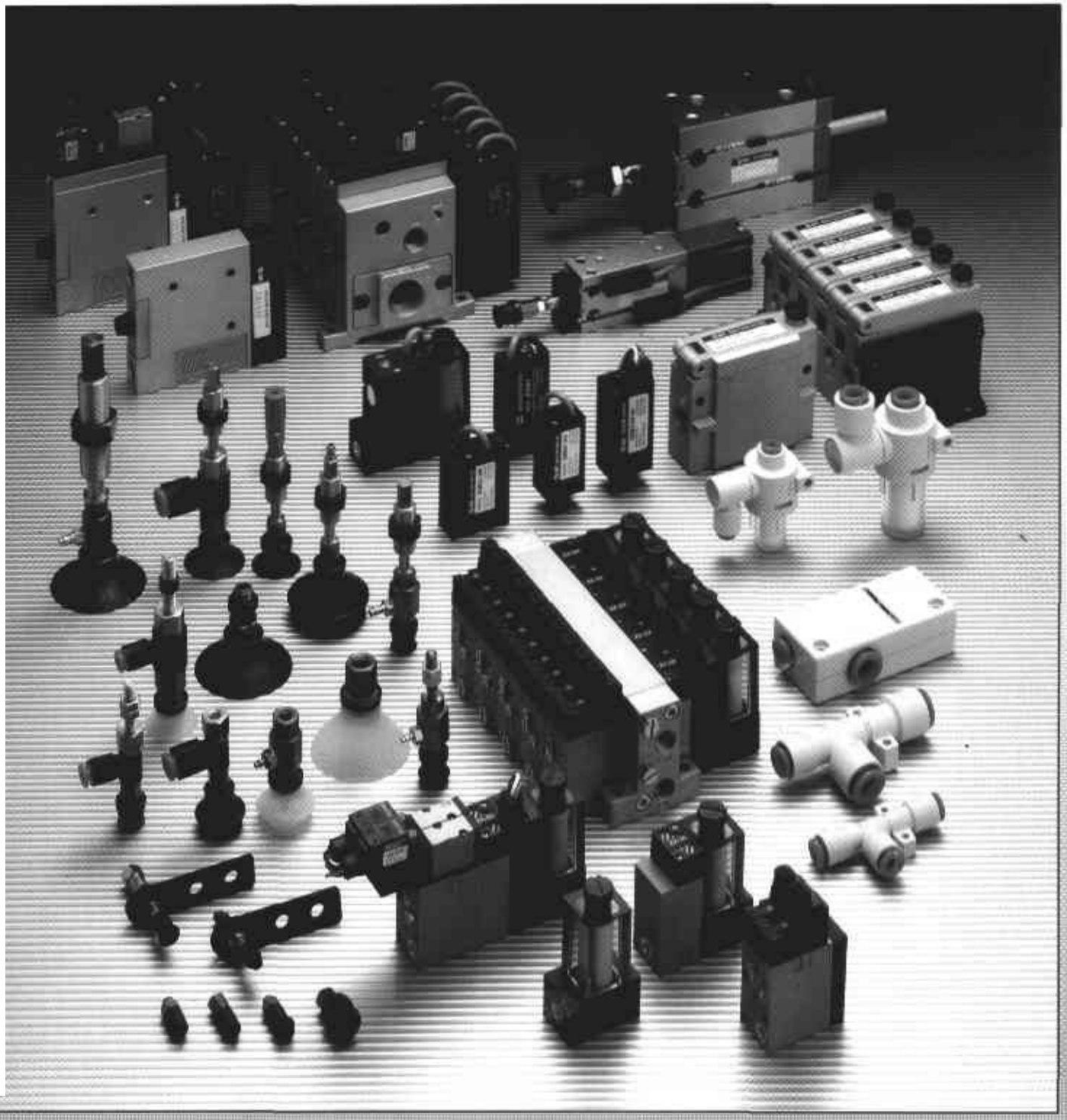
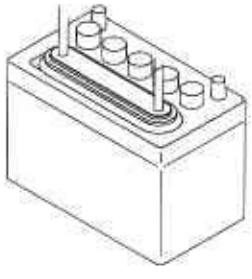
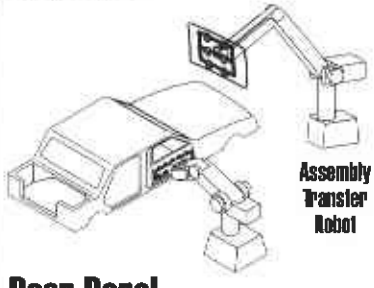
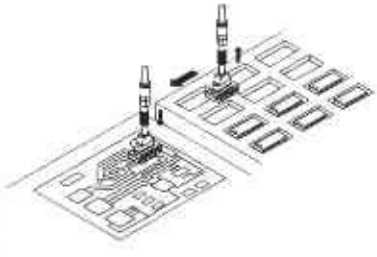
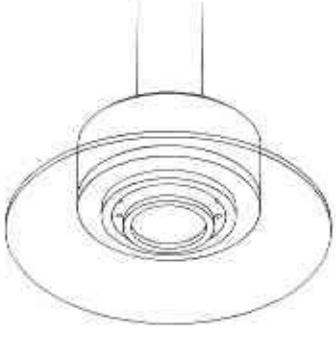
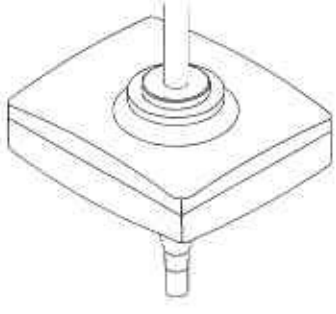
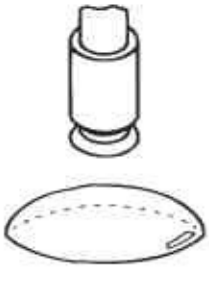
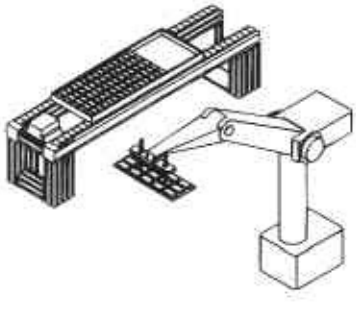
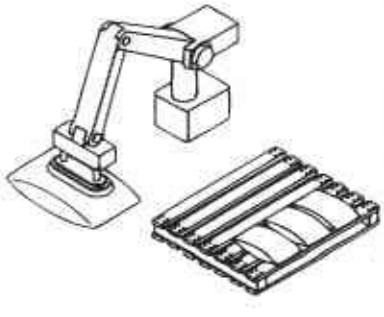
SMC

Vacuum Equipment

Vacuum Ejectors • Vacuum Control Modules
Vacuum Switches • Suction Filters • Vacuum Pads • Accessories



Automation Using Vacuum — Hundreds of Practical Applications!

	Small / Light Loads	Medium Loads	Large / Heavy Loads
Automotive Industry	**Piston** 	**Automotive Battery** 	**Windshield**  **Door Panel**
Electronics Industry	**IC** 	**MD / CD** 	**Picture Tube** 
Food & Medical Industry	**Contact Lens** 	**Chocolate** 	**Grain Sack** 

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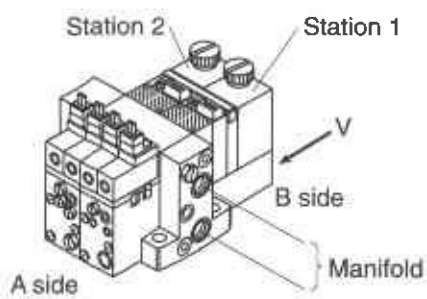
roduction and chnical Section	❶ Introduction / Glossary of Terms / Unit Conversion Table ❷ Specifying the *Vacuum System* / Selecting the Vacuum Pad / Selecting the Vacuum Ejector ❸ Use of Peripheral Components.		2 – 15
cuum ector stem	NZK Series ZR Series	• Modular component system. • Supply / Breaking valves, Vacuum switch, Suction filter. • Extremely compact, lightweight. • Can be used with other source of vacuum supply.	17 – 44
cuum ector stem	NZM Series ZMA Series	• All-in-One system (Valves, switch, filter, etc.). • 2-stage nozzle design (40% increase in suction flow). • Capable of producing -25inHg (-630mmHg) vacuum. • Aluminum diecast design.	45 – 54
ltistage cuum Ejector	NZL Series	• Compact and lightweight. • Integral suction filter and exhaust silencer. • Efficient 3-stage nozzle design. • Integral gauge or switch option.	55 – 81
cuum ector	NZH/ZH Series ZU Series	• Nozzle sizes from ø0.5 to ø2.0mm. • Lightweight high density resin body. • Optional built-in One-touch fittings. • Available with built-in silencer.	83 – 72
ction ter	NZFA Series	• High flow capacity. • Large filtration area of element. • Lightweight aluminum diecast body. • Easy element change without tools.	73 – 76
ction ter	NZFB Series ZFC Series	• Compact in-line unit. • Built-in One-touch fitting connections. • Lightweight, high density resin body. • Replaceable element.	77 – 80
cuum vitches	ZS Series	• Broad selection of features and options. • Solid-state operation. • High-visibility low-watt display. • Digital readout (LCD) types.	81 – 94
cuum ds	ZP Series	• Broad range of sizes, shapes and materials. • Various mounting adapters, with optional built-in fittings. • Optional spring-loaded buffer. • Pad changeout requires no tools.	95 – 131
cuum Pad linder	ZCU Series	• Free-mount cylinder with hollow rod for vacuum. • Vacuum port on cylinder cap or rod tubing. • Vacuum pad attaches to rod end. • High accuracy, non-rotating, double acting.	131 – 142
ccessories	• Manual vacuum regulator IRV Series. • Electronic vacuum regulator ITV Series. • Analog vacuum gauge models GZ46 and K21V.		143 – 156

Introduction

Ordering Notes for Vacuum Components

How to Order NZX Series Factory Assembled Manifold Assemblies

- The NZX series manifolds (NZZX) utilize 2 surfaces -- the "A" side (where valve unit module attaches) and the "B" side (where the ejector unit and/or the switch unit is mounted). (See illustration below).
- To order a factory-built manifold assembly, specify the module part numbers and accessories (if required) per "station". Station 1 is established as the furthest to the left when facing the vacuum ports (V). Complete the specification by indicating the part number of the manifold base to be used.
- Note the methods of the order examples below.



Examples

Qty	Part Number / Configuration
1	Four station manifold assembly: sta. 1-4) NZX1101-K15LZ-EC-M NZZX104-TB-A

Description	Line Qty.
(ejector module)	4
(ejector manifold)	1

Qty	Part Number / Configuration
4	Six station manifold assembly: sta. 1) NZX1071-K35MZ-F-M sta. 2-5) NZX1071-K15LZ-EC-M sta. 6) ZX1-BAB1 NZZX106-TB-A

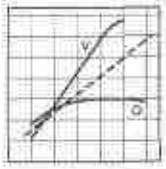
Description	Line Qty.
(ejector module)	4
(ejector module)	16
(blank station kit)	4
(ejector manifold)	4

Qty	Part Number / Configuration
2	Four station manifold assembly: sta. 1-2) NZX1101-EC-M ZX1-DR1-4 sta. 3-4) NZX1071-EC-M ZX1-DR16-4 NZZX104-TB-A

Description	Line Qty.
(ejector module)	4
(direct spacer+adapter)	4
(ejector module)	4
(dummy spacer+adapter)	4
(ejector manifold)	2

Qty	Part Number / Configuration
1	Three station manifold assembly: sta. 1-3) NZX100-K15LZ-EC-M NZZX103-TB-B

Description	Line Qty.
(VAC supply module)	3
(VAC supply manifold)	1



Technical Section

Selection Methods for the Application of Vacuum Equipment

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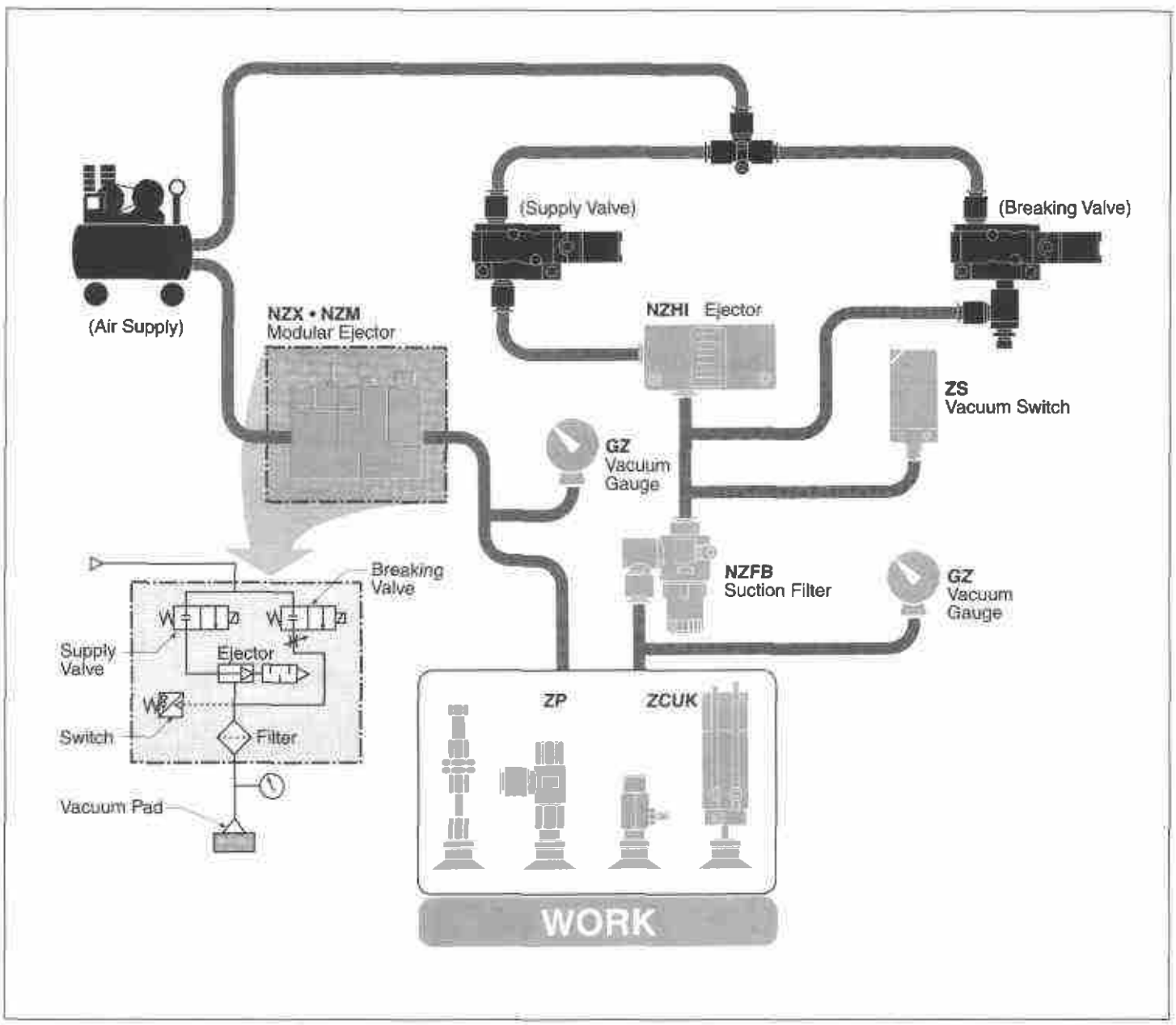
Vacuum Equipment
Technical Section

Introduction

The use of vacuum equipment in industrial automation has increased in popularity and practicality in recent years. The development of more compact, efficient, clean, and economical components and systems has driven this trend. As the world leader in pneumatic component manufacture, SMC has been focused on the role of vacuum within the compressed air circuit. It has always been our goal to provide superior products for your complete system needs.

This section is intended to be used as an application guide for the use of SMC vacuum components. Although it covers vacuum systems in general, specific product references are used extensively. It is recommended that individual product sections be consulted simultaneously. Due to the international usage of our products this section follows the SI (metric) system of units. Please refer to the conversion table on page 5 as needed.

COMPONENTS FOR THE COMPLETE SYSTEM CIRCUIT!



ossary of Terms

e following list of terms and phrases are defined in the ıtext of their relationship to low vacuum technology d SMC products specifically.

sorption: Adhesion in a thin layer of air molecules to surfaces of solid bodies which are in contact.

sorption Response Time: Time elapsed from when supply valve is opened until the vacuum pressure ıches a stable maximum.

Consumption: For an ejector, the rate at which mpressed air is used to create vacuum and suction.

ck Pressure: A build up of positive pressure air in an ıaust cavity.

ector: An *automation component* that can produce cuum and suction via the venturi principle. Phenomena created by throttling compressed air through a conical zzle at a high rate of speed.

akage: Air which invades into the vacuum chamber e to the porosity or uneven surface of the workpiece ıterial and/or poor sealing condition of fittings, joints, . Leakage reduces the vacuum pressure.

ction Flow: Air which is drawn in by a vacuum source h the rate being relative to the pressure differential.

ction Flow, Maximum: For an ejector, the maximum ction flow is produced only when the supply pressure is at its optimal level and when the pressure differential at its greatest (atmospheric).

Suction Flow, Mean: For an ejector, the average value of the suction flow rate used to determine the adsorption response time in a closed vacuum system.

Switch, Adsorption Check: Special vacuum switch used when an adsorption condition produces only a tiny change in the vacuum pressure.

Switch, Vacuum: Electrically operated pressure sensor used to detect the vacuum condition within a circuit and provide an output signal.

Vacuum: Pressure below atmospheric pressure. "Torr" is used in reference to absolute pressure. The height of an equilibrium column of mercury is used in reference to atmospheric pressure (ex., "mmHg").

Vacuum Pad: Vacuum system end effector device usually made of pliable rubber material for conforming to an object's surface thus keeping leakage to a minimum. Also known as a "suction cup".

Valve, Supply: Valve used to control the supply of compressed air to an ejector. For a non-ejector system, the supply valve controls suction flow from the vacuum source directly.

Valve, Breaking: Valve used to quickly eliminate an adsorption condition by supplying pressurized air into the vacuum chamber. Its use enables faster cycle rates in pick and place applications.

Workpiece: Generic term for the object which is to be adsorbed.

ıit Conversion Table

ultiply this:	By this factor:	To get this:
ImHg	0.039	inHg
ımHg	0.536	inH_2O
gf/cm²	14.223	PSI (lbf/in²)
Pa	0.145	PSI (lbf/in²)
gf	2.205	lbf
/min	0.035	cfm (ft³/min)
L/min	0.035	scfm (standard ft³/min)
m²	0.155	in²
	3.281	ft

Vacuum Pressure Equivalents Chart

PSI	Torr	InHg	kPa
-14.7	760	29.9	-101.3
-13.5	700	27.6	-93.3
-11.6	600	23.6	-80.0
-9.7	500	19.7	-66.7
-7.7	400	15.8	-53.3
-5.8	300	11.8	-40.0
-3.9	200	7.9	-26.7
-1.9	100	3.9	-13.3
-0.97	50	1.97	-6.67
-0.193	10	0.394	-1.333
-0.00193	0.10	0.00394	-0.01333
-0.000193	0.01	0.000394	-0.000133

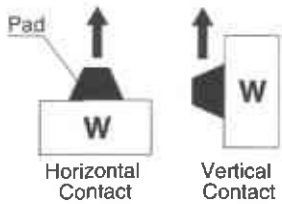
Vacuum System Specification

In the vacuum circuit, vacuum pressure and adsorption response time are affected by piping conditions (tubes, fitting joints, pads, etc.) and the characteristics of the workpiece. Efficient application of a vacuum system is possible by selecting the proper components for the given conditions. The process is, in general, a mixture of theoretical calculation and practical experimentation. Since every application is different in some aspect, the component selection methods discussed in this section are intended as general guidelines.

A. Selecting the Vacuum Pad

1.Calculation Method:

A vacuum pad diameter (øD) can be determined by calculation if the lifting force needed to perform the work function is known. The weight of the workpiece and any potential dynamic forces during movement (lifting, stopping, rotating, etc.) need to be considered. The area of one pad can be divided to an equivalent area of multiple pads (n) as necessary, based on these forces and the shape of the workpiece. Due to potential fluctuations in system conditions, a standard factor of safety (t) should be combined with the theoretical parameters to promote safe and practical results.



Calculating a Pad's Lifting Force:

$$F_T = \frac{P_V}{760} \times 1.033 \times A$$

$$F_P = F_T \times \frac{1}{t}$$

F_T : theoretical lifting force (kgf),

F_P : practical lifting force (kgf),

P_V : stable vacuum pressure (mmHg),

A : pad area (cm^2):

$$A = \frac{\pi}{4} \times \phi D^2 \times \frac{1}{100}$$

øD : pad diameter (mm),

t : factor of safety

horizontal pad contact: ≥ 4 (dynamic); ≥ 2 (static)
vertical pad contact: ≥ 8 (dynamic); ≥ 4 (static)

Calculating a Required Pad Diameter:

$$\phi D = \sqrt{\frac{4}{\pi} \times \frac{760}{P_V \times 1.033} \times \frac{W}{n} \times t \times 100}$$

øD : pad diameter (mm),

W : weight of workpiece (kgf),

n : number of pads used

P_V : stable vacuum pressure (mmHg),

t : factor of safety:

horizontal pad contact: ≥ 4 (dynamic); ≥ 2 (static)
vertical pad contact: ≥ 8 (dynamic); ≥ 4 (static)

Table of Theoretical Lift Force

$\left(\text{Theoretical lift force} = \frac{P}{760} \times A \times 1.033\right)$

Units: (kgf)

Pad diameter (mm)		ø2	ø4	ø6	ø8	ø10	ø13	ø16	ø20	ø25	ø32	ø40	ø50
Adsorption area (cm^2)		0.031	0.126	0.283	0.503	0.785	1.33	2.01	3.14	4.91	8.04	12.6	19.6
Vacuum Pressure (mmHg)	-650	0.028	0.111	0.250	0.444	0.694	1.17	1.77	2.78	4.34	7.11	11.1	17.3
	-600	0.026	0.102	0.231	0.410	0.641	1.08	1.64	2.56	4.00	6.56	10.2	16.0
	-550	0.023	0.094	0.211	0.376	0.587	0.99	1.50	2.34	3.67	6.01	9.35	14.7
	-500	0.022	0.085	0.192	0.342	0.534	0.90	1.37	2.13	3.34	5.47	8.54	13.3
	-450	0.019	0.077	0.173	0.307	0.483	0.81	1.23	1.92	3.00	4.92	7.69	12.0
	-400	0.017	0.068	0.154	0.273	0.427	0.72	1.09	1.71	2.67	4.37	6.83	10.7
	-350	0.015	0.060	0.135	0.239	0.374	0.63	0.96	1.50	2.33	3.83	6.00	9.34
	-300	0.013	0.051	0.115	0.205	0.320	0.54	0.82	1.28	2.00	3.28	5.12	8.01

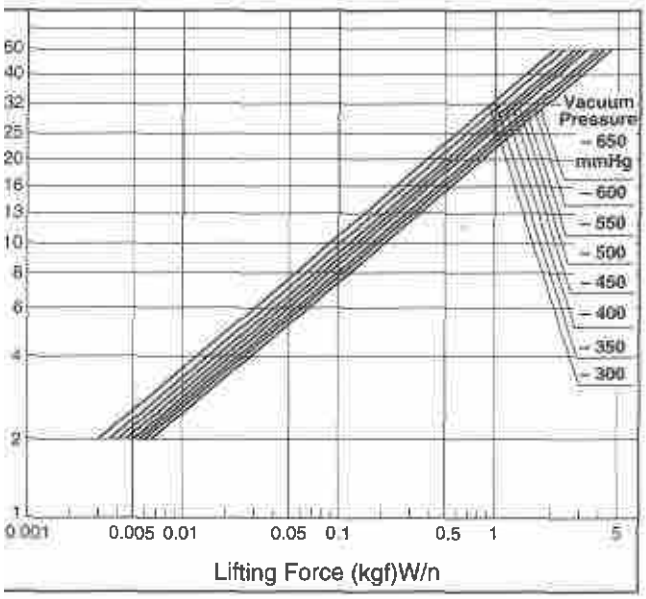
:uum System Specification (continued)

Graphical Method:

pad diameter required for horizontal (selection graphs 1-1 and 1-2) or vertical contact (selection graphs 2-1 and 2-2) be found by setting the weight of the work (W), the number of pads to contact the workpiece (n), and the stable orption vacuum pressure.

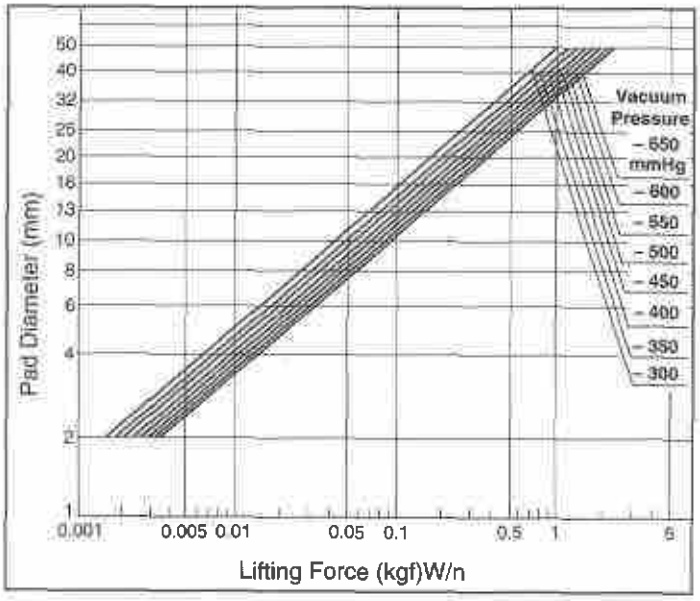
ection Graph 1-1

Selection graph of pad diameter by lift force (horizontal ø2 - ø50)



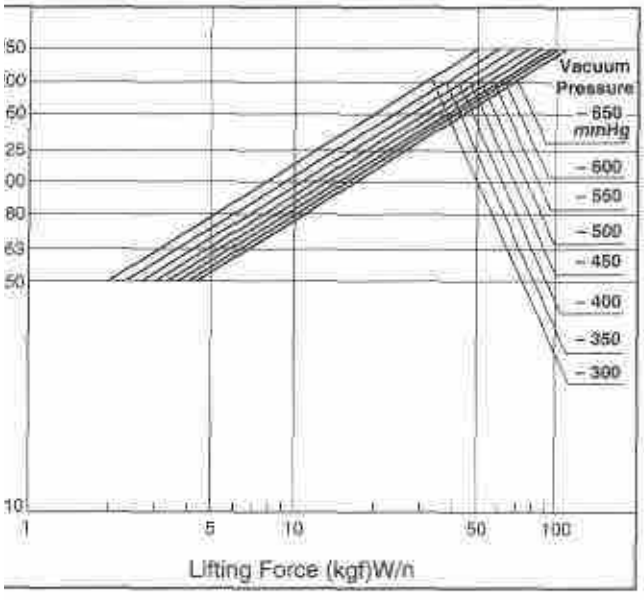
Selection Graph 2-1

Selection graph of pad diameter by lift force (vertical ø2 - ø50)



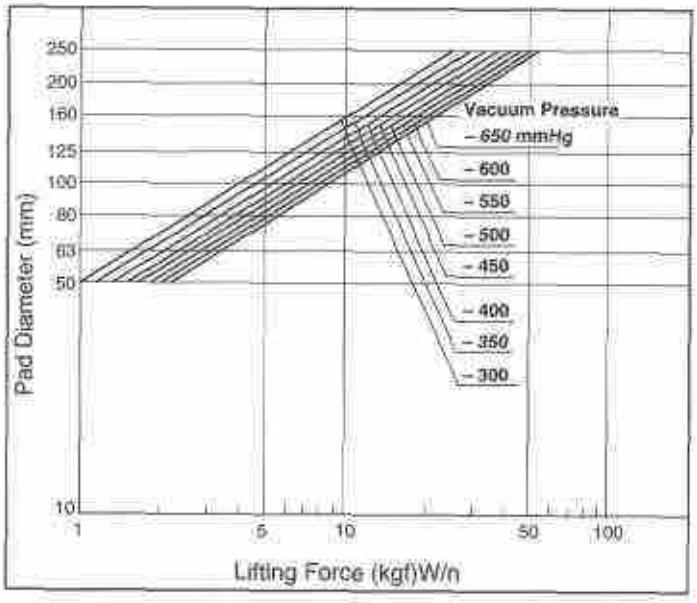
lection Graph 1-2

Selection graph of pad diameter by lift force (horizontal ø50 - ø250)



Selection Graph 2-2

Selection graph of pad diameter by lift force (vertical ø50 - ø250)



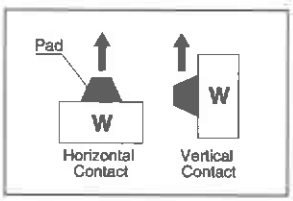
Vacuum System Specification (continued)

3. General Purpose Instructions for Vacuum Pad

Safety:
Material handling by vacuum adsorption requires full consideration for safety. This consideration depends upon the application at hand and the size and weight of the work. In most cases, factors of safety should be strictly adhered to.

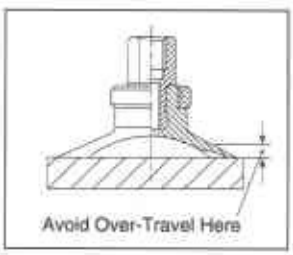
Contact Position:

Make pad surface contact horizontal in general. Contacting slanted or vertically should be avoided.



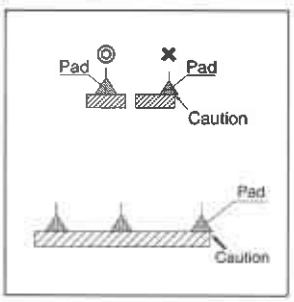
Avoiding Shock to Pad:

Large force should be avoided when contacting a pad to the work. Excessive force can result in deformed, cracked, and worn pads.



Balance Between Pad and Workpiece:

The adsorption area of the pad should be smaller than that of the work to prevent leakage. The quantity and placement of pads should be considered when work which has a large surface area is to be transferred.

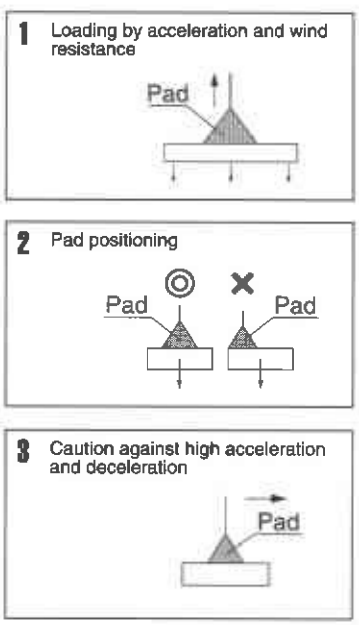


Lifting Force, Moment, Vertical Force:

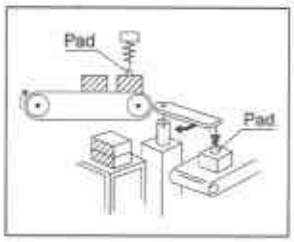
In addition to the weight of the work, forces due to acceleration and shock by wind resistance should be considered as work is lifted upward (see illus. 1).

Moments from asymmetrical weight distribution should be avoided (see illus. 2).

Firm position of pad on the work is due to friction between them. Acceleration and deceleration should be diminished when surfaces of pad or work are smooth or slippery (see illus. 3).

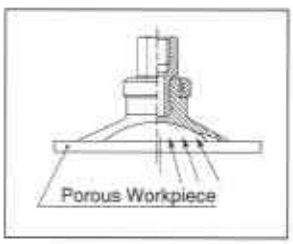


The Vertical Interval Between Pad and Work is Irregular:



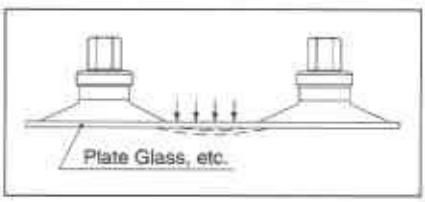
Use a spring-loaded pad with buffer when work positioning is not consistent (ex.: adsorption of work with irregular height). In some cases, a bellows shape pad will also be acceptable. Use a non-rotating type buffer when precise positioning is needed.

Porous Material and Work with Vent Holes:



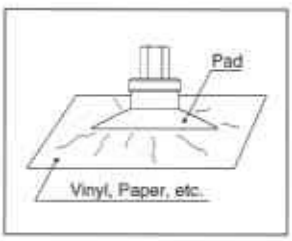
Select a larger pad diameter or higher capacity ejector to compensate for a drop in adsorption force for porous surfaces such as paper.

Flat Work:



Positioning and size of pad should be considered for glass or similar non-flexible substrate. Strong wind resistance or shock can be generated by upward lifting.

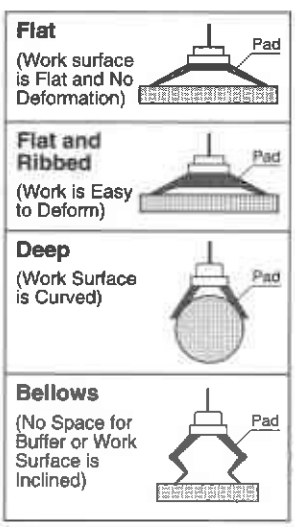
Adsorption of Deformable Work:



When vinyl, paper, or thin board is lifted, deformation of work or wrinkles can be caused by the vacuum suction force. In this case, use small sized pads or ribbed pads and reduce the working vacuum pressure.

Selection of Pad Shape for Work:

Pad shape should be selected according to work shape.



acuum System Specification (continued)

ad/Material Characteristics

Material / Item	Nitrile rubber NBR	Silicone rubber Si	Urethane rubber U	Fluorine rubber F
Tensile Strength	○	×	◎	○
Elongation	◎	○	◎	○
Oil resistance (gasoline)	◎	×	◎	◎
Oil resistance (Benzol)	×	×	○	◎
Solvents (Toluene)	×	×	×	○

Material / Item	Nitrile rubber NBR	Silicone rubber Si	Urethane rubber U	Fluorine rubber F
Solvents (Alcohol)	◎	◎	×	◎
Heat resistant	○	◎	×	◎
Cold resistant	×	◎	○	○
Wear resistant	◎	×	◎	○
Water resistant	○	○	×	◎
Termperature Range	0-80°C 32-176°F	-20-180°C -4-356°F	0-50°C 32-122°F	0-150°C 32-302°F

◎ Excellent ○ Good, subject to conditions × Not recommended

)te) The above table covers only general characteristics of rubber subject to change depending upon the application conditions.

Examples of Pad Types/Application Areas

Flat		Work surface is flat and does not deform.
Ribbed Flat		Work is easy to deform. Sure separation of pad and work.
Deep type		Curved surface of work.
Bellows shaped		No space for mounting buffer or inclined adsorption surface of work.
Oval		Work with small adsorption face. Oblong work. Precise positioning is needed.

Oscillating (Ball-joint)		Work where adsorption face is not horizontal.
Long Stroke Buffer		Height of work is not even. Ease of shock to the work is needed.
Large Size		Heavy work.
Conductive		To prevent damaging static electricity build-up. Handling of electronic parts.

). Selecting the Vacuum Ejector

.PRODUCT SERIES

escriptions and uses of SMC vacuum ejectors in brief:

ZX Series

esigned for micro- to light-duty applications generally ith vacuum pad diameters 2 to 25mm. The NZX unit is a odular system that can selectively combine the ejector ozzle, control valves, vacuum switch, suction filter, and xhaust silencer into a single integrated unit. The unit can lso be used without the ejector nozzle as a control evice when vacuum is supplied from an external source (mainline pump, etc.). Up to 8 NZX units can be mounted to a common supply manifold.

NZM Series

The NZM is slightly larger than the NZX and utilizes a 2-stage ejector nozzle to create higher suction flows. This enables the NZM series to be used with vacuum pad diameters to 100mm. This series also offers multiple component features with optional control valves, switch, suction filter, and exhaust silencer. NZM units can be stacked to form a common supply manifold package.

Vacuum System Specification (continued)

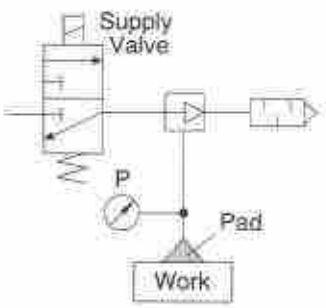
NZHI/ZH Series

Each NZHI/ZH series unit is an individual, economical vacuum ejector. This series offers the broadest range of nozzle sizes capable of producing suction flows for light to heavy-duty applications. The series has outstanding design features with the body being constructed of a lightweight polymer resin, with optional built-in one-touch fitting ports and integral silencer.

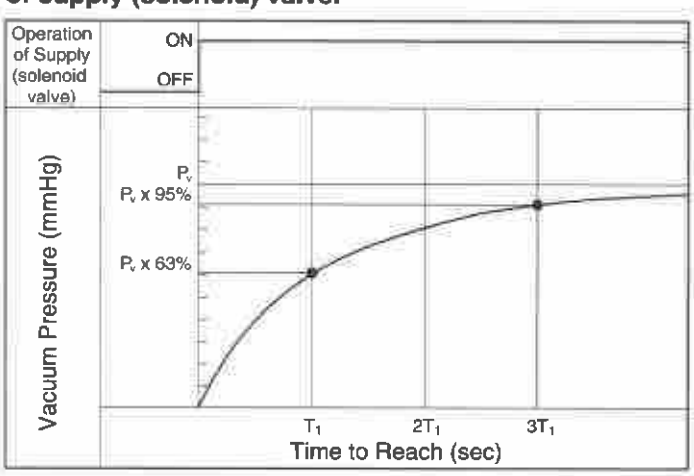
2. DETERMINING ADSORPTION RESPONSE TIME

As the supply valve is opened, vacuum is generated, and the workpiece is adsorbed to the pad, a certain amount of time elapses until the vacuum pressure in the circuit reaches a stable maximum. This is called the adsorption response time which should be repeatable with each system cycle. A graph relating the time elapsed to the vacuum pressure achieved is shown below. It is such that at time T_1, 63% of the final stable vacuum pressure P_v has been reached, and at time $3T_1$, 95% has been achieved. These values prove to be convenient and practical for ejector sizing purposes.

Vacuum Ejector System Circuit



Vacuum pressure and response time after operation of supply (solenoid) valve.



P_V : Final Vacuum Pressure

T_1 : Time to Reach 63% of P_V

$3T_1$: Time to Reach 95% of P_V

Response time determination by calculation:

$$T_1 = V \times \frac{60}{Q}$$

$$T_2 = 3T_1$$

T_1 : adsorption response time to 63% of P_v (sec),

T_2 : adsorption response time to 95% of P_v (sec),

V : volume of piping from ejector to pad (ℓ):

$$V = \frac{\pi}{4} \times d^2 \times \frac{L}{1000}$$

d : inside diameter of tubing (mm),

L : tubing length (meters, m),

Q : the lesser capacity of flow, Q_1 or Q_2 (Nℓ/min):

$$Q_1 = \left[\frac{1}{2} \sim \frac{1}{3}\right] \times Q_{max}$$

$$Q_2 = S \times 11.1 \text{ (Nℓ/min)}$$

Q_1 : mean suction flow of a an ejector (Nℓ/min),

Q_{max} : max suction flow spec for the ejector from the catalog (Nℓ/min),

Q_2 : flow capacity for the piping system (Nℓ/min),

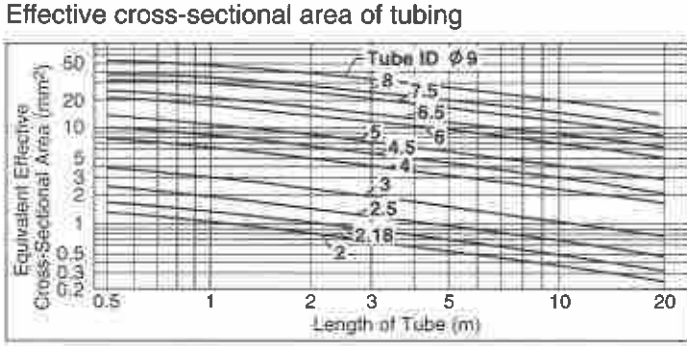
S : the effective cross-sectional area of tubing based on inside diameter and total length (mm^2). See graph below.

$\frac{1}{2}$: No leakage

$\frac{1}{3}$: Leakage

Selection Graph 3

Effective cross-sectional area of tubing



Example: Find Q_2 for tubing with ID of 6mm and length of 1m.

Solution: A vertical line up from 1m tube length intersects the ø6 curve at approximately S = 18mm^2.

$$Q_2 = S \times 11.1 = 18 \times 11.1 = 198 \text{ (NL/min)}$$

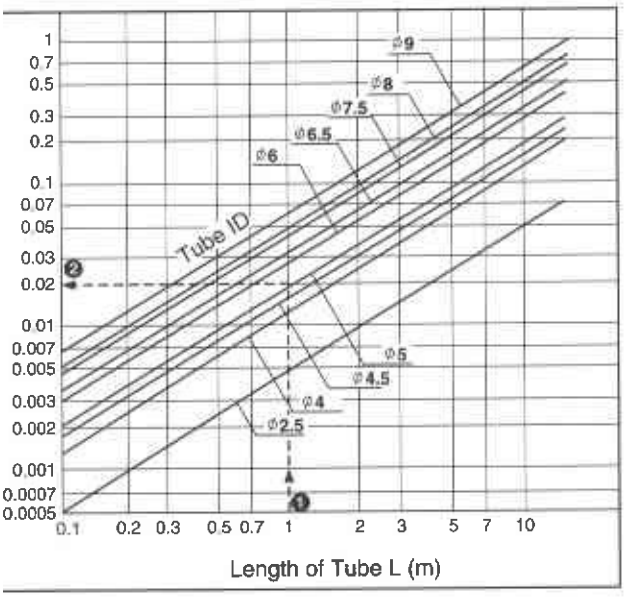
cuum System Specification (continued)

sponse time determination by graphs:

ermine the piping volume directly from selection graph 4:

lection Graph 4:

ing volume by inside diameter of tube



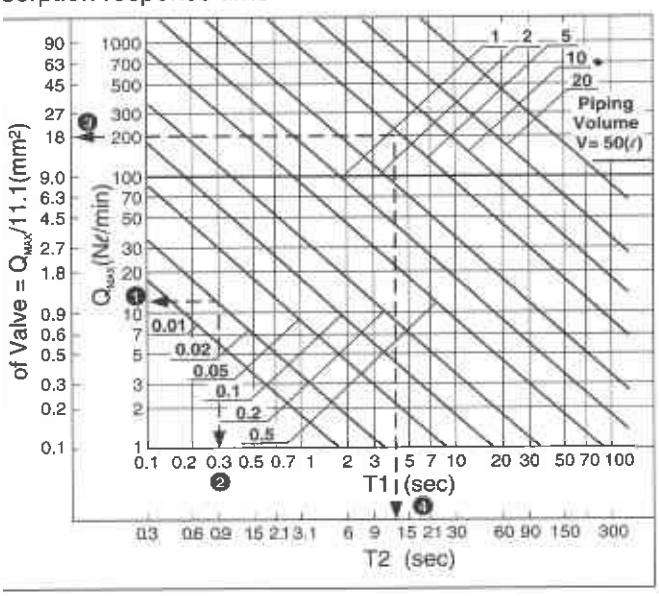
ample: Find the tubing volume for ID of 5mm and length of 1m.

lution: Find the intersection of a vertical line up from tube length of 1m and tube ID of 5. Draw a horizontal line to the vertical axis. Following the order of ❶→❷, the result is 0.02 liters.

e adsorption response times T_1 and T_2 ($3T_1$) can be ermined directly from selection graph 5.

lection Graph 5:

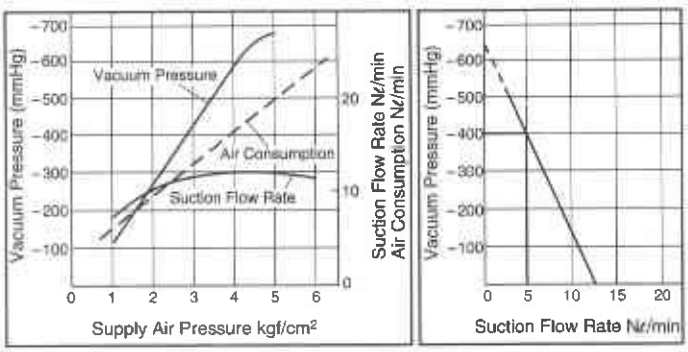
sorption response time



Example: Find the adsorption response time for evacuating a piping system with volume 0.02ℓ down to 63% (T_1) of the final vacuum pressure Pv if ejector NZHI07BS is used at its maximum suction flow of 12Nℓ/min. (performance curves from the catalog page are reprinted below).

Solution: Using graph 5, time T_1 is found by the intersection of the maximum suction flow axis and the piping volume curve. Following the order of ❶→❷, the result is T_1 = 0.3 sec.

Selection graph 5 can also be used for determining response time through a vacuum valve's effective orifice. See example on page 14.



3. DETERMINING SIZE OF EJECTOR (NO LEAKAGE)

Without leakage, any vacuum ejector will eventually reach its maximum vacuum pressure. However, there is always some level of leakage — but for a low leakage pad-to-workpiece interface we can assume no leakage for sizing purposes. It should also be considered that with a small ejector nozzle and a large volume of piping, the resulting adsorption response time may be unacceptable.
Pay close attention to the possibility of leakage since it can cause the stable vacuum pressure to be lower than the maximum vacuum pressure capability of a given ejector. If leakage is anticipated due to the workpiece material, surface condition, or shape, consult the next section.

Ejector size determination by calculation:

1. Determine the mean suction flow:

$$Q_1 = V \times \frac{60}{T_1}$$

$$T_2 = 3T_1$$

Q_1 : mean suction flow required from ejector (Nℓ/min),

T_1 : adsorption response time to 63% to P_v (sec),

T_2 : adsorption response time to 95% of P_v (sec),

Vacuum System Specification (continued)

V : volume of piping from ejector to pad (ℓ):

$$V = \frac{\pi}{4} \times d^2 \times \frac{L}{1000}$$

d : inside diameter of tubing (mm),

L : tubing length (meters, m),

2. Determine the maximum suction flow needed:

$$Q_{max} = (2 \sim 3) \times Q_1$$

Selection Process:

- Set acceptable values for adsorption response time T_1 and T_2.
- Select an ejector model with a maximum suction flow spec that is higher than Q_{max} determined above.
- Adjust times T_1 and T_2 as necessary or refer to a different test ejector to achieve a desired result.

Ejector size determination by graphs:

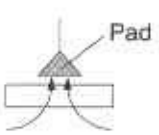
1. Determine the piping volume using Selection Graph 4 on page 11.
2. Find Q_{max} using Selection Graph 5 on page 11.

Selection Process:

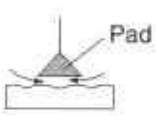
- Maximum suction flow is found by setting acceptable adsorption response times (T_1, T_2) and finding the intersection point with the piping volume.
- Select an ejector model with a maximum suction flow spec that is higher than Q_{max} determined above.

4. DETERMINING SIZE OF EJECTOR (WITH LEAKAGE)

Sometimes it is difficult to achieve a vacuum pressure sufficient for complete adsorption because of the shape or material of the workpiece. A drop in vacuum pressure occurs due to the suction of air through the material or from around the pad circumference. In this case, it is necessary to select an ejector size which can compensate for leakage of this sort.



Leak from porous matter

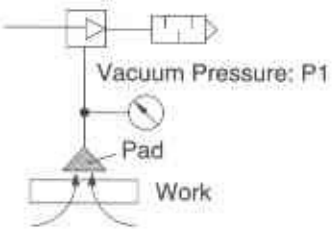


Leak from rough surface

Leakage quantity determination by adsorption test:

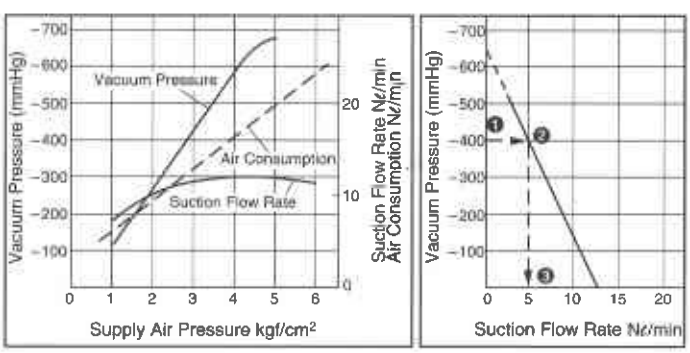
Since it is usually difficult to know the value of the equivalent effective cross-sectional area (S) of the leakage itself, an easy test can be performed to determine the leakage amount.

In this test, the workpiece is adsorbed by a vacuum circuit consisting of a test ejector, test pad, and a vacuum gauge. By reading the vacuum pressure indicated on the gauge we can easily determine the leakage quantity (Q_L) from the catalog performance curves for the ejector.



Example: Find the leakage quantity from a workpiece that is adsorbed by ejector model NZHI07BS when the supply pressure is 4.5kgf/cm² and the vacuum gauge indicates -400mmHg.

