Large Size Vacuum Module: Vacuum Pump System

Series ZR

How to Order

Note for model selection

Take function plates into consideration. (Refer to page 13-3-37.)

Components

Valve unit — Vacuum switch — Suction filter

ZR100

Combination of vacuum switch 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 valve	Vacuum switch electrical entry	Unit specifications (Applicable to Series ZSE4)
K1		5	M	Z		E		

Combination of vacuum valve and release valve

Refer to "Table (1)" in page 13-3-35 for details.

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

⚠ Caution

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

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)

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	

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.

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 "Table (2)" on page 13-3-35 for lead wire with connector.

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 (3)" on page 13-3-35 regarding lead wire with connector part no.

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	Locking slotted type

Light/Surge voltage suppressor

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

* DC voltage: Be much careful about polarity, because it is incorrect at DC (surge voltage suppressor), diode or switching element may be damaged.
AC voltage: S is not available for AC.

Table (1) Valve Unit/Combination of Vacuum Switch Valve and Release Valve

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

Symbol	Vacuum switch 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 vacuum switch valve)	—
C2	—	—	—	●	—	—	—	(Common with vacuum switch valve)
C3	—	—	●	—	—	—	(Common with vacuum switch valve)	—
C4	—	●	—	—	—	(Common with vacuum switch 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) ZR100-K15□Z-EC ····· 1 pc.
*VJ10-20-4A-6 ····· 2 pc.

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

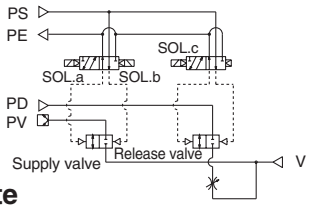
When requiring a vacuum switch with a lead wire of 5 m, indicate the part numbers of the vacuum unit switch without a lead wire connector and the 5 m with lead wire connector separately.

Example) ZR100-□□□□□-□CM ····· 1 pc.
*ZS-10-5A-50 ····· 1 pc.

Vacuum Pump System/Combination of vacuum valve and release valve

Combination Symbol: K1

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

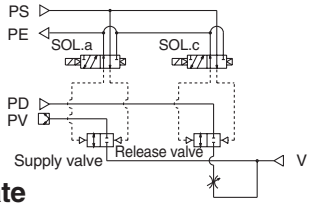


How to Operate

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

Combination Symbol: K2

Feature: Single solenoid valve is provided for vacuum valve.

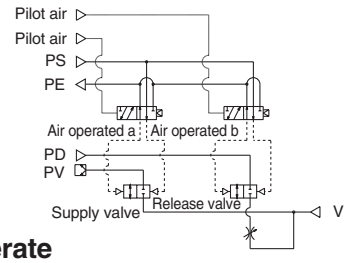


How to Operate

Operation \ Pilot valve operation	Vacuum switching 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

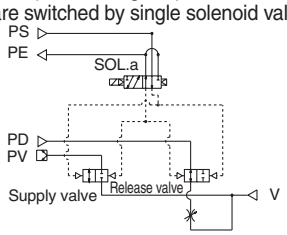
Operation \ Pilot valve operation	Vacuum switching valve	Release valve	Note
	Air operated a	Air operated b	
1. Adsorption	ON	OFF	Suitable when solenoid valves can be used or for centralized control using external pilot air.
2. Vacuum release	OFF	ON	
3. Operation stop	OFF	OFF	

⚠ Caution

When pipe connection is made to one port connection (PV port, PD port) only, use a function plate (ZR1-RV3). Refer to page 13-3-37 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.

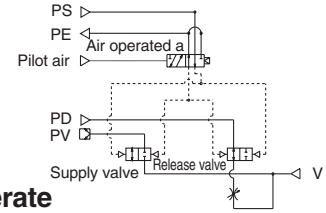


How to Operate

Operation \ Pilot valve operation	Vacuum 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 an external pilot valve.

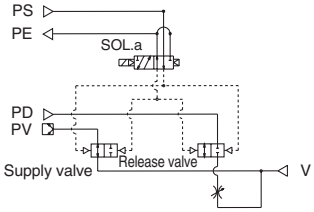


How to Operate

Operation \ Pilot valve operation	Vacuum 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 the single solenoid

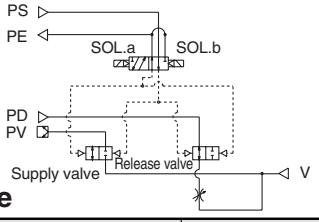


How to Operate

Operation \ Pilot valve operation	Vacuum 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

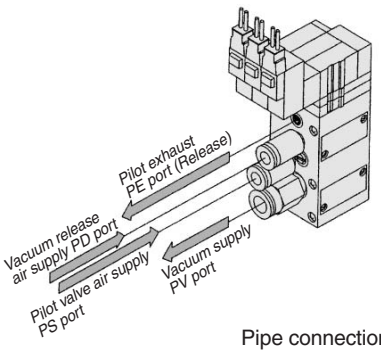
Operation \ Pilot valve operation	Vacuum valve/Release valve		Note
	SOL.a	SOL.b	
1. Adsorption	ON	OFF	When power supply is stopped vacuum valve/vacuum release valve will hold the operation.
2. Vacuum release	OFF	ON	

Function Plate: ZR1-RV3

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.

