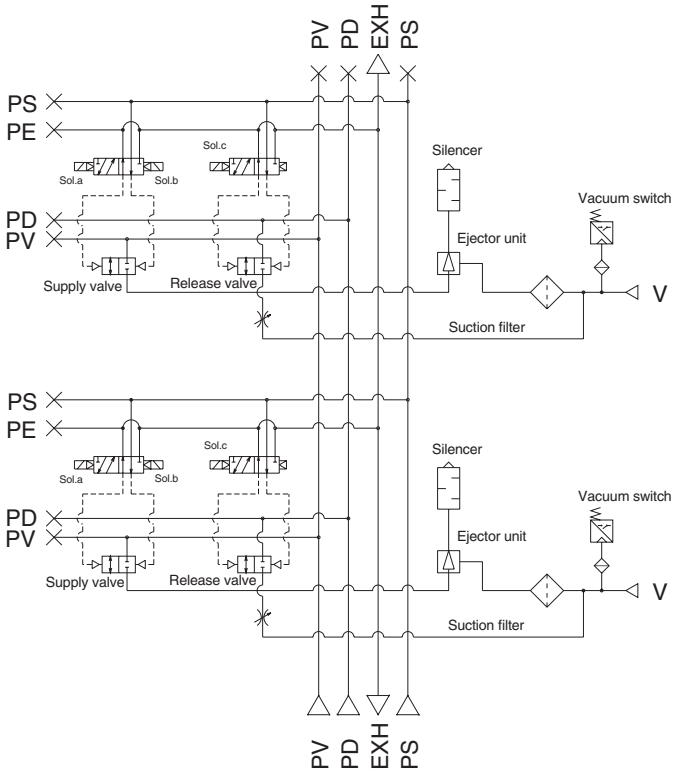
PV: External supply port
PS: Supply valve supply pressure port
PD: Air supply port for release valve
PE: Pilot exhaust port
EXH: Common exhaust port

When using indivisual air pressure supply

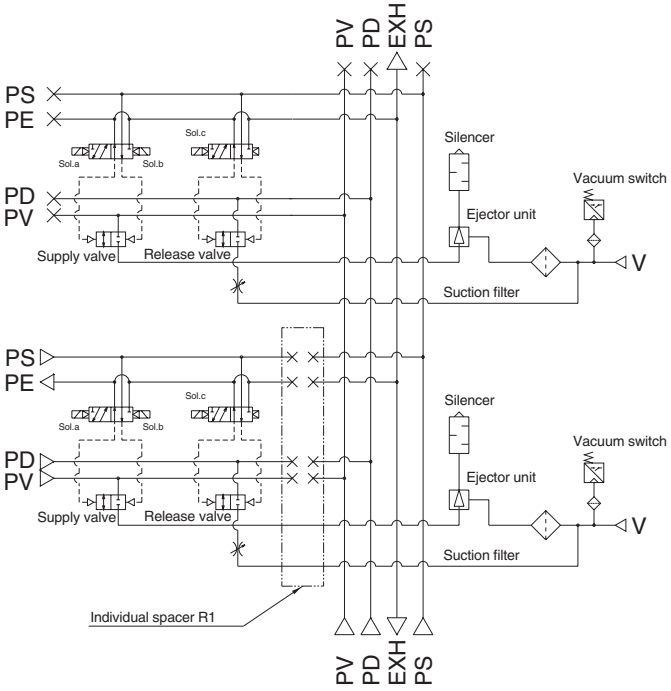


PV: External supply port
PS: Supply valve supply pressure port
PD: Air supply port for release valve
PE: Pilot exhaust port
EXH: Common exhaust port