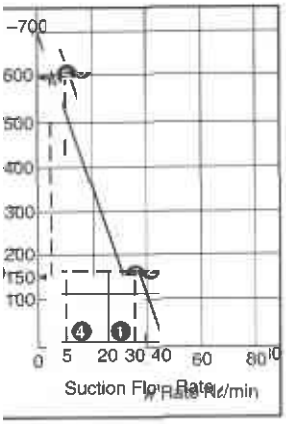
Solution: Since 4.5kgf/cm² is the supply pressure that produces the optimal suction flow, we can read the result directly from the flow characteristic curve shown below. The suction flow is found to be 5Nℓ/min (following order of ❶→❷→❸). Leakage quantity Q_L = Suction flow = 5Nℓ/min



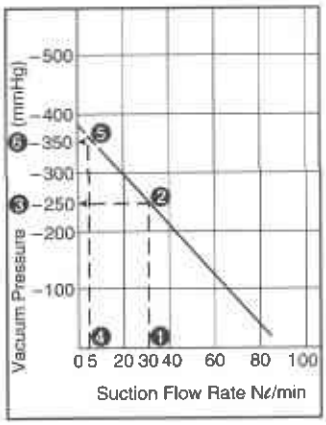
The NZHI/ZH Series of ejectors has two basic nozzle designs roughly divided into a high vacuum pressure type (S-type) and a high suction flow type (L-type). When a workpiece that has leakage is to be adsorbed, the resulting vacuum pressure that the two versions produce should be evaluated.

cuum System Specification (continued)

gh Vacuum Type Flow
ıaracteristic / NZHI13▣S



Large Quantity Flow Type Characteristic / NZHI13▣L



xample: Stable vacuum pressure differs with the amount of leakage flow (Q_L). As shown above for ejectors NZHI13BS and NZHI13BL which have the same nozzle orifice size (ø1.3), when the leakage quantity is 30Nℓ/min, the vacuum pressure is -150mmHg for the S-type (❶→❷→❸) and -250 mmHg for the L-type (❶→❷→❸). When the leakage is only 5Nℓ/min, the vacuum pressure is -600mmHg with the S-type (❹→❺→❻) and -350mmHg for the L-type (❹→❺→❻).

he L-type can produce a higher vacuum pressure at gher leakage rates than the S-type, whereas the S-type roduces superior vacuum pressure in a low leakage tuation. Therefore, it is important to compare the flow ıaracteristics of both types when there is a concern for akage.

jector size determination (w/leakage) by calculation:

he size of the ejector can be found by adding the akage quantity to the mean suction flow requirement:

.Determine mean suction flow:

$$Q_1 = V \times \frac{60}{T_1} + Q_L$$

$$T_2 = 3T_1$$

$_1$ mean suction flow required from ejector (Nℓ/min),

$_L$ leakage quantity when workpiece is adsorbed (Nℓ/min),

$_1$ adsorption response time to 63% of P_v (sec),

$_2$ adsorption response time to 95% of P_v (sec),

volume of piping from ejector to pad (ℓ):

$$V = \frac{\pi}{4} \times d^2 \times \frac{L}{1000}$$

inside diameter of tubing (mm),

tubing length (meters, m),

2. Determine the maximum suction flow needed:

$$Q_{max} = (2 \sim 3) \times Q_1$$

Selection Process:

- Set acceptable values for adsorption response time T_1 and T_2.
- Select an ejector model with a maximum suction flow spec that is higher than Q_{max} determined above.
- Adjust times T_1 and T_2 as necessary or refer to a different test ejector to achieve a desired result.

Ejector size determination (w/leakage) by graphs:

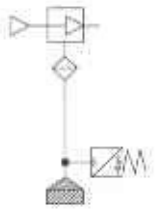
1. Determine the piping volume using Selection Graph 4 from page 11.
2. Find Q_{max} using Selection Graph 5. Note that Q_{max} does not include leakage quantity Q_L.

Selection Process:

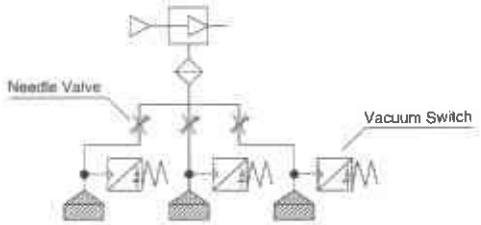
- Maximum suction flow is found by setting acceptable adsorption response times (T_1, T_2) and finding the intersection point with the piping volume.
- Select an ejector model with a maximum suction flow spec that is higher than $Q_{max} + (3 \times Q_L)$.

5. GENERAL GUIDELINES FOR VACUUM EJECTOR APPLICATION

One vacuum pad per ejector is ideal.



In the case of multiple pads per ejector, vacuum pressure can be lowered for all pads if any one pad fails or leaks. Individual vacuum switches should be used to monitor each pad's condition. Also, it is recommended to use a needle valve orifice on each branch to keep leakage effect minimized.



Select a large diameter nozzle for NZX, NZM, and NZHI series ejectors when adsorption is not perfect due to leakage or when a quick response time is required. If overall air consumption is a concern (many ejectors in the system), then it may be more important to minimize the nozzle size.

Vacuum System Specification (continued)

Piping on the vacuum side

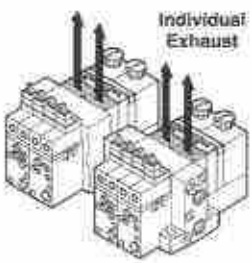
The vacuum side piping should be kept as short as possible. Be sure to select a tubing size that matches well with the suction capability of the chosen ejector. Too much piping volume will adversely affect the response time. Too small a diameter of tubing may be overly restrictive and cause false switch indication.

Prevent kinks in the tube to avoid restriction. Also, avoid excessive fittings, joints, etc. that may be sources of potential leaks.

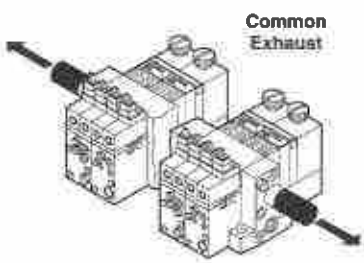
Safety

The appropriate factor of safety depends on the specific needs of the application. To prevent lost production time due to dropping a part during transfer or similiar, factors of safety should be followed. When safety of personnel is involved, the factor of safety should be strictly adhered to. An output signal via a vacuum switch is recommended to confirm adsorption of the workpiece. When lifting heavy or dangerous material, a visual checking means such as a vacuum gauge is advised.

Manifold Instructions



Use the built-in type silencer or port exhaust type when there are several ejectors being operated simultaneously.

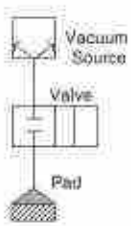


Exhaust from both ends when there are many ejectors and common exhaust is required. If exhaust air is piped away, make sure that the diameter of piping is large enough to *prevent back pressure.*

C. Vacuum Pump Systems

Dedicated mechanical pumps are sometimes used when a high level of vacuum must be delivered to a system occupying a relatively large area. Much of the material in this guide can be used for sizing non-ejector components for use within these systems.

Vacuum switches, suction filters, vacuum pads, valves, etc. can all be used in the same manner with a pump driven system. As well, the NZX series can be used with all of its modular functions minus the ejector portion, simply by supplying a compressed air pilot line to the valve unit.



1. Determining adsorption response time by calculation:

$$T_1 = V \times \frac{60}{Q}$$

$$T_2 = 3T_1$$

T_1 : adsorption response time to 63% of P_v (sec),

T_2 : adsorption response time to 95% of P_v (sec),

V : volume of piping from vacuum source to pad (ℓ):

$$V = \frac{\pi}{4} \times d^2 \times \frac{L}{1000}$$

d : inside diameter of tubing (mm),

L : tubing length (meters, m)

Q : the lesser capacity of flow using S_1 or S_2 (Nℓ/min):

$$Q = S_1 \times 11.1 \text{ (Nℓ/min)}$$

$$Q = S_2 \times 11.1 \text{ (Nℓ/min)}$$

S_1 : the effective cross-sectional area of valve orifice obtained from valve catalog (mm^2),

S_2 : the effective cross-sectional area of tubing based on inside diameter and total length (mm^2). Use selection graph 3.

2. Determining response time by using graphs:

The response time can be found directly from selection graph 5. Find the intersection between the effective cross-sectional area for the valve (from valve catalog), the piping volume, and time T_1 or T_2.

Example: Determine the exhaust response time for exhausting a 5 liter tank to 95% of the final vacuum pressure P_v by using a valve with effective cross-sectional area of $20mm^2$.

Solution: The exhaust response time T_2 can be found using selection graph 5 (page 11) from the intersection of $20mm^2$ and tank volume of 5ℓ (order of ❸→❹). T_2 = 12sec.

3. Effective valve orifice determination by calculation:

1. Determine the mean suction flow:

$$Q_1 = V \times \frac{60}{T_1}$$

Q_1 : mean suction flow required (Nℓ/min),

T_1 : adsorption response time to 63% of P_v (sec),

T_2 : adsorption response time to 95% of P_v (sec),

cuum System Specification (continued)

: volume of piping from valve to pad (ℓ):

$$V = \frac{\pi}{4} \times d^2 \times \frac{L}{1000}$$

: inside diameter of tubing (mm),

: tubing length (meters, m),

Determine the maximum suction flow needed:

$$Q_{max} = (2 \sim 3) \times Q_1$$

lection Process:

Set acceptable values for adsorption response time T_1 nd T_2.

Select a valve with an effective cross-sectional orifice uch that $S \times 11.1 \geq Q_{max}$.

Adjust times T_1 and T_2 as necessary or refer to a ifferent test valve to achieve a desired result.

Effective valve orifice determination using graphs:

Determine the piping volume using Selection Graph 4.

Find Q_{max} using selection graph 5.

lection Process:

Maximum suction flow is found by setting acceptable dsorption response times (T_1, T_2) and finding the ntersection point with the piping volume.

Draw a horizontal line from the Q_{max} axis to the valve ffective cross-section axis to determine S(mm^2).

Select a valve model with an effective orifice area S.

PERIPHERAL VACUUM COMPONENTS

Instructions for Selecting Equipment for Supply Lines:

s important to use dry, filtered (5 micron or better), non-ricated air for the operation of vacuum ejectors. Small rticles in the air lines can clog the internal ejector zzles and quickly degrade performance. It is ommended to use a filter and mist separator on the pply side.

many vacuum ejectors are to be used in the same cuit, be sure to carefully consider the overall air nsumption requirements. If many ejectors are to be erating simultaneously, insufficient air supply can cause graded performance of individual ejectors.

2. Instructions for Selecting Equipment for Vacuum Lines

In-line components should be selected based on their effective cross-sectional area in comparison to the maximum suction flow of the ejector/vacuum pump. The value of the effective cross-sectional area should be greater than the value which is found by the formula below:

$$S = \frac{Q_{max}}{11.1}$$

S : Effective cross-sectional area (mm^2)

Q_{max} : Maximum suction flow (Nℓ/min) of ejector or pump.

Vacuum Switch (ZS Series)

Vacuum Gauge (GZ Series)

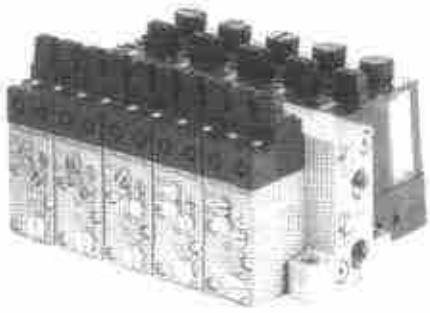
A confirmation output signal by a vacuum switch is recommended when work is adsorbed or transferred. (Visual check by gauge is also recommended for transporting heavy or dangerous work). When electronic or precision parts are adsorbed, the pressure difference between ON and OFF becomes very small with adsorption nozzles on order of 1mm. In that case, a high precision NZSP1 adsorption check switch which has a small hysteresis should be used. Please note that an ejector with appropriate ability should be used. Also, it may be necessary to stabilize the vacuum pressure by using a vacuum regulator or tank.

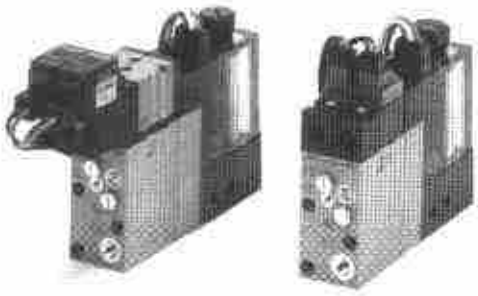
Suction Filter (NZFA, NZFB Series)

It is recommended to use a suction filter on the vacuum side of the circuit to prevent ejectors from becoming clogged or to protect a solenoid valve. It is suggested to use filter NZFA or NZFB together with the NZM or NZX Series ejectors (which have integral filters) if they are used in a dusty atmosphere.

Modular Vacuum System

NZX Series Vacuum Ejector Type • External Vacuum Supply Type





Modular Component Construction

Combine individual functions to form a custom package:
Ejector + Supply Valve + Breaking Valve + Vacuum Switch + Suction Filter.
Minimizes response time lag.

Vacuum Pressure to -25inHg (-630mmHg)

4 different nozzle diameters enable efficient application.

Compact/Lightweight

Modular components combine for small package size and less piping.
Units are lightweight -- can mount directly to tooling or robot arm.

Manifold System

Multiple units can be manifolded for common piping and neat appearance.

External Vacuum Supply Type

System can be used with an external vacuum supply with same control features (ejector component removed).

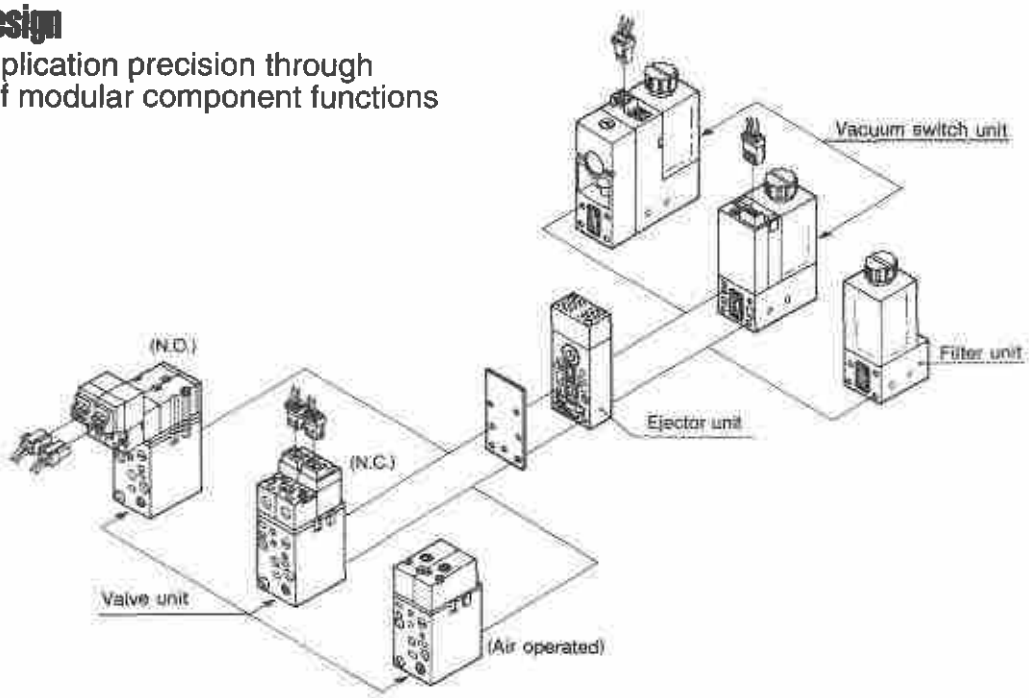
See Also

ZR series for nozzle diameters up to ø2.0mm and suction flow up to 3.67scfm (105NL/min). Request flyer #US98-E447.

Vacuum Module
NZX Series

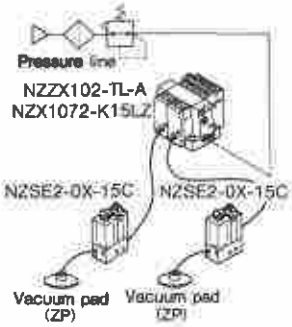
Modular Design

Custom application precision through selection of modular component functions

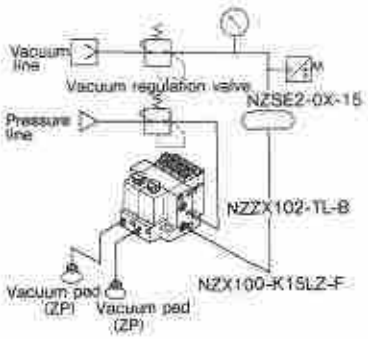


Use module with external vacuum supply (from pump or mainline) or as an air driven ejector system

Ejector system



External vacuum system



Multi-functioning

Compact, lightweight

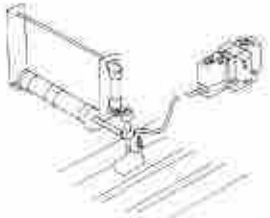
Manifolding possible

Example applications

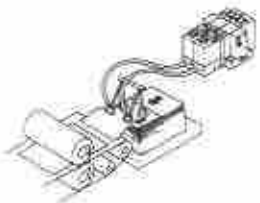
Chip bonding

Chip mounting

Pick and Place of small components

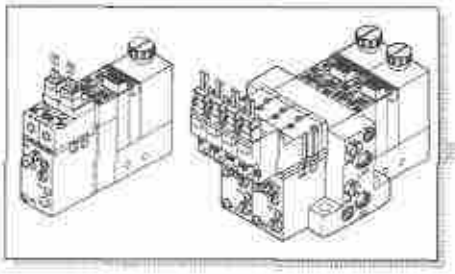


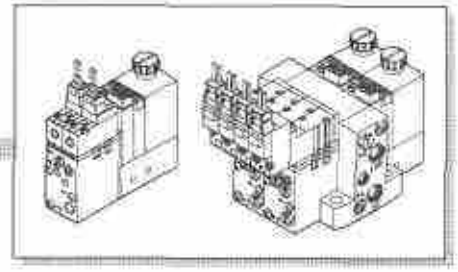
Escorting printing paper



odular Components Introduction

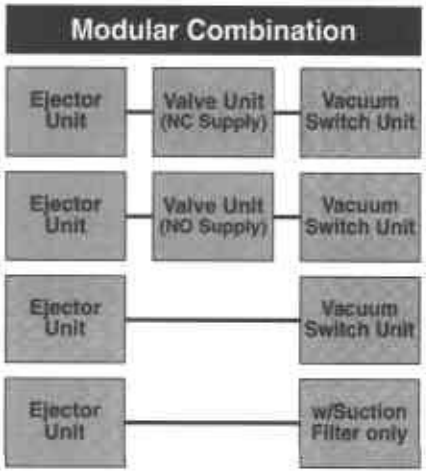
Basic Specification		Vacuum Ejector Type				External Vacuum Supply Type
Component	Characteristic					
ector Unit ZX1☐☐ 	Nozzle size (mmø)	0.5	0.7	1.0	1.3	—
	Max. Suction SCFM (Nℓ/min)	0.18 (5)	0.35 (10)	0.78 (22)	1.13 (32)	
	Air Consumption SCFM (Nℓ/min)	0.46 (13)	0.81 (23)	1.63 (46)	2.65 (75)	
	Max. Vacuum Pressure	-25 in Hg (-630 mmHg)				
	Exhaust Release	Built-in silencer • Manifold common exhaust • Individual port exhaust (1/8 NPTF)				
lve Unit ZX1-V☐ 	Function	Supply valve (pilot main), Release valve (direct)				
	Supply Valve Type	N.C., N.O.				
	Operation Type	Solenoid type, Air-operated type				
	Solenoid Voltage	DC3,5,6,12,24V; AC100,110V (50/60 Hz)				
witch Unit (built-in filter) ZS 	Type	General Purpose	Adsorption Confirm.			General Purpose / Adsorption Confirm.
	Pressure Setting Range	0~-30 inHg (0~-760 mmHg)	-6~-30 inHg (-150~-760 mmHg)			0~-30 inHg (0~-760 mmHg) / -6~-30 inHg (-150~-760 mmHg)
	Hysteresis	3% or less				4mmHg
	Applicable Orifice (mm)	ø2-ø25	ø0.3-ø1.2			ø2-ø25 / ø0.3-ø1.2
	Supply Voltage	DC24V				DC24V
ction Filter Unit ZX1-F 	Operating Pressure	Vacuum ~ 70 PSI (5kgf/cm²)				
	Filtration	30μm				
Manifold	Unit: Vacuum Ports	M5 (std.), M6 (special)				
	Unit: Individual Supply Ports	M5 (std.), M6 (special)				
	End plates: Common Supply Port	1/8 (NPTF or PT)				
	End plates: Common Exhaust Port	1/8 (NPTF or PT)				
	End plates: Common PS, PD Ports	M5				
	End plates: No. of Stations	Max. 8				

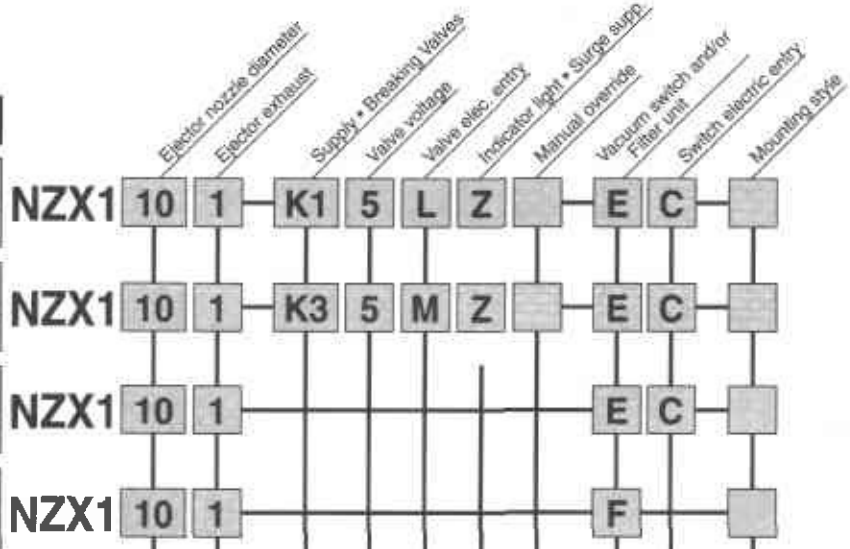




How To Order/Ejector Type

Modular Combination





Ejector Nozzle Diameter

05	0.5mmø
07	0.7mmø
10	1.0mmø
13	1.3mmø

Ejector Exhaust Type

1	individual (integral silencer)
2	individual (port: 1/8 NPTF)
3	common exhaust*

*Must be manifold mount type (-M)

With Valve Unit / Supply • Breaking Valve

➔ p.22, see chart ❶ for valve configurations and part number insert.

Solenoid Valve Voltage

*1	AC100V 50/60Hz
*3	AC110V 50/60Hz
5	DC24V
6	DC12V
V	DC6V
S	DC5V
R	DC3V
(blank)	air operated valve (K6,K8 only)

*Utilizing special connector ass'y with AC→DC rectifier. L,M types only.

Options highlighted in blue:

Preferred Option Program

(See page 2)

Solenoid Valve Electrical Entry

L	Plug-in Wire Connector	connector length 12" (0.3m)
LN		w/parts (add wire)
LO		receptacle without connector
M	Plug-in Connector (K3,J2 only)	Connector length 12" (0.3m)
MN		w/parts (add wire)
MO		receptacle without connector
G	Grommet Type	wire length 12" (0.3m)
H		wire length 24" 0.6m)
(blank)	Air operated valve	

Mounting Style

(blank)	Individual (w/bracket)
M	For manifold use

Vacuum Switch Electrical Entry

(blank)	Grommet Type	Wire length 24" (0.6m)
L		Wire length 120" (3m)
C	Plug-in Connector	Connector length 24" (0.6m)
CL		Connector length 120" (3m)
CN		Without mating conn.

Vacuum Switch/Filter Option

E	vacuum switch (NPN)		w/integral filter
E55	vacuum switch (PNP)		
PS	Adsorption	orifice ø0.3~ø0.7	
PB	confirm	orifice ø0.5~ø1.2	
F	filter unit only		
(blank)	without switch or filter		
D	mmHg	21	2 outputs without analog output
		22	2 outputs with analog output
DP	kPa	23	1 output with breakdown detect output without analog output
		24	1 output with breakdown detect output with analog output

Note) Analog output type is only available for grommet type. When ordering digital switch (for mmHg display) add "-S" to end of part number.

Valve Manual Override

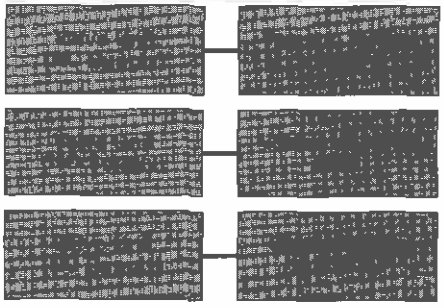
(blank)	Non-locking manual
B	Locking manual

Valve Indicator Light/Surge Suppressor

(blank)	Without
Z	With indicator light and Surge Suppressor
S	With Surge Suppressor only

How To Order/External Vacuum Supply Type

Modular Combination



	Supply • Breaking Valves	Valve voltage	Valve elec. entry	Indicator light • Surge supp.	Manual	Vacuum switch and/or Filter unit	Switch electric entry	Mounting style
NZX100	K1	5	L	Z		E	C	
NZX100	K3	5	M	Z		E	C	
NZX100	K1	5	L	Z		F		

With Valve Unit / Supply • Breaking Valve
➔ p.22, see chart ❷ for valve configurations and part number insert.

Mounting Style

(blank)	Individual (w/bracket)
M	For manifold use

Solenoid Valve Voltage

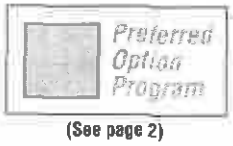
*1	AC100V50/60Hz
*3	AC110V50/60Hz
5	DC24V
6	DC12V
V	DC6V
S	DC5V
R	DC3V
(blank)	air operated valve (K6,K8 only)

*Utilizing special connector ass'y with AC→DC rectifier. L,M types only.

Vacuum Switch Electrical Entry

(blank)	Grommet Type	Wire length 24" (0.6m)
L		Wire length 120" (3m)
C	Plug-in Connector	Connector length 24" (0.6m)
CL		Connector length 120" (3m)
CN		Without mating conn.

Options highlighted in blue:



(See page 2)

Vacuum Switch/Filter Option

E	vacuum switch (NPN)		w/integral filter
E55	vacuum switch (PNP)		
PS	Adsorption confirm	orifice ø0.3~ø0.7	
PB		orifice ø0.5~ø1.2	
F	filter unit only		
(blank)	without switch or filter		
D	mmHg	21	2 outputs without analog output
		22	2 outputs with analog output
DP	kPa	23	1 output with breakdown detect output without analog output
		24	1 output with breakdown detect output with analog output

Note) Analog output type is only available for grommet type

Solenoid Valve Electrical Entry

L	Plug-in Wire Connector	connector length 12" (0.3m)
LN		w/parts (add wire)
LO		receptacle without connector
M	Plug-in Connector (K3,J2 only)	Connector length 12" (0.3m)
MN		w/parts (add wire)
MO		receptacle without connector
G	Grommet Type	wire length 12" (0.3m)
H		wire length 24" 0.6m)
(blank)	Air operated valve	

Valve Manual Override

(blank)	Non-locking manual
B	Locking manual

Valve Indicator Light/Surge Suppressor

(blank)	Without
Z	With indicator light and Surge Suppressor
S	With Surge Suppressor only

❶ Ejector Type / Supply • Breaking Valve Standard Combinations

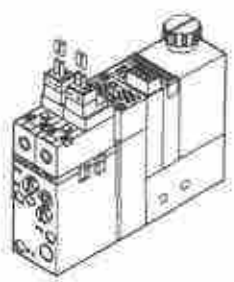
Unit configuration		Part Number Insert	Supply valve					Breaking valve				
			Solenoid		Air operated		Without	Solenoid		Air operated	External	Without
Supply valve	Breaking valve		N.C (NVJ114)	N.O. (NVJ324M)	N.C. (ZX1A)	N.O. (NVJA324)		N.C. (NVJ114)	N.C. (NVJ314)	N.C. (NVJA314)	ZX1A	
Solenoid (N.C.)	Solenoid (N.C.)	K1	●	—	—	—	—	●	—	—	—	—
Solenoid (N.O.)	Solenoid (N.C.)	K3	—	●	—	—	—	—	●	—	—	—
Air operated (N.C.)	Air operated (External)	K6	—	—	●	—	—	—	—	—	●	—
Air operated (N.O.)	Air operated (N.C.)	K8	—	—	—	●	—	—	—	●	—	—
Solenoid (N.C.)	Without	J1	●	—	—	—	—	—	—	—	—	●
Solenoid (N.O.)	Without	J2	—	●	—	—	—	—	—	—	—	●
—		(blank)	Without valve unit									

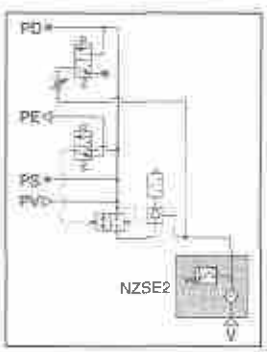
● Other combinations shown on page 25.

❷ External Vacuum Supply Type / Supply • Breaking Valve Standard Combinations

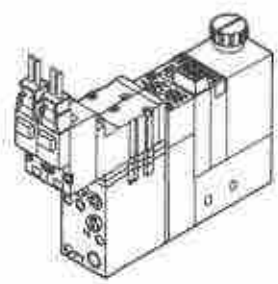
Unit configuration		Part Number Insert	Supply valve					Breaking valve				
			Solenoid		Air operated		Without	Solenoid		Air operated	External	Without
Supply valve	Breaking valve		N.C (NVJ114)	N.O. (NVJ324M)	N.C. (ZX1A)	N.O. (NVJA324)		N.C. (NVJ114)	N.C. (NVJ314)	N.C. (NVJA314)	ZX1A	
Solenoid (N.C.)	Solenoid (N.C.)	K1	●	—	—	—	—	●	—	—	—	—
Solenoid (N.O.)	Solenoid (N.C.)	K3	—	●	—	—	—	—	●	—	—	—
Air operated (N.C.)	Air operated (External)	K6	—	—	●	—	—	—	—	—	●	—
Air operated (N.O.)	Air operated (N.C.)	K8	—	—	—	●	—	—	—	●	—	—
—		(blank)	Without valve unit									

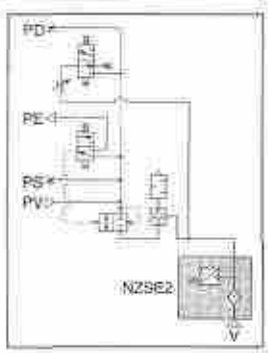
NZX1□□1-K15LZ-EC



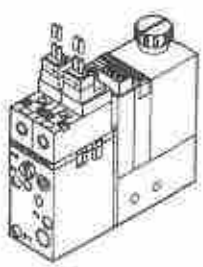


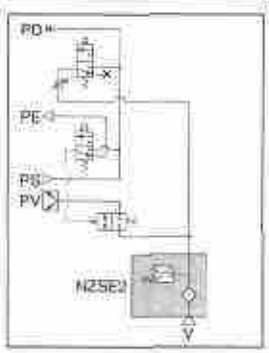
NZX1□□1-K35MZ-EC



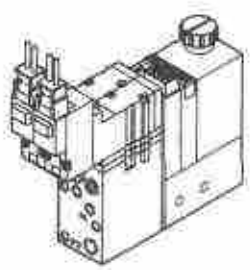


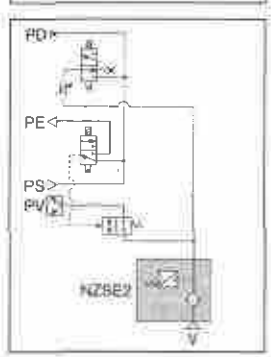
NZX100-K15LZ-EC



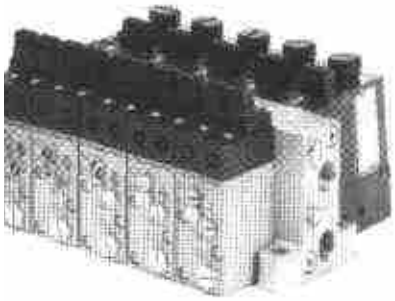


NZX100-K35MZ-EC





anifold Specifications



Specifications

Max. stations	8 stations	
Port	Port size	Function
PV-port	1/8	Ejector air supply / or external vacuum (NZX100)
PS-port	M5	Plugged / or External pilot (NZX100)
PD-port	M5	Plugged (common w/PS)/or external breaking supply
EXH port	1/8	Common exhaust
Weight	Basic weight for two station: 1.7 lbf (780gf) Additional weight for each extra station: 0.1 lbf (50gf)	

- *All PD ports are plugged as standard (PS ports; plugged for ejector type).*
- When using 4 or more stations with NZX1⬚⬚3 type manifold, utilize EXH ports on both sides.
- When using 6 or more stations with NZX100 type and external vacuum, PV ports on both sides should be connected to the vacuum source.

anifold Spacers, Adapter Kits, Blank Station Kits

nifold Spacers (Valve Unit Side)

arts No.	Function	PV port	PS port	PD port
X1-R1	Station's ports PV, PD, PS become individual supply	Individual	Individual	Individual
X1-R9	Common supply, individual breaking	Common		Individual
X1-R16	All common ports (Dummy spacer)	Common (manifold)		

When using spacer ZX1-R1 partially, other valves should be fitted with dummy spacers.
Valve unit ports with spacer R9, R16 are common with main manifold ports.
Valve unit ports with spacer R1 are isolated from main manifold ports.

Spacers (A side) (Optional use)

ZX1-R1

Spacer Type
R1 — Individual supply ports
R9 — Common supply, individual breaking
R16 — Common ports (dummy)

anifold, How To Order

<Manifold Base>>

NZZX1 06 T

ations
—2 stations
•
•
—8 stations

System type*
A — Ejectors
B — External Vacuum
*For plug (X) positioning only.

SUP/EXH Port position
R — Right side*
L — Left side*
B — Both sides
*Other side plugged (X)

rt thread/Size

mbol	Thread	Size
T	NPTF	1/8"

Manifold Adapters, Blank Station Kits

Transfer Plate Adapter (A side) (Includes all mounting hardware)

ZX1-D R1 – 4 (Mandatory when valve unit is not applied to the station)

Adapter Ass'y Type
A1 — Adapter w/o spacer (common)
R1 — Adapter with individual supply spacer R1
R9 — Adapter with spacer R9
R16 — Adapter with spacer R16

Vacuum Plate Adapter (B side)

ZX1- DB1-1 (For NZX100 without switch or filter)

Blank Station Kit

ZX1- BM1 (For future expansion capability)

Ejector Unit

Specifications

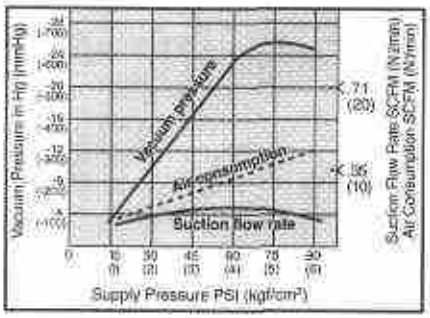
Nozzle diameter mmø	0.5	0.7	1.0	1.3
Max. suction flow SCFM (Nℓ/min)	0.18 (5)	0.35 (10)	0.78 (22)	1.13 (32)
Air consumption SCFM (Nℓ/min)	0.46 (13)	0.81 (23)	1.63 (46)	2.65 (75)
Max. vacuum pressure	−25 inHg (−630mmHg)			
Standard supply pressure	65 PSI (4.5kgf/cm²)			
Supply pressure range	30 – 80 PSI (2 – 5.5kgf/cm²)			
Max. operating pressure	100 PSI (7kgf/cm²)			
Operating temperature	40 – 120°F (5 – 50°C)			
Weight*	(35gf)	(35gf)	(35gf)	(45gf)

* For individual port exhaust type (NZX1□□2), add additional weight of (10gf)

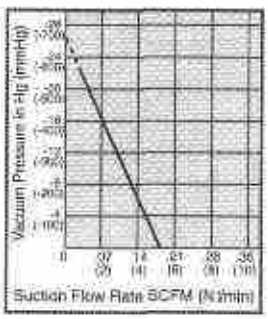
Note) Flow characteristics shown for supply pressure 65 PSI (4.5kgf cm²).

NZX105

Exhaust Characteristics

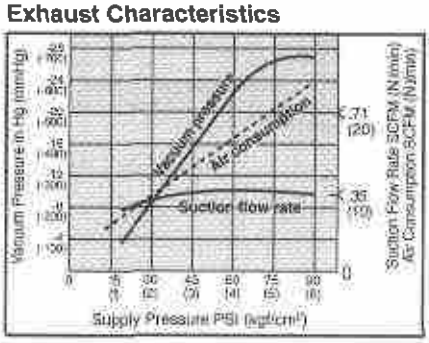


Flow Characteristics

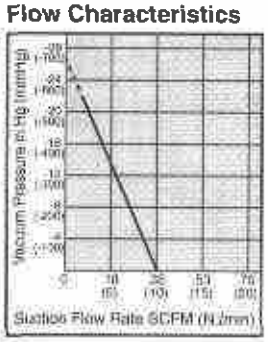


NZX107

Exhaust Characteristics

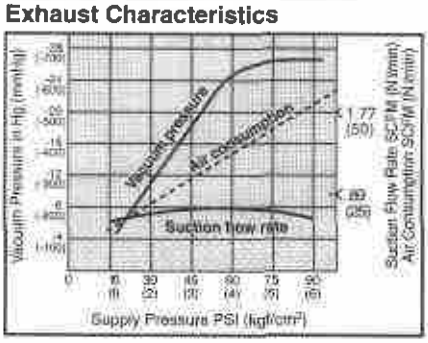


Flow Characteristics

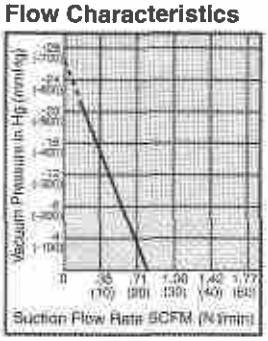


NZX110

Exhaust Characteristics

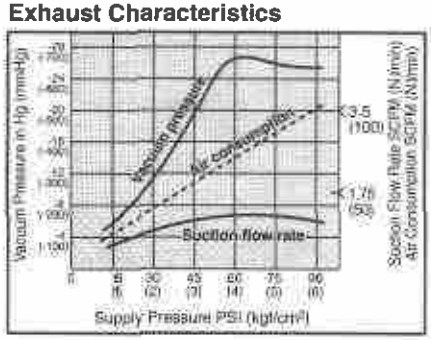


Flow Characteristics

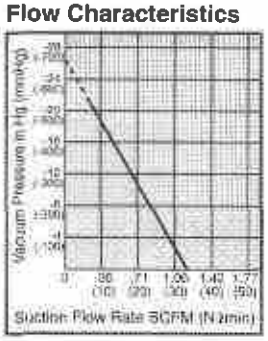


NZX113

Exhaust Characteristics



Flow Characteristics



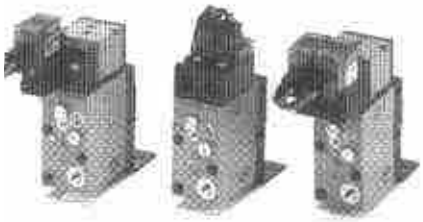
Ejector Unit/How to Order

NZX1-W 05 1

Ejector nozzle dia.
- **05** — .5mm
- **07** — .7mm
- **10** — 1.0mm
- **13** — 1.3mm

Ejector exhaust type
- **1** — individual (integral silencer)
- **2** — individual (port: 1/8 NPTF)

Valve Unit



Specifications

Applied to	External Vacuum Supply System								Vacuum Ejector System							
Basic Part No.	NZX1-VB[ ]								(Consult factory)							
Construction	Vacuum supply valve				Vacuum release valve				Air supply valve				Vacuum release valve			
Operation	Pilot operated				Direct operated				Pilot operated				Direct operated			
	Solenoid valve N.C. (NVJ114)	Solenoid valve N.O. (NVJ324)	Air operated N.C. (ZX1A)	Air operated N.O. (NVJA324)	Solenoid valve N.C. (NVJ114)	Air operated N.C. (NVJ324)	Air operated (ZX1A)	Air operated N.C. (NVJA324)	Solenoid valve N.C. (NVJ114)	Solenoid valve N.O. (NVJ324)	Air operated N.C. (ZX1A)	Air operated N.O. (NVJA324)	Solenoid valve N.C. (NVJ114)	Solenoid valve N.C. (NVJ324)	Air operated (ZX1A)	Air operated N.C. (NVJA324)
Operating pressure	45 ~ 90 PSI (3 ~ 6 kgf/cm²)															
Cv factor	0.17				0.004	0.025	—		0.17				0.004	0.025	—	
Max. operating cycle	5 c/s															
Operating temp.	40 ~ 120°F (5 ~ 50°C)															
Interface† plate symbol	(PV) • (PS↔PD)								(PV↔PS↔PD)							

* Provided as standard: Mounting bracket
† See p. 28 & 29 also.

Vacuum Release Using Low Pressure Nitrogen*

Applied to:	External Vacuum Supply	Vacuum Ejector Type
Base Part No.	NZX100	NZX1[ ][ ][ ]
Interface† plate symbol	(PV) • (PS) • (PD)	(PV↔PS) • (PD)

Consult factory for individual or assembly part numbers.
See p. 28 & 29 also.

Solenoid valve / Specifications

	NVJ114	NVJ314, NVJ324M
Rated voltage	110VAC*, 3, 5, 6, 12, 24VDC	
Electrical entry	L-type connector, grommet	L-type connector, M-type connector, grommet
Indicator light/ surge suppressor	With or without	
Power consumption	Std.: 1W (with LED: 1.2W) *Low Power type (0.45W: consult factory)*	
Manual override	Non-lock push type, locking push type	

Note) Optional long lead wires are available. See below.
*Requires special connector ass'y with AC→DC rectifier.

Solenoid valve / Model

Valve type		Supply valve: Solenoid valve N.C. (NVJ114)	Solenoid valve N.O. (NVJ324M)	Air operated N.C. (ZX1A)	Without
Release valve	Solenoid valve N.C. (NVJ114)	● K1(82)	—	● K5(73)	● D1(77)
	Solenoid valve N.C. (NVJ314)	—	● K3(132)	—	● D2(100)
	Air operated (ZX1A)	● K2(73)	—	● K6(58)	● D3(41)
	Air-operated N.C. (NVJA314)	—	● K4(119)	—	● D4(100)
	Without	● J1(77)	● J2(100)	● J3(41)	—

(Figures) are weights (gf)

Solenoid valve / How To Order (spare, replacement)

ZX1-NVJ114 — 5 L Z (see note)

ZX1-NVJ3 2 4 — 5 L Z

Type of actuation
— N.C. (Normally closed)
— N.O. (Normally open)

Voltage
D3 — 110VAC
5 — 24VDC
6 — 12VDC
V — 6VDC
S — 5VDC
R — 3VDC
*Plug connector (L)(M) only

Electrical entry
L – Connector (12")
LO – without connector
M – Connector (12")
MO – without connector
G – Grommet (12")
H – Grommet (24")

Manual override
(blank) — Non-locking push type
B — Slotted locking type

Indicator light / surge voltage suppressor
(blank) — None
*S — With surge voltage suppressor
*Z — With indicator light/ surge voltage suppressor
*N/A for grommet type

Note Mounting screws are the only difference from standard NVJ Series. (Screw length)
ZX1-NVJ100 — M1.7 x 15
ZX1-NVJ300 — M1.7 x 22 (available separately)

Valve Plug-in Connector

Individual Connector Ass'y

(DC type)
VJ10–20–4A– 6

(AC110V type)
VJ10–36–3A– 6

Lead wire length

(blank)	12 inch (300mm)
6	24 inch (600mm)
10	40 inch (1000mm)
15	60 inch (1500mm)
20	80 inch (2000mm)
25	100 inch (2500mm)
30	120 inch (3000mm)

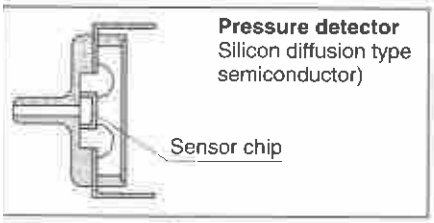
Suction Filter Unit

Specifications

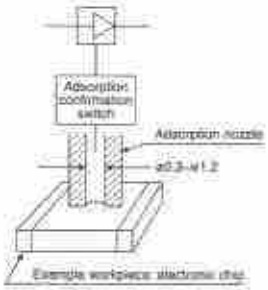
Unit Part No. (Individual use)	NZX1-F
Element Part No.	ZX1-FE
Operating pressure	Vacuum ~ 70 PSI (5kgf/cm²)
Operating temperature	40 ~ 120°F (5 ~ 50°C)
Filtration	30μm
Filtration material	PVF
Weight	35gf

Vacuum Switch Unit / Adsorption Confirmation Switch

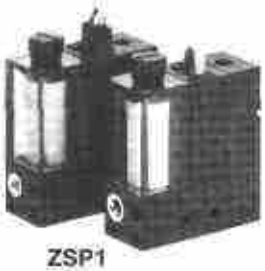
- **Quick response / 10mS**
- **Compact size**
- **Standard with suction filter**
- **Optional plug-in connector**
- **Solid-state pressure sensor**



ZSE2



Best suits small diameter nozzle/ø0.3~ø1.2 (mm)
Standard with suction filter
Optional plug-in connector
Solid-state pressure sensor



ZSP1

General Purpose Vacuum Switch / Specifications

Basic Part No.	ZSE2-0X
Operating fluid.	Air
Pressure setting range	0 ~ -30inHg (0 ~ 760mmHg)
Hysteresis	3% or less (fixed)
Accuracy	±3% full scale (40 ~ 100°F) ±5% full scale (32 ~ 140°F)
Supply voltage	12 ~ 24VDC (Ripple ±10% max.)
Port size	M5 (10 - 32 nom.)

● **Weight:** 50gf ● **Output:** Open coll /emit. (NPN/PNP) 30V, 80mA ● **Indicator light:** Lights at 'ON' condition
● **Consumption current:** 17mA (at 24VDC ON) ● **Operating temperature:** 32 ~ 140°F
● **Maximum operating pressure:** 28 PSI*
* When using ejector system, instantaneous pressure up to 70 PSI will not damage the switch.

Adsorption Confirmation Switch / Specifications

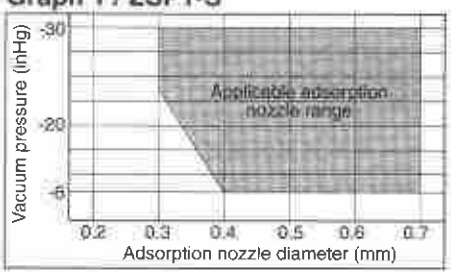
Basic Part No.	ZSP1-S	ZSP1-B
Operating fluid.	Air	
Operating pressure	-6 ~ -30inHg (-150 ~ 760mmHg)	
Applicable adsorption nozzle diameter (ømm)	ø0.3~ø0.7 (refer to graph 1)	ø0.5~ø1.2 (refer to graph 2)
Hysteresis	0.16inHg (4mmHg)	
Internal orifice diameter	ø0.5	ø0.8

● **Weight:** 62gf ● **Supply Voltage:** 12~24VDC (Ripple ±10% max.) ● **Output:** Open collector 30V, 80mA
● **Indicator light:** Lights at 'ON' condition ● **Consumption current:** 17mA (at 24VDC ON)
● **Operating temperature:** 32 ~ 140°F ● **Port Size:** M5 (10 - 32 nom.)

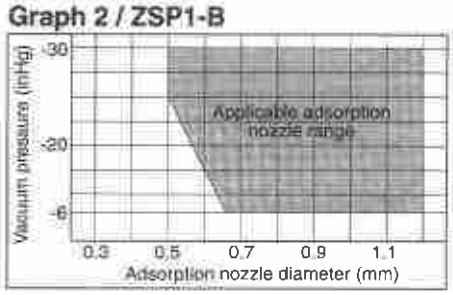
Applicable Adsorption Confirmation Switch

The relationship between vacuum pressure and adsorption nozzle diameter are as following graphs show:

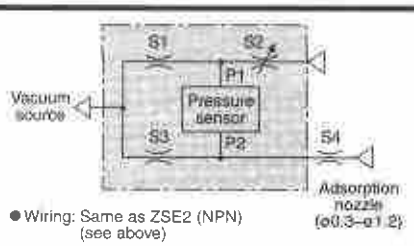
Graph 1 / ZSP1-S



Graph 2 / ZSP1-B



Air Pressure Circuit / Principle



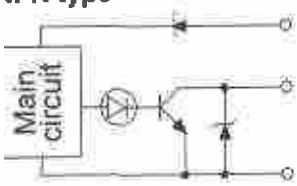
● Wiring: Same as ZSE2 (NPN) (see above)

Air pressure bridge circuit, makes adsorption nozzle (S4) free from adsorption and balances the pressure (P1=P2) applied to the sensor with regulation needle S2. Small hysteresis (P2–P1) caused by adsorption nozzle (S4) when part is adsorbed will be detected by the pressure sensor.

low To Set Vacuum Switch

Circuit

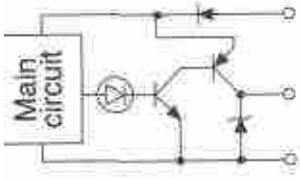
NPN type



Wiring

- ⊕ ····· (Brown) — Lead wire: Connect with power supply
- Output (0) ···· (Black) — Lead wire: Connect with load (Programmable Controller input or relay)
- ⊖ ····· (Blue) — Lead wire: Connect with power source ground

PNP type

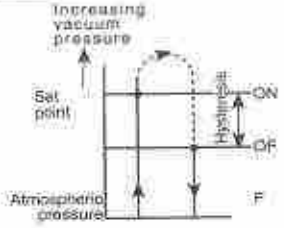


Wiring

- ⊕ ····· (Brown) — Lead wire: Connect with power supply
- Output (0) ···· (Black) — Lead wire: Connect with load (Programmable Controller input or relay)
- ⊖ ····· (Blue) — Lead wire: Connect with power source ground

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.