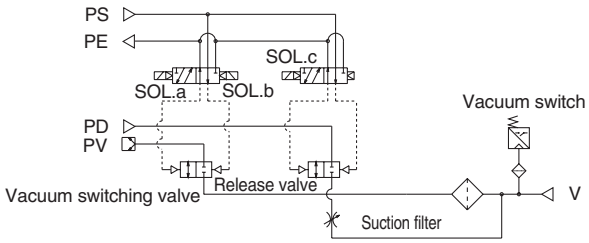
Without Function Plate (Standard)

Applicable system: Ejector system
External vacum supply system



Pipe connection

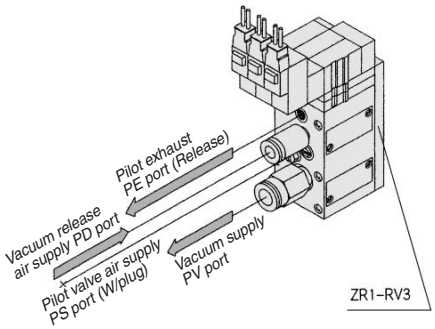
Example of circuit diagram



With Function Plate/Applicable to External Vacuum Supply Only

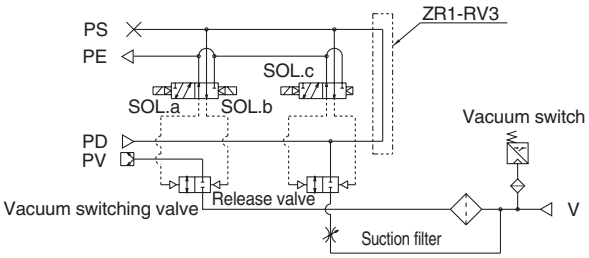
When ZR1-RV3 (PV/PS⇔PD) is Selected

Since compressed air is necessary to operate pilot valve in external vacuum supply system, supply air to PD port (or PS port).



Pipe connection

Example of circuit diagram



How to Order Function Plate Unit

ZR1 — RV 3

Piping specifications

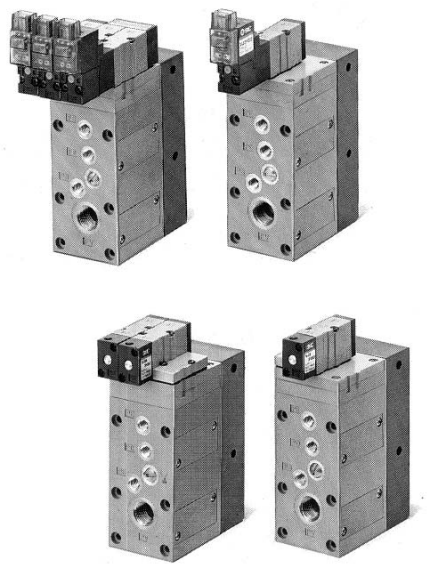
Symbol	Symbol	PV port	PS/PD port
3	PV/PS ↔ PD	Individual	Common

How to order
Indicate the model numbers of the vacuum module and the function plate.
Example) ZR100-K15MZ-E ····· 1
∗ZR1-RV3 ····· 1

⚠ 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.

Valve Unit: ZR1-V



Specifications

Valve unit part no.		ZR1-V□□□□□				
Components		Vacuum switch valve			Release valve	
Operating method		Pilot operated			Pilot operated	
	Vacuum valve, release valve individual	Double solenoid valve VJ3233-X17	Solenoid valve VJ3133	Air operated VJA3130	Solenoid valve VJ3133	Air operated VJA3130
	Vacuum valve, release valve common	Double solenoid valve VJ3233-X18	Solenoid valve VJ3133	Air operated VJA3130		
Operating pressure range		0.25 to 0.6 MPa				
Main valve effective area (mm^2)		8.2			0.96	
Main valve effective area (Cv)		0.45			0.053	
Maximum operating frequency		5 Hz				
Operating temperature range		5 to 50°C				

Standard accessory - Bracket B

Solenoid Valve/Specifications

Solenoid	VJ3133-□□□□, VJ3233-□□□□-X17, VJ3233-□□□□-X18
Rated voltage	24, 12, 6, 5, 3 VDC, 100*, 110* VAC (50/60 Hz)
Electrical entry	100, 110 VAC-L/M plug connector (With rectifier)
	3, 5, 6, 12, 24 VDC-L/M plug connector, Grommet
Light/Surge voltage suppressor	Available, Not available (at grommet)
Manual operation	Non-locking push type, Locking slotted type

* Applicable to plug connector; connector assembly with rectifier is attached.

Combination of Vacuum Valve and Release Valve

Combination symbol	Vacuum switch valve	Release valve	Weight (kg)
K1	Double SOL. (VJ3233-X17)	N.C. (VJ3133)	0.245
K2	N.C. (VJ3133)	N.C. (VJ3133)	0.213
K3	Air operated VJA3130	Air operated VJA3130	0.194
C1	N.C. (VJ3133)		0.187
C2	Air operated VJA3130		0.174
C3	N.C. (VJ3133)		0.184
C4	Double SOL. (VJ3233-X18)		0.214

* Weight includes Bracket B. (Solenoid valve: 24 VDC, M plug connector type)

How to Order

Refer to page 13-3-34 for further part no. information.

ZR1 − V [K1] [ ] [5] [M] [Z] [ ]

- **Combination of vacuum valve and release valve**
- **Pilot valve**
- **Rated voltage**
- **Electrical entry**
- **With light/surge voltage suppressor**
- **Manual override**

Vacuum Pressure Switch: ZSE2-0R-15

Refer to page 13-3-13 for further specifications.

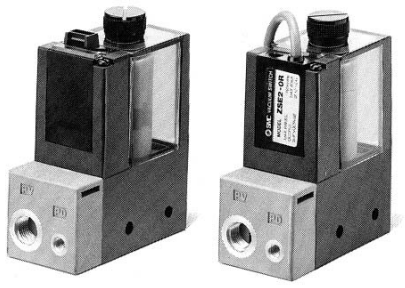
Specifications

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 the ejector system, instantaneous pressure up to 0.5 MPa will not damage the switch.

Note) Operation outside of the max. operating pressure and max. operating temperature range can cause failure.

Vacuum Switch/Suction Filter Unit: ZR1-F



Refer to page 13-3-18 for further specifications.

Specifications

Unit no.		**ZR1-F□□**
Suction filter	Operating pressure range	Vacuum to 0.5 MPa
	Operating temperature range	5 to 50°C
	Filtration efficiency	30 μm
Material		PVF
Vacuum 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.

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.

Suction Filter: ZR1-FX

Refer to page 13-3-20 for further specifications.