<System circuit example>

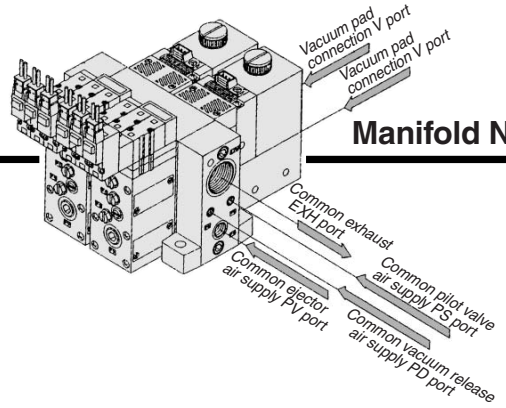


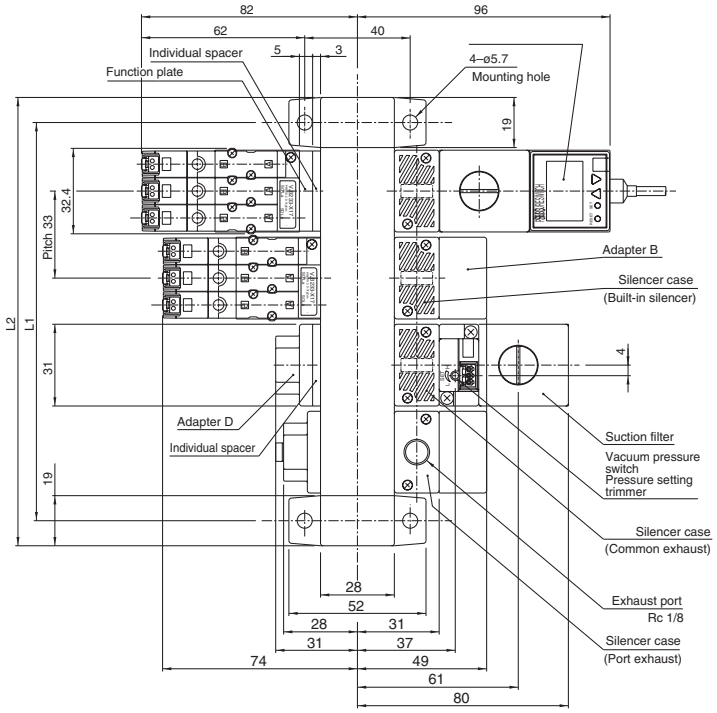
<System circuit example>

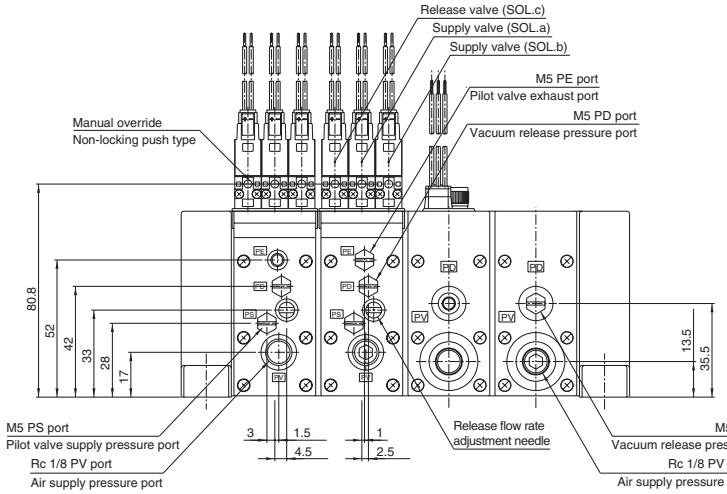