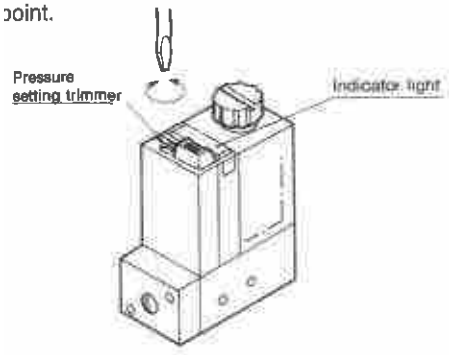


How To Set Vacuum Pressure

ZSE2

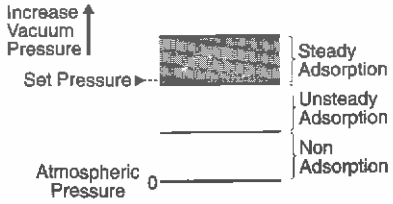
Pressure trimmer selects the ON pressure.

Clockwise rotation increases vacuum set point.



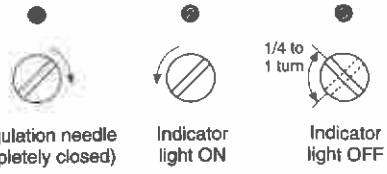
When using the switch to confirm correct adsorption, the set pressure should be as low as possible. But not so low that a false confirmation signal is given when adsorption is incomplete.

If the set pressure is excessively high, a confirmation signal may not be given even when adsorption is satisfactory.



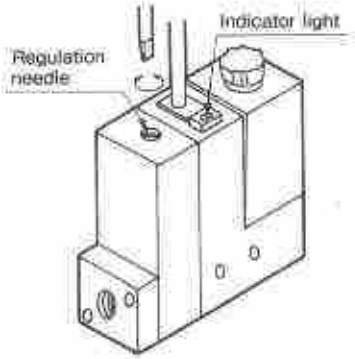
ZSP1

● Supply vacuum pressure and electrical power to the unit. Turn the regulation needle clockwise until it stops completely.
● With the adsorption nozzle removed from the work-piece (open), turn the regulation needle counter-clockwise until the LED indicator lights.
● From the above ● position, turn the regulation needle 1/4 to 1 turn clockwise.



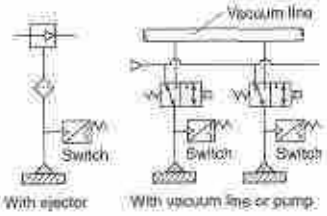
(Regulation needle completely closed) — Indicator light ON — Indicator light OFF

● Finally, adjust the needle so that the indicator lights only when the work adsorption is steady.



How To Use Vacuum Switch Unit

Circuit / Work Adsorption



Set Pressure

When using to confirm work adsorption, the set pressure must be adjusted to ensure that a confirmatory signal is given only when adsorption is complete. Failure to do this will mean that the switch will turn ON even when adsorption is unsteady.

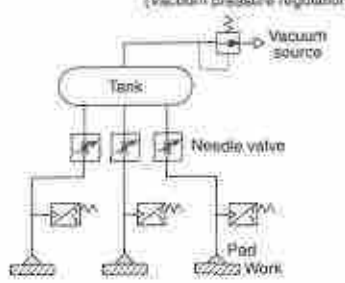
Use of Small Diameter Nozzle for Adsorption

Sometimes small diameter nozzles on the order of ø2mm may be used to adsorb electronic components, small precision components, etc. However, when nozzle diameters in the order of ø1mm are used, depending on the capacity of the ejector or vacuum pump, the pressure ON-OFF differential may become small. In this case it is recommended that **confirmation switch ZSP1** be used as it has a small switching ON-OFF differential and high accuracy. If a large adsorption capacity ejector is used, the ON-OFF differential pressure is difficult to detect. Therefore it is necessary to select an ejector with an appropriate smaller capacity. It is also important that the vacuum pressure remain stable.

One Vacuum Source with Multiple Outlets (ZSE2 Type)

When pads and switches are common to one power source, sometimes there is a possibility, depending on the number of adsorption and non-adsorption applications at each point in time, that the switches do 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.

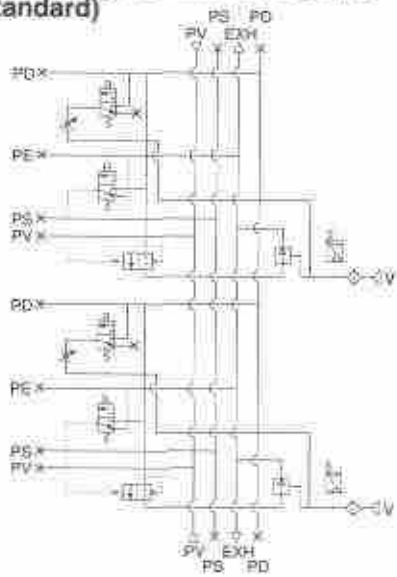
Vacuum pressure regulator (T203 Series)
(Vacuum pressure regulation)



Reduce pressure variation by means of needle valve, throttling it to some extent. Install Tank and Vacuum pressure regulator (T203 Series) to stabilize vacuum source pressure. Sometimes it may be necessary to install individual vacuum switching valves to each nozzle supply line to isolate a line if an error occurs (e.g., incomplete adsorption) thus preventing other apparatus from being influenced by the reduction of vacuum pressure.

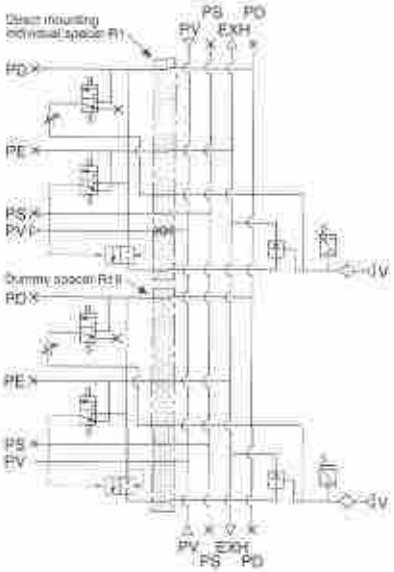
Ejector Type Use

When using common air supply (standard)



*** Internal vacuum generation**

When using individual air supply (or combination)



Ejector Type
Valve interface plates*

1 (PV↔PS↔PD)
for N.C. type supply valve, NVJ100 series.

3 (PV↔PS↔PD)
for N.O. type supply valve, NVJ300 series.

* Double arrow indicates common porting

Manifold/Standard Combination

○ : Fitting Installation ● : Plugged
△ : Open to Atmosphere

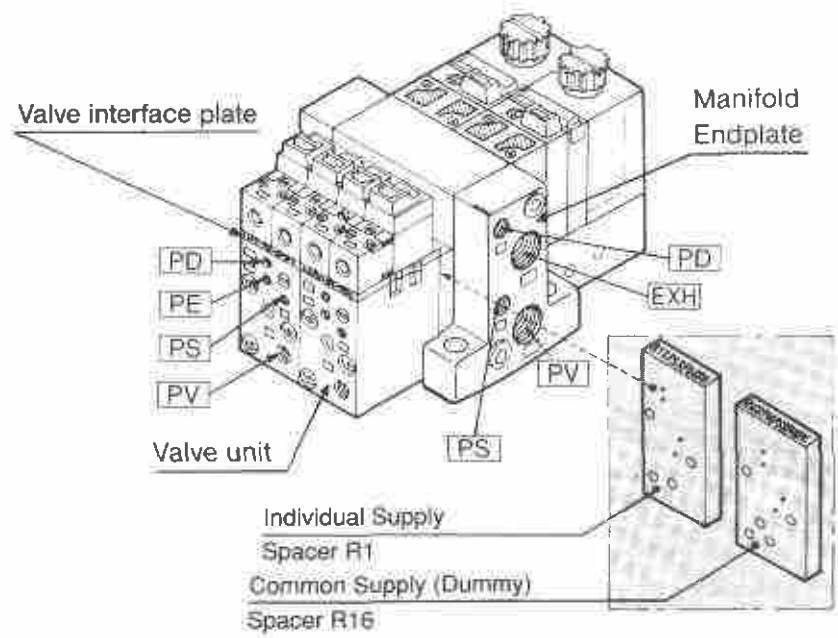
Using Common Supply

Spacer	Function	Valve unit (side) Port Symbol	Port size	Fitting Installation	Manifold (end) Symbol	Port size	Fitting installation R side	Fitting installation L side
None	PV pressure (SUP) to manifold is common with valve unit supply pressure (PV, PS and PD)	PV	M5	●	PV	1/8	○	●
							●	○
							○	○
		PS	M3	●	PS	M5	●	●
		PD			PD		●	●
		PE			EXH	1/8	△	△

Using Individual Supply

Individual SUP spacer (R1) ↕PS, ↕PD, ↕PE	Valve unit PV, PS and PD can be separated from manifold PV, PS & PD and be externally supplied	PV	M5	○	PV	1/8	○	●
							●	○
							○	○
		PS	M3	●	PS	M5	●	●
		PD			PD		●	●
		PE		△	EXH	1/8	△	△
*Common SUP (dummy) spacer (R16) ↕PV, ↕PS, ↕PD, ↕PE	PV pressure (SUP) to manifold is common with valve unit supply pressure (PV, PS and PD)	PV	M5	●	PV	1/8	○	●
							●	○
							○	○
		PS	M3	●	PS		●	●
		PD			PD		●	●
		PE			EXH	1/8	△	△

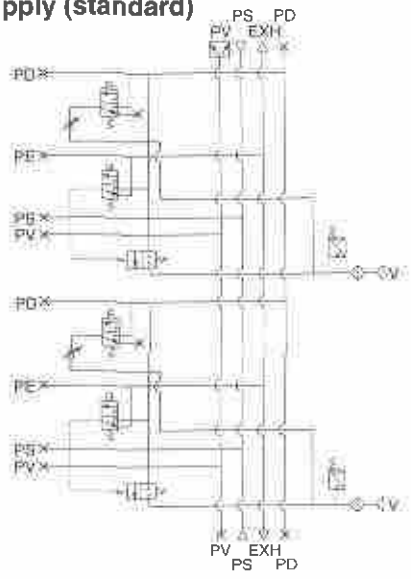
* When using PV direct SUP, combining common SUP stations requires dummy spacers.
↕,↔ indicates port to port common connections.



PV: Supply pressure port (Main supply for ejectors)
PS: Supply valve pressure port
PD: Breaking valve pressure port
PE: Pilot exhaust port
EXH: Common exhaust port

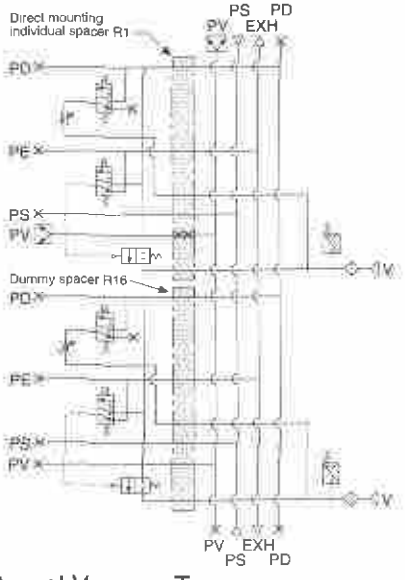
xternal Vacuum Supply Use

'hen using common vacuum upply (standard)



External vacuum supply

'hen using individual vacuum upply (or combination)



xternal Vacuum Type
alve interface plates*

(PV) (PS↔PD)
for N.C. type supply valve, NVJ100 series.

(PV) (PS↔PD)
for N.O. type supply valve, NVJ300 series.

Double arrow indicates common porting

Manifold/Standard Combination Using Common Vacuum Supply

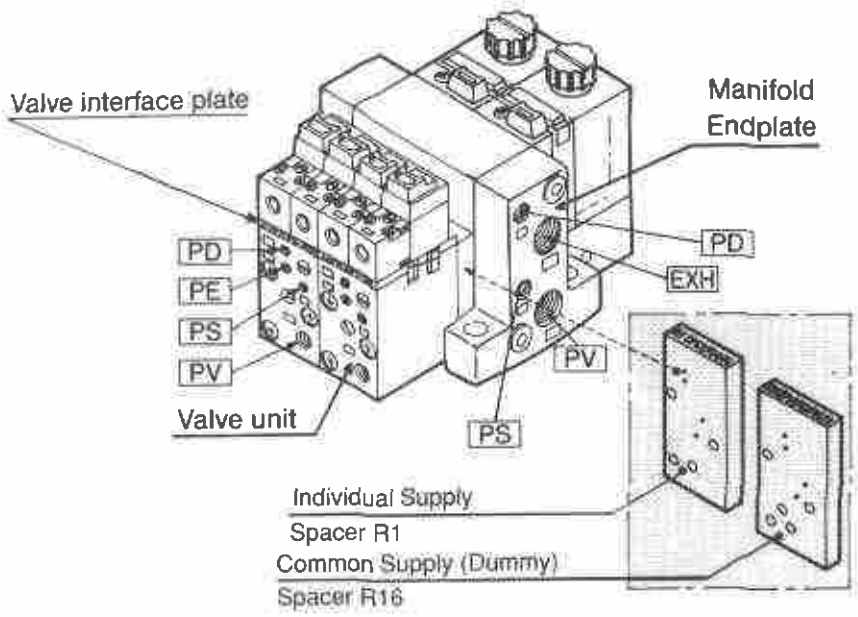
○ : Fitting Installation ● : Plugged
△ : Open to Atmosphere

Spacer	Function	Valve unit (side) Port Symbol	Port size	Fitting installation	Manifold (end) Symbol	Port size	Fitting Installation R side	L side
None	PV supply (vacuum) to manifold is common to each valve unit. PS supply, (pressure) to manifold is common for each valve unit.	PV	M5	●	PV	1/8	○	●
							●	○
							○	○
		PS	M3	●	PS	M5	●	●
		PD			PD		●	●
		PE			EXH	1/8	△	△

Using Individual Vacuum Supply

Individual SUP spacer ↕PS, ↕PD, ↕PE (R1)	Valve unit uses individual PV (external vacuum supply) and PS (external pressure supply).	PV	M5	○	PV	1/8	○	●
							●	○
							○	○
		PS	M3	●	PS	M5	●	●
		PD			PD		●	●
		PE		△	EXH	1/8	△	△
*Common SUP (dummy) spacer (R16) ↕PV, ↕PS, ↕PD, ↕PE	PV supply (vacuum) to manifold is common to each valve unit. PS supply (pressure) to manifold is common to each valve unit.	PV	M5	●	PV	1/8	○	●
							●	○
							○	○
		PS	M3	●	PS		●	●
		PD			PD		●	●
		PE			EXH	1/8	△	△

* Individual vacuum supply is external vacuum pressure directly to the PV port of the valve unit.
↕,↔ indicates port to port common connections.



PV: Supply pressure port
PS: Supply valve pressure port
PD: Breaking valve pressure port
PE: Pilot exhaust port
EXH: Common exhaust port

Specifying NZX Unit with Digital Vacuum Switch (ZSE3)

(See page 89 for switch specifications and further details)

- **Digital Display (3½ digit LCD)**
- **2 Setpoint Use**
- **Predicted Failure Function**
- **High Accuracy**

How To Order (Example)

NZX1 10 1 – K15LZ – D 21 C

Nozzle Diameter (Same as Std.)

Ejector Exhaust Type (Same as Std.)

Valve Unit
(Same as Std.) — With valve unit
(blank) — Without valve unit

Switch Specifications

21	2 output
23	1 output + Predicted failure O.P.

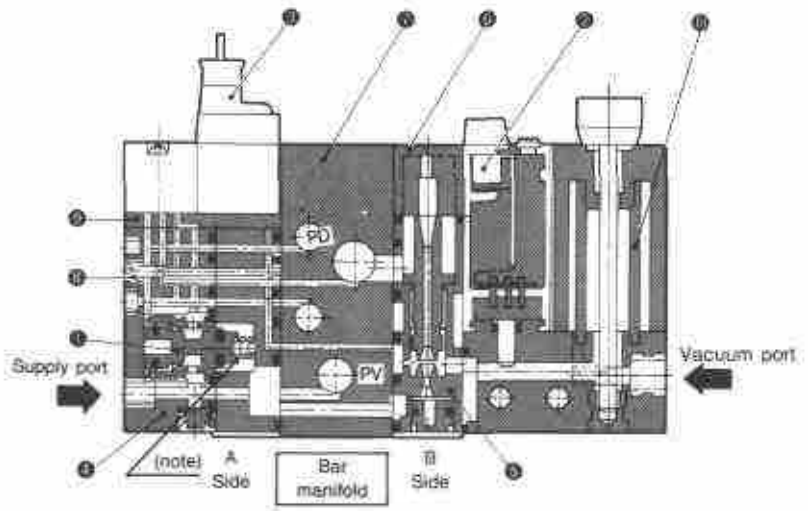
Vacuum Switch Electrical Entry

C	Plug-in Connector	Connector length 24" (0.6m)
CL		Connector length 120" (3m)
CN		Without mating conn.

Mounting Style

(blank)	Individual (w/bracket)
M	For manifold use

Construction/Part List



Parts List

No.	Designation	Material	Note
❶	Poppet valve ass'y	–	ZX1-PV-0
❷	Vacuum switch	–	ZSE2-0X-15◯, ZSP1-◯0X-15◯
❸	Pilot valve	–	NVJ100•300•Air operated
❹	Valve body ass'y	–	
❺	Ejector ass'y	–	Ejector type unit only
❻	Silencer case	PBT	
❼	Manifold base	Aluminum	
❽	Breaking flow rate regulation needle	SUS	
❾	Interface plate	PBT	
❿	Filter element	PVF	ZX1-FE (30μm)

Note Return spring: For external vacuum system use only (NZX100)

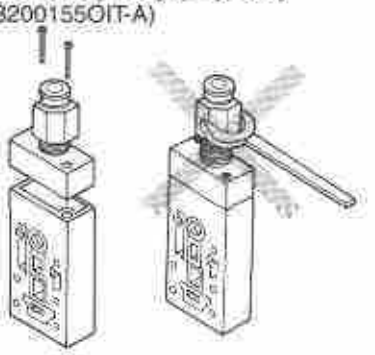
Precautions

❶ **Do not subject body to excessive external force.**

❷ **Piping tightening torques**

Thread	Appropriate tightening torque in.lbs. (kgf•cm)
M3	3 ~ 4 (3 ~ 5)
M5	13 ~ 17 (15 ~ 20)
M6	15 ~ 20 (17 ~ 23)
1/8	60 ~ 78 (70~ 90)

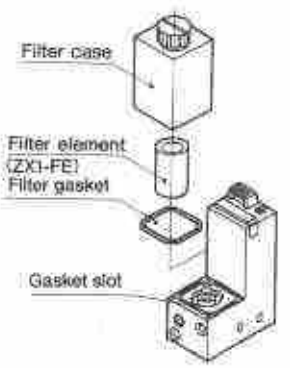
❸ **Port exhaust type/Piping**
Install fitting before mounting on to nozzle ass'y body. (Cap ass'y P3200155OIT-A)



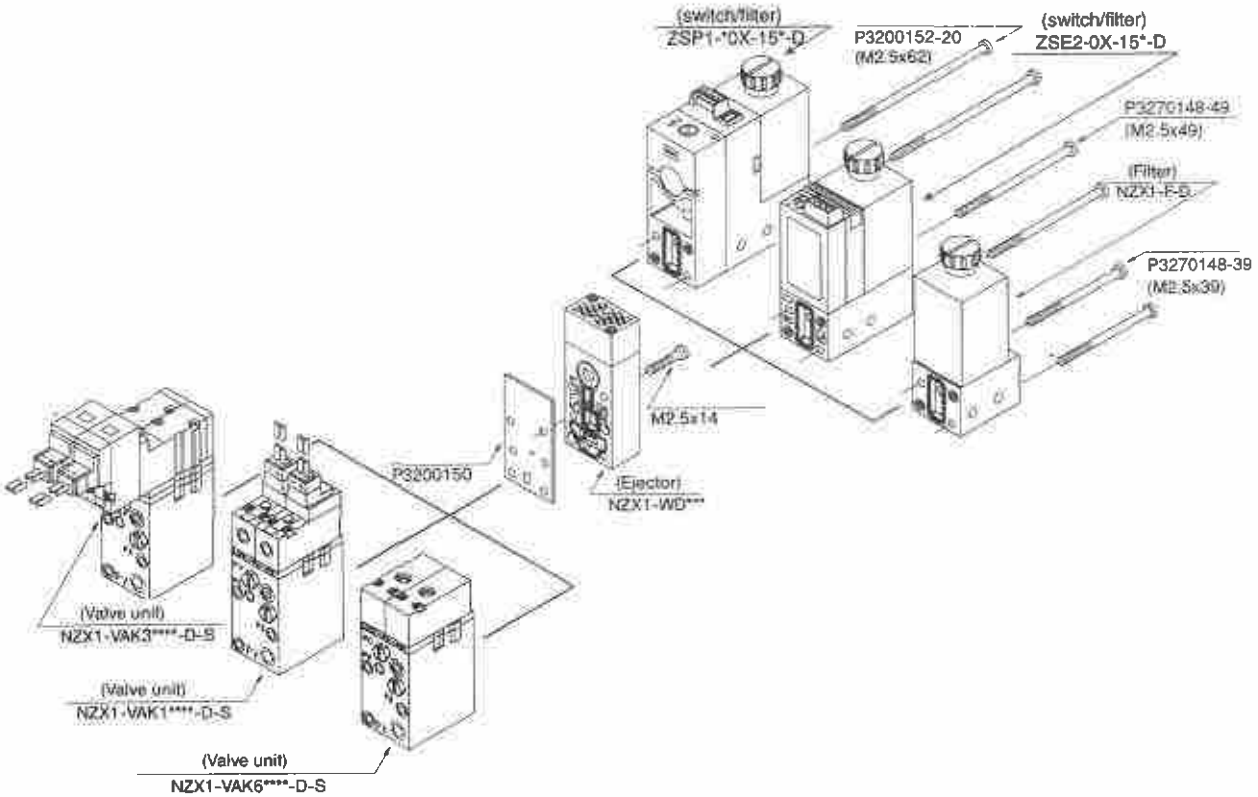
❹ **Common exhaust pipe/Manifold**
When multiple stations of the common exhaust type are manifolded, simultaneous activation of several ejectors can create back pressure within the manifold (due to the common exhaust). The resulting degraded performance due to this back pressure can be remedied by the following procedure:

1) Change exhaust type of ejectors to silencer type or port exhaust.
2) Exhaust from both ends of the manifold.

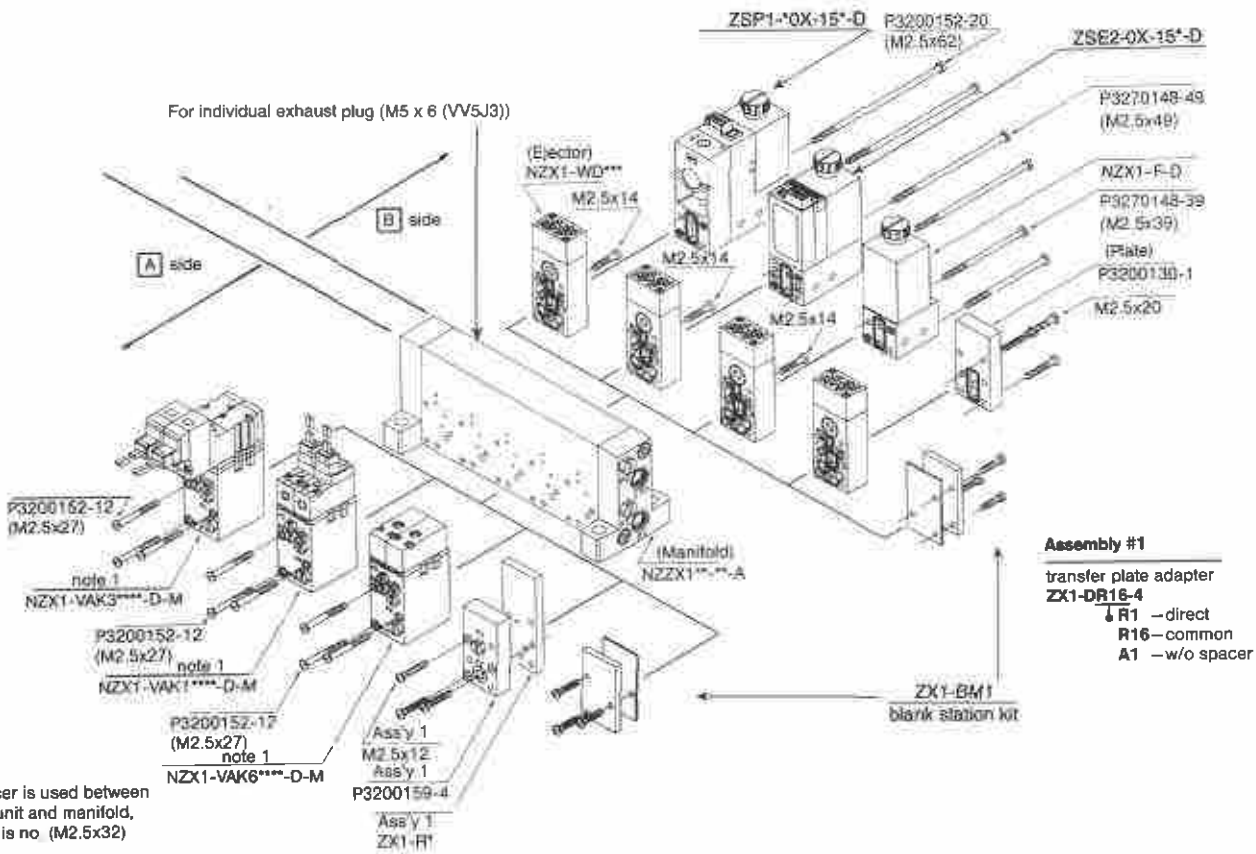
❺ **Replacement of Element (Filter)**
When the element becomes clogged, adsorption performance and response times are degraded. Stop operation and replace element. (Element Part No. ZX1-FE). Please ensure that gasket is in slot before re-installation.



lodule Assembly / Ejector Type

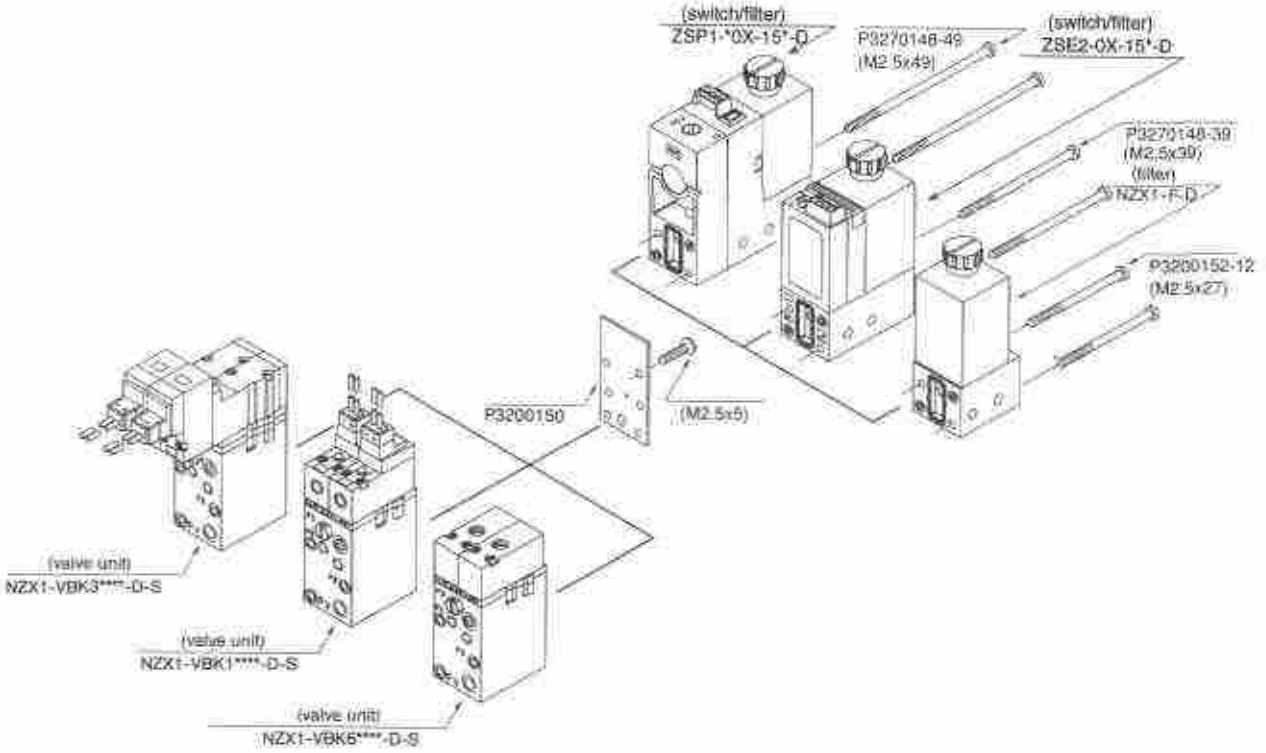


lanifold System / Ejector Type

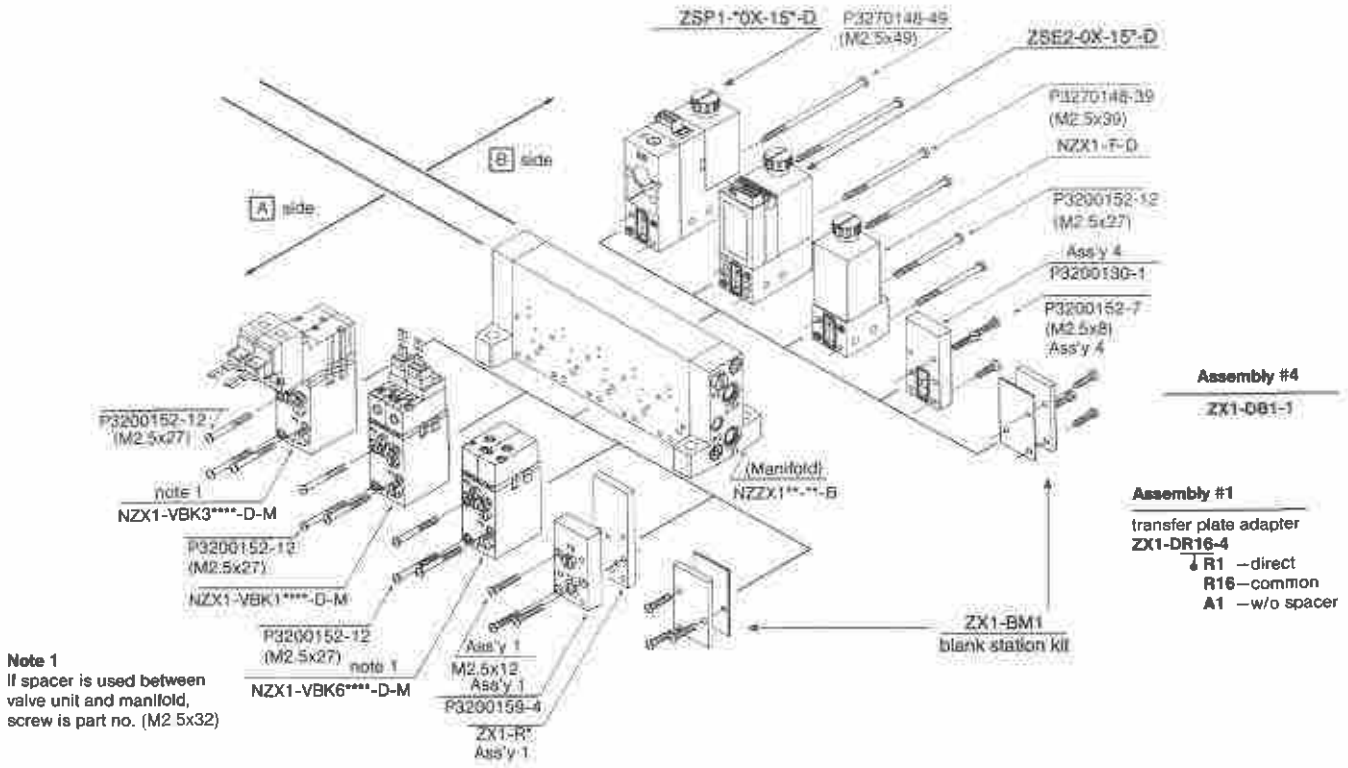


Note 1
If spacer is used between valve unit and manifold, screw is no (M2.5x32)

Module Assembly / External Vacuum Supply Type

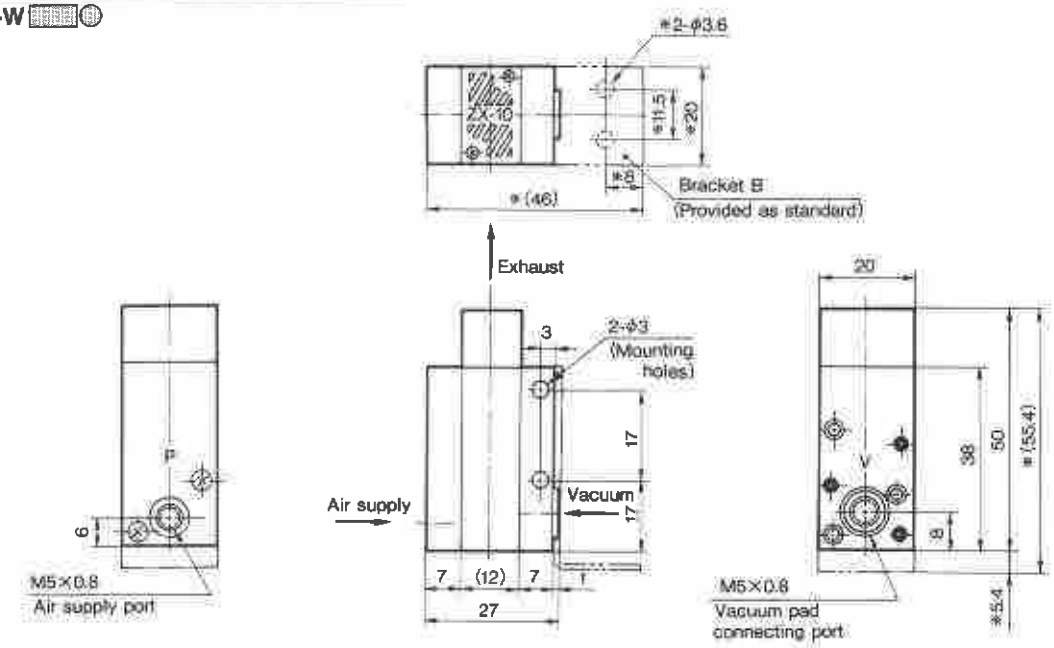


Manifold System / External Vacuum Supply Type



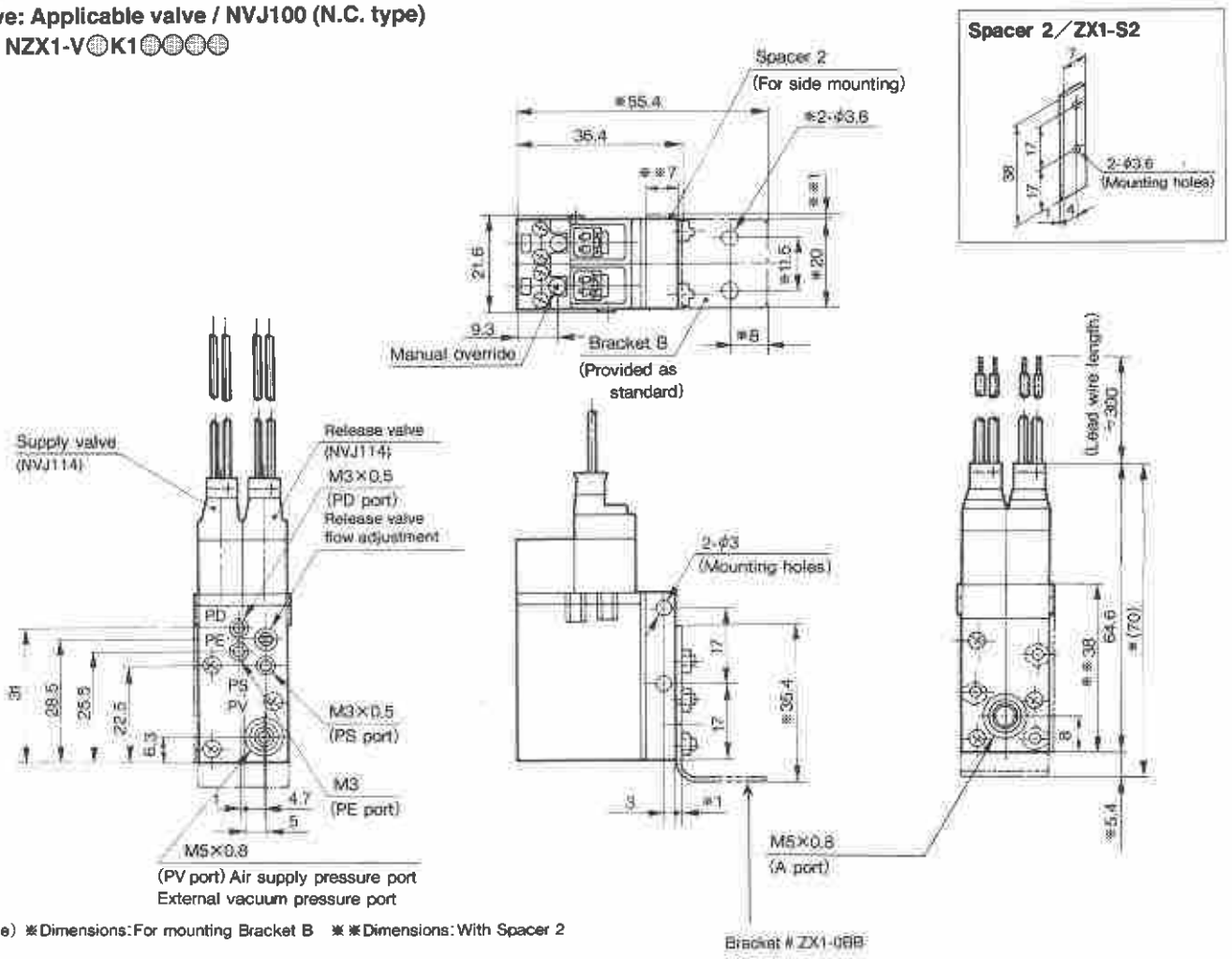
(Dimensions in millimeters)

ctor / NZX1-W▦▦◍



lve: Applicable valve / NVJ100 (N.C. type)

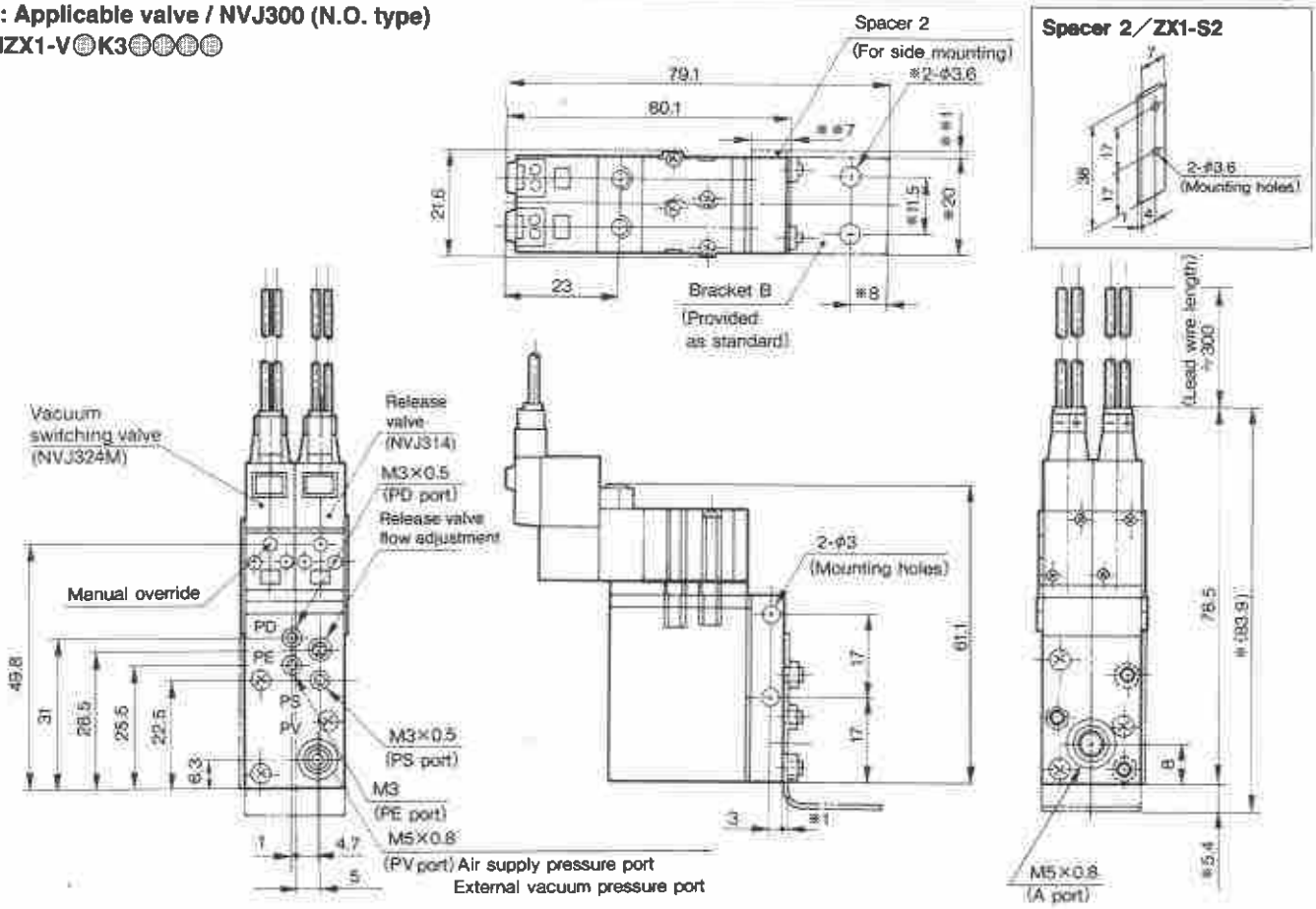
NZX1-V◍K1◍◍◍◍



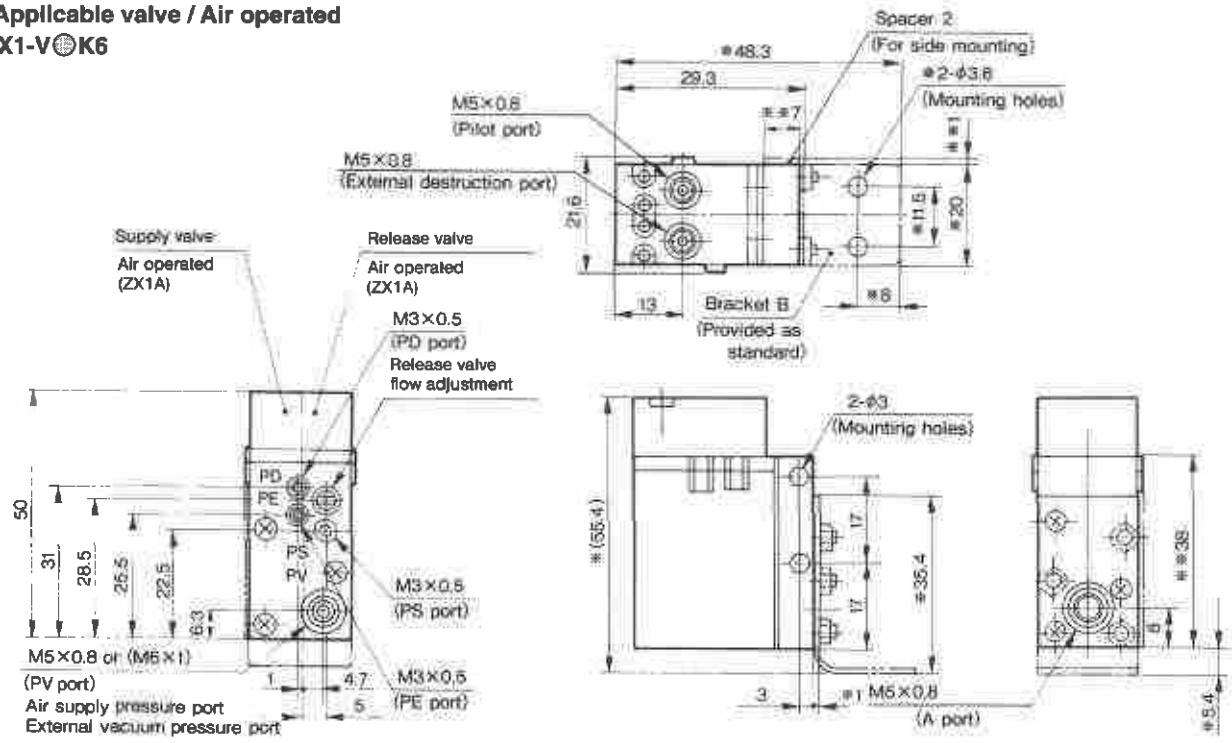
ote) *Dimensions: For mounting Bracket B **Dimensions: With Spacer 2

(Dimensions in millimeters)

Valve: Applicable valve / NVJ300 (N.O. type)
NZX1-V◍K3◍◍◍◍



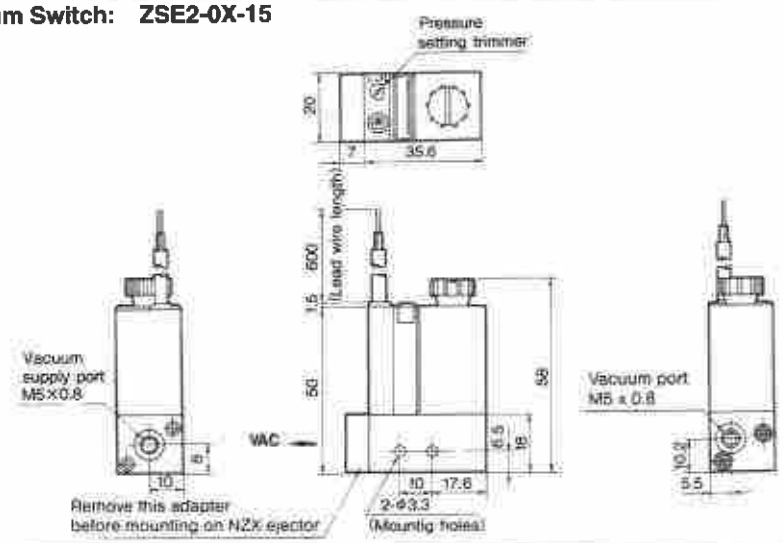
Valve: Applicable valve / Air operated
NZX1-V◍K6



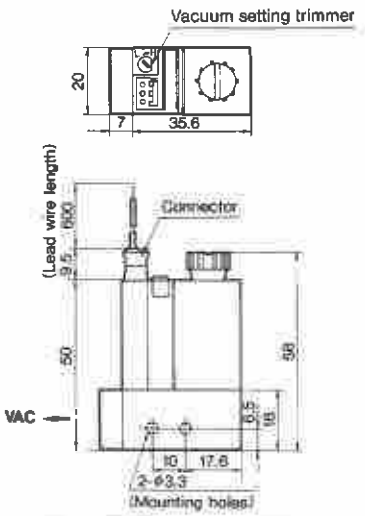
Note) ※Dimensions: For mounting Bracket B ※※Dimensions: With Spacer 2

(Dimensions in millimeters)