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

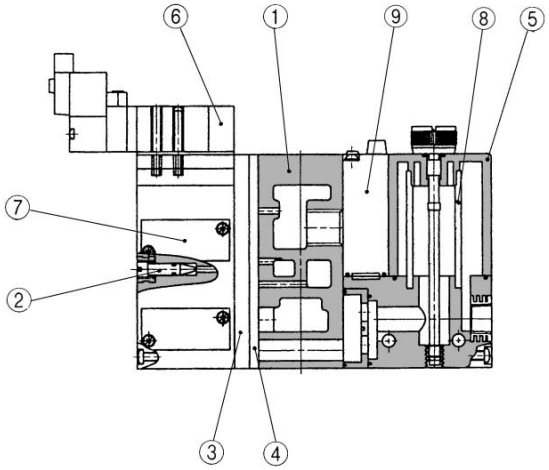
Note) If not operated within the specified range of pressure and temperature, trouble may be caused.

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, watersoluble cutting oil (alkalinic), etc.
2. Do not expose it to direct sunlight.

Construction



Components Parts

No.	Description	Material	Note
①	Manifold	Aluminum	
②	Release flow rate adjustment needle	Stainless steel	
③	Function plate	PBT	→ Refer to page 13-3-44.
④	Individual spacer	PBT	→ Refer to page 13-3-44.
⑤ Note)	Filter case	Polycarbonate	

* 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	Filter element	PVF	ZR1-FZ (30 μm)
⑨	Vacuum switch	—	ZSE2-OR-15-□ ZSE4□-00-□□-□-X105

Table (1) How to Order Pilot Valves

Symbol	Components		Model
	Vacuum switch 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

Table (2) How to Order Valve Body Assembly

ZR1 − VD K1 □ 5 M Z □

- **K1** — Combination of vacuum valve and release valve
- **□** — Pilot valve
- **5** — Rated voltage
- **M** — Electrical entry
- **Z** — With light/surge voltage suppressor
- **□** — Manual override

Refer to page 13-3-34 for further symbol specifications.

How to Order Solenoid Valves/Air Operated Valves

Air operated

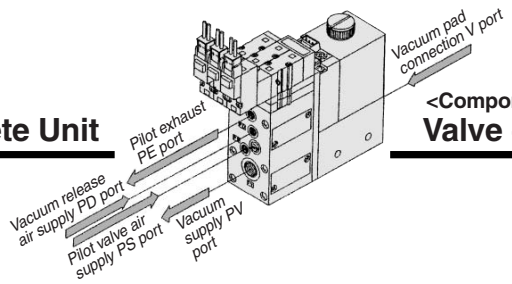
ZR1 − VJA3130

Solenoid valve

ZR1 − VJ3233 □ − 5 M Z □ − X17 / X18

- **□** — Pilot valve
- **5** — Rated voltage
- **M** — Electrical entry
- **Z** — With light/surge voltage suppressor
- **□** — Manual override

Refer to page 13-3-34 for further symbol specifications.

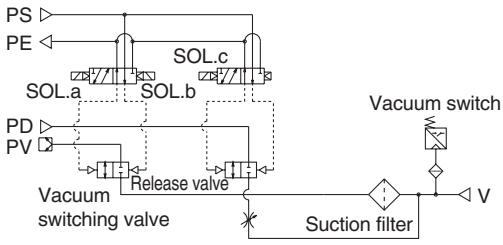


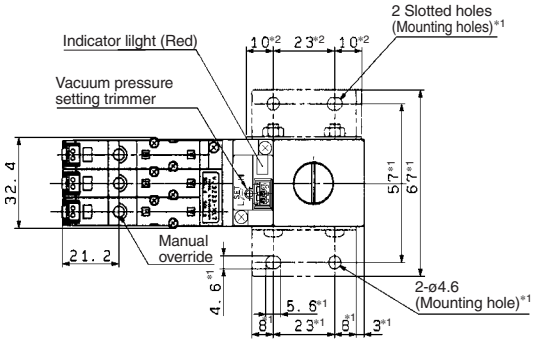
Complete Unit

<Components>
Valve + Vacuum Switch + Filter Unit

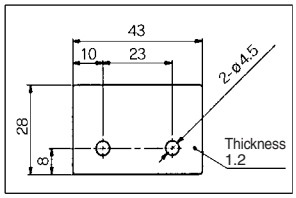
Type K1
Vacuum valve: Double SOL.
Release valve: Single SOL. (N.C.)
ZR100-K1□M□□-E□

Circuit diagram

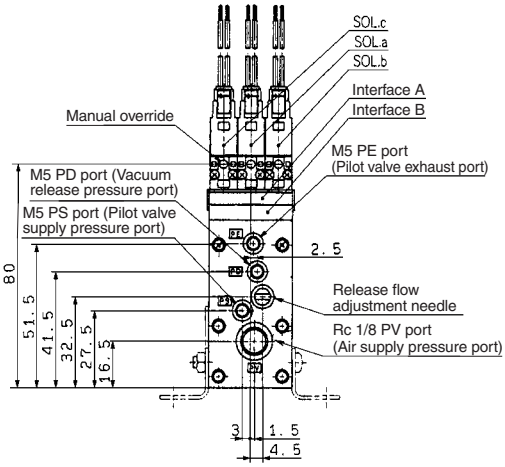


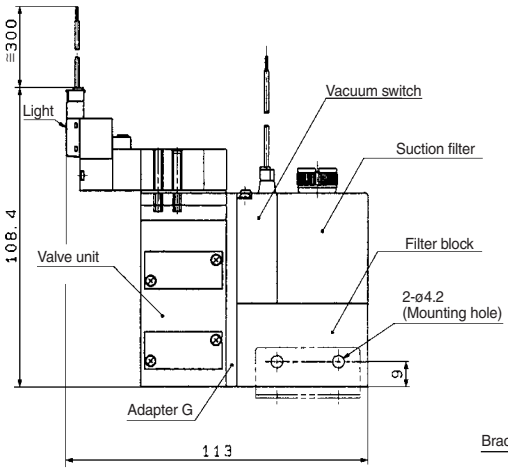


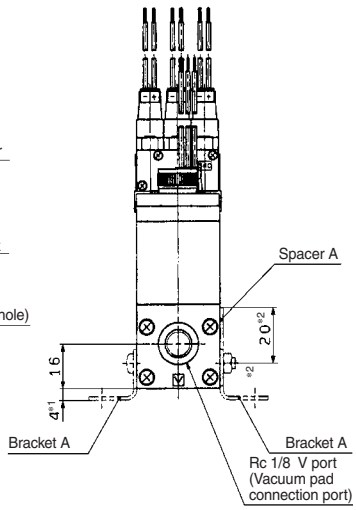
Spacer A



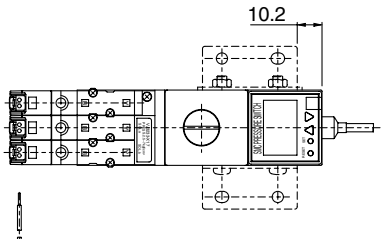
Spacer A is used to leave space for maintenance (for replacement of filter element etc.) on side mounting.