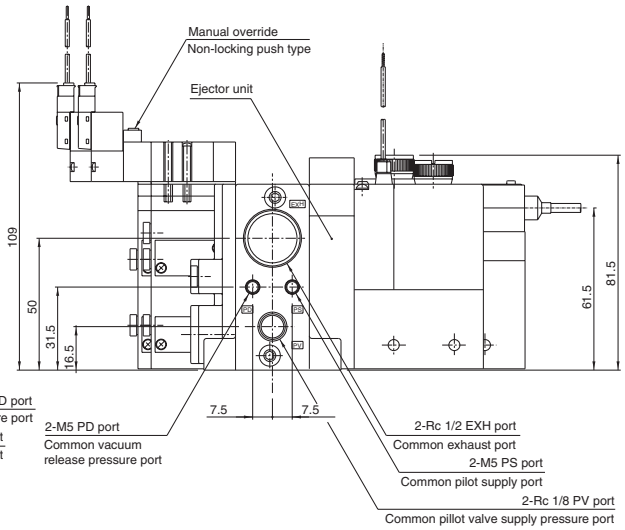
Ejector System

Manifold Nozzle Dia./ø1.0, ø1.3, ø1.5 mm





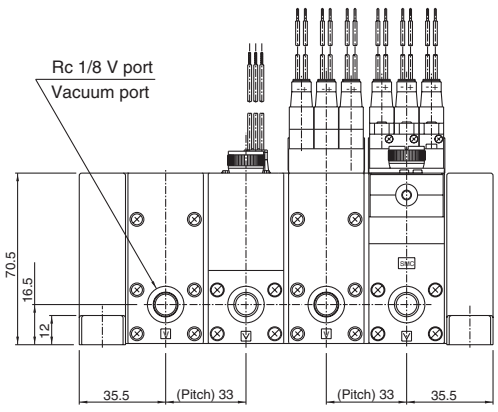


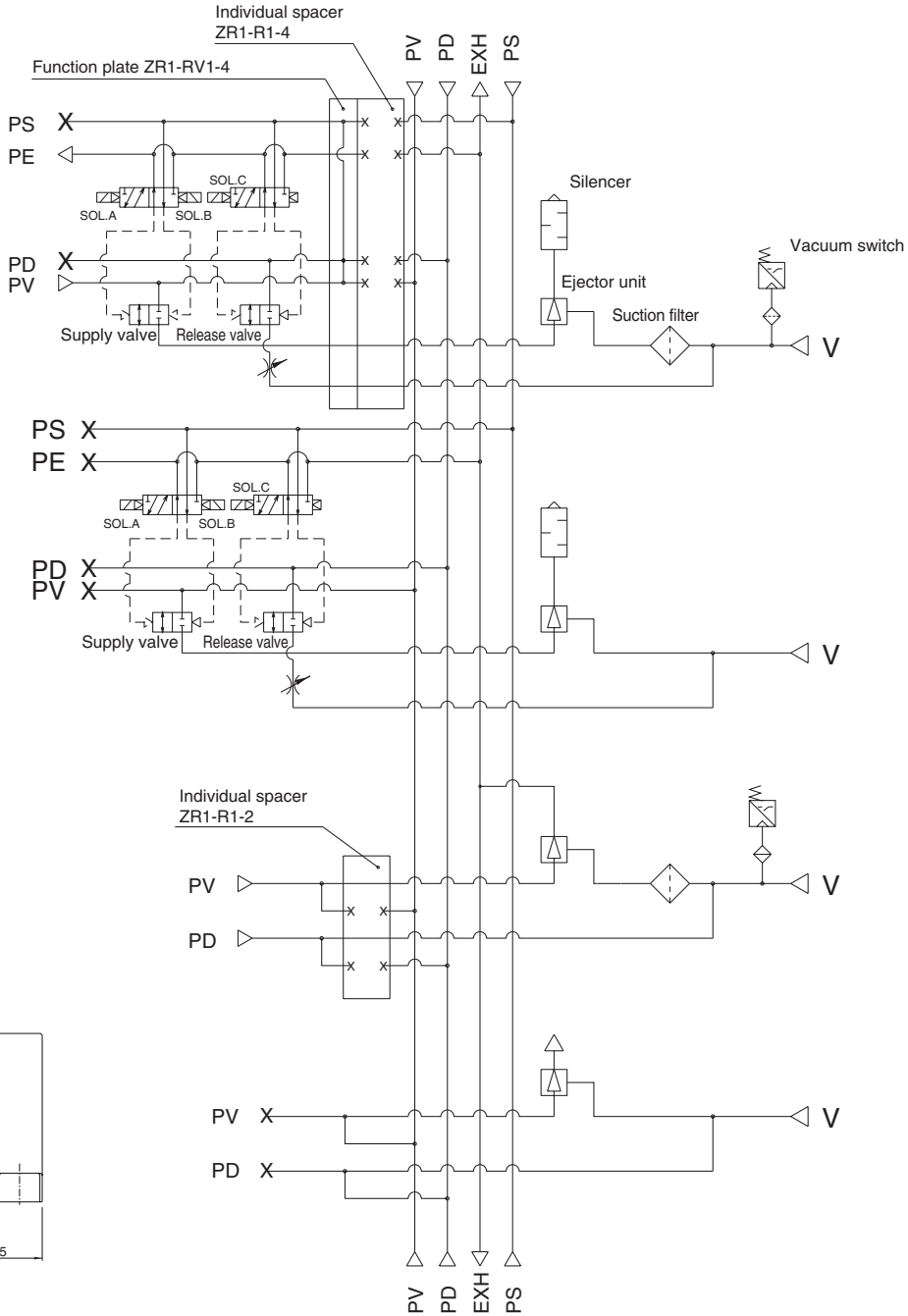


(mm)