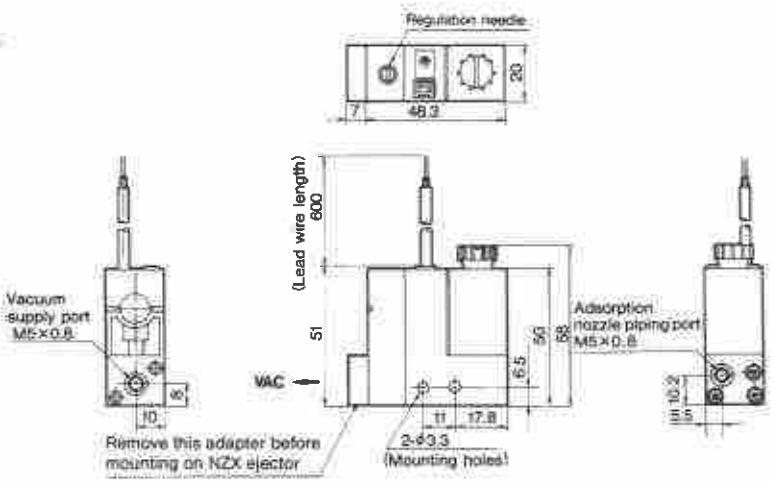
cuum Switch: ZSE2-0X-15



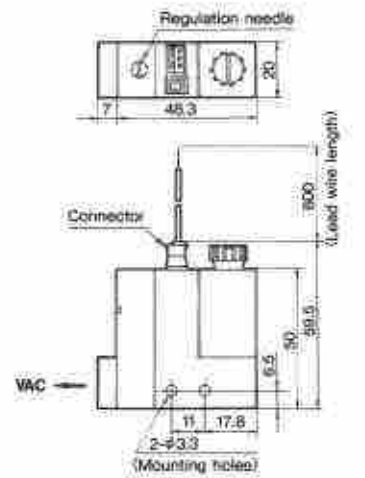
Connector type: ZSE2-0X-15C



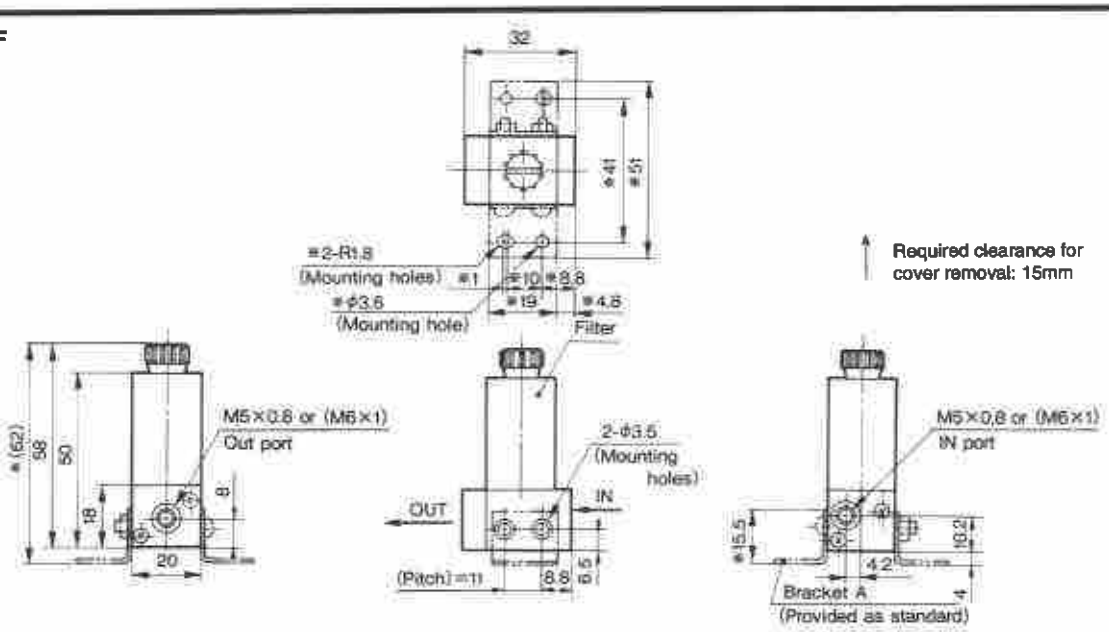
sorption confirmation switch: ZSP1-⊕0X-15



Connector type: ZSP1-⊕0X-15C



ter: NZX1-F

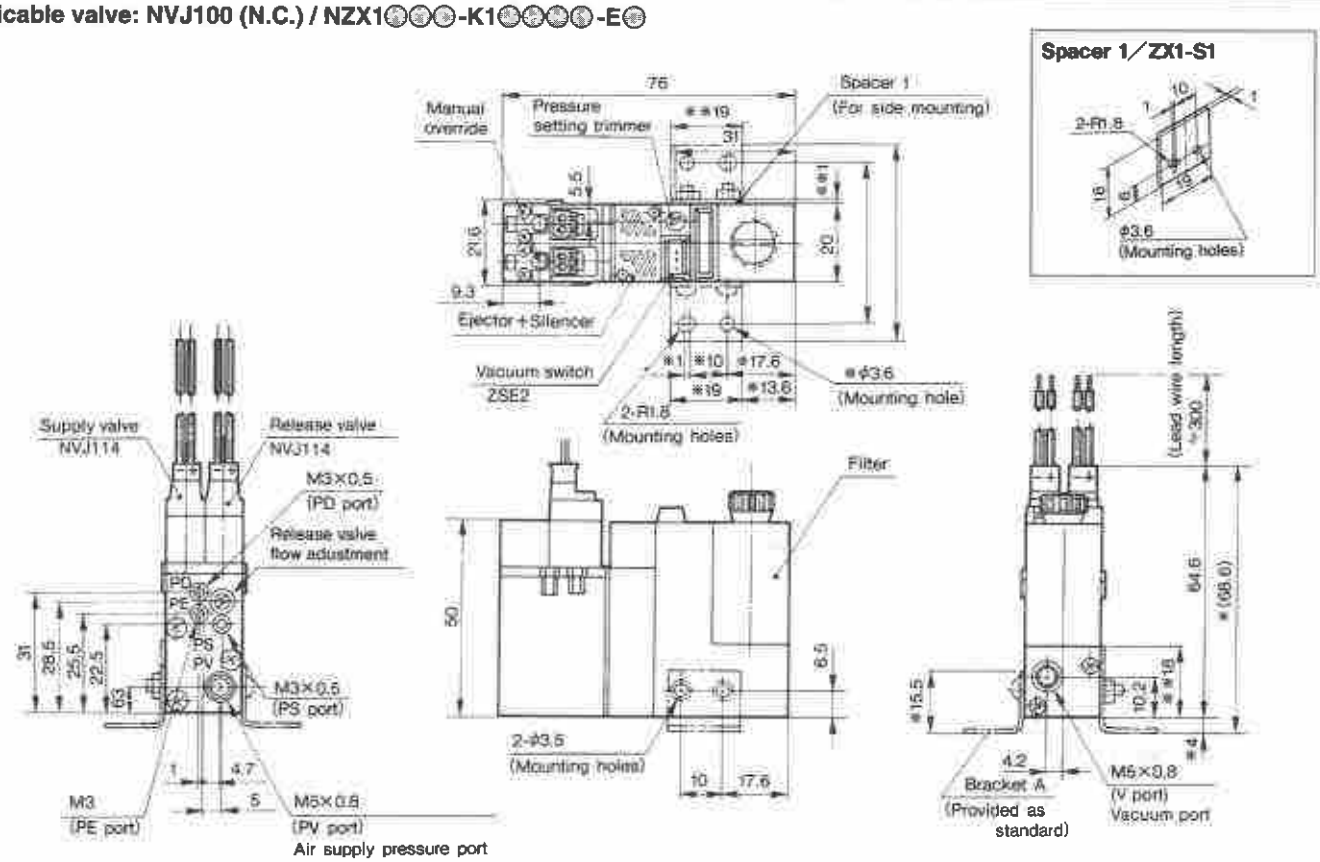


Note) *Dimension: For mounting Bracket A

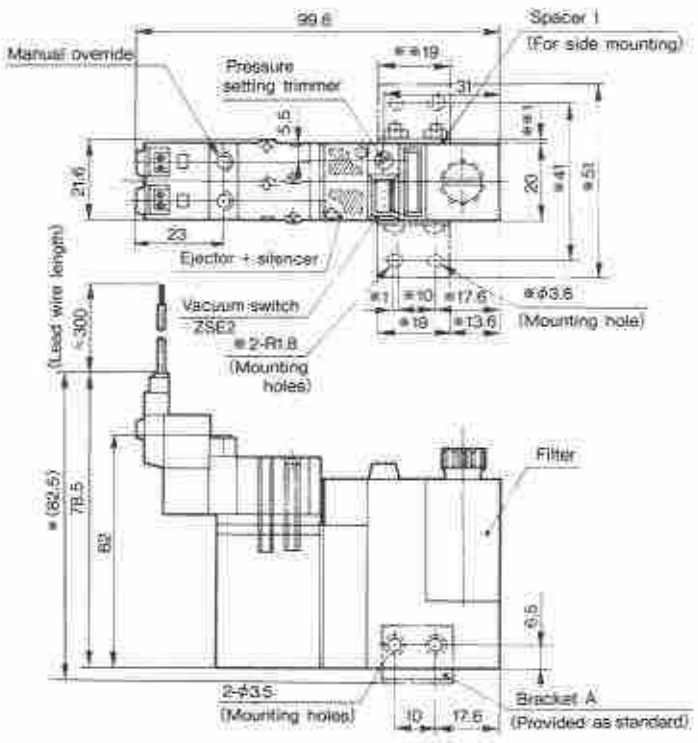
For Ejector System Use / Ejector + Valve + Vacuum Pressure Switch (ZSE2)

(Dimensions in millimeters)

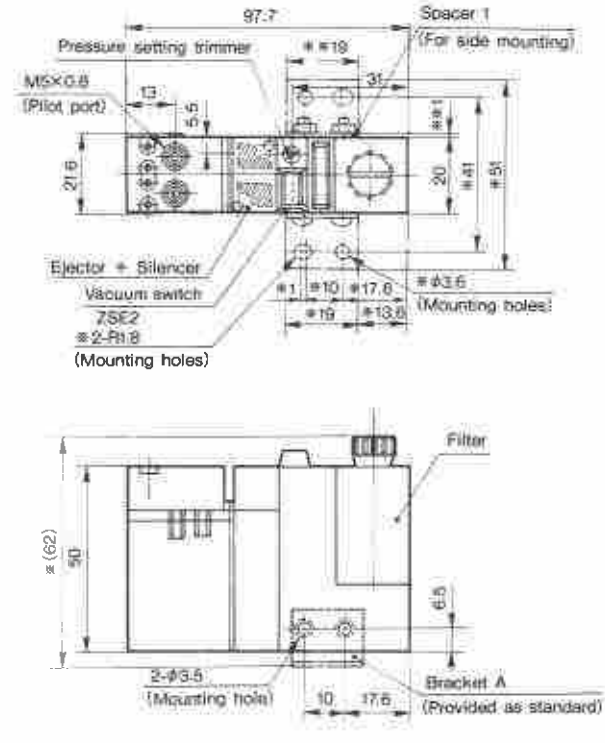
Applicable valve: NVJ100 (N.C.) / NZX1□□□-K1□□□□-E□



Applicable valve: NVJ300 (N.O.) / NZX1□□□-K3□□□□-E□



Applicable valve: Air operated / NZX1□□□-K6-E□

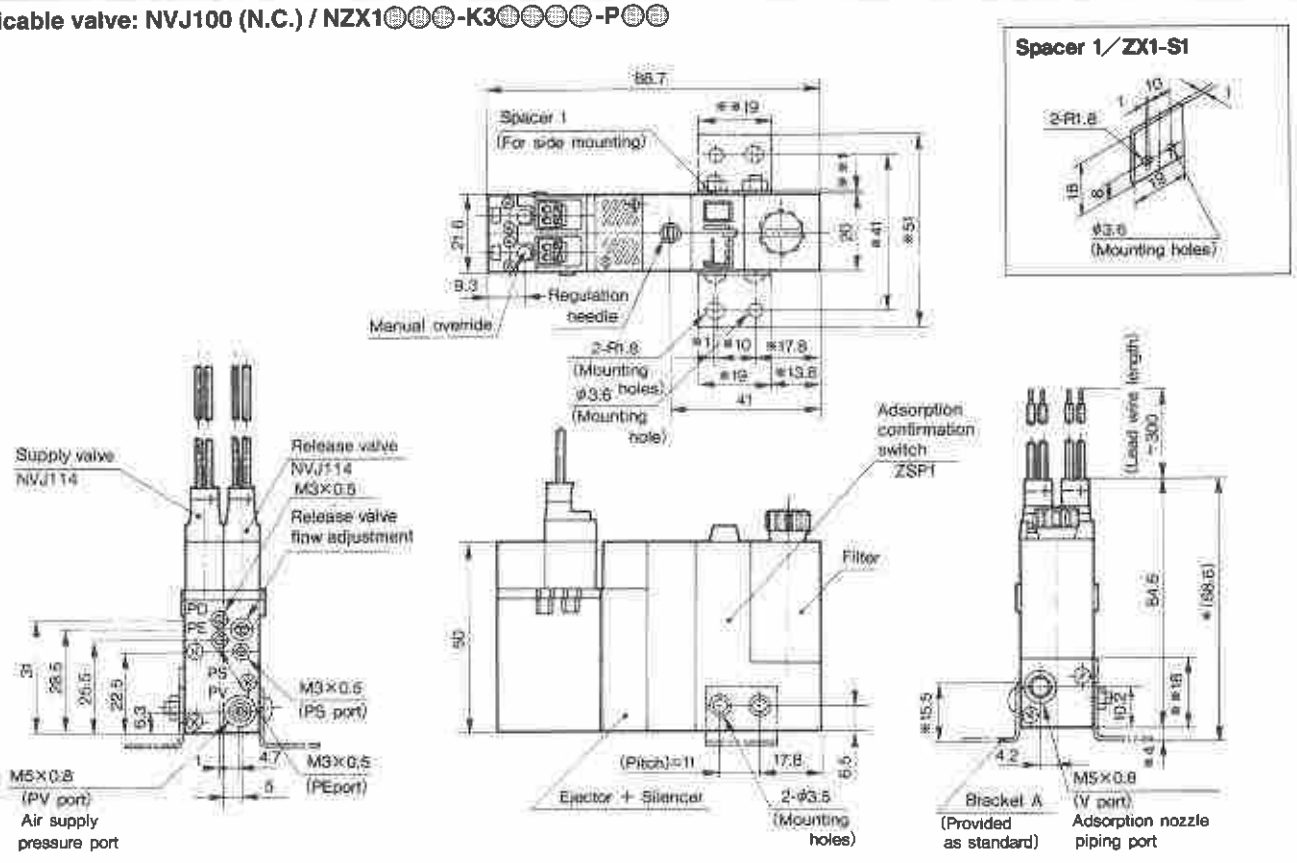


Note) ✻Dimensions: For mounting Bracket A ✻✻Dimensions: With Spacer 1

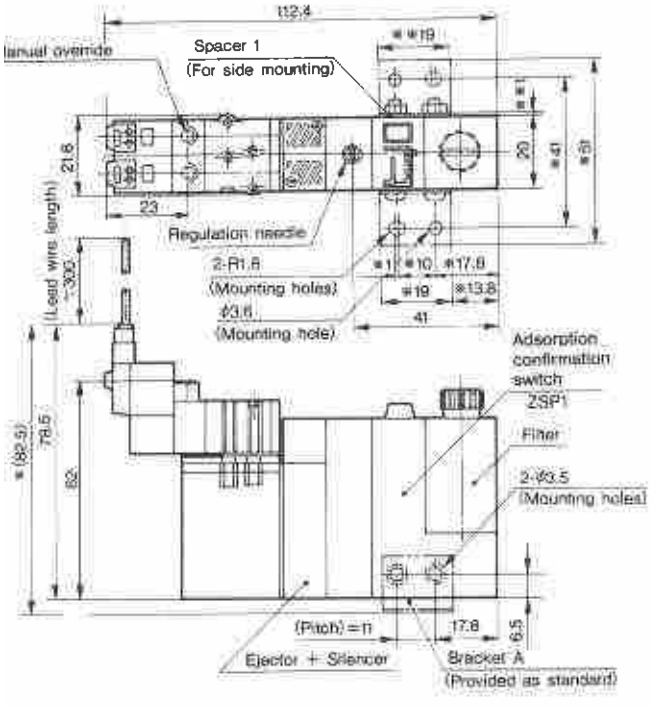
or Ejector System Use / Ejector + Valve + Adsorption Confirmation Switch (ZSP1)

(Dimensions in millimeters)

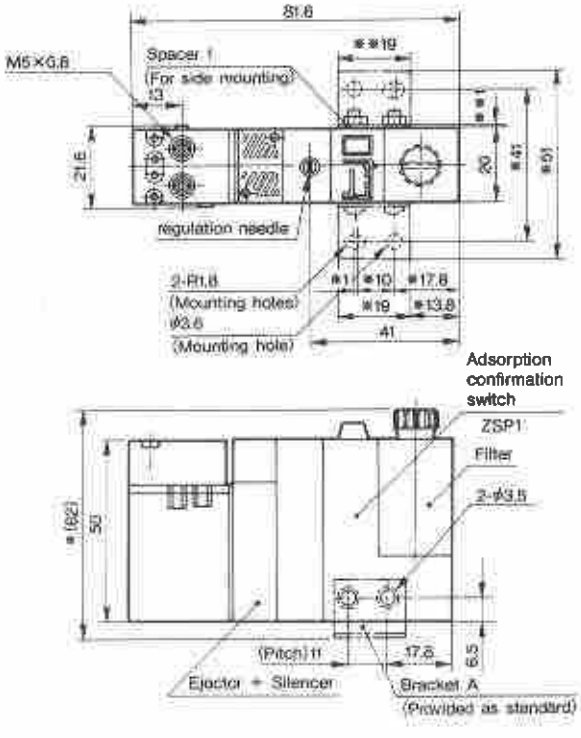
pplicable valve: NVJ100 (N.C.) / NZX1◎◎◎-K3◎◎◎◎-P◎◎



pplicable valve: NVJ300 (N.O.) / NZX1◎◎◎-K3◎◎◎-P◎◎



Applicable valve: Air operated / NZX1◎◎◎-K6◎-P◎◎

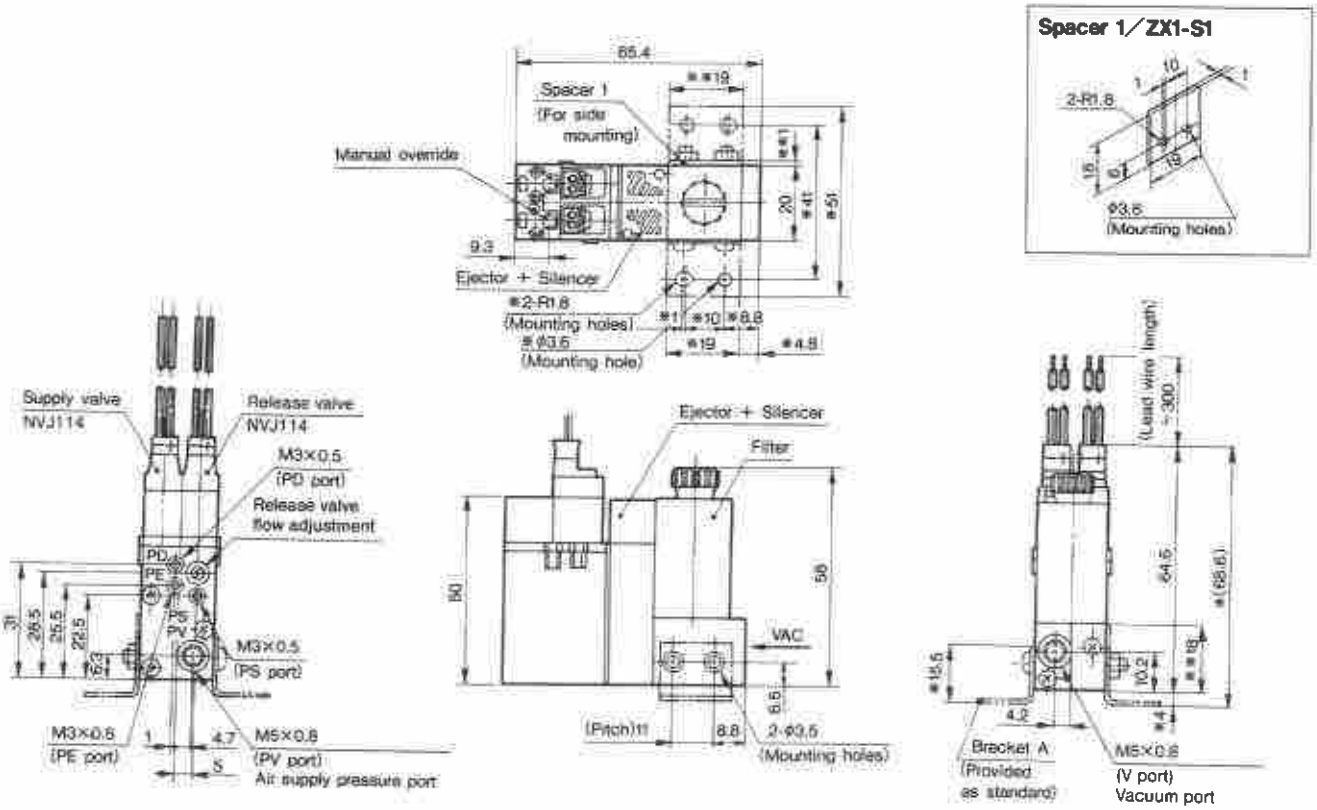


Note) ✻Dimensions: For mounting Bracket A ✻✻Dimensions: With Spacer 1

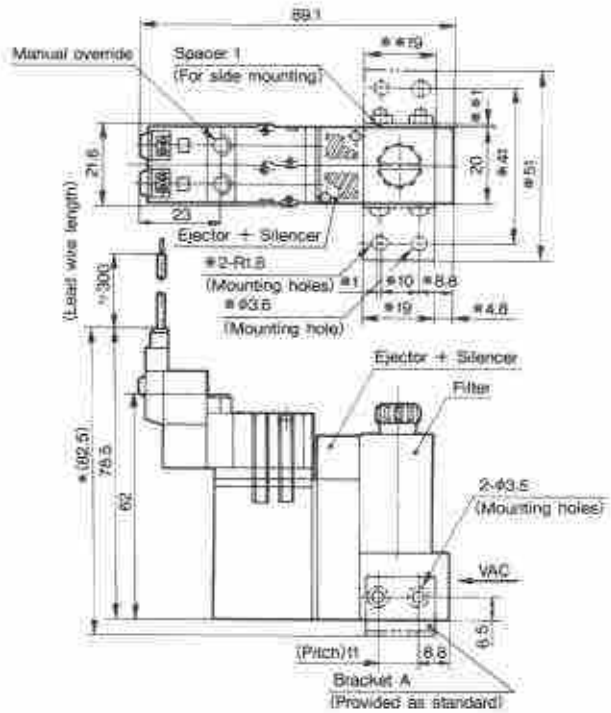
For Ejector System Use / Ejector + Valve + Filter

(Dimensions in millimeters)

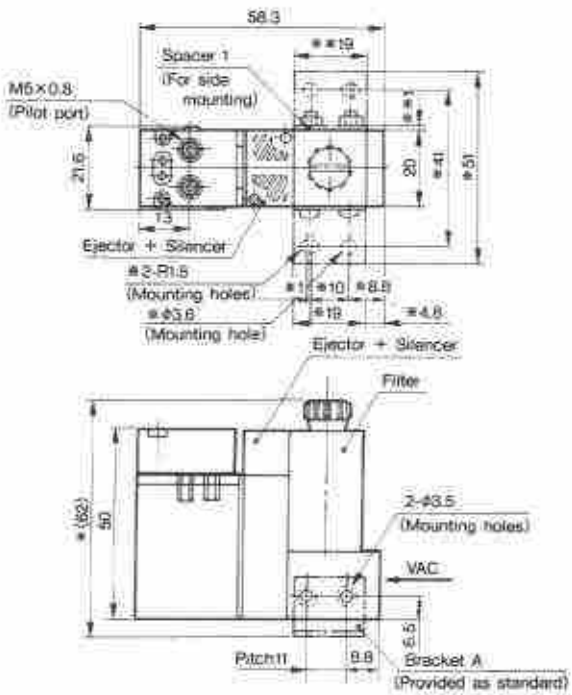
Applicable valve: NVJ100 (N.C.) / NZX1◎◎◎-K1◎◎◎◎-F



Applicable valve: NVJ300 (N.O.) / NZX1◎◎◎-K3◎◎◎◎-F



Applicable valve: Air operated / NZX1◎◎◎-K6-F

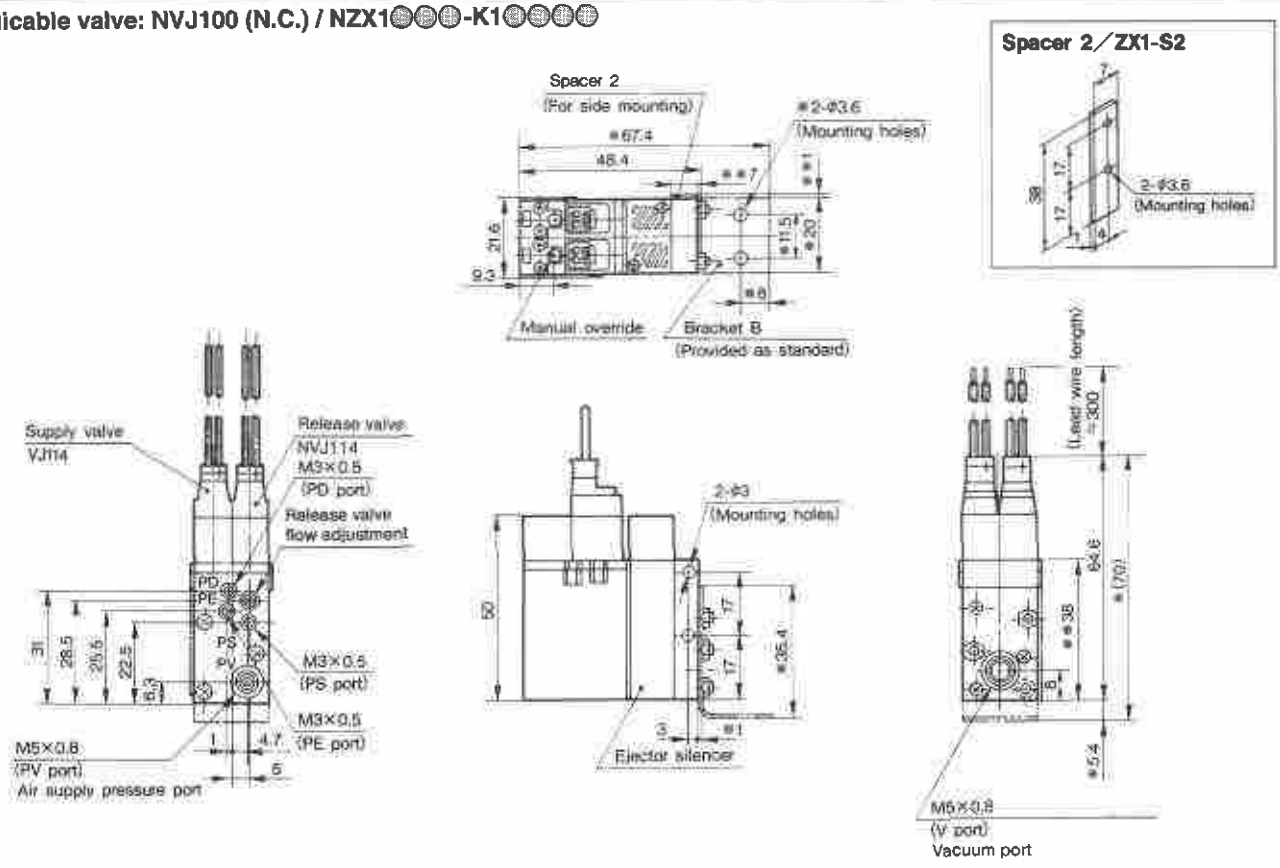


Note) ✱Dimensions: For mounting Bracket A ✱✱Dimensions: With Spacer 1

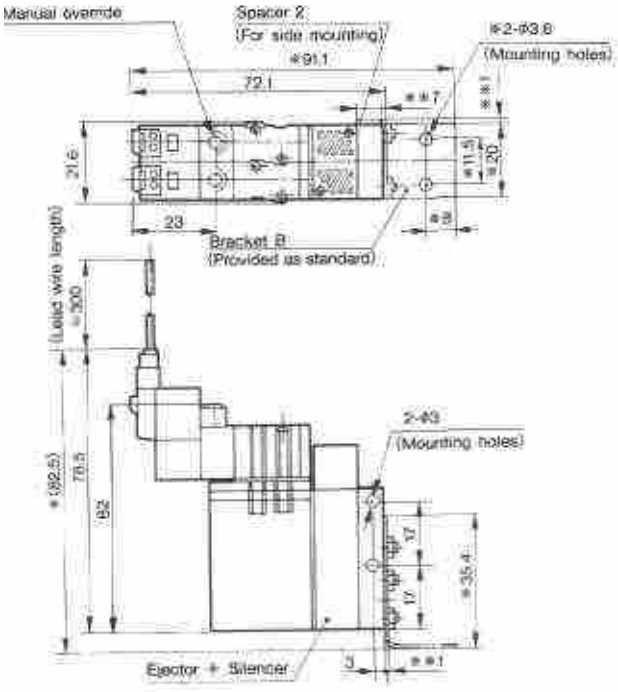
r Ejector System Use / Ejector + Valve

(Dimensions in millimeters)

plicable valve: NVJ100 (N.C.) / NZX1□□□-K1□□□□

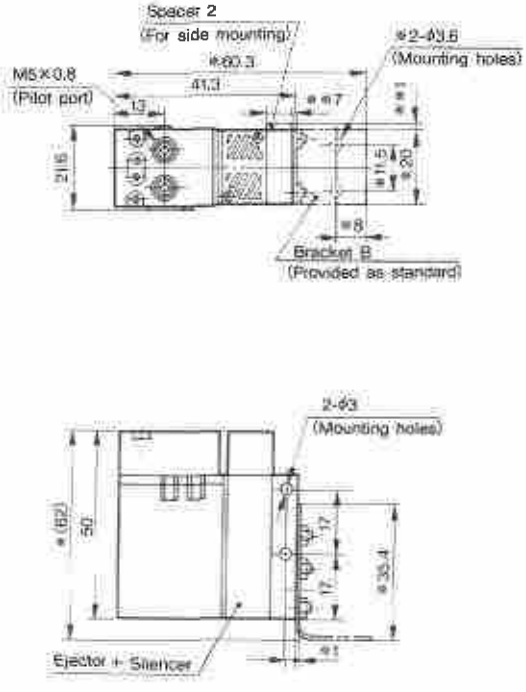


plicable valve: NVJ300 (N.O.) / NZX1□□□-K3□□□□



Note) ※Dimensions: For mounting Bracket B ※※Dimensions: With Spacer 2

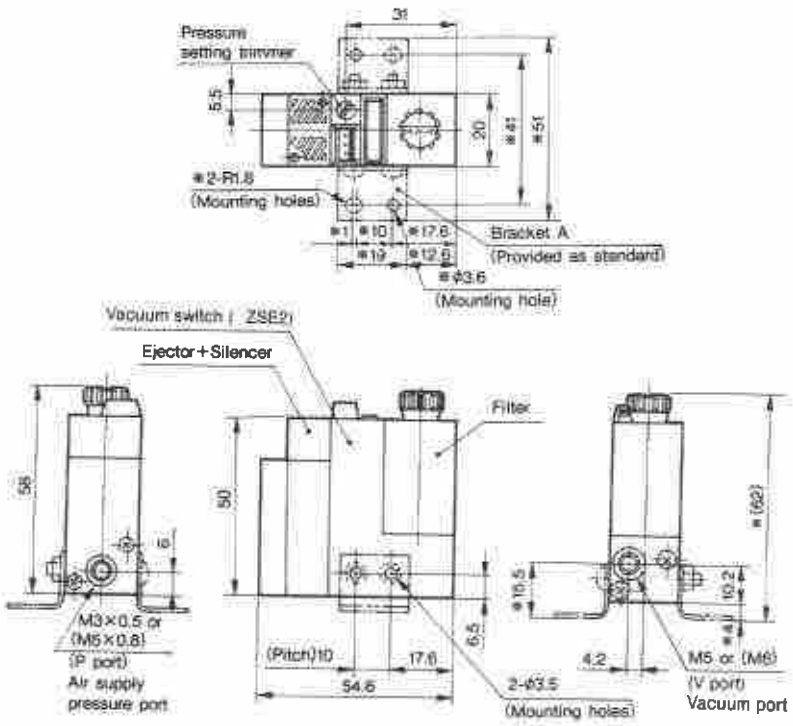
Applicable valve: Air operated / NZX1□□□-K6



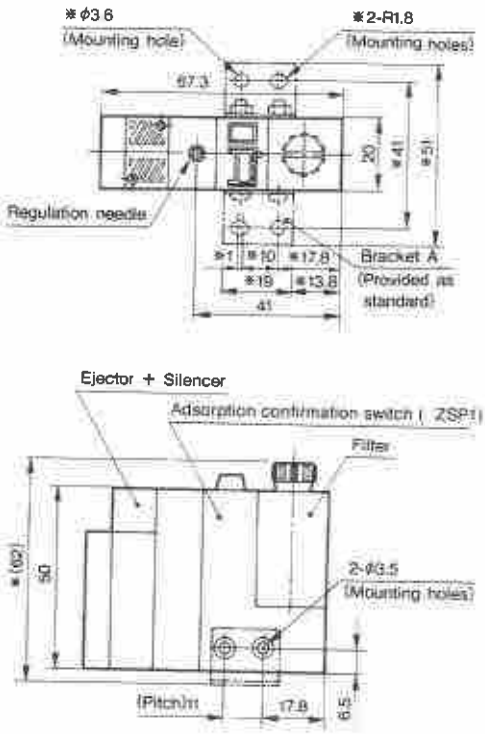
For Ejector System Use / Ejector + Vacuum Switch

(Dimensions in millimeters)

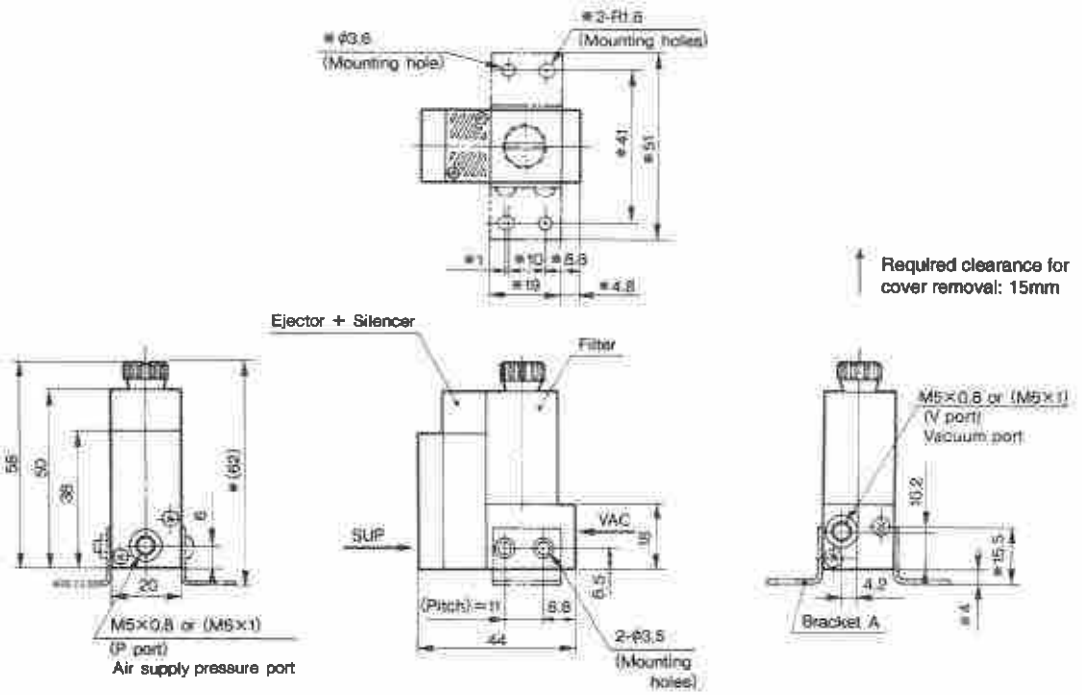
Vacuum pressure switch: ZSE2 / ZS1◯◯◯-E◯



Adsorption confirmation switch: ZSP1 / ZX1◯◯◯◯-P◯



NZX1◯◯◯-F

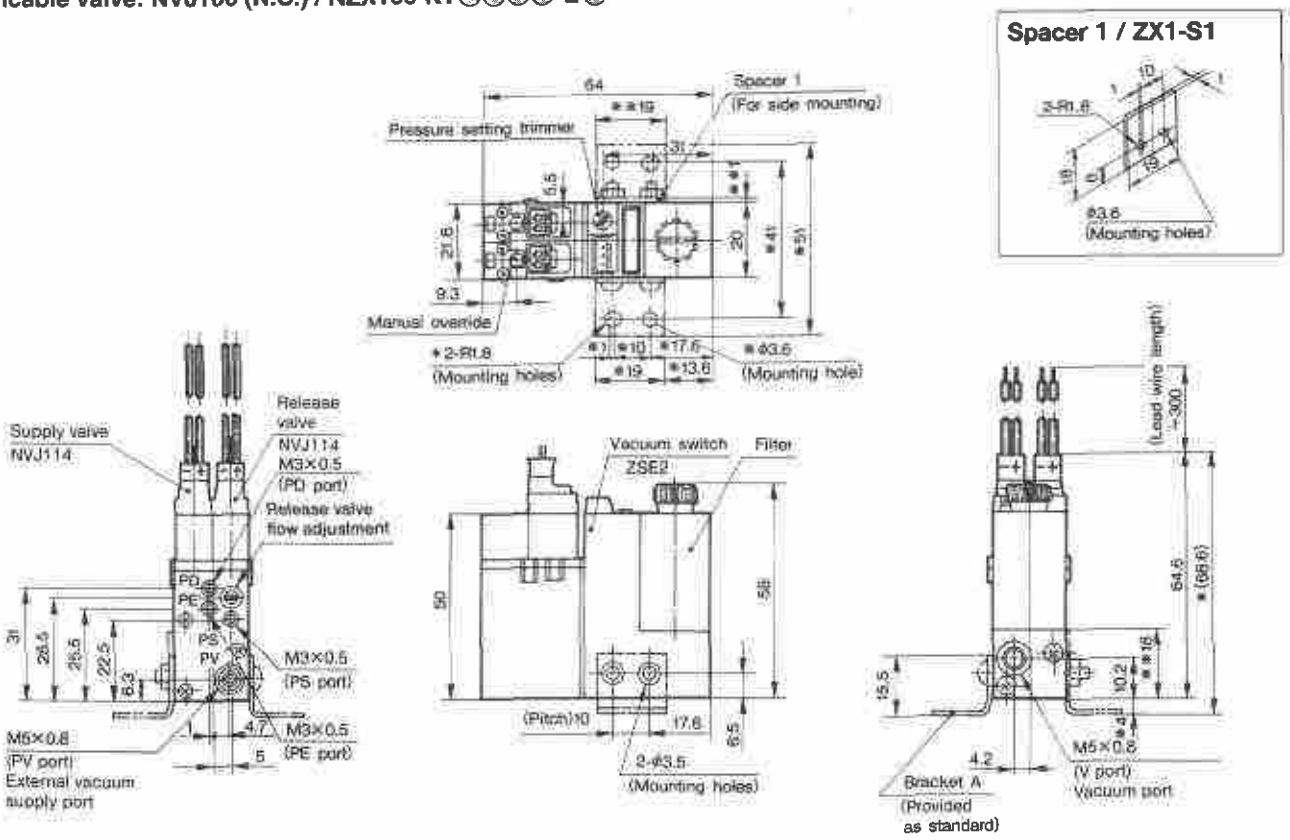


Note) ※Dimensions: For mounting Bracket A

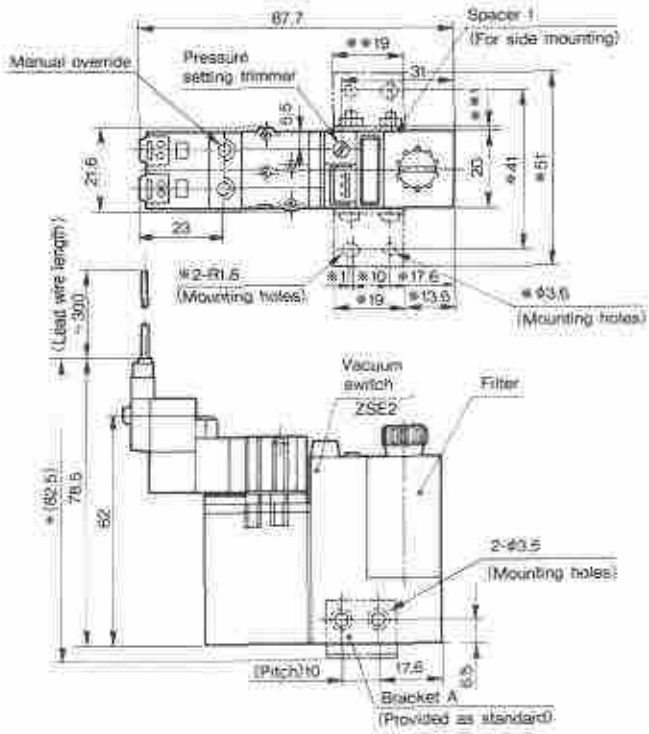
or External Vacuum System Use / Valve + Vacuum Switch (ZSE2)

(Dimensions in millimeters)

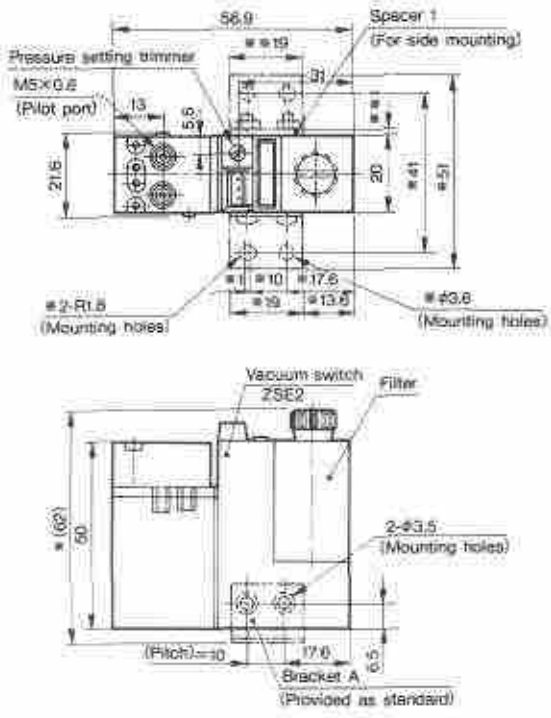
pplicable valve: NVJ100 (N.C.) / NZX100-K1 ⓐⓑⓒⓓ-E ⓔ



pplicable valve: NVJ300 (N.O.) / NZX100-K3 ⓐⓑⓒⓓ-E ⓔ



Applicable valve: Air operated / NZX100-K6-E

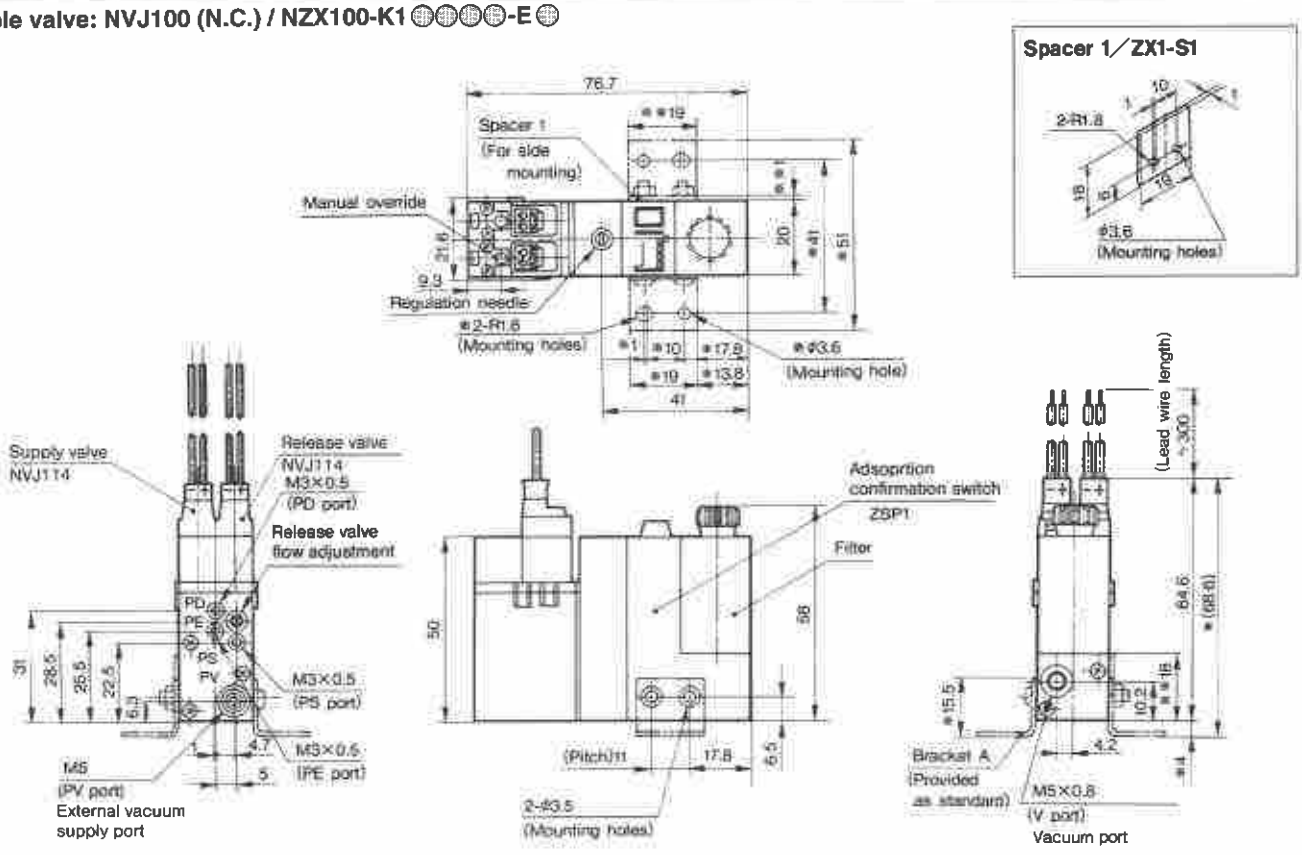


Note) ✻Dimensions: For mounting Bracket A ✻✻Dimensions: With Spacer 1

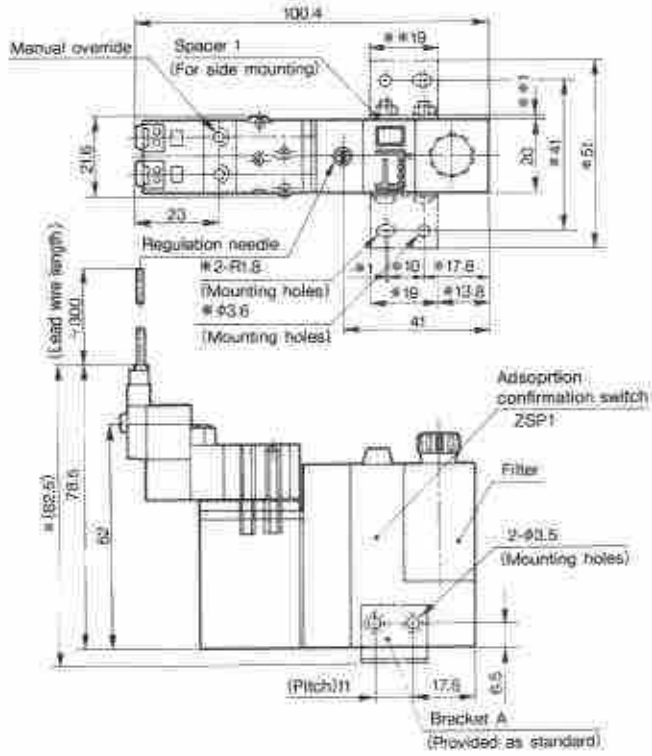
For External Vacuum System Use / Valve + Vacuum Switch (ZSP1)

(Dimensions in millimeters)

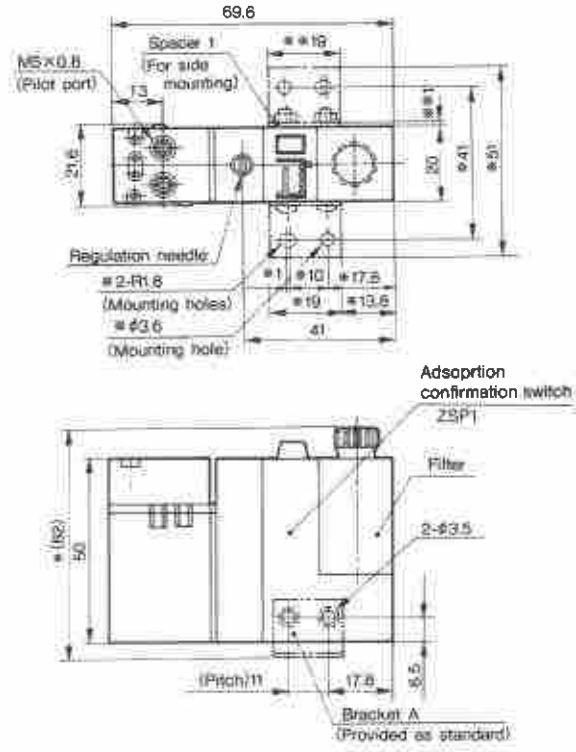
Applicable valve: NVJ100 (N.C.) / NZX100-K1□□□□-E□