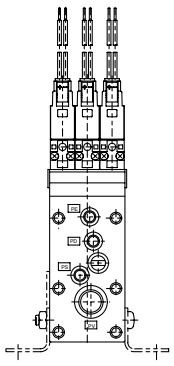


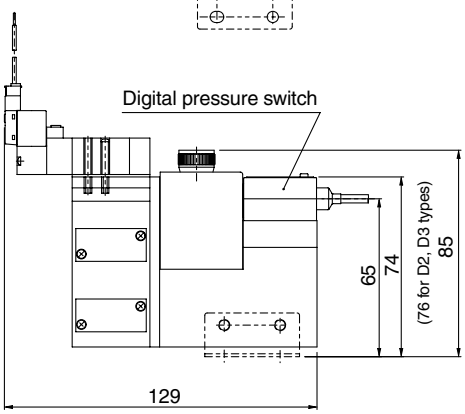


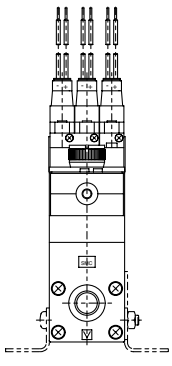


ZR100-K1□M□□- D1 D2 D3 **□-□**

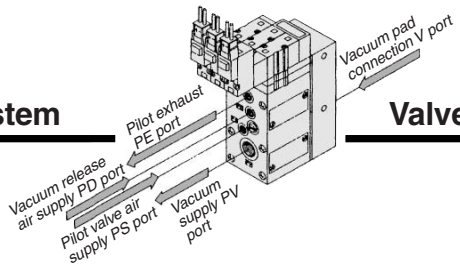








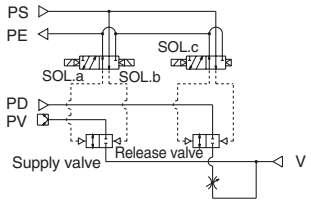
Note) * 1 Dimensions for mounting bracket A
* 2 Dimensions for mounting spacer A
Bracket A part no.: P3270153 (Standard accessory)
Spacer A part no. : P3270156