Symbol \ Stations	1	2	3	4	5	6
L1	52	85	118	151	184	217
L2	71	104	137	170	203	236

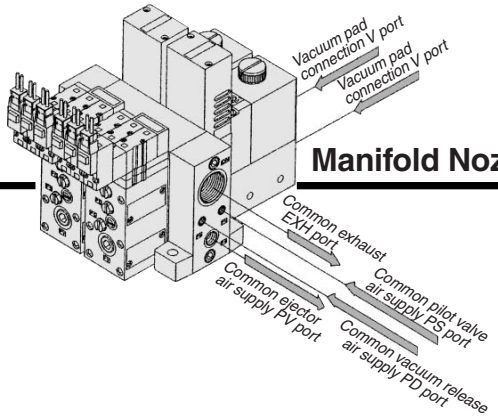
Circuit diagram

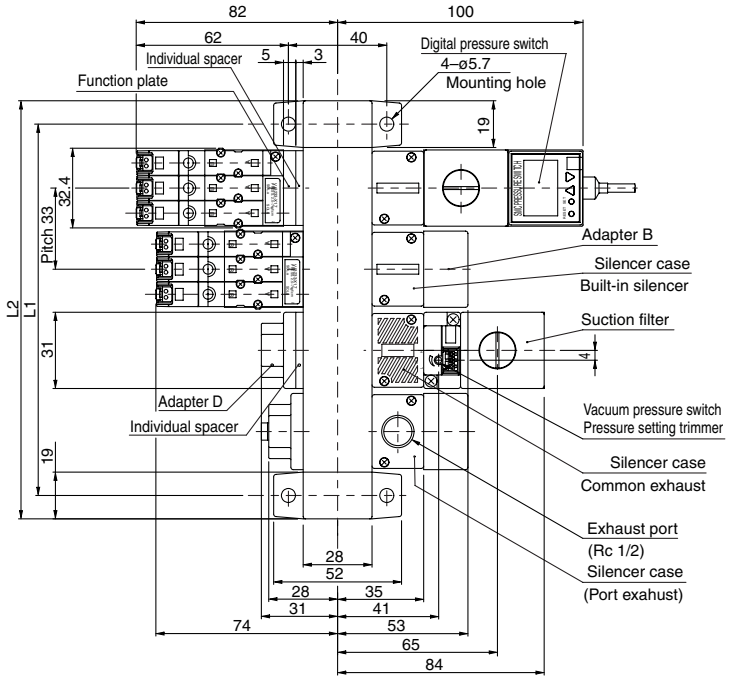


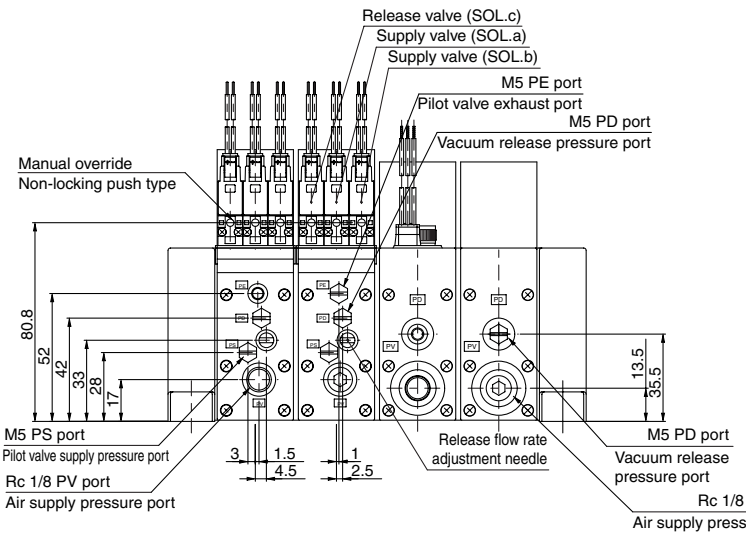


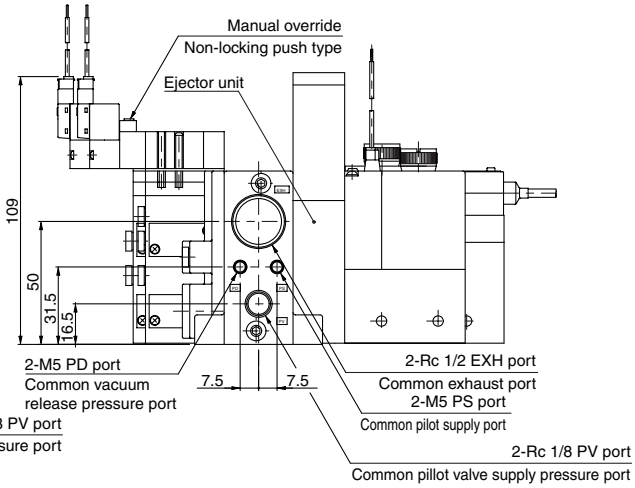
Ejector System

Manifold Nozzle Dia./ø1.8, ø2.0 mm



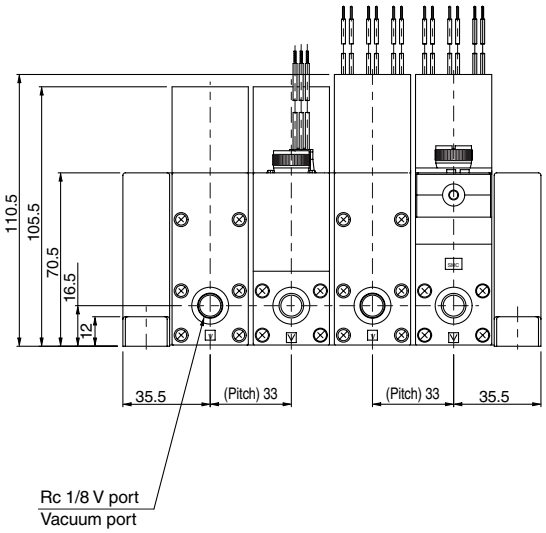