Applicable valve: NVJ300 (N.O.) / NZX100-K3□□□□-P□□



Applicable valve: Air operated / NZX100-K6-P□□

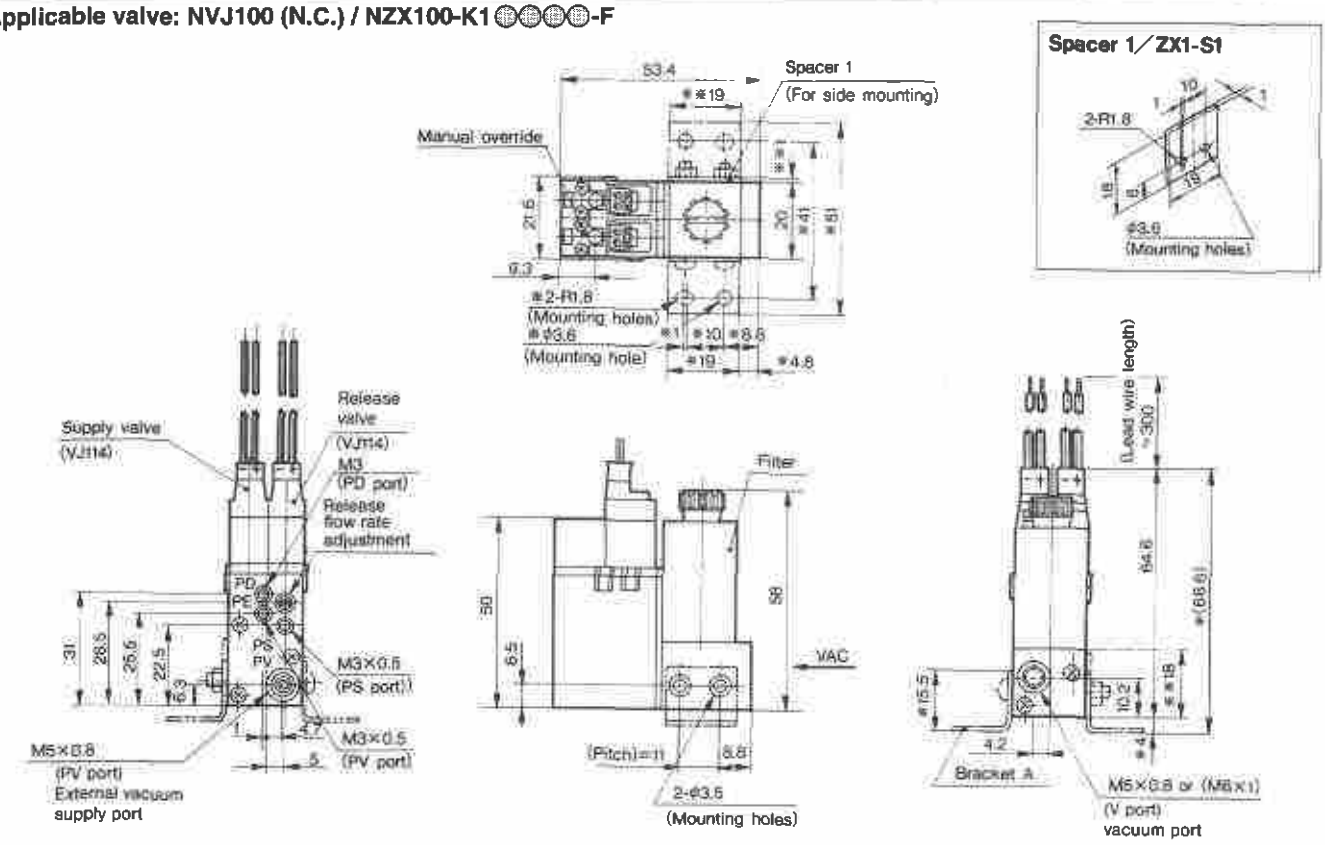


Note) *Dimensions: For mountion Bracket A **Dimensions: With Spacer 1

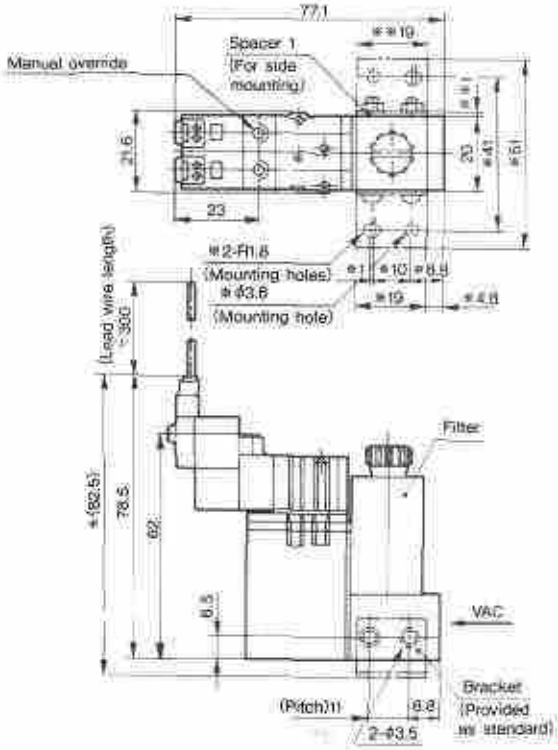
For External Vacuum System Use / Valve + Filter

(Dimensions in millimeters)

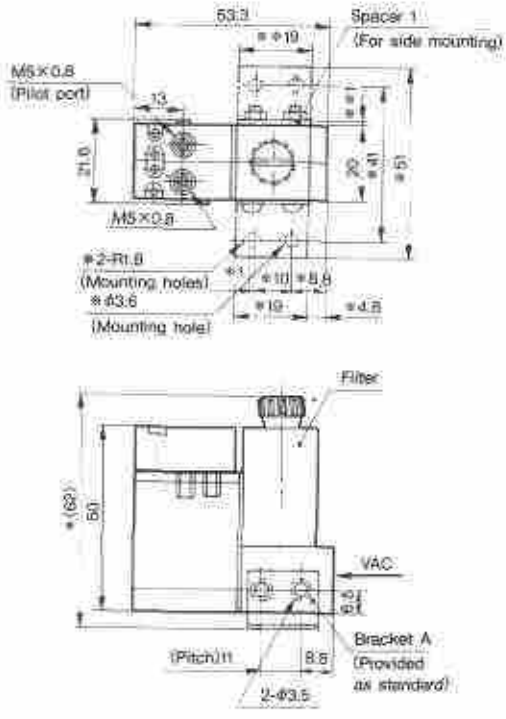
Applicable valve: NVJ100 (N.C.) / NZX100-K1□□□□-F



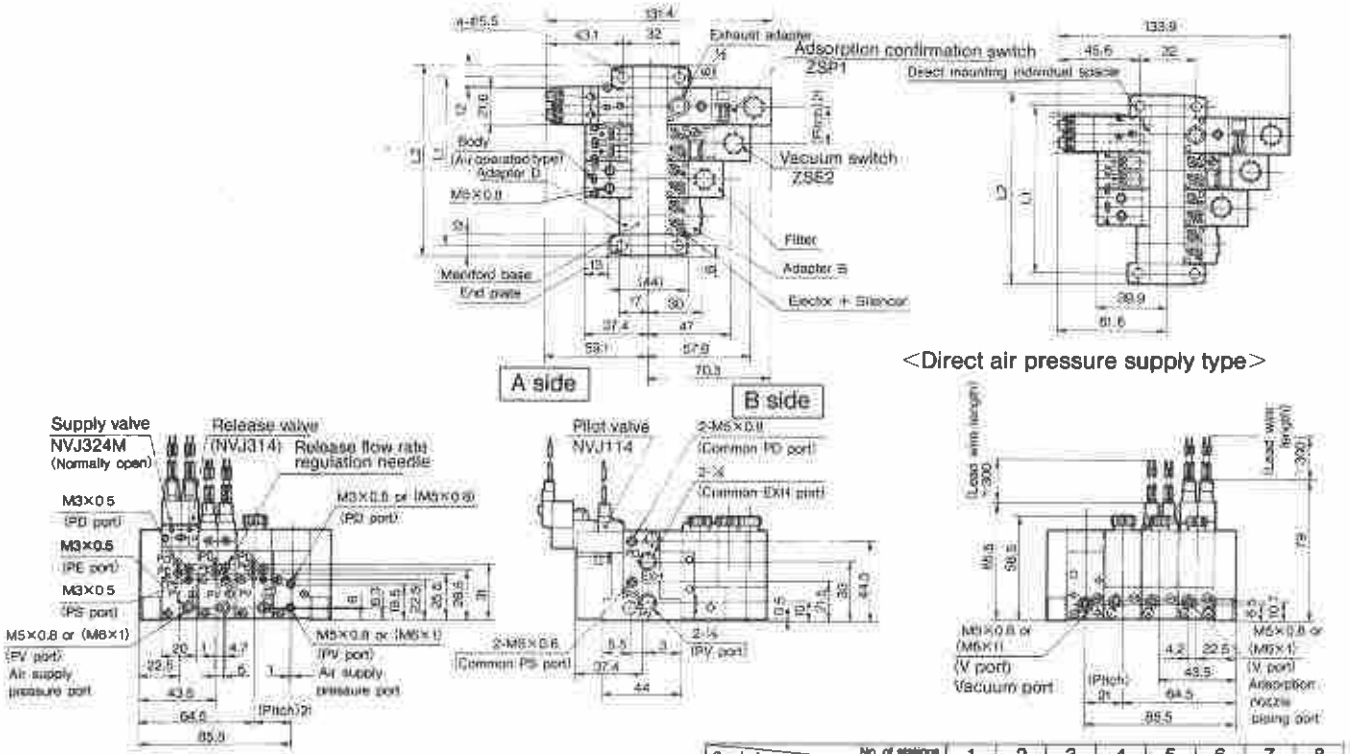
Applicable valve: NVJ300 (N.O.) / NZX100-K3□□□□-F



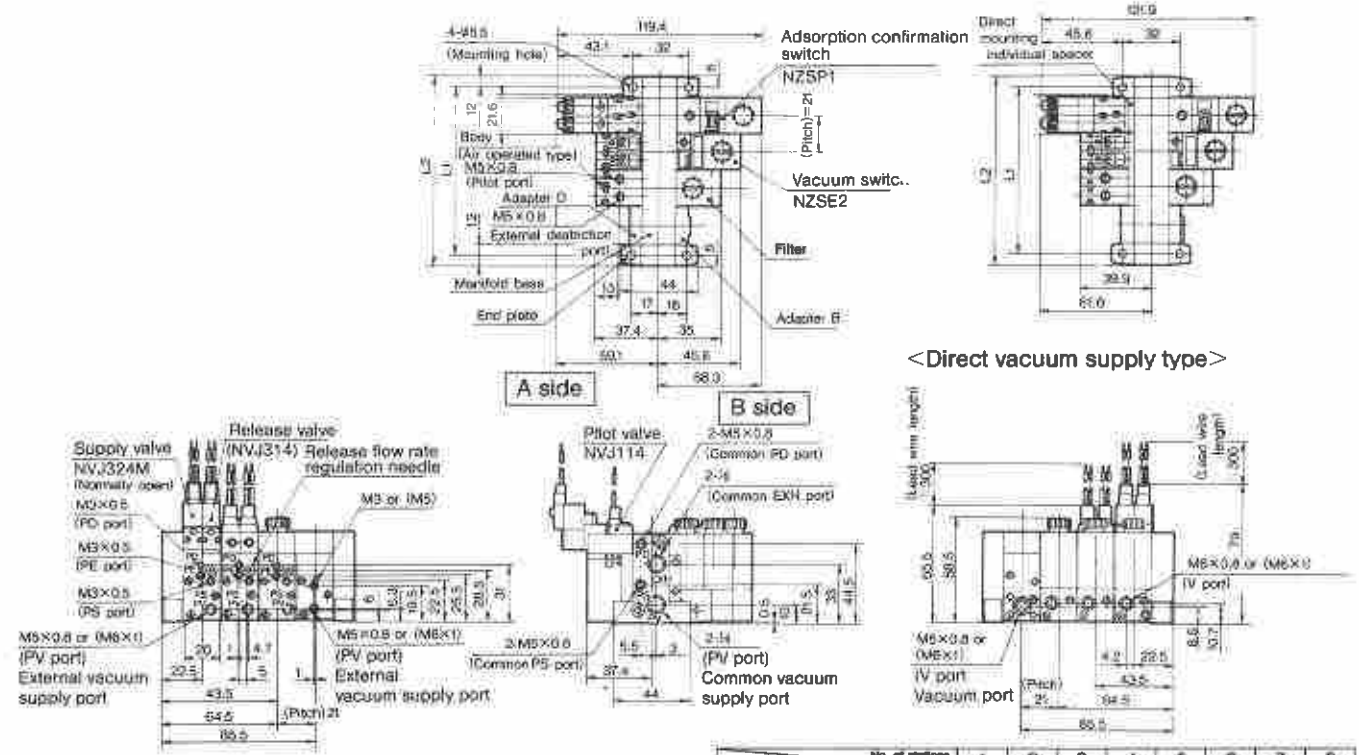
Applicable valve: Air operated / NZX100-K6-F



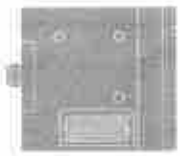
Note) ※Dimensions: For mounting Bracket A ※※Dimensions: With Spacer 1



Symbol \ No. of stations	1	2	3	4	5	6	7	8
L_1	33	54	75	96	117	138	159	180
L_2	45	66	87	108	129	150	171	192

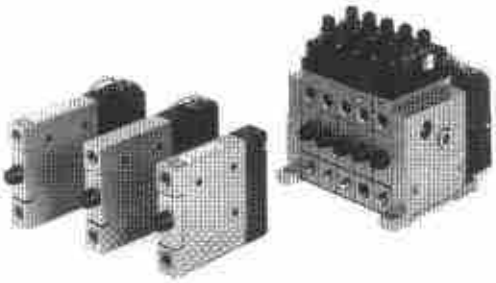


Symbol \ No. of stations	1	2	3	4	5	6	7	8
L_1	33	54	75	96	117	138	159	180
L_2	45	66	87	108	129	150	171	192



Vacuum Ejector System

NZM Series



All in One!

- Internal suction filter and silencer
- Air supply valve
- Vacuum release valve
- Integral vacuum switch (solid-state or diaphragm)

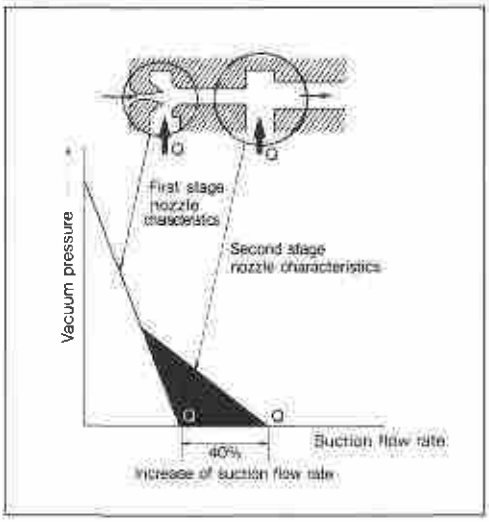
Vacuum Pressure to -25 in-Hg (-630 mmHg).

5 different nozzle diameters for efficient application.

Suction Flow Increased by 40%.

2 stage nozzle suction flow is 40% higher than traditional designs.

2-stage nozzle design



Compact & Lightweight.

0.6in. (15.5mm) width; 0.88lbs. (400gf) weight.

Fully Featured Vacuum Switches.

High accuracy solid state types feature adjustable hysteresis, dual setting outputs, and optional analog output. NPN or PNP type models available.

Multiple Unit Manifolding.

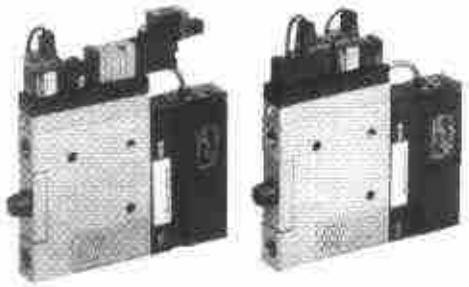
Stacking type units can be manifolded together. Maintenance and adjustment possible without disassembling.

- EXH type – Common
- SUP type – Common or Individual

See Also

ZMA series for built-in solid-state release valve timer. Request flyer #US98-E458.

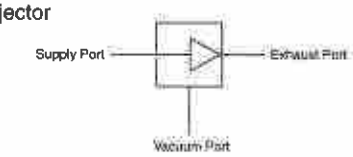
Vacuum Ejector System
NZM Series



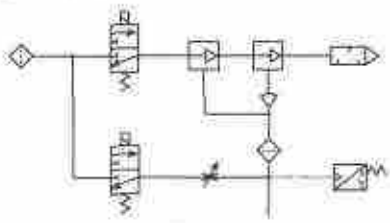
Manifold Type

Symbol

Ejector



System Circuit



All In One.

Internal suction filter and silencer.
Air supply valve.
Vacuum release valve.
Solid state vacuum switch or
Diaphragm vacuum switch.

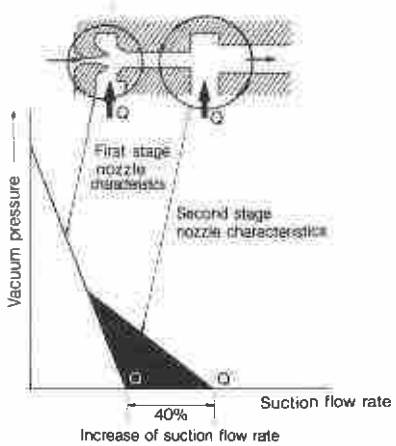
Manifold

Stacked manifold.
Common exhaust.
Common or individual supply.
Maintenance and adjustment is possible without disassembling the manifold.

Increased Flow.

Suction flow rate is 40% higher than traditional designs.

Suction flow rate is increased by two stage nozzles



Increase of suction flow rate

Thin and lightweight.

0.6 inch (15mm) width.
Full system's weight is 0.88 lbs. (400gf).*

*NZM○○1HT-K5LZ-E15

NZM Series

NZM - Nozzle Diameter - Supply Body Type - Supply Pressure

Nozzle Diameter
- **05** (0.5mm)
- **07** (0.7mm)
- **10** (1.0mm)
- **13** (1.3mm)

Supply Body Type
- **1**—With valve
- **2**—Without valve
- **3**—For manifold common supply, with valve
- **4**—For manifold common supply, without valve
- **5**—For manifold individual supply, with valve
- **6**—For manifold individual supply, without valve

Supply Pressure
- **H**—70 PSI
- **M**—50 PSI*

*Except NZM05

Vacuum Performance

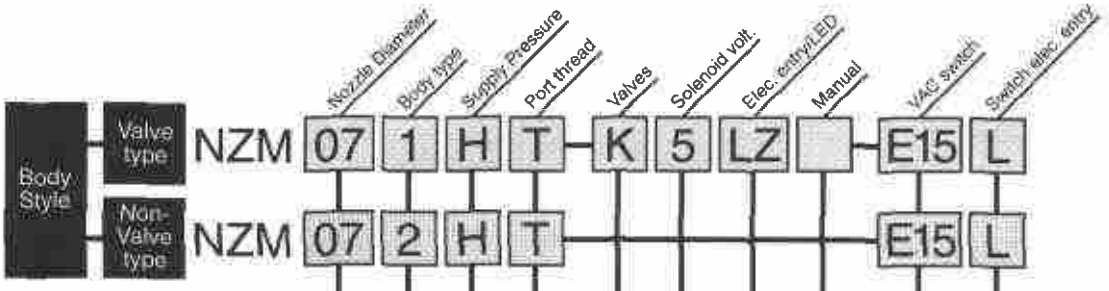
Model	Standard supply pressure	Max. vacuum pressure	Max. suction flow SCFM (Nℓ/min)	Air consumption SCFM (Nℓ/min)
NZM05○H	70 PSI (5 kgf/cm²)	-25 inch Hg (-630mm Hg)	0.64 (18)	0.42 (12)
NZM07○H			0.85 (24)	0.81 (23)
NZM10○H			1.27 (36)	1.63 (46)
NZM13○H			1.41 (40)	2.40 (68)
NZM07○M	50 PSI (3.5 kgf/cm²)		0.71 (20)	0.61 (16)
NZM10○M			0.92 (26)	1.13 (32)
NZM13○M			1.27 (36)	1.66 (47)

Specifications

Operating pressure	30~80 PSI (2~5.5kgf/cm²)
Operating temperature	40~140°F (5~60°C)*
Operating valve (Air supply and release valve)	Main: Poppet valve Pilot: NVJ114 (NVJ324M for N.O. type supply)
Switch	Solid state type switch (ZSE1) Diaphragm type switch (ZSM1)
Suction filter	30μm, PE (Polyethylene)

* 40~120°F (5~50°C) when using with valves

How to Order



Options highlighted in blue:

Preferred Option Program

(See page 2)

Nozzle Dia.

05	0.5mm
07	0.7mm
10	1.0mm
13	1.3mm

Body/Supply type

Body style	No. insert	Mounting / Supply type
Valve type	1	Individual use
	3	Manifold use / Common SUP
	5	Manifold use / Indiv. SUP
Non-Valve type	2	Individual use
	4	Manifold use / Common SUP
	6	Manifold use / Indiv. SUP

Supply Pressure

H	70 PSI (5kgf/cm²)
M*	50 PSI (3.5kgf/cm²)

*except NZM05

Port thread

T	NPTF

Valve configuration

J	Supply valve only
K	Supply and release valve
A	Supply valve (N.O.) only
B	Supply valve (N.O.) and release valve

Valve solenoid volt.

*1	AC100V 50/60Hz
*3	AC110V 50/60Hz
5	DC24V
6	DC12V
V	DC6V
S	DC5V
R	DC3V

* Uses special connector ass'y with rectifier to convert AC→DC. Requires use of special wire connector.

Valve electric entry

G	Grommet 12" (0.3m) (DC types only)
L	L type plug connector 12"(0.3m)
LZ	L type plug connector 12" (0.3m) w/LED and surge suppressor
LO	L type plug receptacle (no connector)
LOZ	L type plug receptacle (no conn.) w/LED and surge suppressor

Valve manual override

(blank)	Non-locking push type
B	Locking type (screw)

Switch Electric Entry

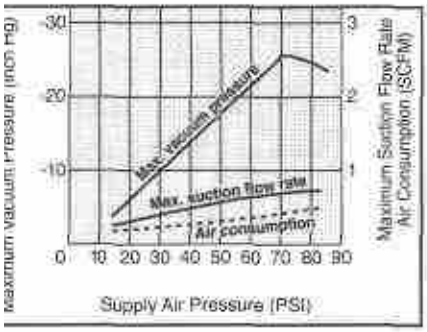
(blank)	Grommet 24" (0.6m)	Switch type :E
L	Grommet 120" (3m)	
C	Plug connector 24" (0.6m)	
CL	Plug connector 120" (3m)	
(blank)	Grommet 20" (0.5m)	Switch type :M
L	Grommet 120" (3m)	

Vacuum Switch

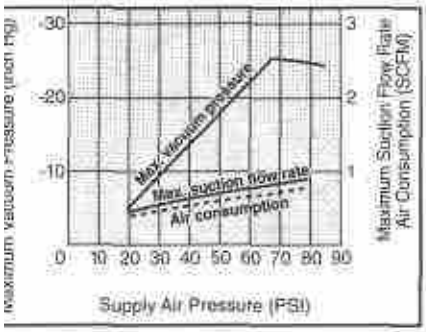
(blank)	Without vacuum switch	
E14	1 setpoint • Non-analog • 3 rev. adjust.	Solid-State (DC 12–24V)
E15	1 setpoint • Non-analog • 200° adjust.	
E16	2 setpoints • Non-analog • 3 rev. adjust.	
E17	2 setpoints • Non-analog • 200° adjust.	
E18	1 setpoint • With analog OP • 3 rev. adjust.	
E19	1 setpoint • With analog OP • 200° adjust.	
E55	1 setpoint • Non-analog (PNP) • 3 rev. adj.	
M15	1 setpoint • Diaphragm type (non-contact) (DC10–28V)	
M21	1 setpoint • Diaphragm type (Reed) (AC100–110V)	

ejector Characteristics

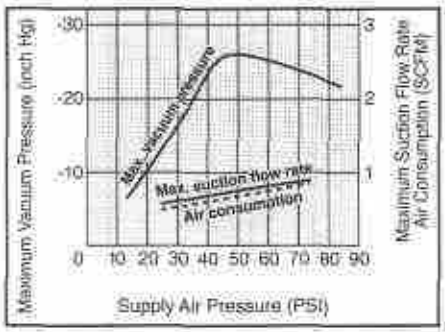
ZM05○H



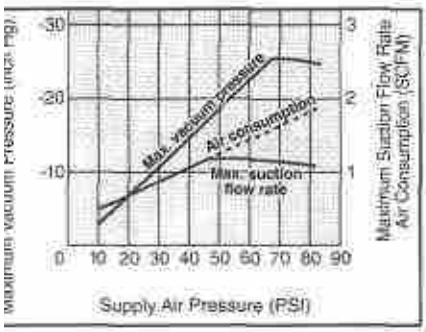
ZM07○H



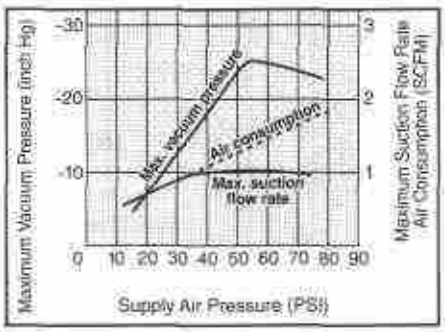
NZM07○M



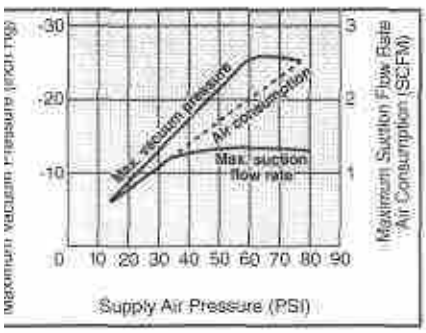
ZM10○H



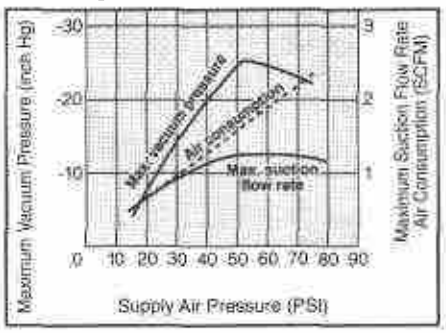
NZM10○M



ZM13○H



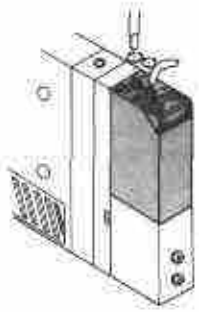
NZM13○M



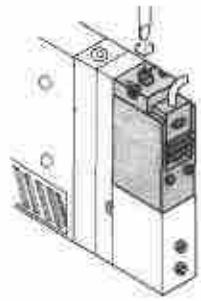
Operating Instructions

Switch Adjustment

Solid state switch adjustment



Diaphragm switch adjustment



Notes

Setting the solid state type switch

"SET" is for adjusting the actuation pressure level set point.
"HYS" is for adjusting the hysteresis allowance of the set point. (1~10%)

Adjust "SET" pressure setting, then adjust "HYS", and finally, readjust "SET" pressure setting.

Setting solid state type switch E16/ E17

"SET1" is for adjusting the actuation pressure level of output 1 (black lead wire, red LED).

"SET2" is for adjusting output 2 (white lead wire, green LED).

Setting the diaphragm type switch.

"SET" is for adjusting the actuation pressure level (set point).

Note: ***Do not use excessive force*** **when adjusting trimmers with a screwdriver.**

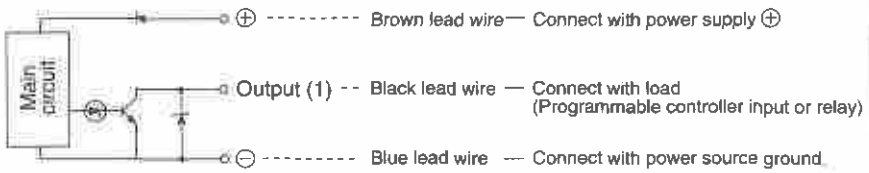
ıcuum Switch Specifications

	ZSE1 Solid state type	ZSM1 Diaphragm type	
ınsor type	Solid state	Diaphragm mechanism	
vitch type	Electrical circuit	Magnetic non-contact	Magnetic reed
essure range	0~-30 inch Hg (0~-760mm Hg)	-8~-26 inch Hg (-200~-660mm Hg)	
fferential	1~10% of setting pressure (see note 1)	Max. 4.3 inch Hg (110mm Hg)	Max. 5.9 inch Hg (150mm Hg)
curacy	±3% FS (Including temperature characteristics)	—	
pply voltage	12~24VDC (Ripple ± 10% or less)	24VDC	115VAC
tput ON - OFF	Open collector NPN (type '55': PNP) 30V max. 80mA	Open collector	—
tput Analog	1-5V (type E19 only)	—	
dicator light	Lighting under ON condition (see note 2)		
nsumption current	17mA (24VDC under ON condition)	16mA (24VDC ON)	5~17mA current
ax. Pressure	28 PSI (2kgf/cm²)	70 PSI (5 kgf/cm²)	
mperature range	40~140°F (5~60°C)		
re	E14/15, E55: 3 wire (note 3) E16/17, E18/19: 4 wire	3 wire	2 wire

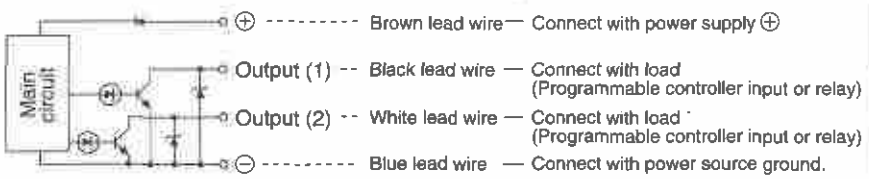
e 1) Types E16/17 3% F.S. or less (fixed).
e 2) Lighting under ON condition (output 1: red, output 2: green). Type E16/17 only.
e 3) E14, E15, E55 types with plug connector do not utilize white wire.

rcuit/Solid state type ZSE

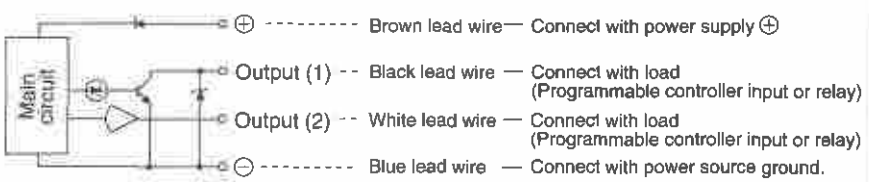
ZSE1-00-1ſ14/15



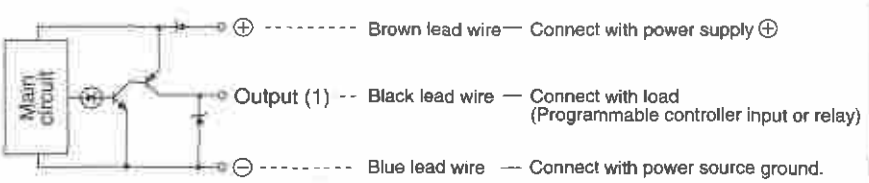
ZSE1-00-116/17



ZSE1-00-18/19

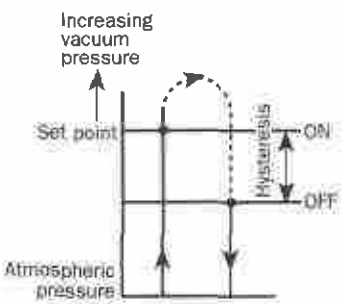


ZSE1-00-55

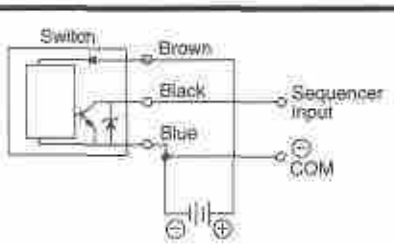


Hysteresis

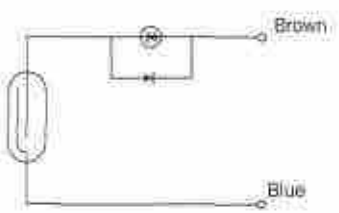
Hysteresis is the pressure difference between the ON pressure and OFF pressure of the output signal. The set pressure is the pressure selected to switch from OFF to ON condition.



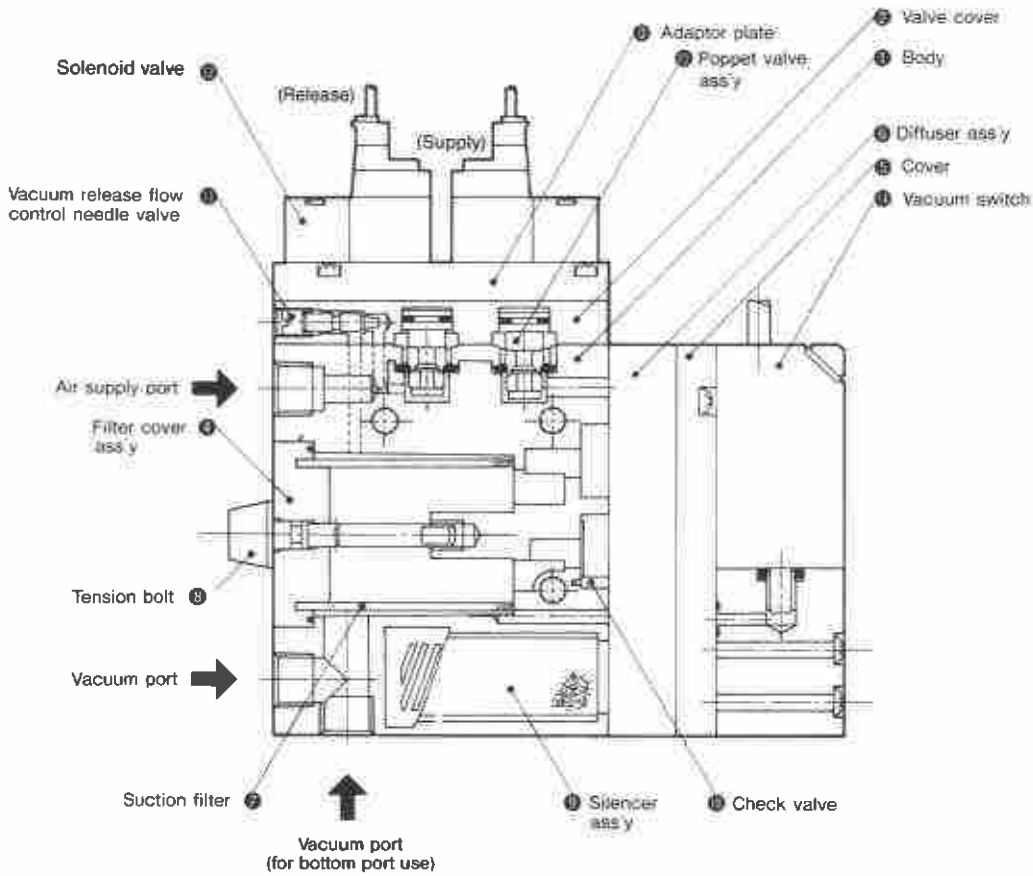
Circuit/Non-contact type ZSM1



Circuit/Contact (Reed) type ZSM1



Construction/ Parts List



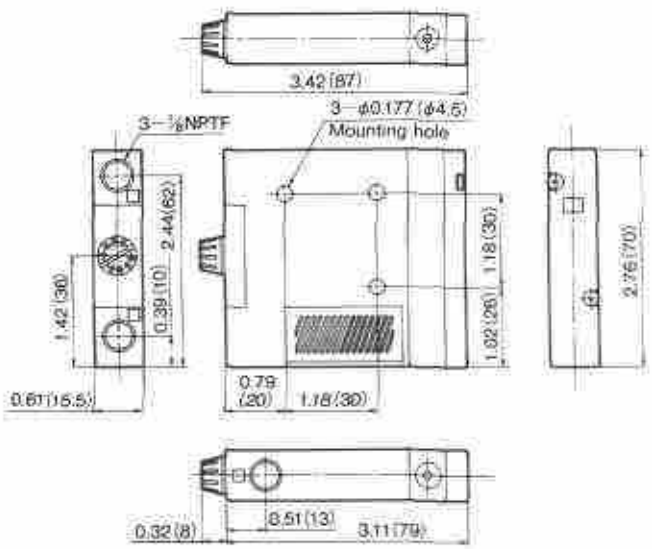
No.	Name	Material	Part No.
❶	**Body**	Aluminum diecast	
❷	**Valve Cover**	Aluminum diecast	
❸	**Adaptor plate**	Aluminum diecast	
❹	**Filter cover ass'y**	—	ZM-FCA-0
❺	**Cover**	Zinc diecast	
❻	**Diffuser ass'y**	—	NZM nozzle size 0-*
❼	**Suction filter**	Polyethylene	NZM-SF
❽	**Tension bolt**	Stainless steel	
❾	**Silencer ass'y**	—	NZM-SA-0
❿	**Check valve**	NBR	ZM-CV
⓫	**Release flow rate control screw**	Stainless steel	P31812-05A
⓬	**Valve****	—	NVJ114-⑤⑥⑦⑧
⓭	**Poppet valve ass'y**	—	ZM-PV-0
⓮	**Vacuum switch**	—	ZSE1-00-1⑨⑩⑪, ZSE1-00-55⑨⑩ ZSM1-015, ZSM1-021
	Plug connector ass'y***	—	ZS-20-5A, ZS-20-5A-30 (10')

*Please specify an appropriate body code:
1—With valve
2—Without valve
3—Manifold type with valve
4—Manifold type without valve
5—Manifold type (Indiv. SUP) with valve
6—Manifold type (Indiv. SUP) without valve

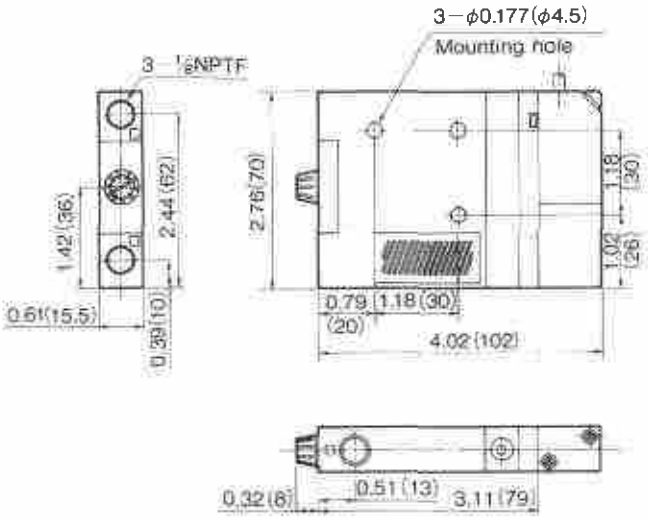
** N.O. type supply valve: NVJ324M-○○○○.
***for connector type vacuum switch.

Dimensions

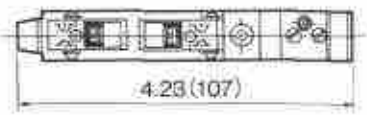
Basic type

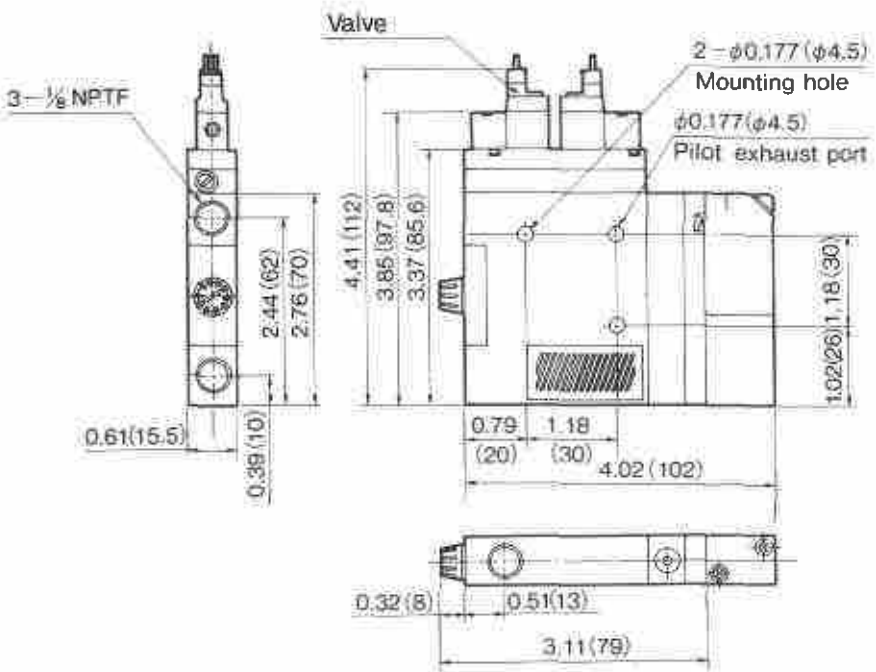


With vacuum switch*



With valve and vacuum switch*





*Dimensions are the same for both the solid state and the diaphragm type switch.

Millimeter in parentheses

Manifold

Manifold Specifications

Common air supply port	1/4 NPTF
Common exhaust port	1/2 NPTF, 3/4 NPTF
Exhaust port location	Right end, Left end, or Both ends
Maximum stacking number	(see chart at right)

Maximum Ejector Stations

Model	NZM05□	NZM07□	NZM10□	NZM13□
NZZM○-T06$^{R}_{L}$	10	8	5	4
NZZM○-T06B	10	10	8	6
NZZM○-T04$^{R}_{L}$	10	8	5	4
NZZM○-T04B	10	10	8	6

Silencer Cv: 4.4

Recommended Silencers

Model No.	Mounting	Noise Reduction dB
ZZM-SA	Integral mounting	30
NAN400-N04	Fits 1/2" EXH adapter	
NAN500-N06	Fits 3/4" EXH adapter	

Other Recommended Accessories:
ZP Series Vacuum Pads (suction cups)
ZCU Cylinder w/Vacuum Pad
NZFB Series Suction Filters

How To Order Manifold

NZZM 06 T 06 R

NZM ejector manifold

Number of ejectors
(see above chart)
01 — 1 station
05 — 5 stations
10 —10 stations (Max.)

Port thread
T — NPTF

Exhaust Adapter/Port size
04 — 1/2
06 — 3/4
S—Integral ZZM-SA silencer (included)

Exhaust adapter location
R — Right end (one adapter*/one blank)
L — Left end (one adapter*/one blank)
B — Both ends (two adapters*)
*(or ZZM-SA silencer)

Note: Order proper body types for manifold use.
(NZM○○3; NZM○○4)
(NZM○○5; NZM○○6)

Example (2) 4-station ejector manifolds

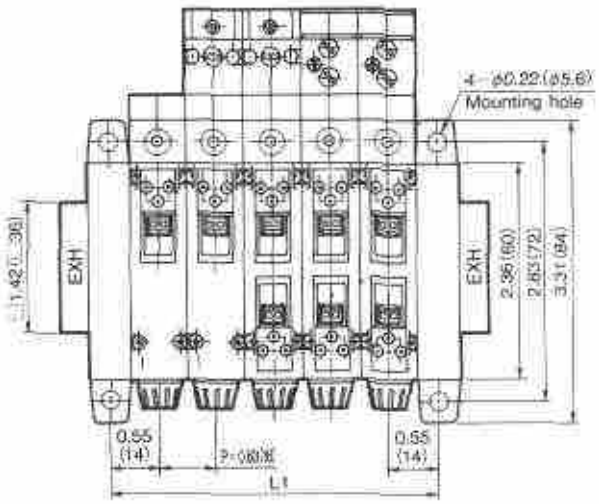
NZZM04-T04R (2) ..... (Manifolds)
NZM103HT-J5LZ (6) ..... (stations 1-3)
NZM053HT-J5LZ (2) ..... (station 4)

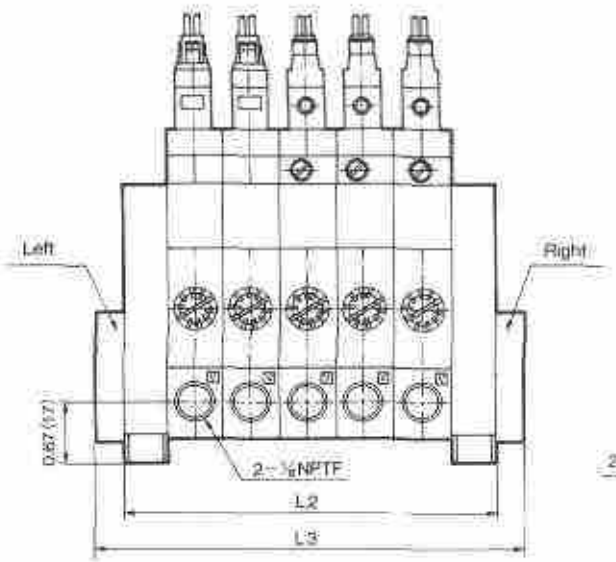
Note: Order left to right (station 1-10)
facing tension bolt & filter cover

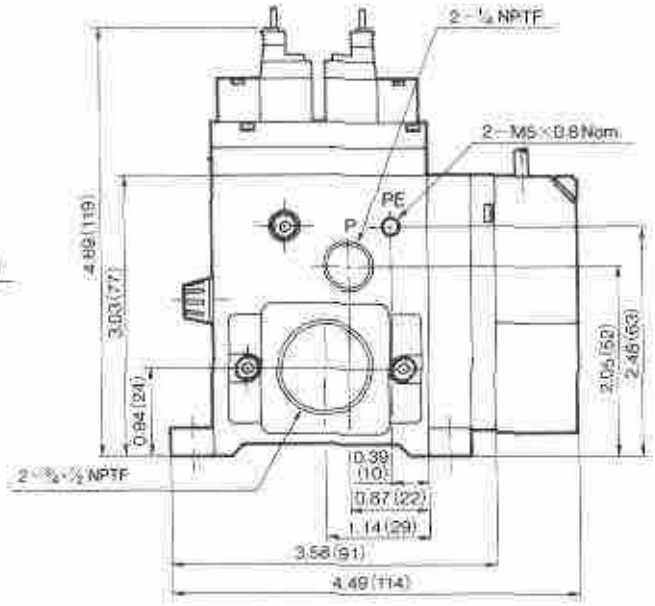
Manifold Dimensions

inch (mm)

NZZM05-T06B







n: stations

n	2	3	4	5	6	7	8	9	10
L1	1.73 (44)	2.36 (60)	2.99 (76)	3.62 (92)	4.25 (108)	4.88 (124)	5.51 (140)	6.14 (156)	6.77 (172)
L2	2.20 (56)	2.83 (72)	3.46 (88)	4.09 (104)	4.72 (120)	5.35 (136)	5.98 (152)	6.61 (168)	7.24 (184)
L3	2.83 (72)	3.46 (88)	4.09 (104)	4.72 (120)	5.35 (136)	5.98 (152)	6.61 (168)	7.24 (184)	7.87 (200)

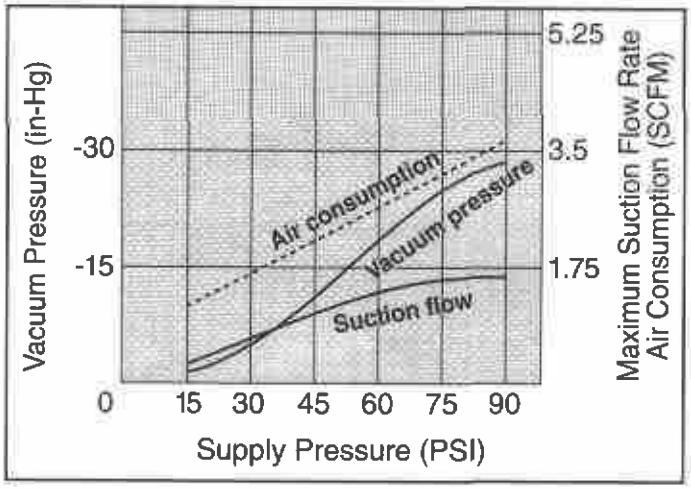
Millimeter in parentheses.

NZM Series / Special Options

❶ Single-Stage Nozzle (ø1.5)

- Produces high suction flow with quick response time.
- Interchangeable with all other nozzle/diffuser ass'ys.

Model	Standard supply pressure	Max. vacuum pressure	Max. suction flow SCFM (Nℓ/min)	Air consumption SCFM (Nℓ/min)
NZM15◯S	70 PSI (5 kgf/cm²)	-25 Inch Hg (-630mm Hg)	1.59 (45)	3.18 (90)



How To Order

Same as standard except as noted below:

NZM 15 1 S T- ◯ - ◯

- 15 — ø1.5
- 1 — Body type
- S — Single-stage nozzle
- ◯ — Valve options
- ◯ — Switch options

❷ Air Piloted Valve Type

- Non-electric unit with pilot port control of internal poppet valves.
- Supply valve port only; or supply valve and release valve ports.
- All other specifications are same as standard unit.