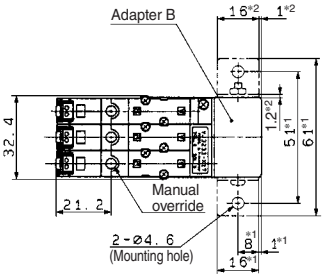


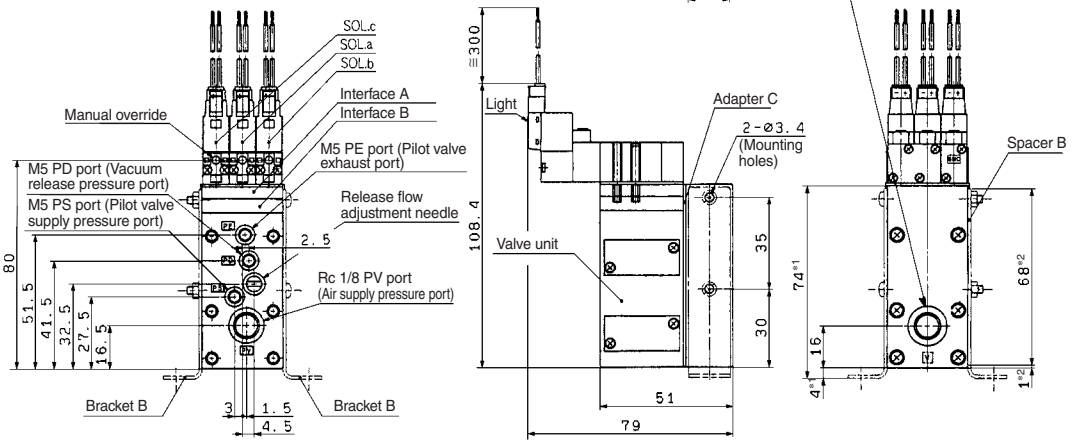
Vacuum Pump System — Valve Unit

Type K1
ZR1-VK1□M□□□

Circuit diagram

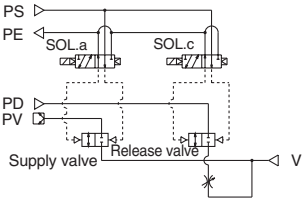


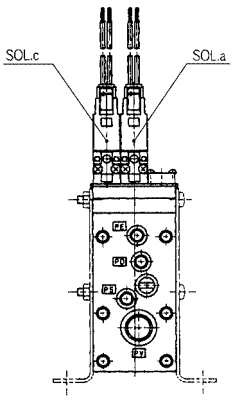




Type K2
ZR1-VK2□M□□□

Circuit diagram

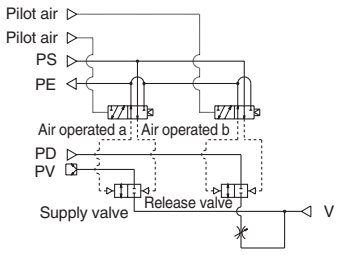


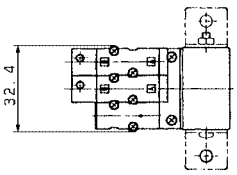


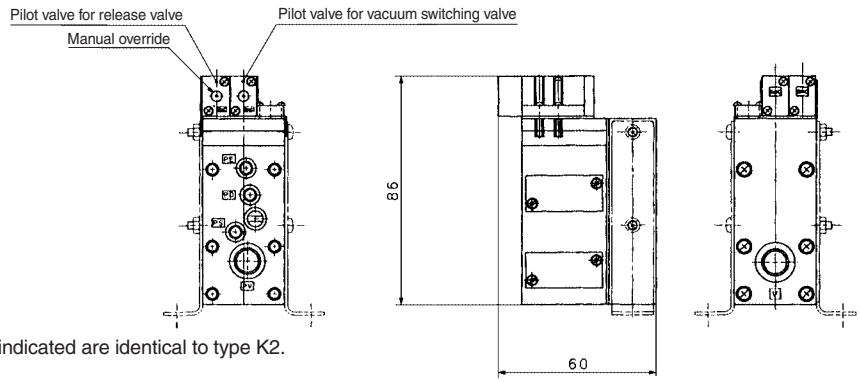
Note) * 1 Dimensions for mounting bracket B
* 2 Dimensions for mounting spacer B
Spacer B is used to leave space for maintenance (for replacement of solenoid valve etc.) on side mounting of used on surface mounting.
Bracket B part no.: P3270154
(Standard accessory)
Spacer B part no. : P3270157

Type K3
ZR1-VK3□M□□□□

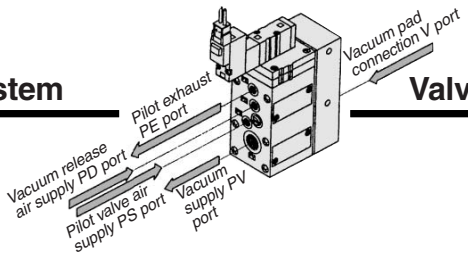
Circuit diagram







* Dimensions not indicated are identical to type K2.

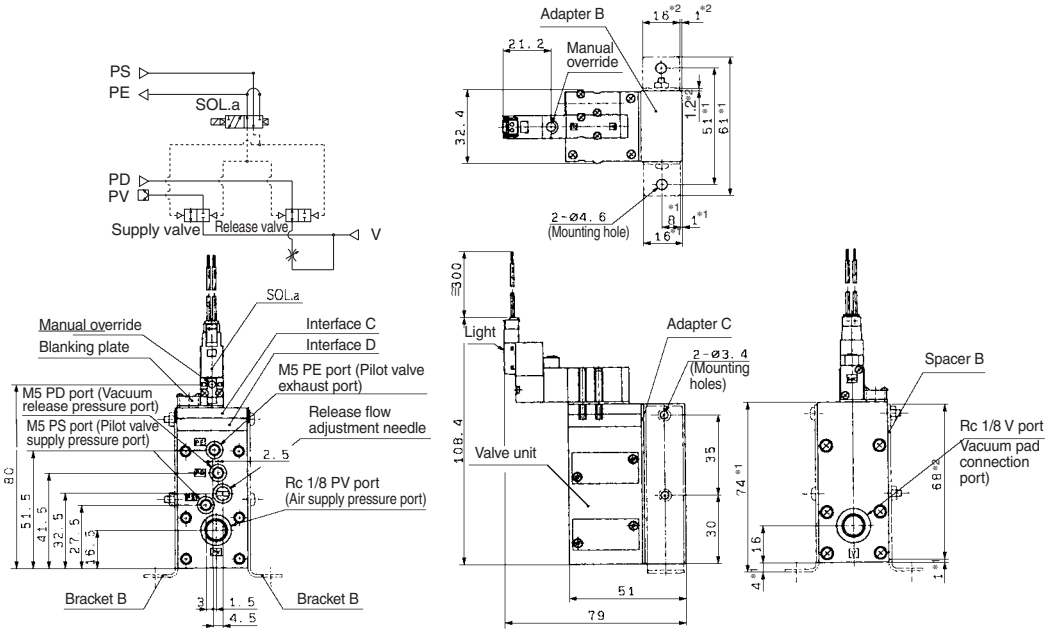


Vacuum Pump System

Valve Unit

Type C1
ZR1-VC1□□□□

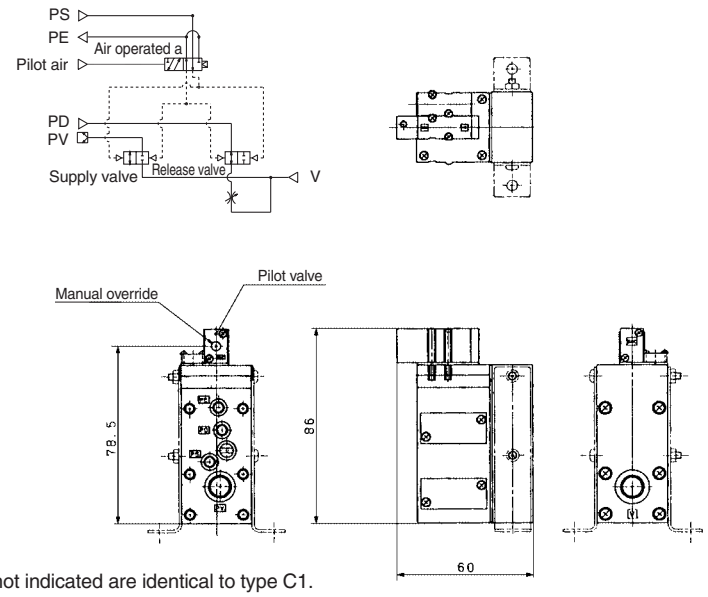
Circuit diagram



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 solenoid valve etc.) on side mounting of used on surface mounting.
Bracket B part no.: P3270154
(Standard accessory)
Spacer B part no.: P3270157

Type C2
ZR1-VC2□□□□

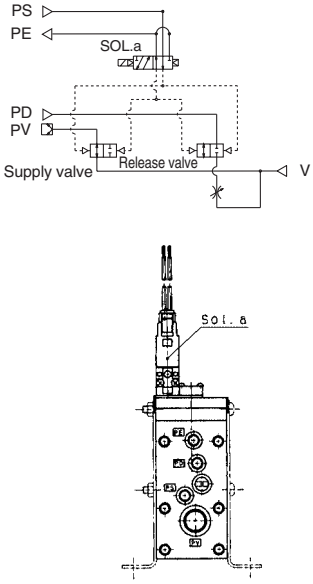
Circuit diagram



* Dimensions not indicated are identical to type C1.