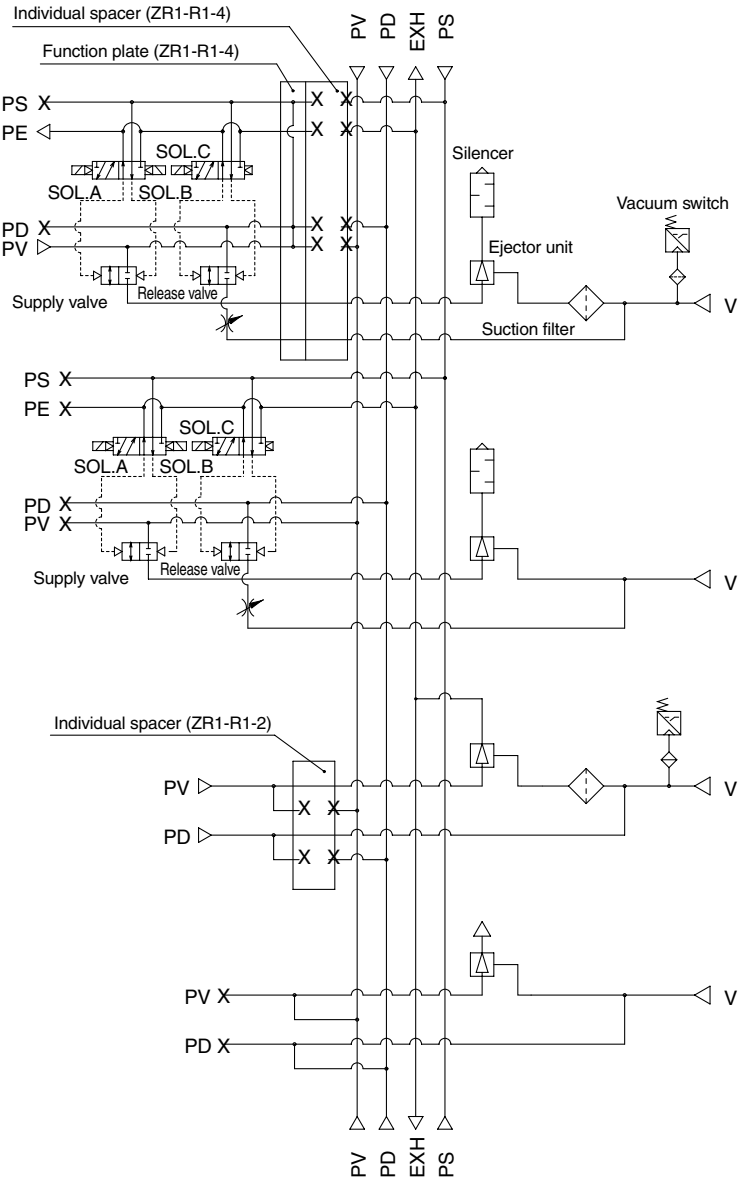


(mm)

Symbol \ Stations	1	2	3	4	5	6
L1	52	85	118	151	184	217
L2	71	104	137	170	203	236



Circuit diagram

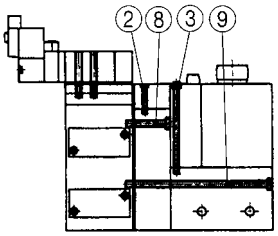


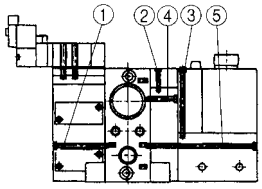
Ejector System

Mounting Thread Parts List for Unit Combination

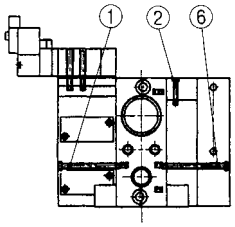
Manifold Specifications | **Without Manifold**

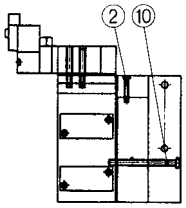
Components	Valve unit + Ejector unit + Vacuum switch/Filter unit



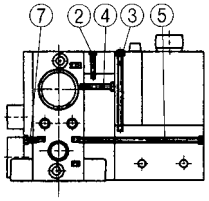


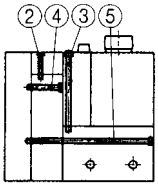
Components	Valve unit + Ejector unit



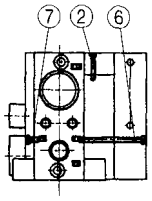


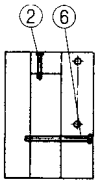
Components	Ejector unit + Vacuum switch/Filter unit