NZM 05 1 H T- Q 5

Nozzle dia.
05 — ø0.5mm
07 — ø0.7mm
10 — ø1.0mm
13 — ø1.3mm

Body type

Supply pressure
H — 70 PSI (5kgf/cm²)
M* — 50 PSI (3.5kgf/cm²)
*Except NZM05

Pilot port(s)
P — Supply pilot port only
Q — Supply and release pilot ports

Pilot port size
5 — M5 x 0.8 (10-32 nom.)

Vacuum Ejector

NZL Series

Digital Vacuum Switches

Optional high accuracy solid state vacuum switches feature LCD, LCD with back light or LED readout, NPN, PNP or analog outputs and push button calibration. EE PROM assures no loss of calibration data during power outages.

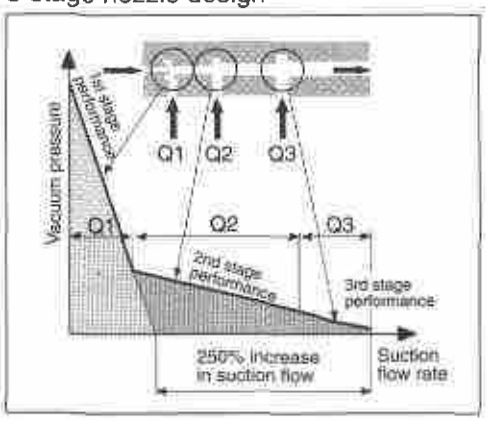
Compact & Lightweight

175mm L x 36mm W x 59mm H, 440g

Suction Flow increased by 250%

3 stage nozzle design allows for suction flow of *up to 250% higher than traditional single stage designs.*

3-stage nozzle design



Built-in One-Touch Fittings

Built-in One-Touch fittings (Ø¼ SUP / Ø½ VAC) allow for quick and easy process connection.

Suction Filter & Exhaust Silencer

Suction filter and exhaust Silencer are an integral part of the vacuum ejector module. *Ported exhaust option is also available.*

See Also

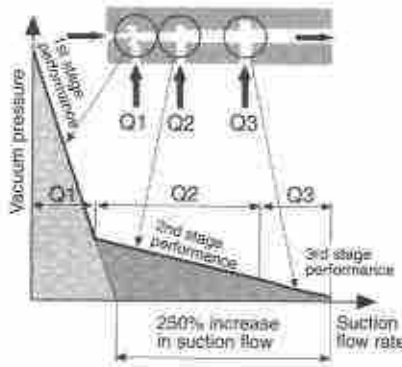
ZL212 series for suction flow up to 6.9scfm (200NL/min). Request catalog #N404.

Multistage Vacuum Ejector
NZL Series

Energy Saving — *Air Consumption* **2.23 scfm (63N ℓ/min)**

Compact • Large Flow — *Suction Flow Rate* **3.54 scfm (100N ℓ/min)**

Efficient 3-stage nozzle design



Standard Features:

- *Built-in One-Touch Fittings* [ø1/4 SUP / ø1/2 VAC]
- *Integral Suction Filter*
- *Integral Exhaust Silencer*
- *Compact Dimensions* [175L x 36W x 59H mm]
- *Lightweight* [440g]
- *Mounting possible from 3 sides*

Without valve **ZL1 12** □□

With valve **ZL1 12** □□ **K1 5 M Z** □ **E 25** □

Nozzle diameter

12	ø1.2mm

Exhaust specifications

N	Built-in silencer
P	Port exhaust

Exhaust port thread specification (port exhaust only)

N	Rc1/2
F	G1/2
N	1/2-14NPT
T	1/2-14NPTF

Supply valve/Release valve combination

K1	With supply and release valves
K2	With supply valve

Rated voltage

DC specifications	
5	24VDC
6	12VDC
V	6VDC
3	5VDC
R	3VDC
AC specifications (50/60Hz)	
1	100VAC
2	200VAC
3	110VAC (115V)
4	220VAC (230V)

Electrical entry

G	Grommet	Lead wire length 0.3m
H		Lead wire length 0.6m
L	L type plug connector	Lead wire length 0.3m
LN		Without lead wires
LO		Without connector
M	M type plug connector	Lead wire length 0.3m
MN		Without lead wires
MO		Without connector

Lead wire length

Nil	0.6m
L	3.0m

Digital vacuum pressure switch specifications

For E (ZSE4) E8 (ZSE4B)		
25	NPN output	Lead wire length 0.3 (2.5) m
26	Analog output	Lead wire length 0.6 (3) m
65	PNP output	Lead wire length 0.3 (2.5) m
For E8 (ZSE4B)		
27	NPN output	Lead wire length 0.3 (2.5) m
28	Analog output	Lead wire length 0.6 (3) m
67	PNP output	Lead wire length 0.3 (2.5) m

* Not required for nil, vacuum adapter (ZSE) and vacuum pressure gauge (G)

Vacuum pressure sensor

Nil	None
ON	Vacuum adapter Rc1/8
G	With vacuum pressure gauge
E	With digital vacuum pressure switch ZSE4
E8	With digital vacuum pressure switch ZSE4B
EE	With digital vacuum pressure switch ZSE4E

Manual override

Nil	Non-locking push type
D	Slotted locking type

Light/Surge voltage suppressor

Nil	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
U	With light/surge voltage suppressor (non-polar type)

Note 1) Type U is 24 or 12VDC only.
Note 2) Since surge voltage is prevented by a rectifier in the case of AC, there is no "S" type

Optional Features:

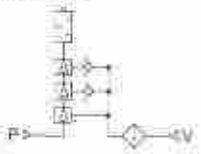
with integral vacuum gauge — with integral digital switch

Ejector Specifications

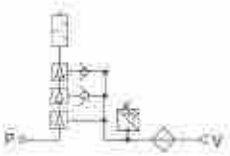
Model	NZL112	NZL112-G	NZL112-E
Primary nozzle	ø1.2mm		
Max. suction flow rate (ANR)	100ℓ/min (3.54 scfm)		
Air consumption (ANR)	63ℓ/min (2.23 scfm)		
Max. vacuum pressure	-84kPa (-24.8 in-Hg)		
Max. operating pressure	0.7MPa (100 psi)		
Supply pressure range	0.2~0.5MPa (30~70 psi)		
Standard supply pressure	0.4MPa (60 psi)		
Operating temp. range	5 ~ 50°C (40 ~ 122°F)		
Option	None (std.)	w/vacuum gauge	w/digital vac. switch

Schematic Symbol

NZL112

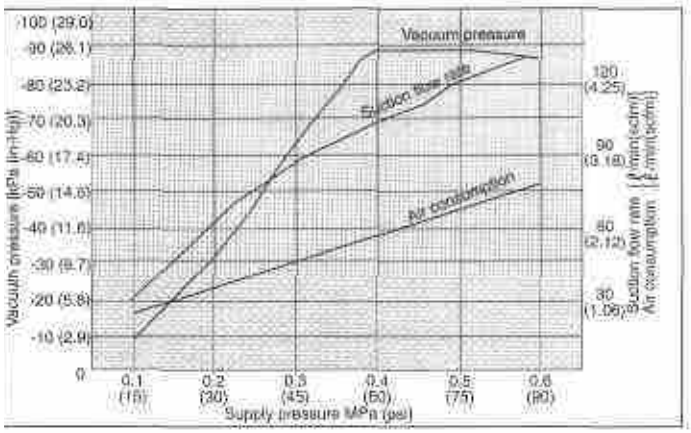


NZL112-E

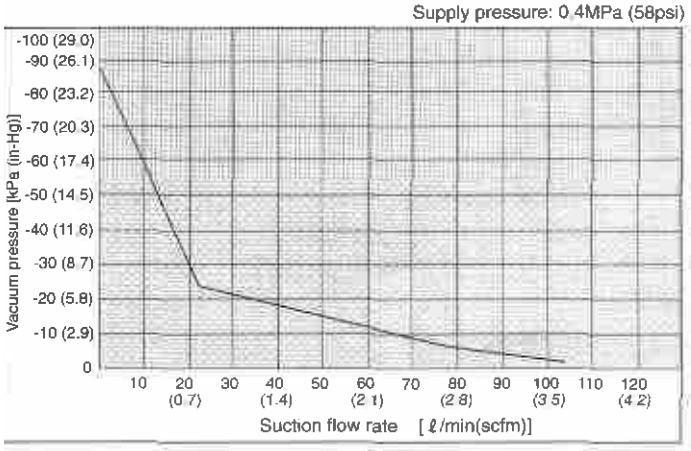


NZL112-G

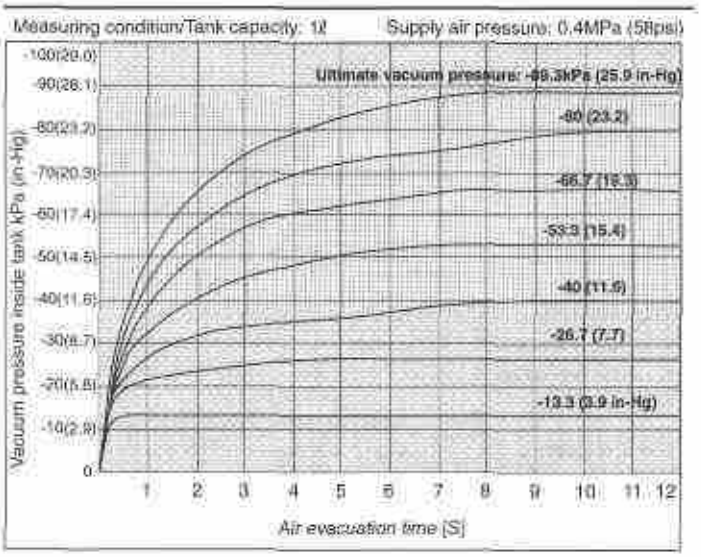
Exhaust Characteristics



Flow Characteristics



Air Evacuation Time



Understanding the graph above

The time necessary for atmospheric pressure inside a 1ℓ (61in³) hermetically sealed container to reach the ultimate vacuum pressure. (Subject to given external conditions). Example; it takes approximately 8.8 seconds when the ultimate vacuum pressure is -89.kPa (25.9 in-Hg).

Option Specifications

Integral Vacuum Gauge

Model	NGZ30S	GZ30S*
Media	Air	
Pressure Scale	-30in-Hg~14psi	-100~100kPa
Accuracy	±3% F.S. (full span)	
Class	3rd class	
Operating temp. range	40~122°F (5~50°C)	
Material	Case: Polycarbonate/ABS resin	

*Special Order

Gauge Adapter for external mount gauge

Part No.	P397209
Port Size	1/8 NPT
Material	ABS resin
External gauge model	K21V (side mount)

Note 1) Adapter fits in place of standard integral gauge.
Note 2) Order external gauge model no. separately.

Vacuum Switch

Model	ZSE4-00-□-X105	ZSE4E-00-□-X105	ZSE48-00-□-X105
Digital display	LCD	LED(red)	LCD (w/backlight)
Press. display range*	-760 ~ +75mmHg (-101kPa ~ +10kPa)		
Max. oper. pressure	2.04kgf/cm², (200kPa),(30 psi)		
Display Units/ Min. display units	kPa:1 mmHg:5 PSI:0.1 bar:0.01	kPa:1 PSI:0.1,kgf/cm²:.01 mmHg:5 inHg:2 bar:01	kPa:1 mmHg:5 PSI:0.1 bar:0.01
Media	Air, non-corrosive gas		
Temp. characteristics	±3% F.S. max.		
Repeatability	±1% F.S. max.		
Power supply	12~24VDC (Ripple 10% max.)		
Consumption current	25mA max(LCD), 45mA max. (LED, LCD w/backlight)		
Fault display	Indication: Red LED flashes/Error code displayed		
Pressure display	3-1/2 Digits (10mm LCD, 8mm LED)		
Self diagnosis function	(note2) Excess current, Excess pressure, Data error, Pressure during 0-clear		
Operating temp. range	40 ~ 122°F (0 ~ 50°C)		
Noise resistance	1000Vp-p / pulse width 1μs / standing 1ns		
Voltage resistance	Between whole wires and case: 1000VAC 50/60Hz for 1 min.		
Insulation resistance	Between whole wires and case: 2MΩ (500VDC by megameter)		
Vibration resistance	10~500Hz width=1.5mm or acceleration 10G (choose the smaller vibration) to X,Y,Z direction (2 hrs.)		
Shock resistance	100G to X,Y,Z direction (3 times for each direction)		

*Range is same for all display unit selections.

Hysteresis mode
When the values of P1 and P2 are equal or when P1>P2 but within 3 digits, the hysteresis will be automatically set to 3 digits for the set value of P1.

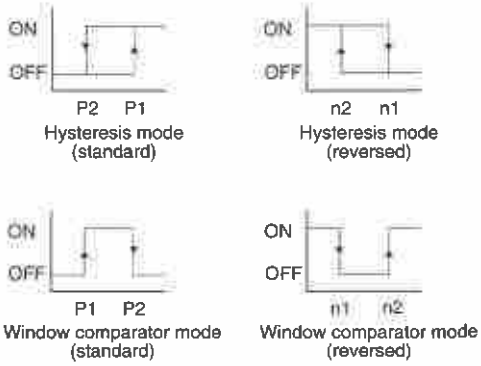
Window comparator mode
The hysteresis is automatically set to 3 digits, so separate P1 from P2 by 7 digits or more when programming.

Note 1)
* "1 digit" is the minimum display/setting differential (see specifications in the table above).

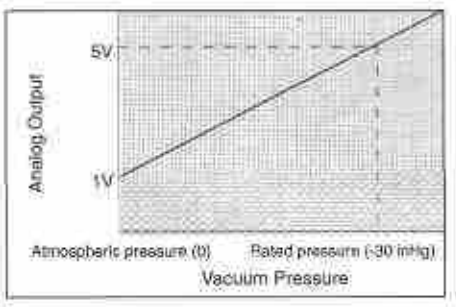
Note 2)
Analog output type switch has no overcurrent detection funtion.

Non-Analog Output Flexibility

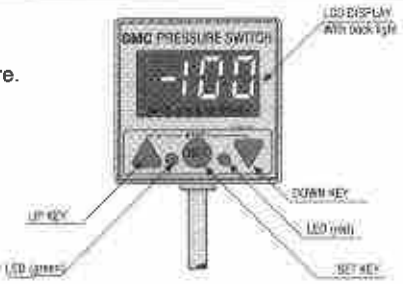
Hysteresis, Window Comparator, and Reverse modes

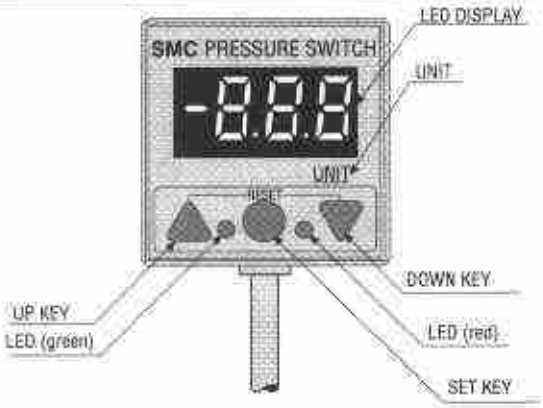


Analog Output Characteristics



witch Handling





:D/LED isplay)	Displays operating pressure. Displays ON/OFF setting. Displays error code
:D(green)	Displays switch operation conditions.
:D(red)	Blinks on and off when an error occurs.
:T key	Switches to the calibration mode. When the button is pressed for 1 second or more, the mode changes to the output mode.
P key	Increases ON/OFF set point.
)WN key	Decreases ON/OFF set point. Used for unit change and output mode change.
:SET key	Press the UP and DOWN buttons simultaneously to initiate the RESET function. Displays "0".

lode display and reset function

Peak Mode

ess the UP button during pressure display and the peak pressure (the ghest degree of vacuum) will be displayed. In this case, an "H" appears in e display. To reset, press the UP button again.

Bottom Mode

ess the DOWN button during pressure display and the bottom pressure ie lowest degree of vacuum) is displayed. In this case, an "L" appears in e display. To reset, press the DOWN button again.

Reset Function

ie reset operation causes the following:

When the reset button is pressed during normal operation:

- Peak display clear, bottom display clear, or zero clear.

When the reset button is pressed after an error has occurred:

- The system will reset and retain any data that was set in the calibration mode.
- When a data error occurs, the system enters the calibration mode and then resets.

ote: The reset function is unavailable when in the calibration mode.

When an error occurs

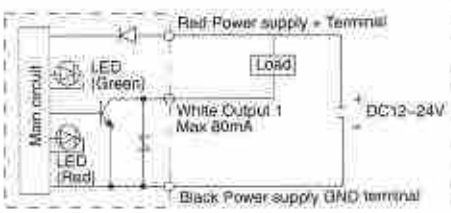
When an error occurs, take the following steps.

Display	Problem	Correction
E1 dE	Accidental corruption of calibration data.	Push the RESET key to set all the data again.
E2 CE1	Current exceeding 80mA is flowing through Output 1 load.	Turn off the power supply and remove cause of excessive load.
	Output 1 (white wire) may have contacted when the output was turned ON or be contacting the power supply, etc.	Confirm that the Output 1 (white wire) is not in contact with the power supply, etc. and execute RESET operation.
E3 PE	Max. operating pressure was exceeded for more than 2 seconds.	Maintain pressures less than the max. rated pressure.
E4 HP	Pressure of ±7kPa (1.1 PSI) compared with atmospheric pressure was detected at the time of "0" clear.	Release the RESET key to restore atmospheric pressure reading.

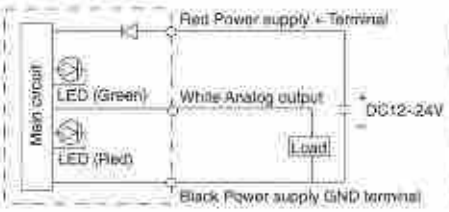
Note) Does not apply to analog output type.

ıternal Circuit and Wiring

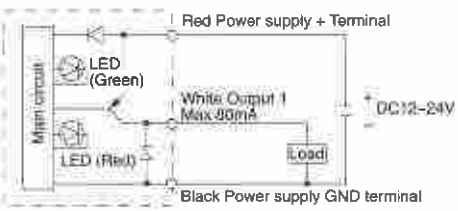
-25 NPN open collector (LCD)



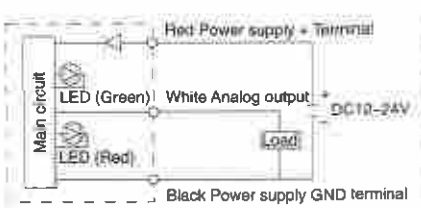
-26 analog output type (LCD)



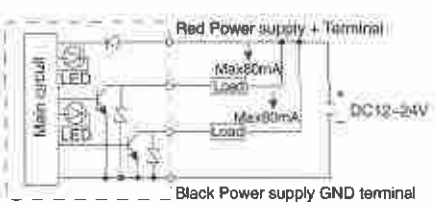
-65 PNP open collector (LCD)



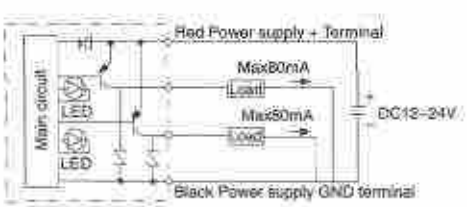
-26 analog output type (LED)



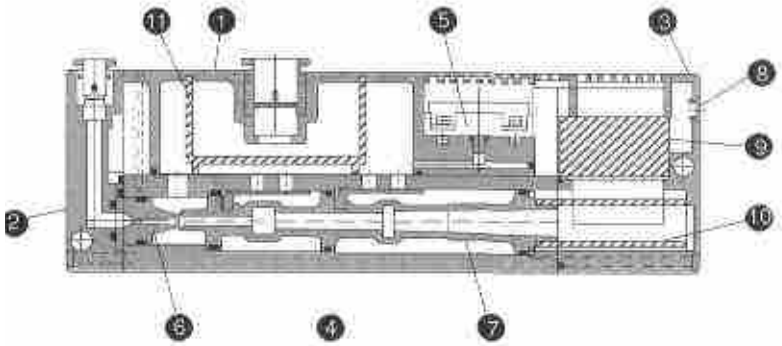
-27 NPN open collector (LED)



-67 PNP open collector (LED)



Construction/Parts List



Parts List/Main Parts

No.	Description	Part no.
1	Suction cover	
2	Front cover	
3	End cover	
4	Body	
5	Vacuum detection unit	
6	Main nozzle	
7	Diffuser unit	
8	Grommet plug (NZL112, [-G])	P397110
	Lead wire grommet (NZL112-E□)	P397176

Spare Parts/Repair Kits

No.	Description	Material	Part no.
9	Silencer B	PVF	ZL112-SP01 (includes 1 pc. ea.)
10	Silencer A	PVF	
11	Suction Filter	PE	

ZL2 12 □ □ □ □

Nozzle diameter

12	ø1.2mm

Exhaust specifications

Nil	Built-in silencer
P	Port exhaust

Vacuum pressure sensor

Nil	None
GN	Adaptor Rc1/8
G	With vacuum pressure gauge
E	With digital vacuum pressure switch ZSE4
EB	With digital vacuum pressure switch ZSE4B
EE	With digital vacuum pressure switch ZSE4E

Digital vacuum pressure switch specifications

For E (ZSE4) EB (ZSE4B)		
25	NPN output	Lead wire length 0.6 (3.0)m
26	Analog output	Lead wire length 0.6 (3.0)m
65	PNP output	Lead wire length 0.6 (3.0)m
For EE (ZSE4E)		
27	NPN output	Lead wire length 0.6 (3.0)m
28	Analog output	Lead wire length 0.6 (3.0)m
67	PNP output	Lead wire length 0.6 (3.0)m

* Not required for nil, vacuum adapter (GN) and vacuum pressure gauge (G).

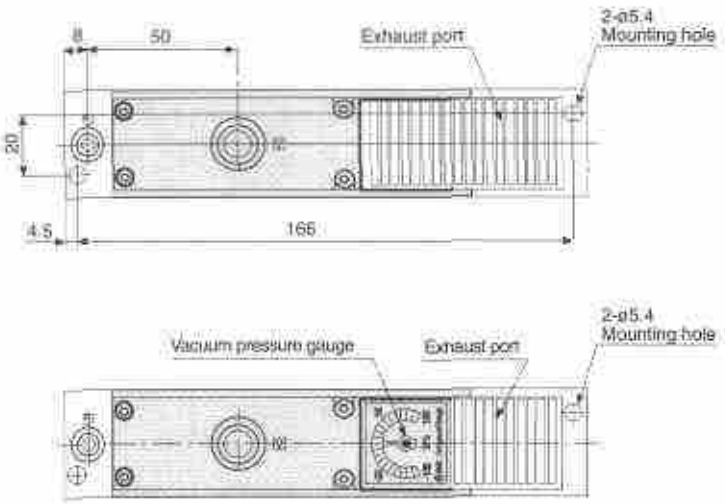
Lead wire length

[redacted]	0.5m
[redacted]	2.9m

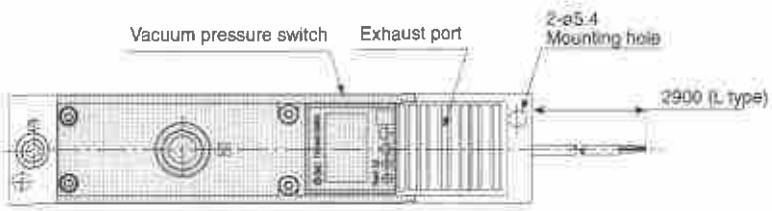
Dimensions

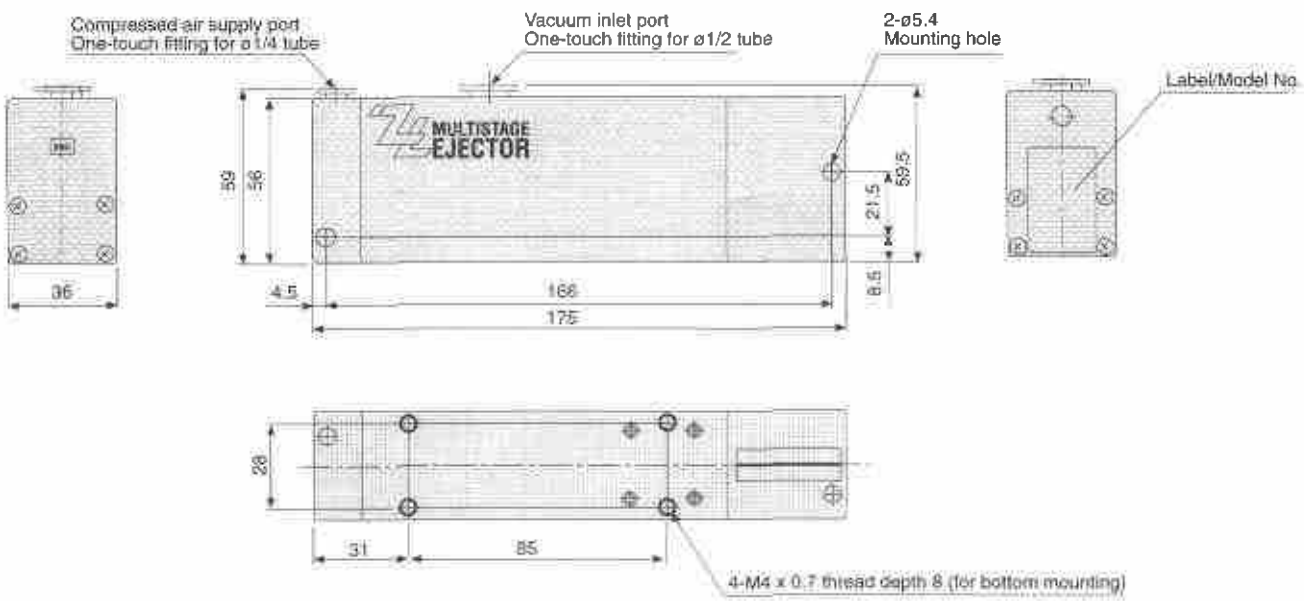
Scale: 40%

Standard
NZL112



With digital vacuum switch
NZL112-E□





Vacuum Ejector

NZHI • ZH Series

NZHI Series 64

Nozzle Sizes ø0.5, ø0.7, ø1.0, ø1.3
Model Variation S: High vacuum pressure type
L: High suction flow type

- **Lightweight and Compact Design**
- **Built-in Silencer type or Body-ported type**
- **Integral One-touch Fittings or Port Threads**

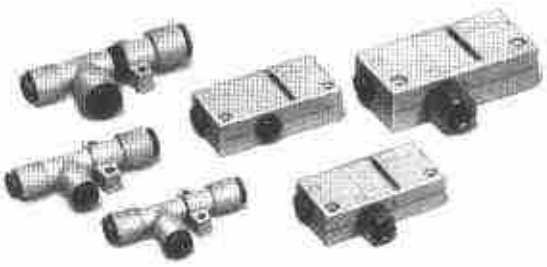
ZH Series 69

Nozzle Sizes ø1.5, ø1.8, ø2.0
Model Variation S: High vacuum pressure type
L: High suction flow type

- **Lightweight and Compact Design**
- **Body-ported type with NPTF port threads**
- **See also ZU series inline vacuum ejectors with built-in exhaust silencer and suction flow up to 0.74scfm (21NL/min). Request flyer #POW014.**

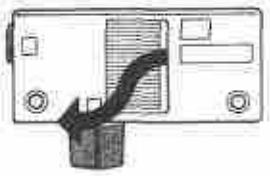
Vacuum Ejector
NZHI Series

Nozzle Diameter ø0.5, ø0.7, ø1.0, ø1.3
Type Standard Type
Large Flow Type

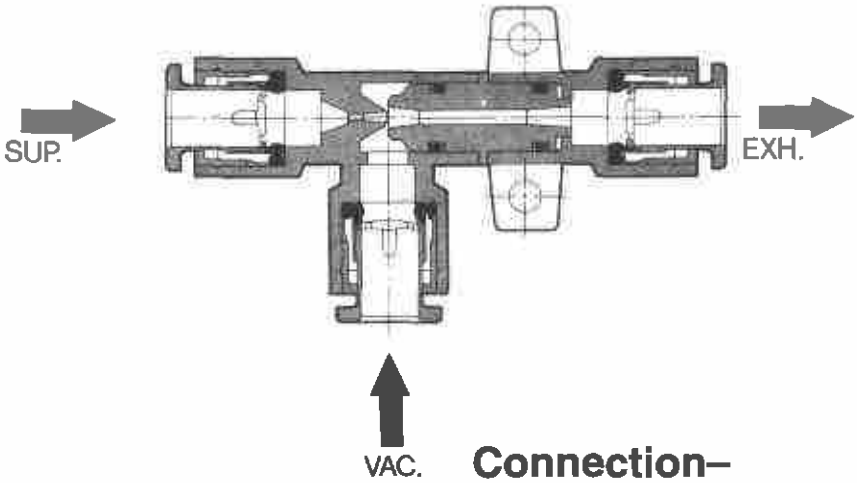


Light • Compact

Compact and lightweight due to the solid resin design of nozzle and body. Nozzle diameter ø0.5 ••• 28gf (1 oz.)



Silencer Exhaust

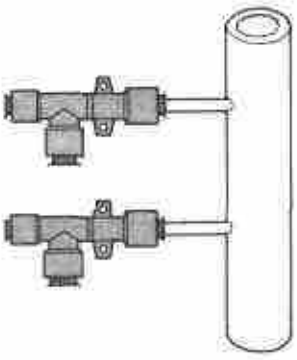


Silencer type (built-in) and body-ported type

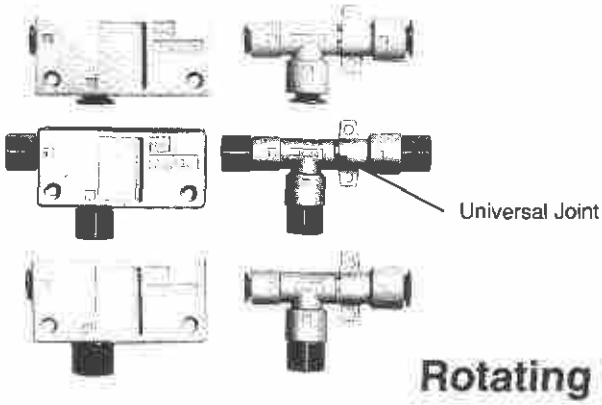
Two types are available in this series – *Silencer type has muffled exhaust.* Body-ported type has individual exhaust port.

Connection– One-touch fittings, threaded ports, or a combination.

Depending upon the application condition, the connection is at your option.

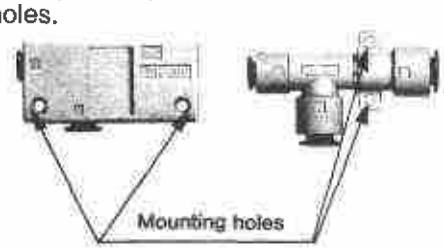


Manifold Common Exhaust



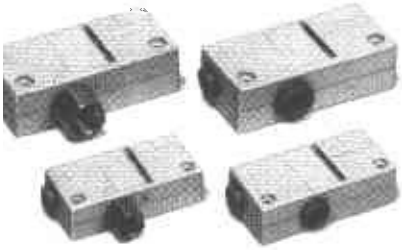
Body-mounting and fixation possible.

Body-ported type also has mounting holes.



Rotating body

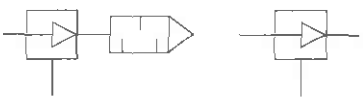
Vacuum port of body-ported type can be rotated throughout 360 degrees.



Silencer type/B type

Body ported type/D type

Ejector Symbol



Silencer type (Built-in silencer) **NZHI○○B**

Body ported type (without silencer) **NZHI○○D**

Model

Model	Nozzle mmø	Body type	Max.vacuum pressure in Hg (mmHg)	*Note) Connection (One-touch/Screw-in) SUP	VAC	EXH	Weight (gf)
NZHI05B○	0.5	Silencer type (Built-in silencer)	26 (660) • 14 (360)	(1/4) / 1/8	(1/4) / 1/8	–	28
NZHI07B○	0.7						28
NZHI10B○	1.0						33
NZHI13B○	1.3			(5/16) / 1/8	(3/8) / 1/4		66
NZHI05D○	0.5	Body ported type (Without silencer)	26 (660) • 14 (360)	(1/4) / 1/8	(1/4) / 1/8	(1/4) / 1/8	20
NZHI07D○	0.7						21
NZHI10D○	1.0			(1/4) / 1/8	(1/4) / 1/8	(5/16) / 1/8	25
NZHI13D○	1.3			(5/16) / 1/8	(3/8) / 1/4	(3/8) / 1/4	53

Note: One touch, port threads, or a combination are available for each port. Refer to "How To Order."
*Circles indicate one-touch fitting type tube size.

Specifications

Fluid	Air
Operating pressure range	35~85 PSI (2~6kgf/cm²)
Max. operating pressure	100 PSI (7 kgf/cm²)
Operating temperature range	40~140°F (5~60°C)
Lubrication	Non lube only

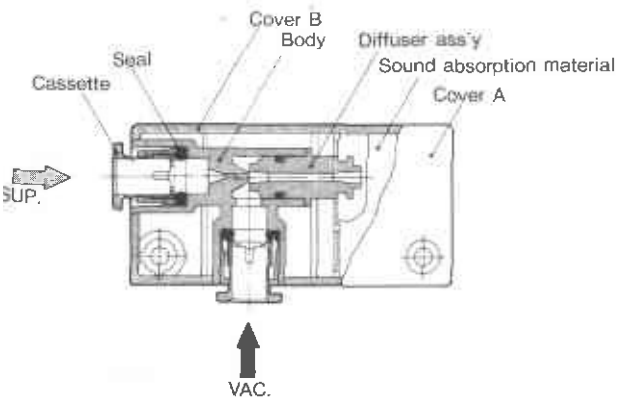
Max. Suction Flow Rate/Air Consumption SCFM (Nℓ/min)

Specifications	Max. vacuum pressure in Hg (mmHg)	Nozzle diameter mmø			
		0.5	0.7	1.0	1.3
Max. suction flow rate SCFM (Nℓ/min)	S type–26" (660)	0.18 (5)	0.42 (12)	0.85 (24)	1.41 (40)
	L type–14" (360)	0.28 (8)	0.71 (20)	1.20 (34)	2.48 (70)
Air consumption SCFM (Nℓ/min)	S type–26" (660)	0.35 (10)	0.71 (20)	1.20 (34)	2.41 (68)
	L type–14" (360)				

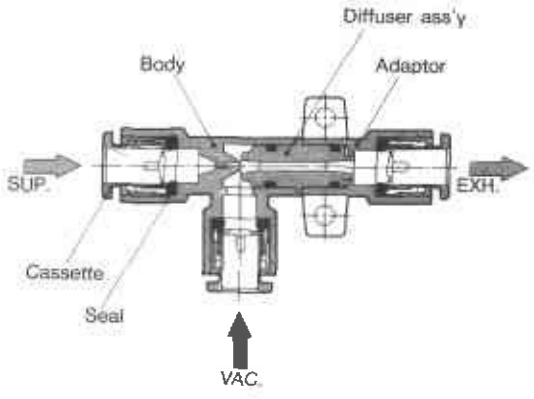
At 4.5kgf/cm² (65 PSI)

onstruction

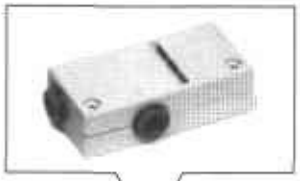
encer type
uilt-in silencer)



Body-ported type
(Without silencer)



How To Order



Options highlighted in blue:

Preferred Option Program

(See page 2)

Max. vacuum pressure

S	26" Hg (660 mmHg)
L	14" Hg (360 mmHg)

Silencer type (Built-in silencer) NZHI 07 B S 07 07

Body ported type (Without silencer) NZHI 07 D S 07 07 07

Nozzle diameter

05	0.5mmø
07	0.7mmø
10	1.0mmø
13	1.3mmø

Note) SUP. port size

Symbol	Size	Type
07	1/4	One touch
09	5/16	
T01	1/8 NPT	Threaded

Note) VAC. port size

Symbol	Size	Type
07	1/4	One touch
11	3/8	
T01	1/8 NPT	Threaded
T02	1/4 NPT	

Note) EXH. port size

Symbol	Size	Type
07	1/4	One touch
09	5/16	
11	3/8	
T01	1/8 NPT	Threaded
T02	1/4 NPT	

Note) Connection of SUP, VAC and EXH ports in relation to port size: refer to diagram ❶ & ❷.

Diagram ❶ Combination of Connection

Body		SUP	VAC	EXH
Silencer type (Built-in silencer)	❶	One touch	One touch	–
	❷	One touch	Threaded	–
	❸	Threaded	Threaded	–
Body ported type (Without silencer)	❶	One touch	One touch	One touch
	❷	One touch	Threaded	One touch
	❸	Threaded	Threaded	Threaded

Diagram ❷ Port Size*

Model	SUP	VAC	EXH
NZHI05B	(1/4) / 1/8	(1/4) / 1/8	–
NZHI07B			
NZHI10B			
NZHI13B	(5/16) / 1/8	(3/8) / 1/4	
NZHI05D	(1/4) / 1/8	(1/4) / 1/8	(1/4) / 1/8
NZHI07D			
NZHI10D	(1/4) / 1/8	(1/4) / 1/8	(5/16) / 1/8
NZHI13D	(5/16) / 1/8	(3/8) / 1/4	(3/8) / 1/4

*Circles indicate one-touch fitting type size.

Precautions

Air Supply Side Circuit

It is necessary to design appropriate piping on air supply side circuit to allow for air consumption of each ejector. The effective orifice area of tubes, fittings, valves, etc., should be large enough to prevent poor ejection flow due to pressure drop. Also, it is necessary to allow for maximum air consumption from each ejector and any other air consumption.

The nozzle diameter can become clogged due to fragments of tubing, etc. This can cause significant degraded function. Therefore, clean supply side air **without oil** should be used.

The use of a mist separator is recommended as a pre-filter.

Vacuum Side Circuit

Piping between ejector and vacuum pad (etc.) should be kept as short as possible to prevent unnecessary throttle and/or leakage. Avoid contamination from work surface. Installation of suction filter (series NZFA or NZFB) on vacuum side will be helpful.

Number of Pads (suction cups)

One ejector vs. one pad is the general rule. Two or more pads to one ejector can cause imperfect adsorption on one end and/or faulty adsorption on the other.

Installation

Prevent ejector body from excessive load and moment due to the connection piping and mounting method

Selecting Nozzle Diameter

Selection of nozzle diameter demands that all conditions be considered. Suction flow rate, expected vacuum pressure, adsorption speed on work, etc., should be taken into consideration. A large suction flow rate ejector should be adapted in the case where piping volume between ejector and adsorption area is large, since it takes a longer time to reach the expected vacuum pressure.

Exhaust Side Piping

For exhaust ports of model NZHI○○B○ keep at least one side open.
For model NZHI○○D○, keep back pressure under 0.05 kgf/cm². (0.7 PSI)

Symbol of Port: P= Supply port
V= Vacuum port
E= Exhaust port

haust Characteristics/Flow Characteristics

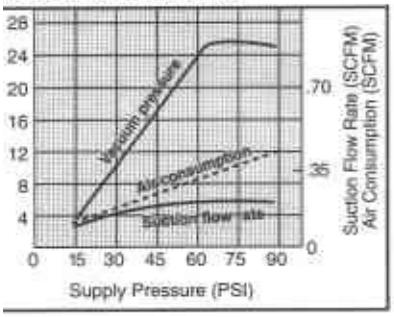
Flow characteristics: at 4.5 kgf.cm² supply air pressure (65PSI)

x. vacuum pressure: 26" Hg (660mmHg)

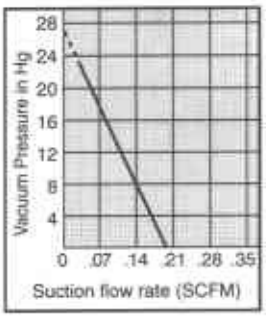
Max. vacuum pressure: 14" Hg (360mmHg)

ZHI05BS, NZHI05DS

haust Characteristics

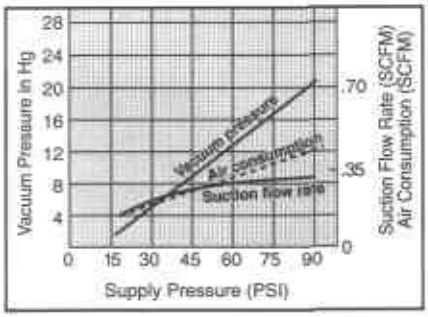


Flow Characteristics

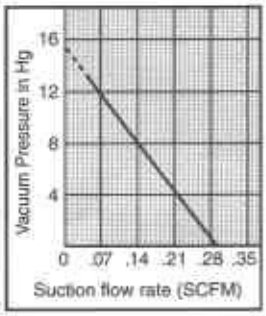


NZHI05BL, NZHI05DL

Exhaust Characteristics

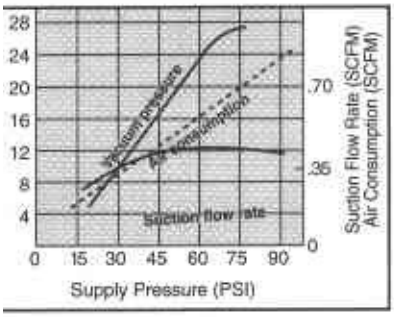


Flow Characteristics

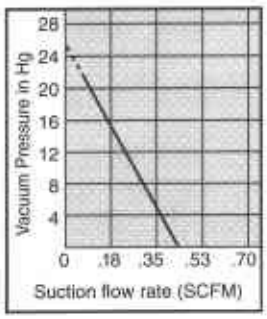


ZHI07BS, NZHI07DS

haust Characteristics

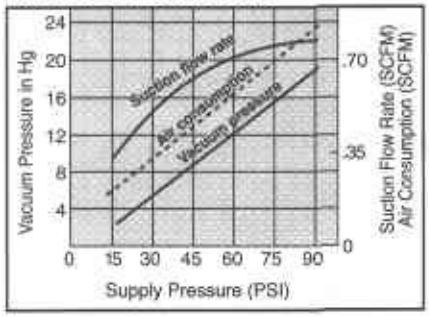


Flow Characteristics

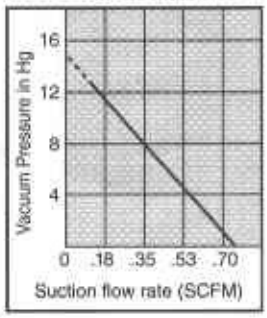


NZHI07BL, NZHI07DL

Exhaust Characteristics

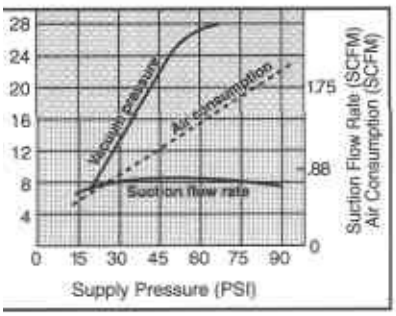


Flow Characteristics

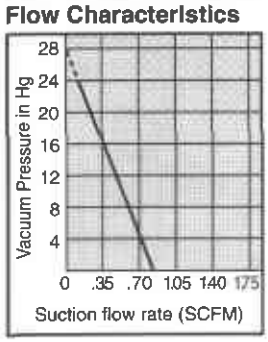


ZHI10BS, NZHI10DS

haust Characteristics

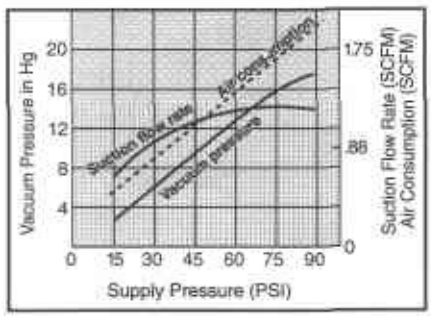


Flow Characteristics

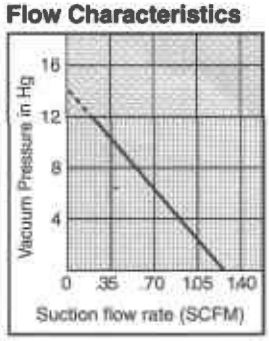


NZHI10BL, NZHI10DL

Exhaust Characteristics

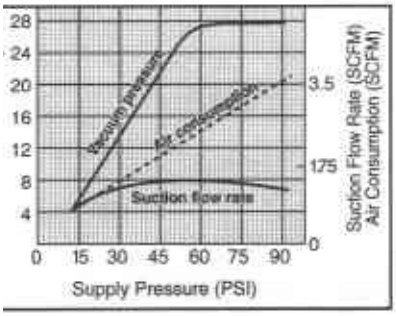


Flow Characteristics

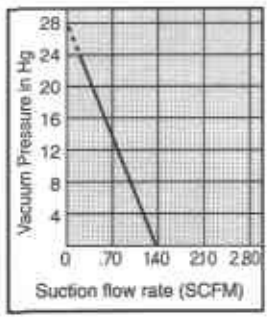


ZHI13BS, NZHI13DS

haust Characteristics

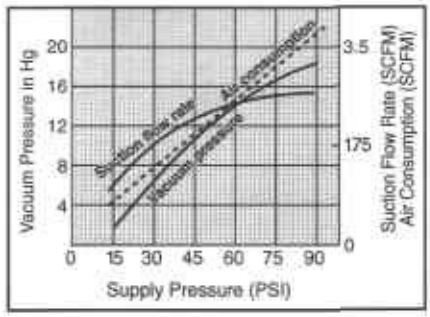


Flow Characteristics

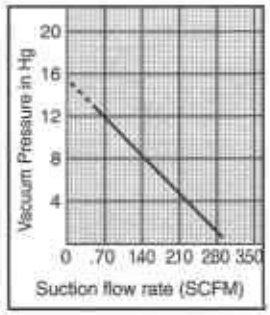


NZHI13BL, NZHI13DL

Exhaust Characteristics

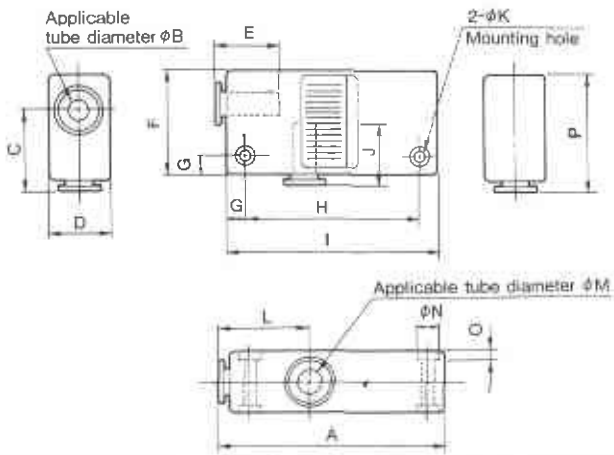


Flow Characteristics



Silencer Type (Built-in) NZHI○○B○/Dimensions (mm)

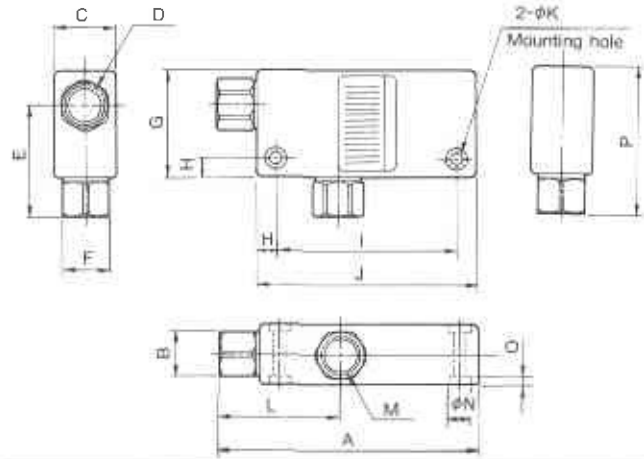
One touch connection



Model	A	øB	C	D	E	F	G	H
NZHI05B○-07-07	54	1/4"	22	19	17	28	6.35	38.1
NZHI07B○-07-07	60	1/4"	22	19	17	28	6.35	44.5
NZHI10B○-07-07	67	1/4"	25	19	17	32	6.35	50.8
NZHI13B○-09-11	79	5/16"	29	25	18.5	38	6.35	63.5

Model	I	J	øK	L	øM	øN	O	P
NZHI05B○-07-07	51	17	3.2	22	1/4"	6.35	2.4	32
NZHI07B○-07-07	57	17	3.2	22	1/4"	6.35	2.4	32
NZHI10B○-07-07	64	17	3.2	26	1/4"	6.35	2.4	35
NZHI13B○-09-11	76	21	3.2	28	3/8"	6.35	2.4	41

Threaded connection

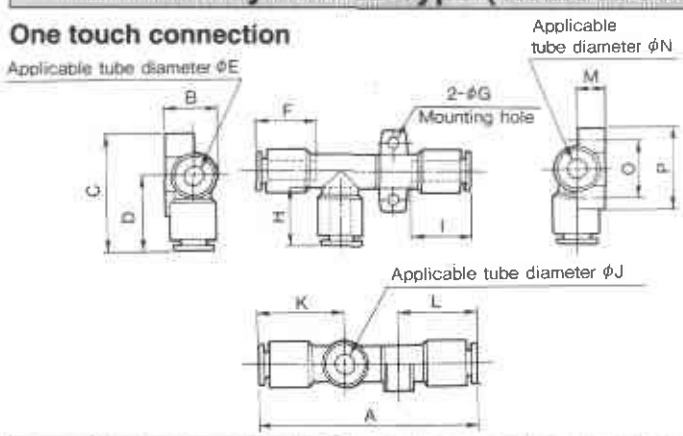


Model	A	B	C	D	E	F	G	H
NZHI05B○-T01-T01	61.9	12.7	19	1/8"	30.1	12.7	28	6.35
NZHI07B○-T01-T01	68.3	12.7	19	1/8"	30.1	12.7	28	6.35
NZHI10B○-T01-T01	74.6	12.7	19	1/8"	33.3	12.7	32	6.35
NZHI13B○-T01-T02	88.9	15	25	1/8"	41.3	17	38	6.35

Model	I	J	øK	L	M	øN	O	P
NZHI05B○-T01-T01	38.1	51	3.2	30.1	1/8"	6.35	2.4	40
NZHI07B○-T01-T01	44.5	57	3.2	30.1	1/8"	6.35	2.4	40
NZHI10B○-T01-T01	50.8	64	3.2	33.3	1/8"	6.35	2.4	43
NZHI13B○-T01-T02	63.5	76	3.2	38.1	1/4"	6.35	2.4	54

Body-Ported Type (Without silencer) NZHI○○D○/Dimensions (mm)

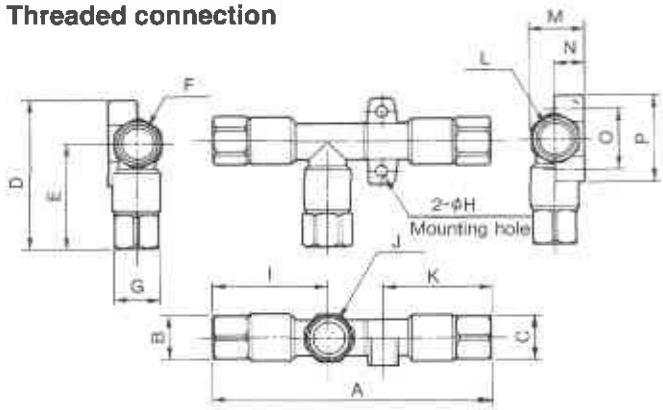
One touch connection



Model	A	B	C	D	øE	F	øG	H
NZHI05D[S]○-07-07-07	57	13.8	33	22	1/4"	17	3.2	17
NZHI07D[S]○-07-07-07	60	13.8	33	22	1/4"	17	3.2	17
NZHI10D[S]○-07-07-09	70	15.6	38	25	1/4"	17	3.2	17
NZHI13D[S]○-09-11-11	79	18.5	43	29	5/16"	18.5	3.2	21

Model	I	øJ	K	L	M	øN	O	P
NZHI05D[S]○-07-07-07	17	1/4"	22	21	7.2	1/4"	15.9	22
NZHI07D[S]○-07-07-07	17	1/4"	23	23	7.2	1/4"	15.9	22
NZHI10D[S]○-07-07-09	18.5	1/4"	25	27.5	8	5/16"	19	25
NZHI13D[S]○-09-11-11	21	3/8"	29	29.6	9.5	3/8"	22.2	29

Threaded connection



Model	A	B	C	D	E	F	øG	H
NZHI05D[S]○-T01-T01-T01	73.5	12.7	12.7	41.2	30.1	1/8"	12.7	3.2
NZHI07D[S]○-T01-T01-T01	76	12.7	12.7	41.2	30.1	1/8"	12.7	3.2
NZHI10D[S]○-T01-T01-T01	82(86)	12.7	15	46	33.3	1/8"	12.7	3.2
NZHI13D[S]○-T01-T02-T02	94.5(98.5)	15	17	55.6	41.3	1/8"	17	3.2

Model	I	øJ	K	L	M	øN	O	P
NZHI05D[S]○-T01-T01-T01	30.1	1/8"	29.3	1/8"	13.8	7.2	15.9	22
NZHI07D[S]○-T01-T01-T01	30.1	1/8"	31	1/8"	13.8	7.2	15.9	22
NZHI10D[S]○-T01-T01-T01	33.3	1/8"	37.2	1/8"	15.6	8	19	25
NZHI13D[S]○-T01-T02-T02	37.8	1/4"	42	1/4"	18.5	9.5	22.2	29

* In parentheses are the dimensions for L type

High flow/Body ported Type

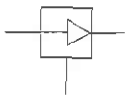
Model

Model	Nozzle mmø	Performance type	Vacuum pressure in Hg (mmHg)	Port Connection (NPTF)			Weight (gf)
				SUP	VAC	EXH	
ZH15DS	1.5	High vacuum pressure type	26 (660)	1/4	3/8	3/8	43
ZH18DS	1.8			3/8	3/8	3/8	55
ZH20DS	2.0			3/8	1/2	1/2	95
ZH15DL	1.5	High suction flow type	16 (400)	1/4	3/8	3/8	43
ZH18DL	1.8			3/8	3/8	3/8	55
ZH20DL	2.0			3/8	1/2	1/2	95

Specifications

Fluid	Air
Operating pressure range	35~85 PSI (2.5~6kgf/cm²)
Max. operating pressure	100 PSI (7 kgf/cm²)
Operating temperature range	40~140°F (5~60°C)
Lubrication	Non lube only

Ejector Symbol



ZH○○D

Max. Suction Flow Rate/Air Consumption* SCFM (Nℓ/min)

Specifications	Max. vacuum pressure in Hg (mmHg)	Nozzle diameter (ømm)		
		1.5	1.8	2.0
Max. suction flow rate SCFM (Nℓ/min)	S type–26" (660)	1.95 (55)	2.30 (65)	3.01 (85)
	L type–16" (400)	2.66 (75)	3.90 (110)	4.78 (135)
Air consumption SCFM (Nℓ/min)	S type–26" (660)	3.37 (95)	4.60 (130)	6.20 (175)
	L type–16" (400)			

At 4.5kgf/cm² (65 PSI)

v To Order

Nozzle diameter

15	ø1.5mm
18	ø1.8mm
20	ø2.0mm

Max. vacuum pressure

S	26" Hg (660 mmHg)
L	16" Hg (400 mmHg)

ody ported type Without silencer) — **ZH 18 D S T03 T03 T03**

ram ❶ Available Port Sizes

el type	SUP	VAC	EXH
H15D	1/4	3/8	3/8
H18D	3/8	3/8	3/8
H20D	3/8	1/2	1/2

Note) SUP. port size

Symbol	Size	Type
T02	1/4	NPTF
T03	3/8	NPTF

Note) VAC. port size

Symbol	Size	Type
T03	3/8	NPTF
T04	1/2	NPTF

Note) EXH. port size

Symbol	Size	Type
T03	3/8	NPTF
T04	1/2	NPTF

Note) Refer to diagram ❶ for port sizes in relation to nozzle diameter.