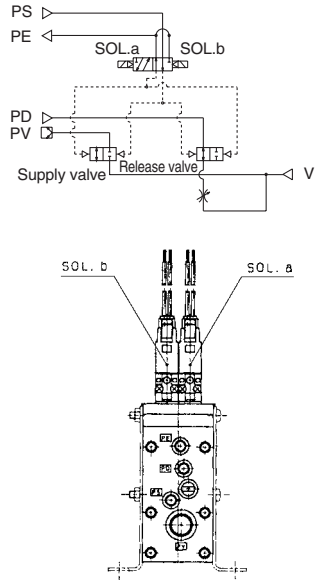
Type C3
ZR1-VC3□□□□

Circuit diagram

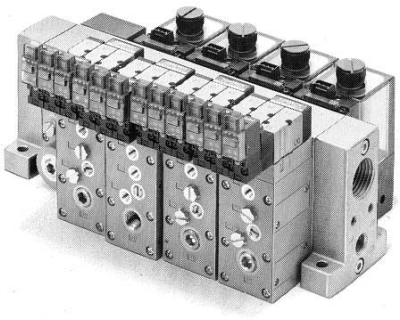


Type C4
ZR1-VC4□□□□

Circuit diagram



Manifold Specifications/Vacuum Pump System



Specifications

Max. number of units	6 stations	
Port	Port size	Function
PV port	Rc1/8	External vacuum pump connection
PS port	M5	Air supply for pilot valve
PD port	M5	Air supply for release
EXH port	Rc1/2	Common exhaust
Weight	Basic weight for one station is 0.275 kg. Additional weight per one station is 0.12 kg.	

Note) When using 3 or more stations with ZR100 manifold, utilize PV port as suction on both sides.

Manifold Vacuum/Air Supply

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

Vacuum supply to ◎ PV port.
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 external vacuum 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 □ □

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)
∗ZR100-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 − RV3 − 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-RV3-1
∗ZR1-RV3-3
∗ZR1-RV3-A··2
↑ Fill the number

<Individual spacer>

ZR1 − R1 − 1

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

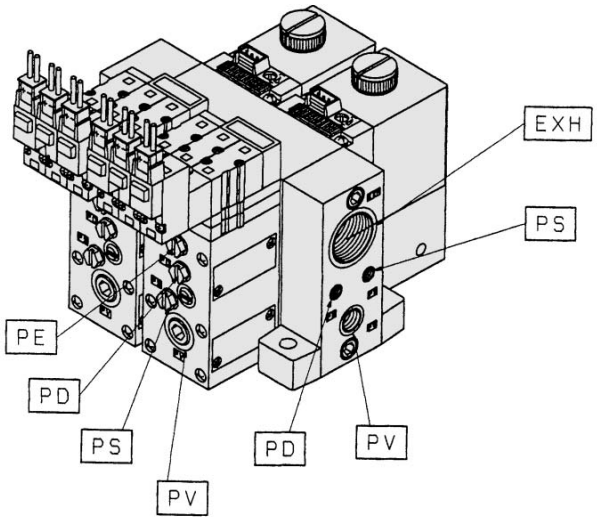
1	1 station only
⋮	⋮
6	6 stations only
A	All stations

∗ If more than one spacer is required, specify all spacers.

Example) Attached to the first and third stations
∗ZR1-R1-1
∗ZR1-R1-3

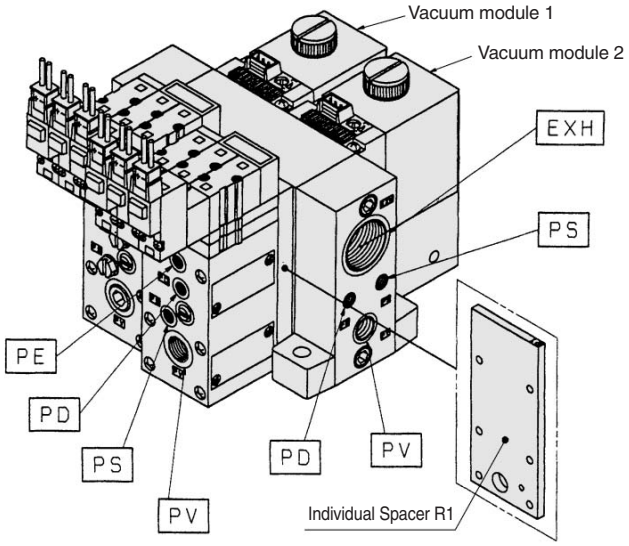
Manifold/System Circuit Example

When not using indivisual air pressure supply



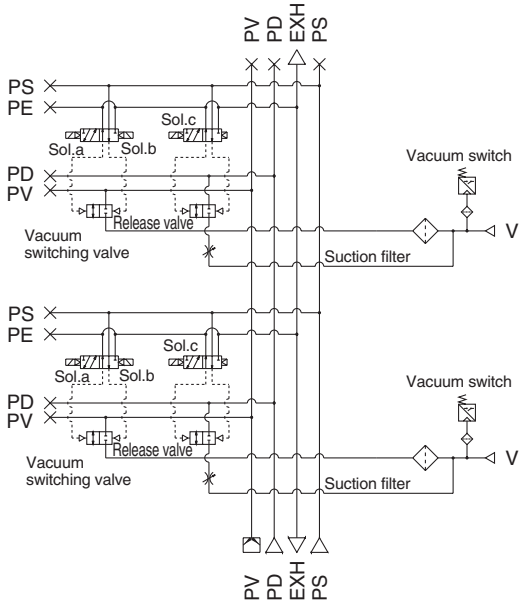
PV: External vacuum pressure port
PS: Pilot valve air supply port
PD: Release valve/Supply valve port
PE: Pilot valve exhaust port
EXH: Common exhaust port