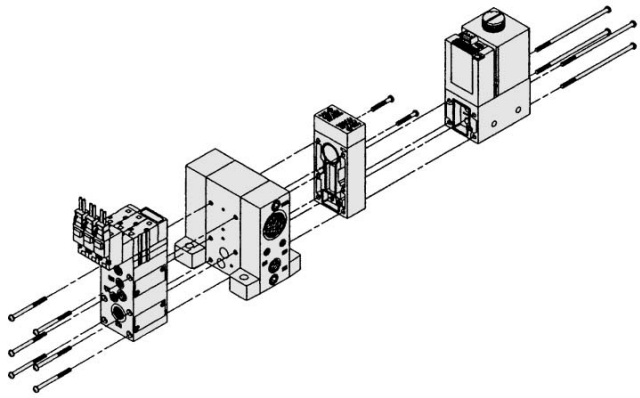




Components	Ejector unit







Mounting Thread Parts List for Unit Combination

No.	Combination specifications	Mounting thread	Quantity
①	Standard (without options)	M2.5 x 0.45 x 33	6
	With individual spacer	M2.5 x 0.45 x 35	6
	With function plate	M2.5 x 0.45 x 37	6
	With individual spacer + with function plate	M2.5 x 0.45 x 40	6
②	Individual, common and port exhaust style for nozzle size 10, 13	M2 x 0.4 x 13	2
	Common and port exhaust style for nozzle size 15		
	Individual exhaust style for nozzle size 15	M2 x 0.4 x 23	2
	Common and port exhaust style for nozzle size 18, 20	M2 x 0.4 x 48	2
	Individual exhaust style for nozzle size 18, 20	M2 x 0.4 x 53	2
③	For vacuum switch and adapter A	M2.5 x 0.45 x 41	2
④	For nozzle size 10, 13, 15	M2.5 x 0.45 x 17	2
	For nozzle size 18, 20	M2.5 x 0.45 x 21	2
⑤	For nozzle size 10, 13, 15	M2.5 x 0.45 x 66	4
	For nozzle size 18, 20	M2.5 x 0.45 x 70	4
	For nozzle size 10, 13, 15 [For ZSE4 spec.]	M2.5 x 0.45 x 82	4
	For nozzle size 18, 20 [For ZSE4 spec.]	M2.5 x 0.45 x 86	4
⑥	For nozzle size 10, 13, 15	M2.5 x 0.45 x 35	6
	For nozzle size 18, 20	M2.5 x 0.45 x 39	6
⑦	Standard (without options)	M2.5 x 0.45 x 5	6
	With individual spacer	M2.5 x 0.45 x 8	6
⑧	For nozzle size 10, 13, 15	M3 x 0.35 x 19	2
	For nozzle size 18, 20	M3 x 0.35 x 23	2
	For nozzle size 10, 13, 15 + with function plate	M3 x 0.35 x 24	2
	For nozzle size 10, 13, 15 + with function plate	M3 x 0.35 x 28	2
⑨	For nozzle size 10, 13, 15	M3 x 0.35 x 68	4
	For nozzle size 18, 20	M3 x 0.35 x 72	4
	For nozzle size 10, 13, 15 + with function plate	M3 x 0.35 x 73	4
	For nozzle size 10, 13, 15 + with function plate	M3 x 0.35 x 77	4
	For nozzle size 10, 13, 15 [For ZSE4 spec.]	M3 x 0.35 x 84	4
	For nozzle size 18, 20 [For ZSE4 spec.]	M3 x 0.35 x 88	4
	For nozzle size 10, 13, 15 + with function plate [For ZSE4 spec.]	M3 x 0.35 x 89	4
	For nozzle size 10, 13, 15 + with function plate [For ZSE4 spec.]	M3 x 0.35 x 93	4
⑩	For nozzle size 10, 13, 15	M3 x 0.35 x 37	6
	For nozzle size 18, 20	M3 x 0.35 x 41	6
	For nozzle size 10, 13, 15 + with function plate	M3 x 0.35 x 42	6
	For nozzle size 10, 13, 15 + with function plate	M3 x 0.35 x 46	6

⚠ Precautions

Be sure to read before handling. Refer to pages 13-15-3 to 13-15-4 for Safety Instructions and Common Precautions and refer to page 13-1-5 for Precautions on every series.

⚠ Caution

For precautions associated with matching the ejector to the vacuum circuit, refer to the technical data in 13-1-10 to 13-1-19.