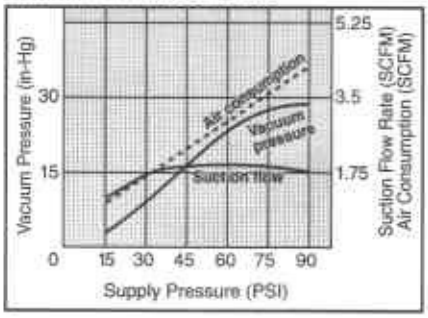
Exhaust Characteristics/Flow Characteristics

Flow characteristics: at 4.5 kgf/cm² supply air pressure (65PSI)

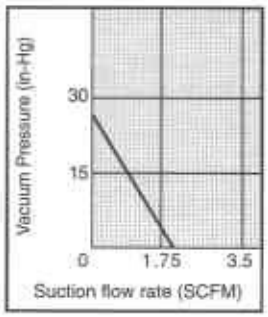
Max. vacuum pressure: 26" Hg (660 mmHg)

ZH15DS

Exhaust Characteristics

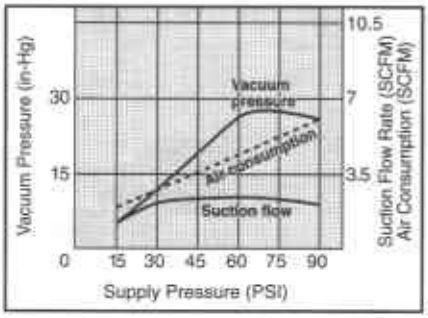


Flow Characteristics

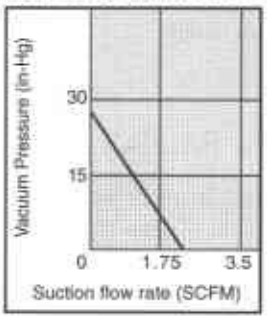


ZH18DS

Exhaust Characteristics

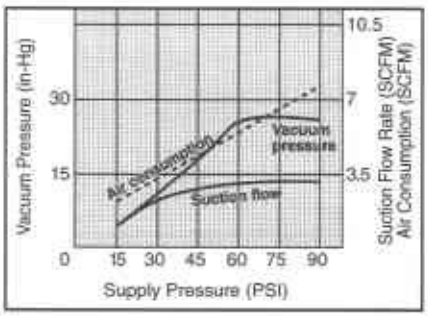


Flow Characteristics

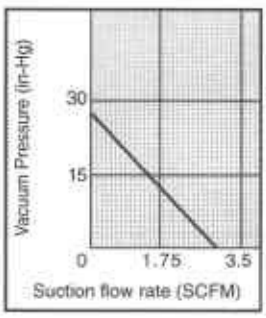


ZH20DS

Exhaust Characteristics



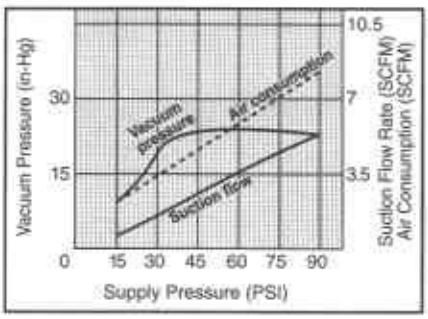
Flow Characteristics



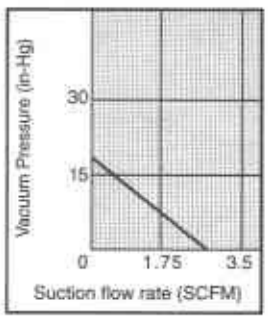
Max. vacuum pressure: 16" Hg (400 mmHg)

ZH15DL

Exhaust Characteristics

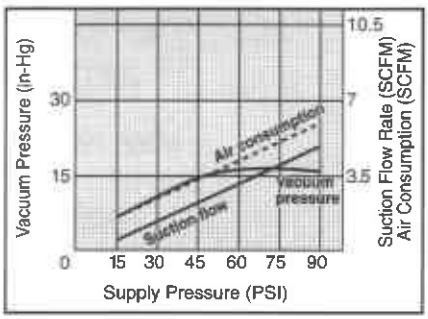


Flow Characteristics

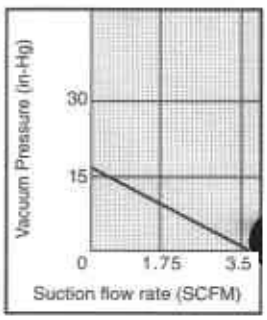


ZH18DL

Exhaust Characteristics

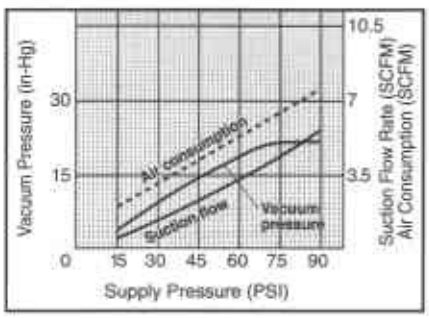


Flow Characteristics

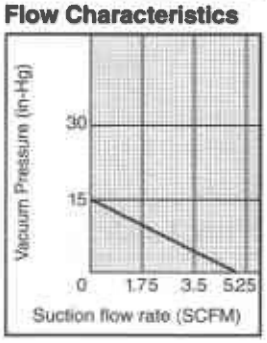


ZH20DL

Exhaust Characteristics



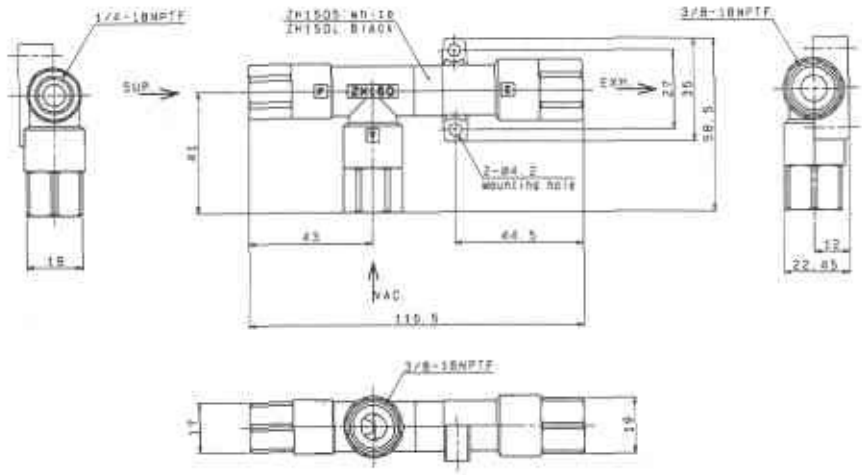
Flow Characteristics



Dimensions (mm)

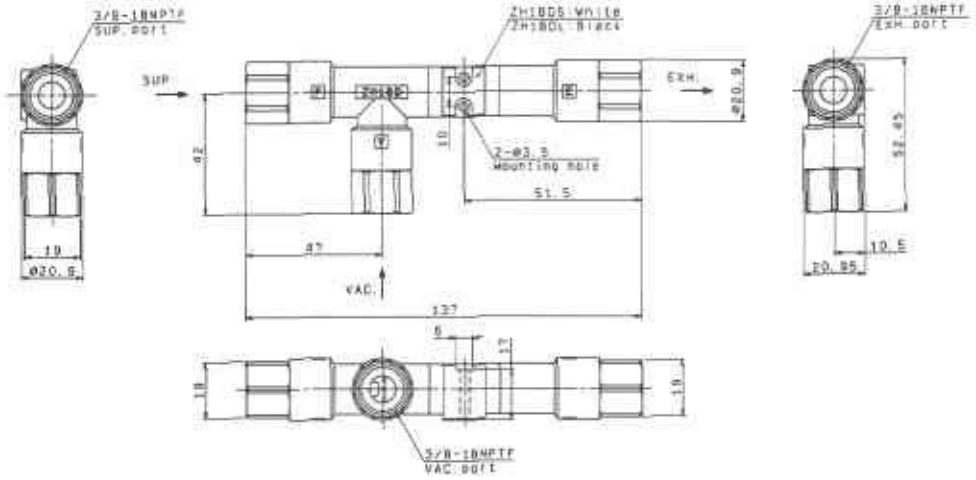
H15D

(mm)



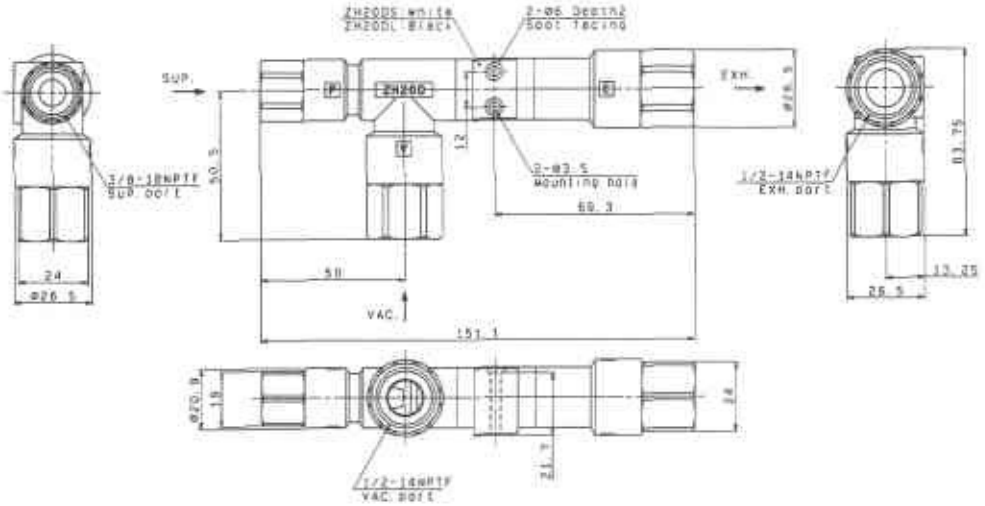
H18D

(mm)



H20D

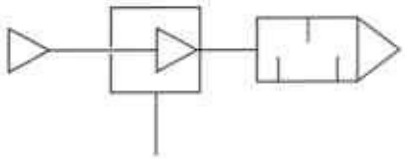
(mm)



Application Circuit Examples

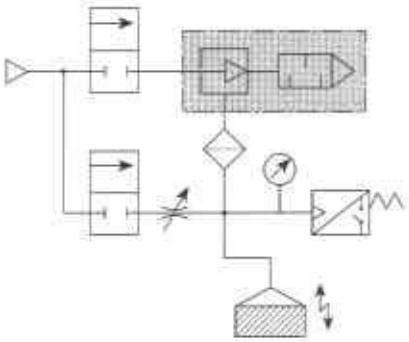
Basic Type

Symbol

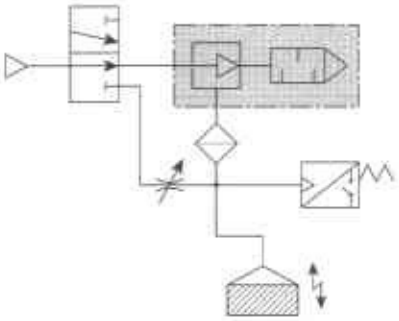


Ⓐ ~ Ⓓ are example applications (with peripherals).

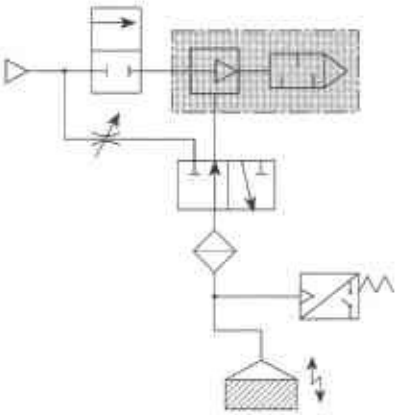
Ⓐ Full circuit system



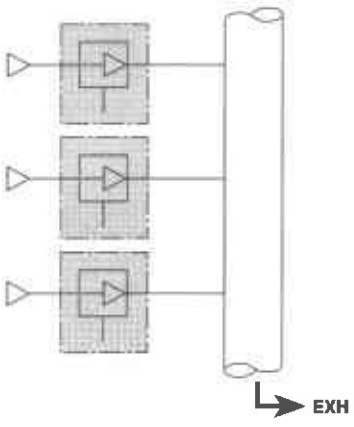
Ⓑ 3 port selector system



Ⓒ Switching pressure/vacuum sides



Ⓓ Common exhaust type
(w/large pipe for exhaust)



Precautions

Precautions in case of power outage

Use a N.O. supply valve for ejector to operate with self-retention function.

Adsorption due to small nozzle diameter

In the case of adsorption of electronic components and precision tiny components, especially when adsorption nozzle diameter is on order of ø1mm, nozzle can throttle, and vacuum switch remains on. In this case, gauging by the vacuum switch cannot be performed. Use the ejector compatible with this nozzle and employ an appropriate vacuum switch which has better pressure differential accuracy. (See model ZSP1, p. 26, 85.)

Excessive leakage from adsorption area

If workpiece has a vent hole or if air leaks from between the pad and work, ejector with large nozzle diameter and large suction flow rate will be best.
If possible, make a leakage estimation by effective orifice area on the leakage side beforehand. Vacuum pressure can be worked out by flow characteristics of the ejector.

Blow-off valve

2-port or 3-port valve is ideal for blow-off, and a low vacuum compatible valve is recommended for this purpose. The insertion of a needle valve can regulate the flow of breaking air.
Breaking pressure should be at least atmospheric pressure.

Suction filter

To prevent ejector and valve from dust and contamination, application of a suction filter is recommended. (Series NZFA, NZFB)

Suction Filter

NZFA Series

Air Suction Filter completely isolates vacuum equipment from contamination problems

Prevents collected dust from entering tank

Dust trapped in filter element can be pump exhausted and will not fall back into the vacuum storage tank when replacing filter element.

Can be used to protect auxiliary equipment from particle contamination

(Vacuum ejectors, vacuum switches, vacuum valves, etc.).

Compact and light weight

Housing is made of light weight aluminum alloy and is compact in design.

Manifolding possible

Can be manifold mounted up to 10 stations for saving space.

Large filtration area of element

Large filtration area due to pleated element design permits longer maintenance cycle.

Easy replacement of element

Quick and simple replacement without the need for tools.

Mounting direction is free

Mounting orientation does not affect filter performance.

Suction Filter
NZFA Series

NZFA100

NZFA200

Symbol

Model

Model	Port size	Recommended air flow SCFM (Nℓ/min)	Weight lbs (kgf)
NZFA100	1/8 NPT	1.8 (50)	0.30 (0.14)
NZFA200	1/4NPT	7.1 (200)	0.42 (0.19)

Specifications

*Fluid	Air, Nitrogen
Operating pressure range	Vacuum ~75PSI (Vacuum~5kgf/cm²)
Operating temperature range	40~140°F (5~60°C)
Filtration	30μm
Element proof D.P.	20PSI (1.5kgf/cm²)

* Please contact SMC representative when using fluids other than air.

Accessories • Options

Model	NZFA100	NZFA200	Note
Single Bracket Ass'y	**BP-1H**	**BP-1H**	
Manifold brackets (1~10 stations)	**ZZFA1–** Number of stations	**ZZFA2–** Number of stations	With bracket, bolt, nut, washer. (2 pcs. each)

Material

Description	Material
Cover	Zinc die-cast
Case	Aluminum die-cast
Gasket • Seal	NBR
Element	Polyester • ABS

Part No. of Element

Part No.	Applicable filter model	Element size inch (mm)
EJ001H-030N	**NZFA100**	1.69x1.65x0.47(43x42x12)
EJ101H-030N	**NZFA200**	1.69x1.57x0.87(43x40x22)

How To Order

NZFA (100) – (T01) ( )

Air suction filter

Applicable filter
(Recommended air flow)
100 — 1.8SCFM (50Nℓ/min)
200 — 7.1SCFM (200Nℓ/min)

Port size
T01 — 1/8NPTF (NZFA100)
T02 — 1/4NPTF (NZFZ200)

Bracket (Individual units only)
(blank) — Without bracket
L — With bracket (1pc on the left)
R — With bracket (1pc on the right)

L or R is left or right of the filter IN port

How To Order / Manifold

Indicate in parallel the air suction filter and manifold brackets.

Example) In the case of 6 stations of air suction filter NZFA (single):

ZZFA1-06 ..... 1 pc.
*NZFA100-T01 ..... 6 pc.

*Assembled with left and right bracket

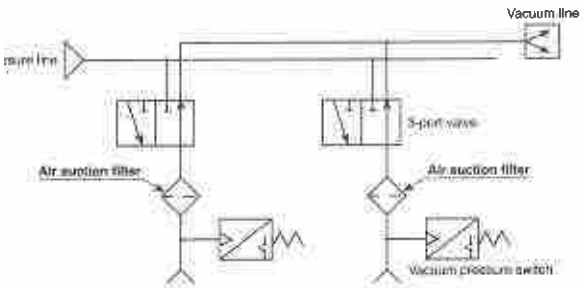
se and Application Examples

eas —— semiconductor • electronics related industry, automobile assembly, food industry.

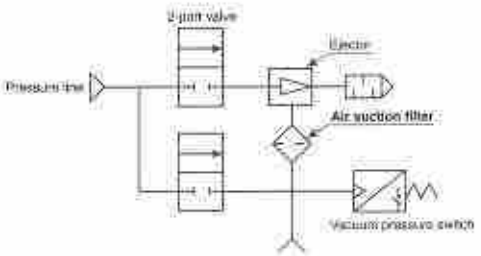
chines —— robotics/material handling, automatic assembly machine, automatic transport machine, pick and place, painting machines.

nctions —— vacuum transporting, suction devices, vacuum generated air flow.

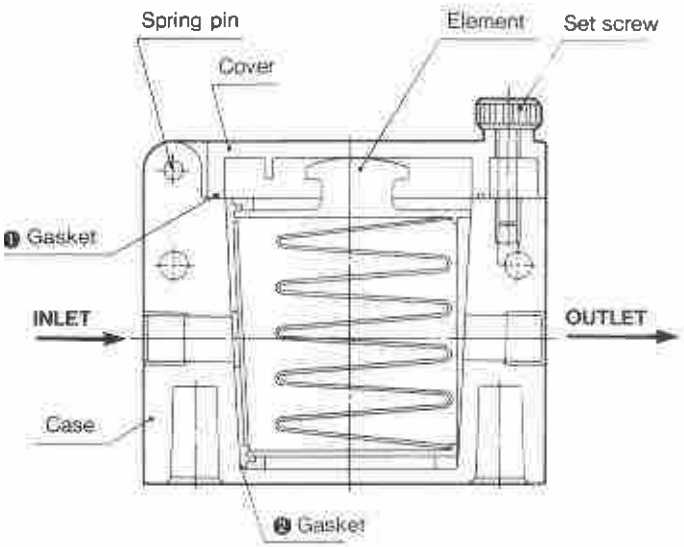
pplication in a Vacuum Pump Type System



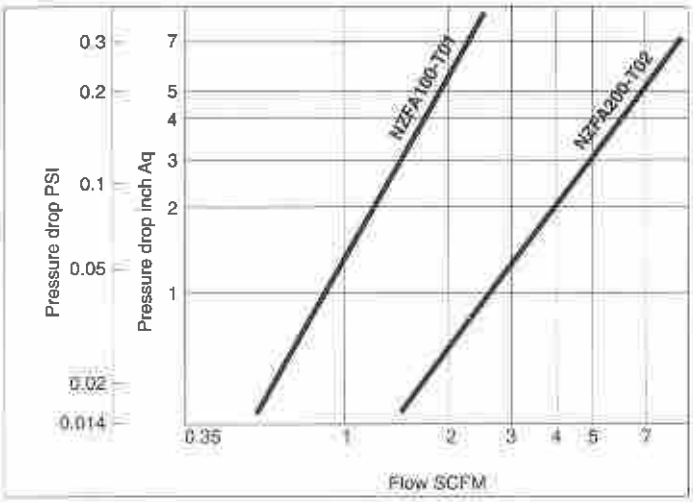
pplication in an Ejector Type System



onstruction/Seals



Flow Characteristics



Fluid —— Air
Material —— Polyester
Filtration —— 30μm
Pressure —— Secondary pressure side is open to air.

Precautions

❶ **(Installation)**
- Check carefully IN and OUT locations before mounting
- Reserve enough space on the cover side to allow element maintenance.
- Check sealing on the piping thread and clean or replace it to prevent leakage.

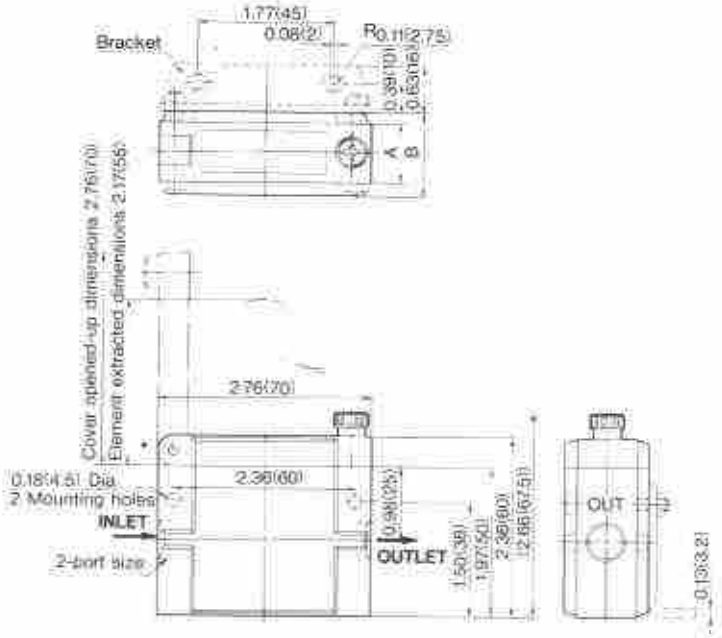
❷ **(Replacement)**
- When element is clogged, stop the operation, and clean or replace it.
- When assembling or disassembling, prevent gasket and seal from being damaged (scratches, nicks).
- When reinserting element, check the direction symbol on the case and element. (Note that reverse orientation prevents closing the cover.)

Seals

No.	Description	Part no.	
		NZFA100	NZFA200
❶	Gasket for cover case	AL-204H	AL-205H
❷	Gasket for element	AL-202H	AL-203H

Single / Dimensions

inch (mm)

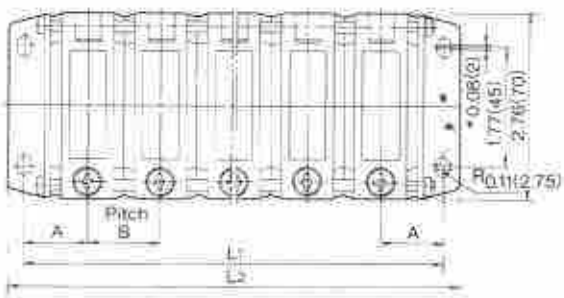


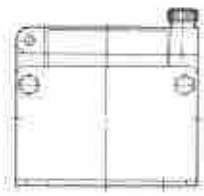
Note) The diagram on the left is for **NZFA200**. The bracket location shown is on the left side.

Model \ Symbol	Port size	A	B
NZFA100	1/8 NPTF	0.75 (19)	0.71 (18)
NZFA200	1/4 NPTF	0.94 (24)	1.10 (28)

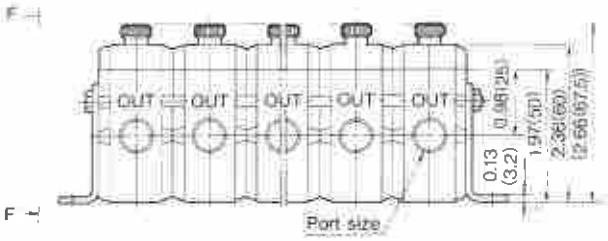
Manifold / Dimensions

inch (mm)





F-F' Perspective drawing



Model \ Symbol	Port size	A	B
NZFA100	1/8 NPTF	0.75 (19)	0.71 (18)
NZFA200	1/4 NPTF	0.94 (24)	1.10 (28)

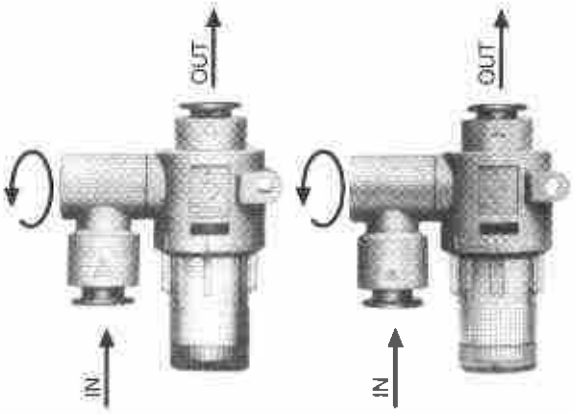
Model	Symbol	No. of stations									
		1	2	3	4	5	6	7	8	9	10
NZFA100	L_1	1.50 (38)	2.20 (56)	2.91 (74)	3.62 (92)	4.33 (110)	5.04 (128)	5.83 (148)	6.46 (164)	7.17 (182)	7.87 (200)
	L_2	1.97 (50)	2.68 (68)	3.39 (86)	4.09 (104)	4.80 (122)	5.51 (128)	6.22 (158)	6.93 (176)	7.64 (194)	8.35 (212)
NZFA200	L_1	1.89 (48)	2.99 (76)	4.09 (104)	5.20 (132)	6.30 (160)	7.40 (188)	8.50 (216)	9.61 (244)	10.71 (272)	11.81 (300)
	L_2	2.36 (60)	3.46 (88)	4.57 (116)	5.67 (144)	6.77 (172)	7.87 (200)	8.98 (228)	10.08 (256)	11.18 (284)	12.28 (312)

Suction Filter (w/One-Touch Fittings)

NZFB Series

Prevents vacuum circuit contamination trouble

- **Protects vacuum ejectors, pumps, switches and valves from particle contamination.**
- **Fully rotational tube orientation.**
  The orientation of tubing can be set at any angle from 0° ~ 360° via the universal joint on the inlet side.
- **Easy element maintenance.**
  By simple removal of the transparent cover, the element can be changed quickly without tools or removal of tubing.
- **Popular One-Touch Fitting Type tube connections.**
  Release button is red for inch sizes and blue for metric sizes.
- **Compact and lightweight.**
  Compact and lightweight molded resin material.
- **See Also**
  ZFC series inline suction filters with one-touch fittings and replaceable 10μm filter elements.
  Request catalog #N402.



Inch or metric size tube fittings

Suction Filter
NZFB Series

Symbol

Model

Model		Port size (Applicable tube O.D.) INLET side, OUTLET side	Recommended* max. air flow SCFM (Nℓ/min)	Weight lbs (gf)
Inch size	ZFB101-05	ø3/16"	0.7 (20)	0.05 (22)
	ZFB101-07	ø1/4"	0.7 (20)	0.05 (22)
	ZFB201-07	ø1/4"	1.1 (30)	0.07 (30)
	ZFB301-11	ø3/8"	2.7 (75)	0.09 (40)
	ZFB401-13	ø1/2"	3.5 (100)	0.14 (62)
Mili size	ZFB100-04	ø4mm	0.35 (10)	0.05 (22)
	ZFB100-06	ø6mm	0.7 (20)	0.05 (22)
	ZFB200-06	ø6mm	1.1 (30)	0.07 (30)
	ZFB200-08	ø8mm	1.75 (50)	0.07 (30)
	ZFB300-08	ø8mm	2.7 (75)	0.09 (39)
	ZFB300-10	ø10mm	2.7 (75)	0.09 (39)

*Flow rate in less than 0.43 PSI (0.03kgf/cm²) of the initial pressure drop

Principal Parts

Description	Material
Body	Polyester
Cover	Transparent nylon
Universal joint	Polyester
Cap	C3604B (Electroless plating)
Element	PVF
"O" ring • Packing	NBR

Specifications

Fluid/Media	Air, Nitrogen
Operating pressure	Vacuum
Proof pressure	75PSI (5kgf/cm²)
Operating and ambient temperature	32~140°F (No freezing)
Filtration efficiency	30 μm
Element proof D.P.	24PSI (1.5kgf/cm²)
Applicable tubing material	Nylon, soft nylon, polyurethane

Replacement Element

Kit No.	Applicable filter model	Element size inch (mm)
I-34S-A	ZFB101 ZFB100	ø0.93xø0.24x1.30L (ø10xø6xL33)
I-35S-A	ZFB201 ZFB200	ø0.47xø0.31x1.65L (ø12xø8xL42)
I-36S-A	ZFB301 ZFB300	ø0.55xø0.39x1.77L (ø14xø10xL45)
I-39S-A	ZFB401	ø0.71xø0.55x2.36L (ø18xø14xL60)

Note) Replacement O-ring seal included with replacement elements.

How To Order

ZFB 101 — 05

Body size •

	Symbol	Flow SCFM (Nℓ/min)
Inch size* (Release button: Red)	101	MAX 0.7 (20)
	201	MAX 1.1 (30)
	301	MAX 2.1 (60)
	401	MAX 3.5 (100)
Mili size* (Release button: Blue)	100	MAX 0.7 (20)
	200	MAX 1.8 (50)
	300	MAX 2.6 (75)

• IN • OUT Applicable tube O.D.

	Symbol	Tube size	Model
Inch size*	05	ø3/16"	NZFB101
	07	ø1/4"	NZFB101 NZFB201
	11	ø3/8"	NZFB301
	13	ø1/2"	NZFB401
Mili size	04	ø4mm	ZFB100
	06	ø6mm	ZFB100 ZFB200
	08	ø8mm	ZFB200 ZFB300
	10	ø10mm	ZFB300

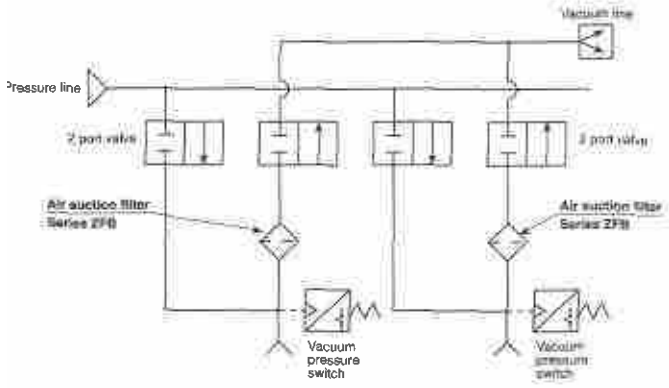
Note) ø4mm can be used with 5/32" tubing.
ø8mm can be used with 5/16" tubing.

se and Application Areas

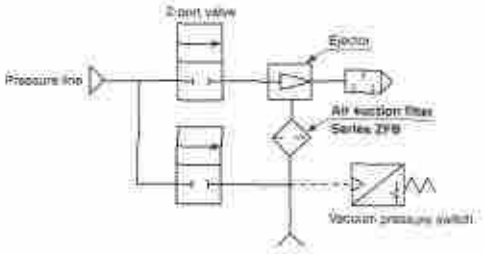
ısic —— Semiconductor/Electronics related industry, Automobile assembly, Food industry, Medical instruments, General assembly machines

ıchines —— Robotic arm/Material handling, Automatic assembly machine, Automatic transport machine, Pick and Place, painting machine.

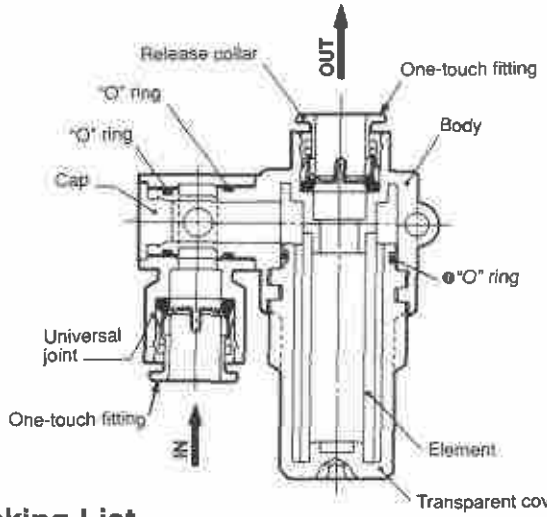
pplication To Vacuum Pump Type System



pplication To Ejector Type System



onstruction/Packing List



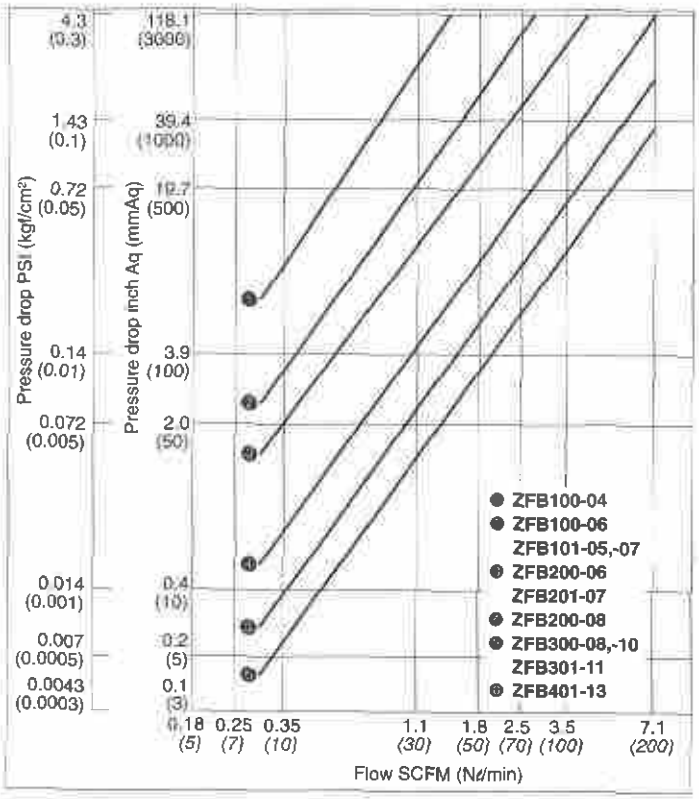
acking List

No.	Description	Part No.			
		ZFB100,101	ZFB200,201	ZFB300,301	ZFB401
	"O" ring for transparent cover	S11.2	S12.5	S16	S18

ng is included when spare element is ordered. See previous page.

Flow Characteristics

Fluid — Air Temperature — Ambient temperature
Measuring pressure — Secondary pressure side is open to air.
(Application of pressure)



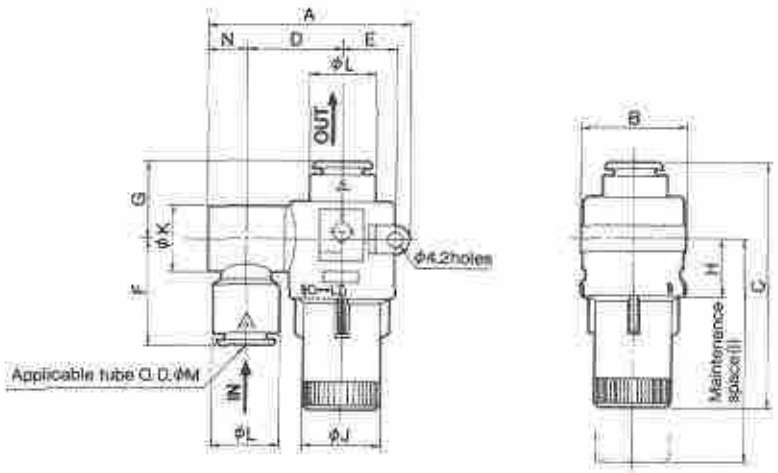
Precautions

❶ Installation
- Check carefully IN and OUT locations before mounting.
- Reserve enough maintenance space on the cover side to assemble and disassemble element. (Refer to dimensions.)
- Refer to precaution no. ❶, concerning the tube connection installation.

❷ Element Change (Refer to "Element Change Procedure" on next page.)
- As the element becomes clogged, stop the operation, reduce the internal pressure of the filter to atmospheric pressure and then change the element. (The cover removal does not require tools.)
- Verify that there is no damage on the "O" ring before replacing the cover. The element change should be worked in a pressure drop of 3 PSI (0.2kgf/cm²) as a rough standard.

❸ Fittings
- **Selecting Tube**
  When using a brand of tubing other than SMC, examine carefully the tolerance of the tube's O.D.
  Nylon • soft nylon tube —— ± 4 mils (0.1mm) max.
  Polyurethane tube —— ± 6 mils (0.15mm) max.
- **Installing tube**
  Cut the tube perpendicularly, being careful not to damage its exterior. (Use tube cutter TKA-1).
  Grasp the tube, and slowly push it in until it comes to a dead stop.
  Do not bend the tube sharply adjacent to the fitting. Be sure to have sufficient length to accommodate bending radius.
- **Removing tube**
  Pull out the tube while pushing the release collar. (Insufficient depression of the release collar results in difficulty pulling out the tube and may result in damage to the tube.)
  Before reuse of the removed tube, cut off any damaged portion.

Dimensions

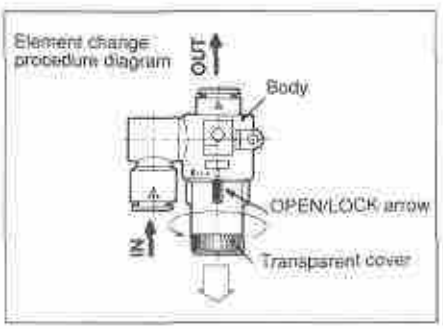


(mm)

	Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Inch Size	ZFB10105	48	26	53	22.5	12.5	24	17.5	15	50	15.5	14.4	12.8	3/16"	8.5
	ZFB101-07			54			24.2	17.7						1/4"	
	ZFB201-07	52	28	65	24.5	13.5	27.2	19.7	16	61	17.5	16.6	15.2	1/4"	9.5
	ZFB301-11	57	30	70	27	14.5	30.2	21.7	17	65	21.5	8	18.5	3/8"	11
	ZFB401-13	64.5	34	87.5	30.5	16.5	34	24	21.5	81	25.6	23	21.7	1.2"	13.5
Mill Size	ZFB100-04	48	26	53	22.5	12.5	24	17.5	15	50	15.5	14.4	12.8	4	8.5
	ZFB100-06													6	
	ZFB200-06	52	28	65	24.5	13.5	27	19.5	16	61	17.5	16.6	15.2	6	9.5
	ZFB200-08													8	
	ZFB300-08	57	30	69.5	27	14.5	29.5	21	17	65	21.5	18	16.5	8	11
	ZFB300-10													10	

Element Change Procedure

1. Stop the operation and reduce the internal pressure of the filter to atmospheric pressure.
2. Turn the transparent cover in the counterclockwise direction and position the arrow indicator on the transparent cover from the "L" (LOCK) position to the "O" (OPEN) position.
3. Pull the transparent cover downward to access the element. Remove any dust trapped in the transparent cover by air blowing. (Check for damage to the "O" ring. Replace if necessary.)
4. Insert a new element into the body.
5. Set the arrow indicator on the transparent cover to the "O" side, push the transparent cover into the body and turn the arrow from the "O" position to the "L" position to LOCK in place.
6. Restart the operation.



Vacuum Switches

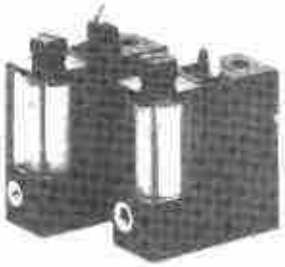
ZS Series

- **ZSE30 two-color single ouput digital swtich**
- **ZSE40 bright LED dual-output digital switch**
- **ZSP1**
- **ZSM1**

ZSE30

ZSE40

ZSM1
Diaphragm/Reed Type



ZSP1

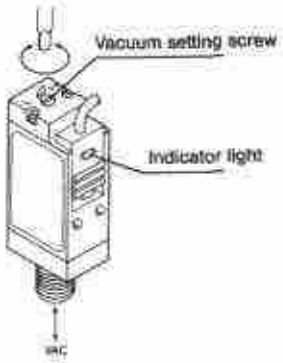
Solid State Vacuum Pressure Switches

Specifications		Switch Model			
		ZSE30	ZSE40	ZSM1	ZSP1
Digital Display	Red & Green LCD	●			
	Red LED		●		
	No Display			●	●
Selectable Display Units		●	●		
Piping	Tube Fitting	●			
	Port Thread	●	●	●	●
Available Outputs	Contact only			●	
	1 NPN	●		●	●
	1 PNP	●			
	2 NPN		●		
	2 PNP		●		
	Analog (VCD)	●	●		
	Analog (mADC)	●			
Wiring	Flying Leads		●	●	●
	Plug-in connector	●			●
Compatible Systems	(N)ZX, ZR				●
	(N)ZM, ZMA			●	
Options	Panel Mounting	●	●		
	Built-In Suction Filter				●

- Compact/Lightweight
- Long life
- Diaphragm design:
  Solid-state non-contact
  Reed type contact
- 115 VAC type
- Shield plate standard
  Prevents external interference

Operation

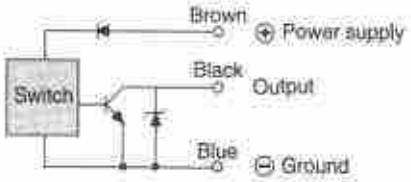
Use vacuum setting screw to adjust set point. Turn screw clockwise to increase vacuum pressure, counterclockwise to decrease vacuum pressure setpoint.