When using indivisual air pressure supply

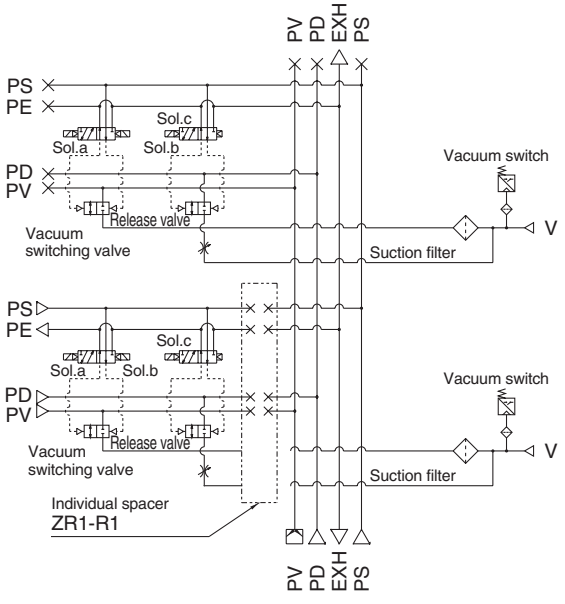


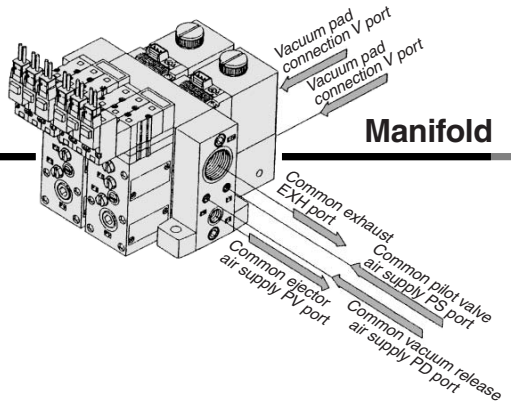
PV: External vacuum pressure port
PS: Pilot valve air supply port
PD: Release valve/Supply valve port
PE: Pilot valve exhaust port
EXH: Common exhaust port

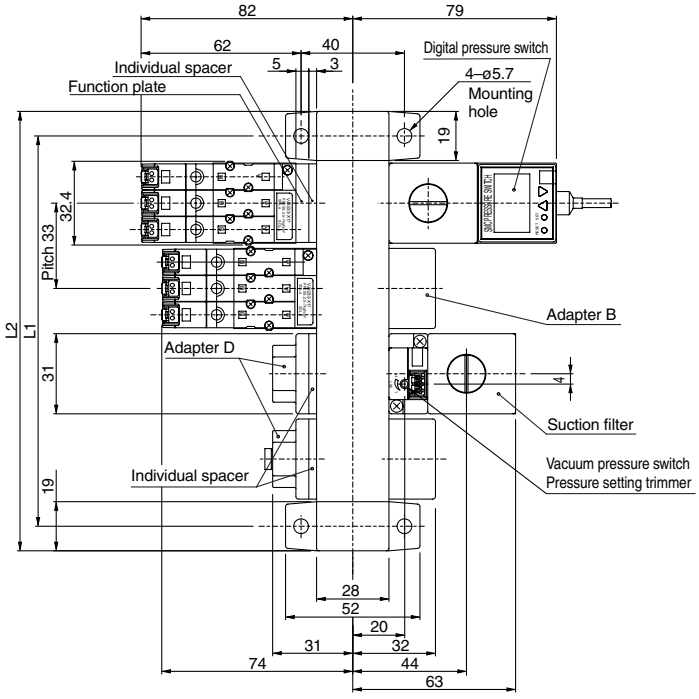
<System circuit example>

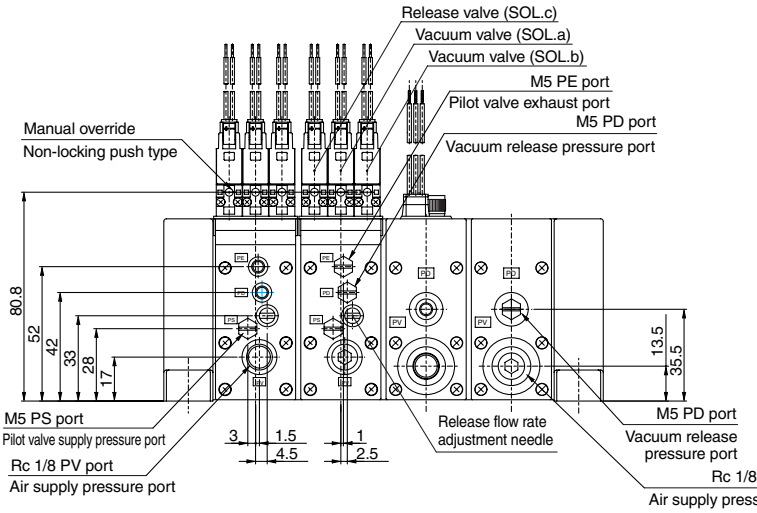


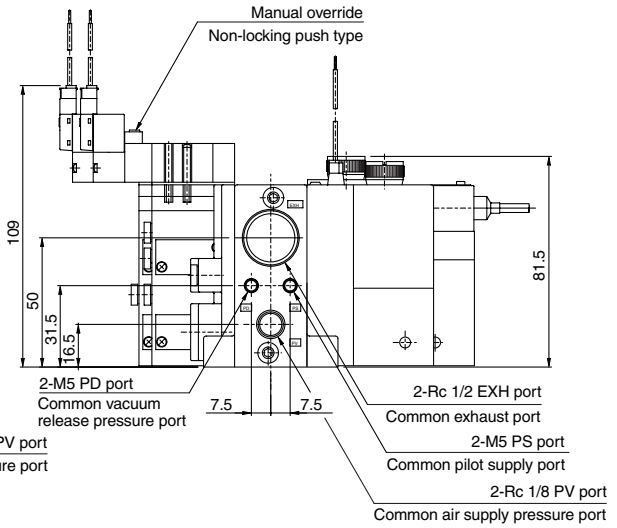
<System circuit example>





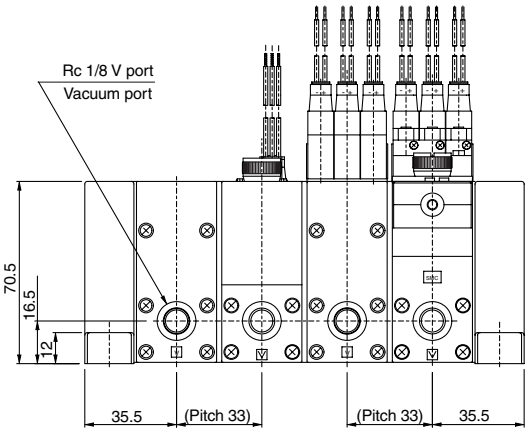




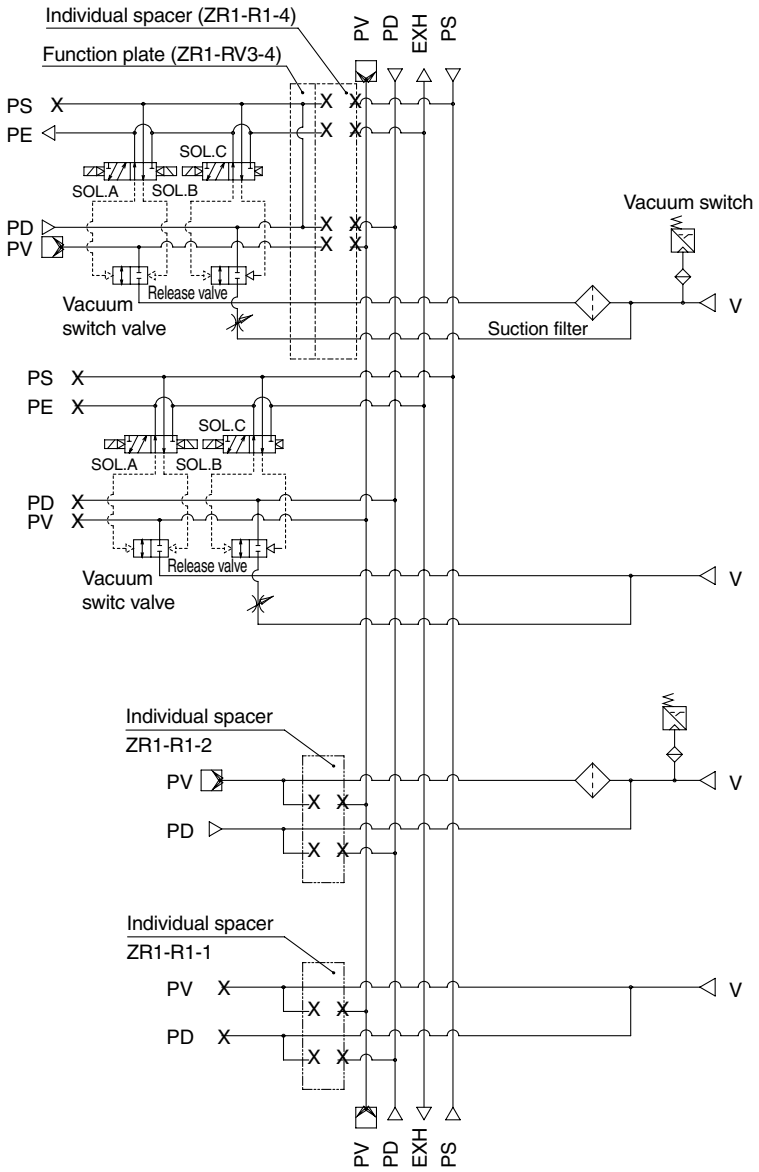


(mm)

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



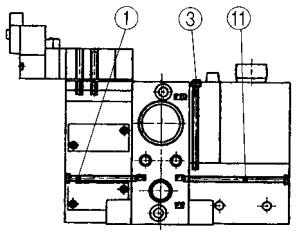
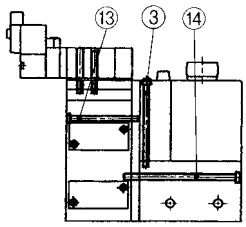
Circuit diagram

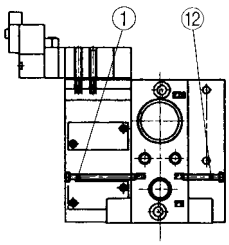
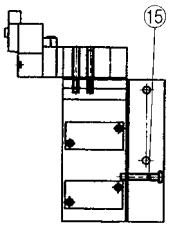


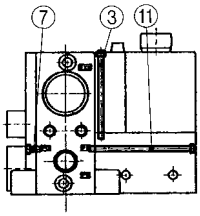
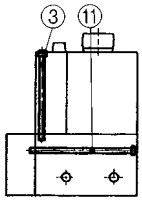
Vacuum Pump System

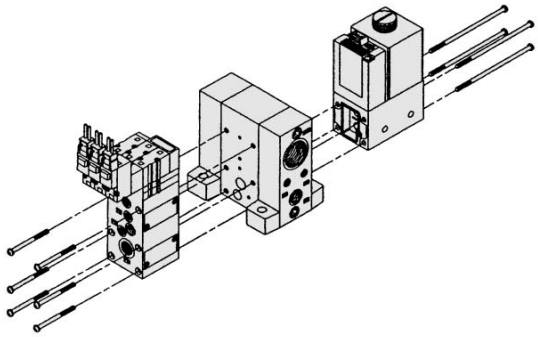
Mounting Thread Parts List for Unit Combination

Manifold Specifications | **Without Manifold**

Components	Valve unit + Vacuum switch/Filter unit
	

Components	Valve unit
	

Components	Vacuum switch/Filter 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
③	For vacuum switch and adapter A	M2.5 x 0.45 x 41	2
⑦	Standard (Without options)	M2.5 x 0.45 x 5	6
	With individual spacer	M2.5 x 0.45 x 8	6
⑪	Standard (Without options)	M2.5 x 0.45 x 49	4
	Standard (Without options) [For ZSE4 spec.]	M2.5 x 0.45 x 65	4
⑫	Standard (Without options)	M2.5 x 0.45 x 18	6
⑬	Standard (Without options)	M2.5 x 0.45 x 33	2
	With function plate	M2.5 x 0.45 x 38	2
⑭	Standard (Without options)	M3 x 0.35 x 54	4
	With function plate	M3 x 0.35 x 59	4
	Standard (Without options) [For ZSE4 spec.]	M3 x 0.35 x 70	4
	With function plate [For ZSE4 spec.]	M3 x 0.35 x 75	4
⑮	Standard (Without options)	M3 x 0.35 x 19	6
	With function plate	M3 x 0.35 x 24	6