Electrical Specifications

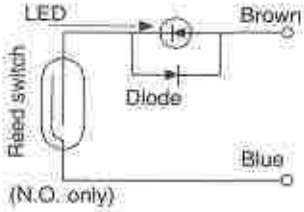
ZSM1-T115

Power supply voltage	10~26 VDC
Operating voltage	30 VDC or less
Current consumption	24 VDC; 16mA or less
Internal voltage drop	100mA; 0.8V or less 150mA; 1.5V or less



ZSM1-T121

Operating voltage	115VAC
Current	5~17mA



ZSM1 • Vacuum Switch Specifications

Model	ZSM1-T115	ZSM1-T121
Switch type	Non-contact	Contact (reed)
Media	Air	
Maximum Pressure	75 PSI (2~5.5kgf/cm²)	
Temperature Range	40~140°F (5~60°C)	
Set Pressure Range	-8 ~ -26 in.Hg (-200 ~ -600 mmHg)	
Maximum Hysteresis	4.3 in.Hg (110 mmHg)	5.9 in.Hg (150 mmHg)
Voltage	24 VDC	115 VAC
Indicator Lamp	Lighting under ON condition (LED)	

How To Order

ZSM1 – T1 15 L

Lead wire length

(blank)	19.5 inch (1.5m)
L	120 inch (3m)

Vacuum switch
(Diaphragm type)

Switch type

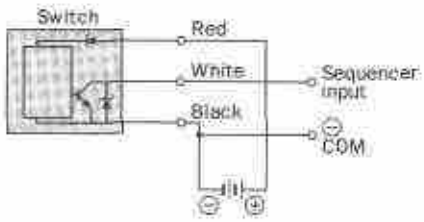
15	Non-contact/24VDC
21	Contact (reed switch) 115VAC

Port thread

T1	1/8NPTF
01	1/8Rc(PT)*
O	For mounting on NZM ejector

*Special order

Connecting with Sequencer (ZSM1-T115/Non-Contact type 24 VDC)

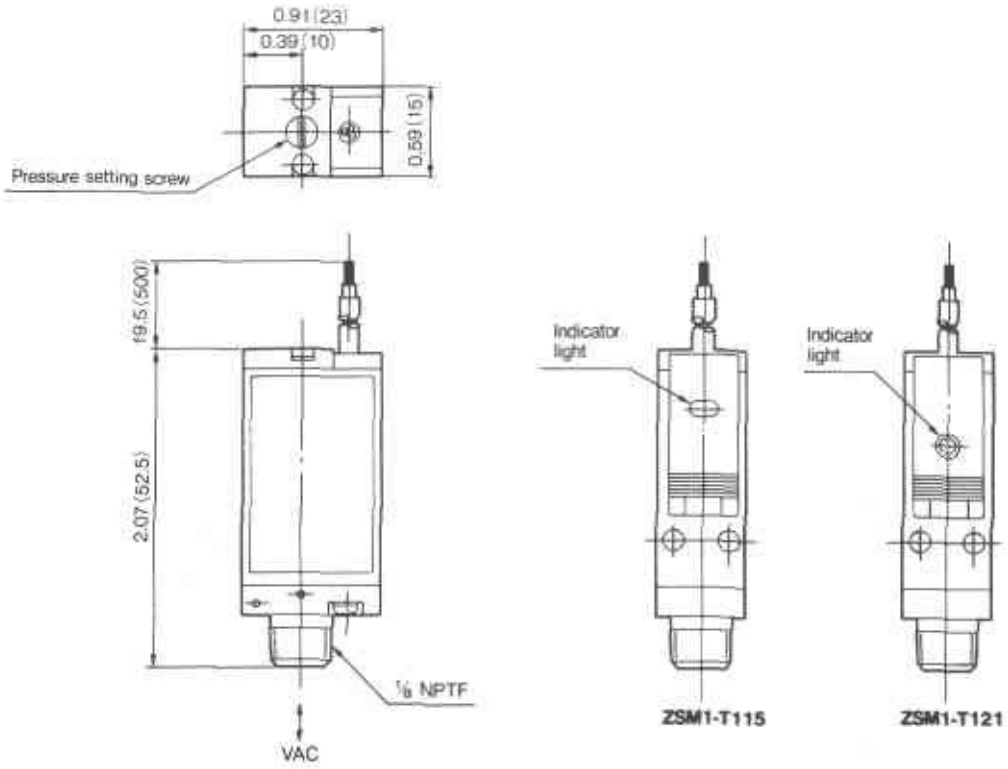


Red wire: Power source for operating switch (+).
White wire: Connect with output load. (Sequencer input or output relay).
Black wire: Connect with power source ground.

mensions

in. (mm)

M1-T115/-T121



2-Color Display Type
High-Precision Digital Pressure Switch

Series ZSE30/ISE30

2-color digital display allows you to choose the setting according to your application requirements. 4 different display settings are available.

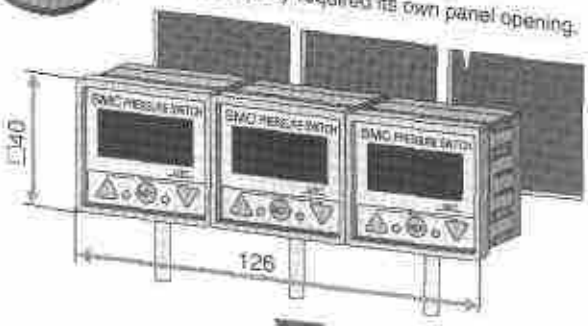
Abnormal conditions can be detected at a glance!

Space-saving improvement

Economical use of space

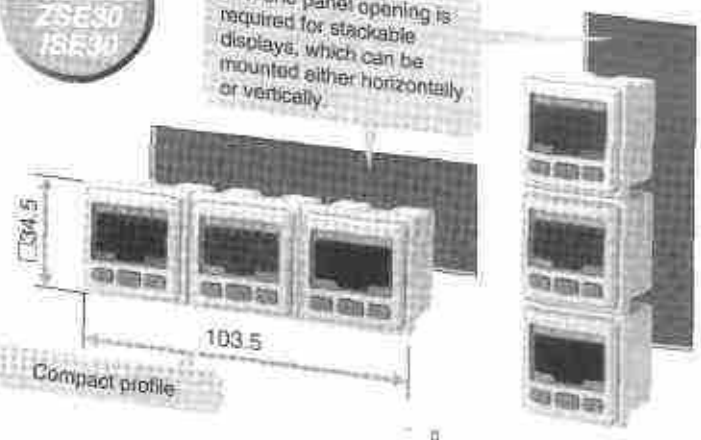
Old Model
ZSE4E
ISE4E

Each display required its own panel opening.



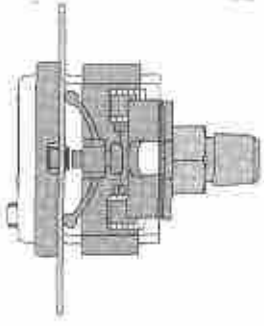
New Model
ZSE30
ISE30

Just one panel opening is required for stackable displays, which can be mounted either horizontally or vertically.



Applicable panel thickness is up to 6mm.

(Panel mounting)



With analog output

In addition to the conventional voltage output type (1 to 5V)

Current output type (4 to 20mA)

is now available.

- Convenient when longer wiring is required
- Excellent noise resistance

Switches for vacuum and positive pressure can be easily distinguished.

The different display panel frame colors easily tell them apart.

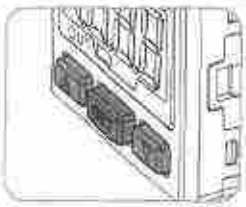
Vacuum/Low pressure (ZSE30) — Blue

Positive pressure (ISE30) — Gray

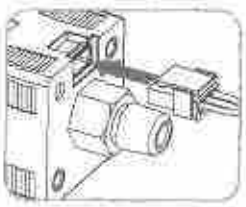
Display calibration

This function allows uniformity in the numbers displayed.

More user-friendly controls



Raised rubber button controls are clearly set apart, simple to operate, soft to the touch.



Plug-type connectors take the burden out of wiring work and maintenance.

High-precision resolution: 1/1000

Variations

		Vacuum/Low pressure ZSE30	Positive pressure ISE30
Rated pressure range		100kPa 0 −100kPa	1MPa 0
Setting/Display resolution		0.2kPa	0.001MPa
Output	Switch output	NPN/PNP open collector (1 output)	
	Analog output	Voltage output: 1 to 5V; Current output: 4 to 20mA	
Current consumption		45mA or less (70mA or less for current output)	
Option		Panel mount/Bracket	

2-Color Display Type
High-Precision Digital Pressure Switch
Series ZSE30/ISE30

How to Order

For positive pressure ISE30 – 01 – 25 – M

For vacuum/Low pressure ZSE30 – 01 – 25 – M

Option 1

Nil	Without lead wire 
L	Lead wire with connector (Lead wire length: 2m) 

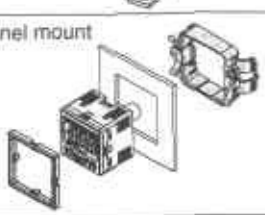
Piping specification

01	R 1/8 (with M5 female thread)
T1	NPT 1/8 (with M5 female thread)

Output specification

25	NPN output
65	PNP output
26	1 to 5V output
28	4 to 20mA output

Option 2

Nil	None
A	Bracket 
B	Panel mount 

Unit specification

Nil	With unit switching function
M	Fixed SI unit! (International System of Units) Note)

Note) Fixed units:
For vacuum/Low pressure: kPA
For positive pressure: MPa

Optional Part Nos.

When optional parts are required separately, use the following part numbers to place an order.

Option	Part no.	Note
Lead wire with connector	ZS-27-A	Lead wire length: 2m
Bracket	ZS-27-B	With mounting screws (M3 x 5L: 2 pcs.)
Panel mount adapter	ZS-27-C	

Specifications

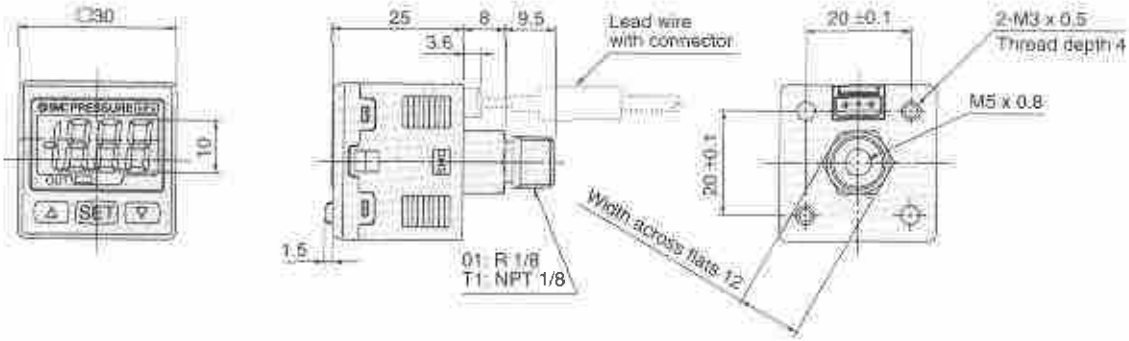
		ZSE30	ISE30
Rated pressure range		−100 to 100kPa	0 to 1MPa
Regulating pressure range		−101 to 101kPa	−0.1 to 1MPa
Proof pressure		500kPa	1.5MPa
Setting/Display resolution		0.2kPa	0.001MPa
Fluid		Air, Inert gas, Non-flammable gas	
Power supply voltage		12 to 24VDC ±10%, Ripple (p-p) 10% or less (with power supply polarity protection)	
Current consumption		45mA or less (70mA or less for current output)	
Switch output Note 1)		NPN or PNP open collector output: 1 output	
	Max. load current	80mA	
	Max. applied voltage	30V (with NPN output)	
	Residual voltage	1V or less (with load current of 80mA)	
	Response time	2.5ms or less (Response time selections with anti-chattering function: 20ms, 160ms, 640ms, 1280ms)	
	Short circuit protection	With short circuit protection	
Repeatability		±0.2% F.S. ±2 digits or less	±0.2% F.S. ±1 digit or less
Analog output	Voltage output Note 2)	Output voltage: 1 to 5V ±2.5% F.S. or less (with rated pressure range) Linearity: ±1% F.S. or less; Output impedance: Approx. 1kΩ	
	Current output Note 3)	Output current: 4 to 20mA; ±2.5% F.S. or less (with rated pressure range) Linearity: ±1% F.S. or less Maximum load impedance: 300Ω with power supply voltage of 12V; 600Ω with power supply voltage of 24V Minimum load impedance: 50Ω	
Hysteresis	Hysteresis mode Window comparator mode	Variable	
Display		3 1/2-digit, 7-segment indicator, 2-color display (red and green) Sampling cycle: 5 times/s	
Display accuracy		±2% F.S. ±2 digits (25°C)	±2% F.S. ±1 digit (25°C)
Indication light		Lights up when output is ON (Green)	
Temperature characteristics		±2% F.S. or less (based on 25°C)	
Enclosure		IP40	
Ambient temperature range		Operating: 0° to 50°C; Stored: −10° to 60°C (with no freezing or condensation)	
Ambient humidity range		Operating and stored: 35 to 85% RH (with no condensation)	
Withstand voltage		1000VAC for 1 min. between live parts and enclosure	
Insulation resistance		50MΩ or more between live parts and enclosure (at 500VDC)	
Vibration resistance		10 to 150Hz, 1.5mm amplitude in X, Y, Z directions for 2 hours each	
Impact resistance		100m/s² in X, Y, Z directions 3 times each	
Port size		01 type: R 1/8, M5 x 0.8; T1 type: NPT 1/8, M5 x 0.8	
Material		Front case: PBT; Rear case: PBT; Piping port: C3602 (electroless nickel plated) Sensor pressure: Silicon; O-ring: NBR	
Weight		43g (without lead wire)	

Note 1) When switch output is selected, analog output is not available.

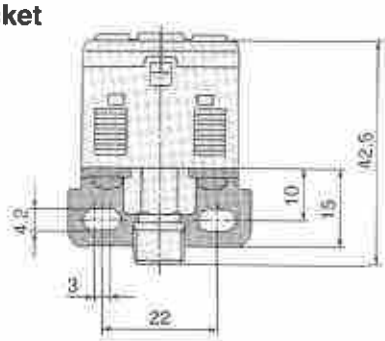
Note 2) When voltage output is selected, a simultaneous selection of switch output and current output is not available.

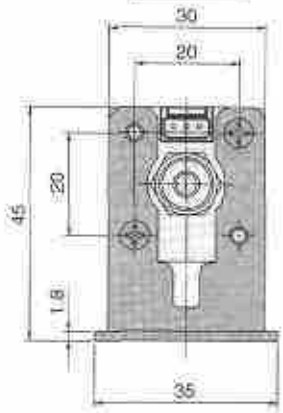
Note 3) When current output is selected, a simultaneous selection of switch output and voltage output is not available.

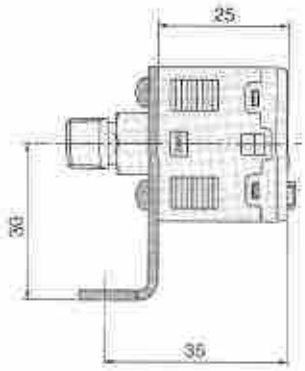
Dimensions



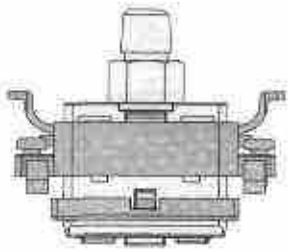
With bracket

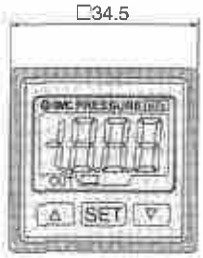


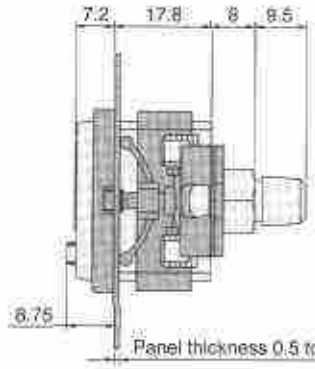


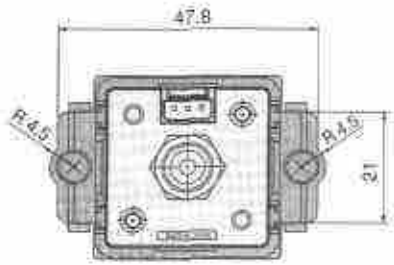


Panel mount





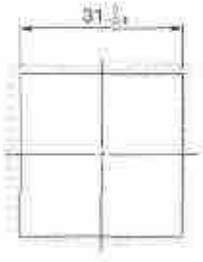




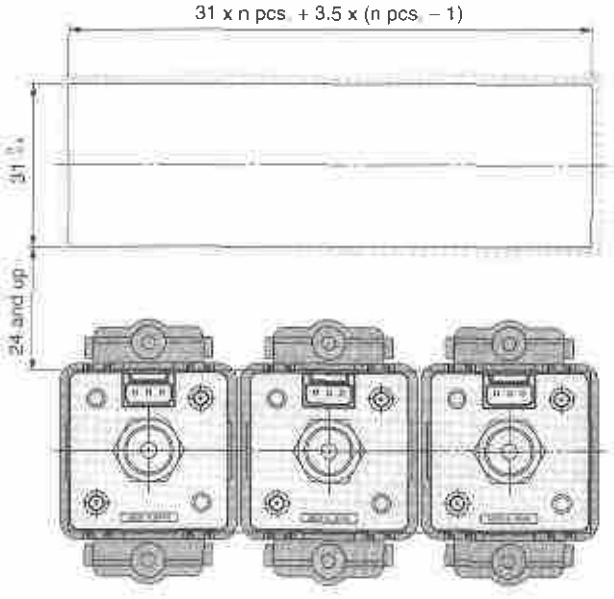
Dimensions

Panel fitting dimension

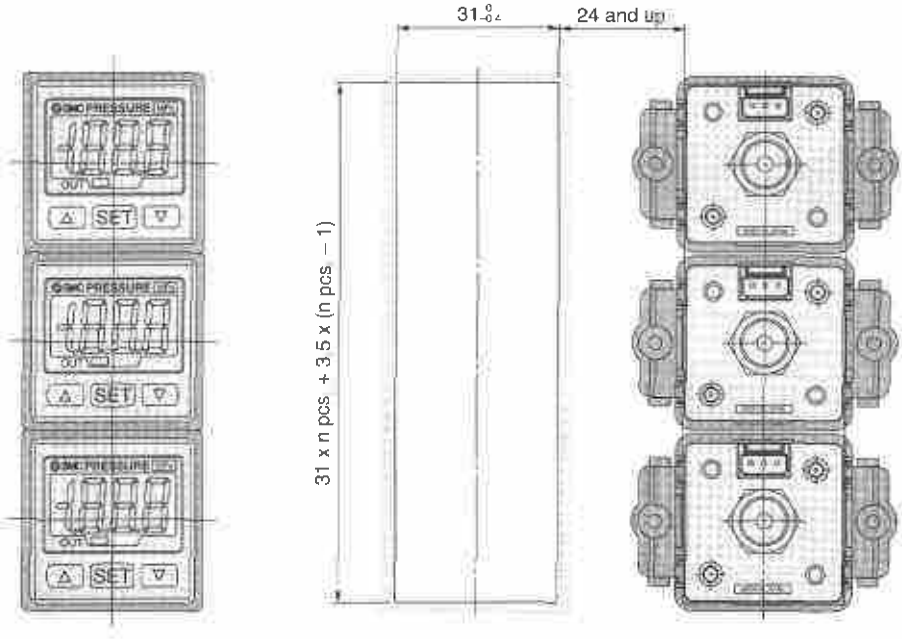
1-pc. mounting



Multiple (2 pcs. or more) horizontal mounting



Multiple (2 pcs. or more) vertical mounting



How to Order

Set pressure range

Nil	−0.100 to 1.000MPa	For positive pressure

For Positive Pressure **ISE40** — 01 — 22 — — — —

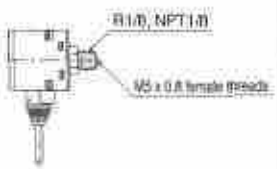
For Vacuum/Compound Pressure **ZSE40** — — — 01 — 22 — — — —

Set pressure range

Nil	10.0 to −101.3kPa	For vacuum pressure
F	−100.0 to 100.0kPa	For compound pressure

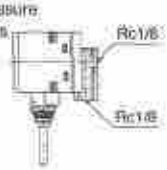
Piping specifications

01: R1/8 (with M5 female threads)
T1: NPT1/8 (with M5 female threads)



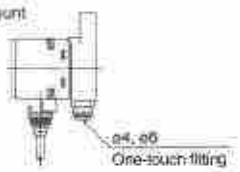
W1: Rc1/8

Reverse pressure two directions



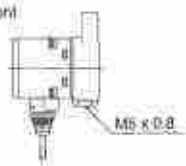
- **C4:** With ø4 One-touch fitting
- **C6:** With ø6 One-touch fitting

Wall mount



- **M5:** M5 x 0.8 (female threads)

Wall mount



* Optional

Input/Output specifications

22	NPN open collector 2 outputs + analog output
30*	NPN open collector 2 outputs + auto shift input
62*	PNP open collector 2 outputs + analog output
70*	PNP open collector 2 outputs + auto shift input

* Optional

Note

When equipped with auto shift function, the following ranges can be set.

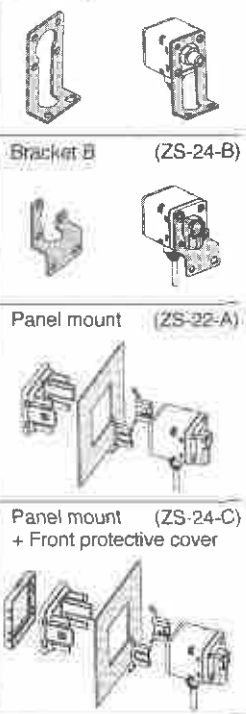
Set pressure range	Setting range
−100.0 to 100.0kPa	−100.0 to 100.0kPa
10.0 to −101.3kPa	−101.3 to 101.3kPa
−0.1 to 1.000MPa	−1.000 to 1.000MPa

Lead wire length

Nil	0.6m
L	3m

Option

Nil	None	
A	Bracket A	(ZS-24-A)
B	Bracket B	(ZS-24-B)
E	Panel mount	(ZS-22-A)
F	Panel mount + Front protective cover	(ZS-24-C)



* When optional parts only are required, order with the part numbers inside ( ).

Unit specifications

Nil	With unit switching function Note 1)
M	SI units only Note 2)

Note 1) This will no longer be sold for use in Japan after the new Weight and Measure Act is implemented (October, 1999)

Note 2) Fixed units
For vacuum/compound pressure : kPa
For positive pressure : MPa

Specifications

		ZSE40F (Compound pressure)	ZSE40 (Vacuum pressure)	ISE40 (Positive pressure)
ated pressure range		−100.0 to 100.0kPa	0.0 to −101.3kPa	0.000 to 1.000MPa
erating pressure range/Set pressure range		−100.0 to 100.0kPa	10.0 to −101.3kPa	−0.100 to 1.000MPa
thstand pressure		500kPa		1.5MPa
t pressure solution (Note 1)	kPa	0.1		—
	MPa	—		0.001
	kgf/cm²	0.001		0.01
	bar	0.001		0.01
	psi	0.02	0.01	0.1
	mmHg	1		—
	inHg	0.1		—
plicable fluid		Air, Non-corrosive/Non-flammable gas		
wer supply voltage		12 to 24VDC ±10%, Ripple (p–p) 10% or less		
rrent consumption		55mA or less		
itch output		NPN or PNP 2 outputs	Max. load current : 80mA Max. applied voltage : 30VDC (with NPN output) Residual voltage : 1V or less (with 80mA load current)	
peatability		±0.2% F.S. ±1digit or less		
steresis	Hysteresis mode	Variable		
	Window comparator mode	Fixed (3 digits) (Note 4)		
sponse time (with anti-chattering function)		2.5ms or less (with anti-chattering function: 24ms, 192ms and 768ms selections)		
tput short circuit protection		Yes		
splay		3 1/2 digit LED display (sampling cycle: 5 times/sec.)		
splay accuracy		±2% F.S. ±1 digit or less (at ambient temperature of 25 ±3°C)		
eration indicator light		Green LED (OUT1: Lights when ON), Red LED (OUT2: Lights when ON)		
alog output (Note 2)		Output voltage: 1 to 5V ±5% F.S. or less (in rated pressure range) Linearity: ±1% F.S. or less Output impedance: Approx. 1kΩ	Output voltage: 1 to 5V ±2.5% F.S. or less (in rated pressure range) Linearity: ±1% F.S. or less Output impedance: Approx. 1kΩ	
to shift input (Note 3)		No-voltage input (reed or solid state), input 5ms or more		
vironmental sistance	Enclosure	IP65		
	Ambient temperature range	Operating: 0 to 50°C, Stored: −10 to 60°C (with no condensation or freezing)		
	Ambient humidity range	Operating/Stored: 35 to 85% RH (with no condensation)		
	Withstand voltage	1000VAC for 1min. between lead wires and body		
	Insulation resistance	50MΩ or more (at 500VDC) between lead wires and body		
	Vibration resistance	10 to 500Hz at the smaller of amplitude 1.5mm or acceleration 98m/s² (10G) in X, Y, Z directions for 2hrs. each (deenergized)		
	Impact resistance	980m/s² (100G) in X, Y, Z directions 3 times each (deenergized)		
mperature characteristics		In a temperature range of 0 to 50°C, ±2% F.S. or less of pressure measured at 25°C		
rt size		01: R1/8, M5 x 0.8, T1: NPT1/8, M5 x 0.8, W1: Rc1/8 C4: With ø4 One-touch fitting, C6: With ø6 One-touch fitting, M5: M5 female threads		
ad wires		5 wire oil resistant heavy duty cord (0.15mm²)		
ight		01/T1 types approx. 60g, W1 type approx. 80g, C4/C6/M5 types approx. 92g (each including 0.6m lead wires)		

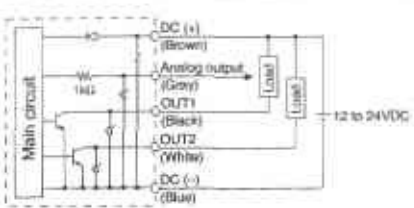
e 1) Equipped with unit switching function
(Types without the unit switching function use SI units (kPa or MPa) only.)
e 2) For ZSE40 (F)/ISE40-□-$^{22}_{62}$
e 3) For ZSE40 (F)/ISE40-□-$^{30}_{70}$
e 4) For ZSE40F (compound pressure) with "psi" indication, this is 0.03 to 0.04 psi.
e 5) For ZSE40F (compound pressure) with "psi" indication, zero clear is in the range of ±0.01 psi.

Note:
When equipped with auto shift function, the following ranges can be set.

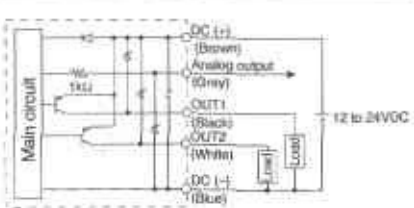
Set pressure range	Setting range
−100.0 to 100.0kPa	−100.0 to 100.0kPa
10.0 to −101.3kPa	−101.3 to 101.3kPa
−0.1 to 1.000MPa	−1.000 to 1.000MPa

nternal circuits and wiring examples

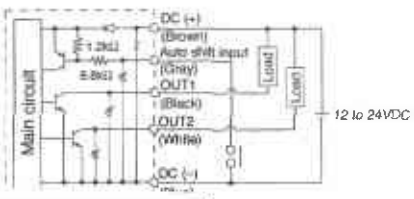
E40 (F)
:40-□-22 (L)-(M)
h analog output



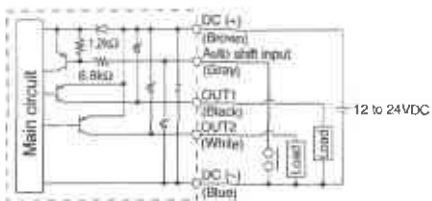
ZSE40 (F)
ISE40-□-62 (L)-(M)
With analog output



E40 (F)
:40-□-30 (L)-(M)
h auto shift input

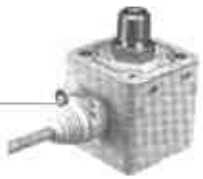


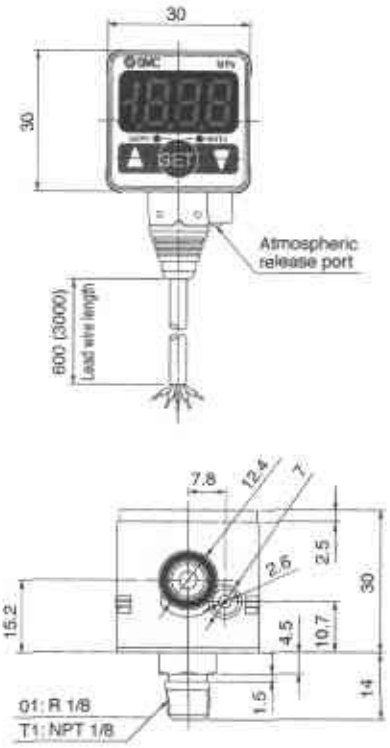
ZSE40 (F)
ISE40-□-70 (L)-(M)
With auto shift input

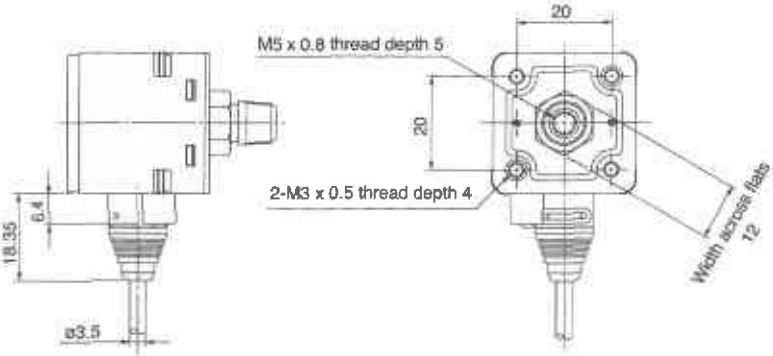


Dimensions

ZSE40(F)/ISE40–$^{01}_{T1}$

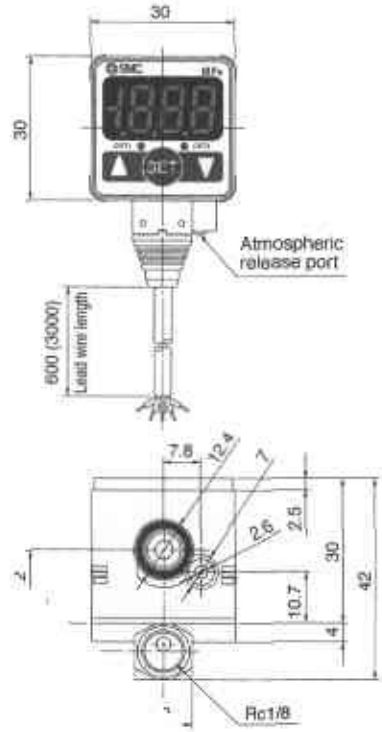


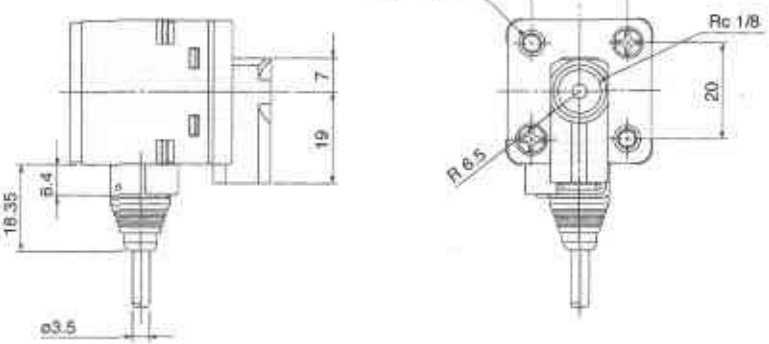




* For splash proof use (IP65), insert an air tube into the atmospheric release port.
(Refer to Specific Product Precautions 4 on the back cover for details.)

ZSE40(F)/ISE40–W1

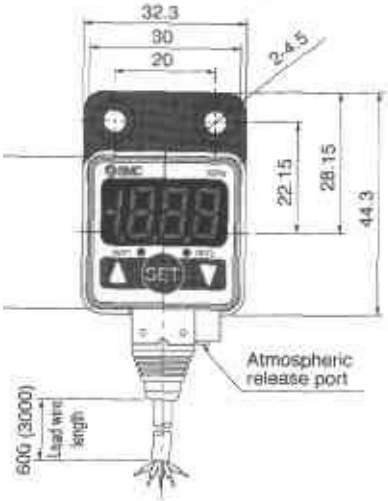


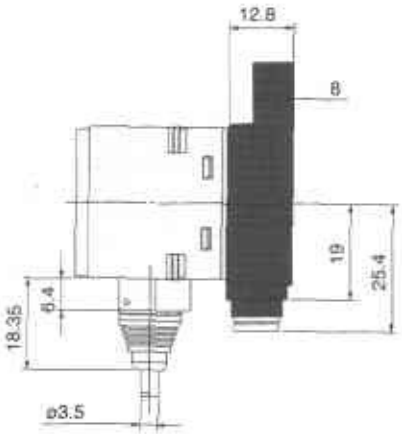


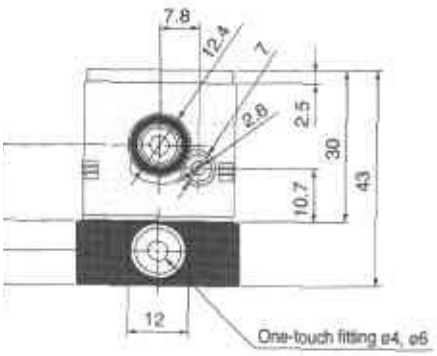
* For splash proof use (IP65), insert an air tube into the atmospheric release port.
(Refer to Specific Product Precautions 4 on the back cover for details.)

Dimensions

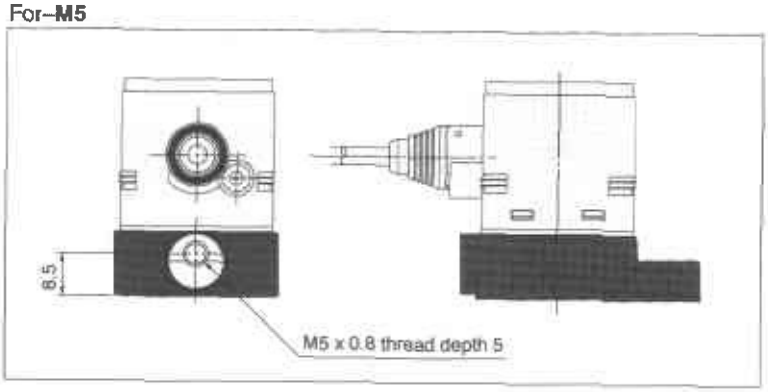
E40(F)/ISE40–C4 C6 M5







For–**M5**



For splash proof use (IP65), insert an air tube into the atmospheric release port.
Refer to Specific Product Precautions 4 for details.)

⚠ Specific Product Precautions

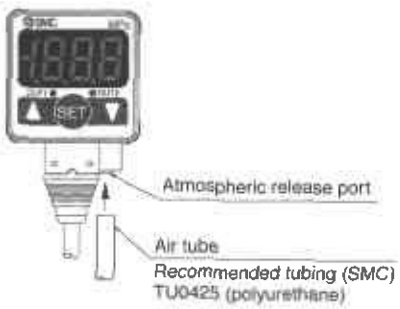
Caution

ediately after supplying power, there is drift of about ±0.5% F.S. When used very low pressure, allow the unit to warm up for about 20 to 30 minutes.

not use in locations where there is splashing or spraying of oils and solvents.

en using a commercially available switching regulator, be sure to ground the terminal.

ocations where the switch is exposed to water and dust, etc., these may er the switch from the atmospheric release port. Insert ø4 tubing (inside meter ø2.5) into the atmospheric release port, and extend the other end to a area where water, etc., is not splashed or sprayed. Be sure that tubing is bent and holes are not blocked, etc., or it will become impossible to make ect pressure measurements.

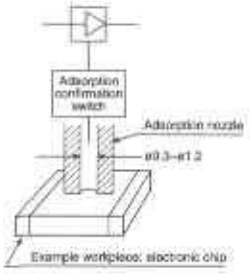


Standard Type/Dimensions in. (mm)

ZSP1 • Adsorption Confirmation Switch

- **Best suits small diameter nozzle/ø0.3~ø1.2 (mm). See p.27**
- **Standard with suction filter**
- **Optional plug-in connector**
- **Solid-state pressure sensor**

ZSP1



Adsorption Confirmation Switch / Specifications

Basic Part No.	ZSP1-S	ZSP1-B
Operating fluid.	Air	
Operating pressure	-6 ~ -30inHg (-150 ~ 760mmHg)	
Applicable adsorption nozzle diameter (ømm)	ø0.3~ø0.7	ø0.5~ø1.2
Hysteresis	0.16inHg (4mmHg)	
Internal orifice diameter	ø0.5	ø0.8

● **Weight:** 62gf ● **Supply Voltage:** 12~24VDC (Ripple ±10% max.) ● **Output:** Open collector 30V, 80mA
● **Indicator light:** Lights at 'ON' condition ● **Consumption current:** 17mA (at 24VDC ON)
● **Operating temperature:** 32 ~ 140°F ● **Port Size:** M5 (10 - 32 nom.)

How To Order

ZSP1 (B) 0X −15 (C)

Adsorption Confirmation Switch

Available nozzle diameter
S – ø0.3~0.7mm
B – ø0.5~1.2mm

Connection
0X – w/suction filter (M5 port)

Switch type
15 – Solid state (12~24VDC)

Electrical entry

(blank)	grommet (24")
L	grommet (120")
C	w/plug conn. (24")
CL	w/plug conn. (120")
CN	no mating conn. supplied

Dimensions

Refer to NZX section, page 35.

Vacuum Pads

ZP Series

■ Various pad shapes for Custom Application
Flat • Ribbed Flat • Deep • Bellows • Oval

■ Broad Range of Sizes Available
Diameters 2mm (0.08") to 250mm (9.8")

■ Four Standard Pad Materials
NBR (Buna-N) • Silicone • Urethane • FPM (Fluorine)

■ Vertical/Horizontal Vacuum Entry
Compact and neat arrangement with thread or One-touch/Barbed fitting.

■ Easy Installation and Maintenance
Pads can be removed/replaced from adaptors without tools.

■ Spring-loaded Buffer Option
For level compensation and contact shock absorption.

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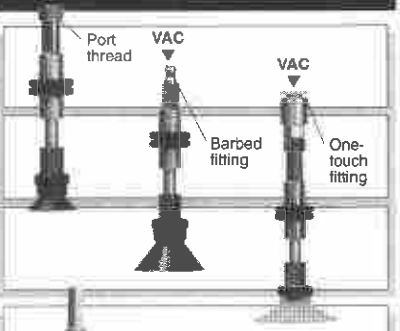
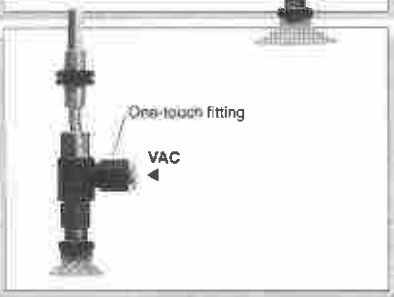
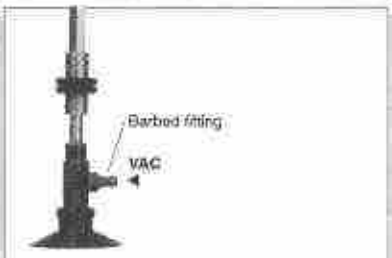
Vacuum Pads
ZP Series

TYPE	STANDARD (Without Buffer)			BUFFER TYPE (Rotating • Non-rotating / Standard strokes: ø2 ~ ø8 pad: 6mm, ø10 ~ ø50 pad: 10mm)		
	Vacuum Entry	Mounting		Vacuum Entry	Mounting	
ZPT Series Vertical type Vacuum entry	Male Thread	Male Thread		Female Thread	Buffer Body	
	Female Thread	Female Thread		Barbed Fitting	Buffer Body	
				One-touch Fitting	Buffer Body	
ZPR Series Horizontal type Vacuum entry	One-touch Fitting	Male Thread		One-touch Fitting	Buffer Body	
	One-touch Fitting	Female Thread				
ZPY Series Horizontal type Vacuum entry	Barbed Fitting	Male Thread		Barbed Fitting	Buffer Body	
	Barbed Fitting	Female Thread				

Pad Shapes (Standard)

Pad diameter	ø2	ø4	ø6	ø8	ø10	ø13	ø16	ø20	ø25	ø32	ø40	ø50
Flat	●	●	●	●	●	●	●	●	●	●	●	●
Flat w/ribs	–	–	–	–	●	●	●	●	●	●	●	●
Deep	–	–	–	–	●	–	●	–	●	–	●	–
Bellows	–	–	●	●	●	●	●	●	●	●	●	●

Pad Diameters

ø2 ~ ø50

ø2 ~ ø50 (Optional sizes to ø250)

Pad Materials

NBR (black) • Silicone rubber (white) • Urethane rubber (brown) • Fluorine rubber (black w/mark)
Conductive NBR (black w/mark) • Conductive silicone (black w/mark)

Application Information

Please refer to introductory technical section, P3 ~ P15

Special Application Types

● Long stroke buffer ❷ Oval shape pads ❸ Ball-joint pad ass'y ❹ Large, heavy-duty pads

"ertical Type Vacuum Entry: /ithout Buffer

Specifications

	Entry		Vertical type	
	Connection		Male thread	Female thread
Vacuum entry	Thread dia.	ø2 ~ ø 8	M5 x 0.8,M6 x 1	M4 x 0.7,M5 x 0.8
		ø10 ~ ø16	M5 x 0.8,M6 x 1	M5 x 0.8,M6 x 1,1/8
		ø20 ~ ø32	M6 x 1,M8 x 1	M5 x 0.8,M6 x 1,M8 x 1.25,1/8
		ø40 ~ ø50	M6 x 1,M8 x 1	M6 x 1,M8 x 1.25,1/8
Mounting			Use connection for vacuum entry	

Pad Type	Flat type	Flat w/ribs	Deep type	Bellows type
Pad dia. (mm)	2, 4, 6, 8, 10, 13, 16, 20, 25, 32, 40, 50	10, 13, 16, 20 25, 32, 40, 50	10, 16, 25, 40	6, 8, 10, 13, 16, 20 25, 32, 40, 50
Material (color)	NBR (black), Silicone (white), Urethane (brown), Fluorine (black with mark)			
Durometer	NBR (50°), Silicone (40°), Urethane (60°), Fluorine (60°)			

ow to Order

ZPT 02 U N – A5

ad dia. (mm)
- 2 — ø2
- 4 — ø4
- 6 — ø6
- 8 — ø8
- 0 — ø10
- 3 — ø13
- 6 — ø16
- 0 — ø20
- 5 — ø25
- 2 — ø32
- 0 — ø40
- 0 — ø50

Pad type
(Avail. diameters: Refer to List ❶)
- **U** — Flat
- **C** — Flat with rib
- **D** — Deep
- **B** — Bellows

Material
- **N** — NBR
- **S** — Silicone rubber
- **U** — *Urethane rubber*
- **F** — Fluorine rubber
- **GN** — Conductive NBR (ø2~ø16)
- **GS** — Conductive Silicone (ø2~ø16)

Vacuum entry (also mounting thread dia.)

	Symbol	Thread dia	ø2 ~ ø 8	ø10 ~ ø16	ø20 ~ ø32	ø40 ~ ø50
Male thread	**A5**	M5 x 0.8	●	●		
	A6	M6 x 1	●	●	●	●
	A8	M8 x 1			●	●
Female thread	**B4**	M4 x 0.7	●			
	B5	M5 x 0.8	●	●	●	
	B6	M6 x 1		●	●	
	B8	M8 x 1.25			●	●
	B01	1/8 PT		●	●	●

t ❶ Pad Dia. – Pad Type

ype \ Dia. (mm)	2	4	6	8	10	13	16	20	25	32	40	50
lat	●	●	●	●	●	●	●	●	●	●	●	●
lat with rib					●	●	●	●	●	●	●	●
eep					●		●		●		●	
ellows			●	●	●	●	●	●	●	●	●	●

Vertical Type Vacuum Entry: With Buffer

Specifications

	Entry		Vertical type		
	Connection		Female thread	Barbed fitting	One-touch tube fitting
Vacuum entry	Thread dia.	ø2~ø8	M3 x 0.5 M5 x 0.8	ø4 Nylon tube ø4 Urethane tube	ø4 tube ø6 tube
		ø10~ø32	M5 x 0.8	ø6 Nylon tube ø6 Urethane tube	ø4 tube ø6 tube
		ø40~ø50	M5 x 0.8 1/8	ø6 Nylon tube ø6 Urethane tube	ø6 tube ø8 tube
Mounting	Thread dia.	ø2~ø8	M8 x 1 Male thread		
		ø10~ø32	M10 x 1 Male thread		
		ø40~ø50	M14 x 1 Male thread		

Buffer type	360° Rotating type (J), Non-rotation type (K)
Buffer stroke	Pad size ø2~ø8: Std. 6mm
	Pad size ø10~ø50: Std. 10mm

Pad Type	Flat type (U)	Flat w/ribs (C)	Deep type (D)	Bellows type (B)
Pad dia. (mm)	20, 25, 32, 40, 50	25, 32, 40, 50		25, 32, 40, 50
Material (color)	NBR (black), Silicone (white), Urethane (brown), Fluorine (black with mark)			
Durometer	NBR (50°), Silicone rubber (40°), Urethane rubber • Fluorine rubber (60°)			

Spring force

(kgf)

Pad dia. (mm)	0 stroke	Stroke end
ø2 - ø 8	0.08	0.12
ø10 - ø32	0.1	0.3
ø40 - ø50	0.2	0.5

How to Order

ZPT 02 U N J6 — B3 — A8

Pad dia. (mm)
02 — ø2
04 — ø4
06 — ø6
08 — ø8
10 — ø10
13 — ø13
16 — ø16
20 — ø20
25 — ø25
32 — ø32
40 — ø40
50 — ø50

Pad type
(Avail. diameters: Refer to List ❶)
U — Flat type
C — Flat with rib
D — Deep type
B — Bellows type

Material
N — NBR
S — Silicone rubber
U — Urethane rubber
F — Fluorine rubber
GN — Conductive NBR (ø2~ø16)
GS — Conductive Silicone (ø2~ø16)

With standard buffer
J6 — With buffer stroke 6mm (for ø2~ø8)
J10 — With buffer stroke 10mm (for ø10~ø50)
K6 — Non-rotation type with buffer stroke 6mm (for ø2~ø8)
K10 — Non-rotation type with buffer stroke 10mm (for ø10~ø50)

Vacuum entry (Application: Refer to List ❷)

Mounting thread
(Application: Refer to List ❷)

List ❶ Pad Dia. – Pad Type

Type \ Dia. (mm)	2	4	6	8	10	13	16	20	25	32	40	50
Flat	●	●	●	●	●	●	●	●	●	●	●	●
Flat with rib					●	●	●	●	●	●	●	●
Deep					●		●		●		●	
Bellows type			●	●	●	●	●	●	●	●	●	●

List ❷ Vacuum Entry–Mounting

		Symbol	Thread dia/Port size	ø2 - ø 8	ø10 - ø32	ø40 - ø50
Vacuum entry	Female thread	B3	M3 x 0.5	●		
		B5	M5 x 0.8	●	●	●
		B01	1/8 PT			●
	Barbed fitting	N4	ø4 Nylon tube	●		
		N6	ø6 Nylon tube		●	●
		U4	ø4 Urethane tube	●		
		U6	ø6 Urethane tube		●	●
	One-touch tube fitting*	04	ø4 tube	●	●	
		06	ø6 tube	●	●	●
		08	ø8 tube			●
Mounting	Male thread	A8	M8 x 1	●		
		A10	M10 x 1		●	
		A14	M14 x 1			●

* 5/32" and 5/16" tube may be substituted for 4mm and 8mm respectively. (check leakage).

Horizontal Type Vacuum Entry: Without Buffer, With One-Touch Tube Fitting

Specifications

Vacuum entry	Entry		Horizontal type	
	Connection		One-touch tube fitting	
	Tube dia.	ø2~ø 8	ø4, ø6 Tube	
		ø10~ø16	ø4, ø6 Tube	
		ø20~ø32	ø4, ø6, ø8 Tube	
		ø40~ø50	ø6, ø8 Tube	
Mounting	Connection		Male thread	Female thread
	Thread dia.	ø2~ø 8	M5 x 0.8, M6 x 1	M4 x 0.7, M5 x 0.8
		ø10~ø16	M5 x 0.8, M6 x 1	M5 x 0.8, M6 x 1
		ø20~ø32	M6 x 1, M8 x 1	M5 x 0.8, M6 x 1, M8 x 1.25
		ø40~ø50	M6 x 1, M8 x 1	M6 x 1, M8 x 1.25

Pad Type	Flat type	Flat w/ribs	Deep type	Bellows type
Pad dia. (mm)	2, 4, 6, 8, 10, 13, 16, 20, 25, 32, 40, 50	10, 13, 16, 20 25, 32, 40, 50	10, 16, 25, 40	6, 8, 10, 13, 16, 20 25, 32, 40, 50
Material (color)	NBR (black), Silicone (white), Urethane (brown), Fluorine (black with mark), Conductive NBR (black with mark), Conductive Silicone (black with mark)			
Durometer	NBR (50°), Silicone rubber (40°), Urethane rubber • Fluorine rubber (60°)			

How to Order

ZPR **02** **U** **N** — **04** — **A5**

Pad dia. (mm)
02 — ø2
04 — ø4
06 — ø6
08 — ø8
10 — ø10
13 — ø13
16 — ø16
20 — ø20
25 — ø25
32 — ø32
40 — ø40
50 — ø50

Pad type
(Avail. diameters: Refer to List ❶)
U — Flat type
C — Flat with rib
D — Deep type
B — Bellows type

Material
N — NBR
S — Silicone rubber
U — Urethane rubber
F — Fluorine rubber
GN — Conductive NBR (ø2~ø16)
GS — Conductive Silicone (ø2~ø16)

Vacuum entry (Application: Refer to List ❷)

Mounting thread (Application: Refer to List ❷)

List ❶ Pad Dia. – Pad Type

Type \ Dia. (mm)	2	4	6	8	10	13	16	20	25	32	40	50
Flat	●	●	●	●	●	●	●	●	●	●	●	●
Flat with rib					●	●	●	●	●	●	●	●
Deep					●		●		●		●	
Bellows type			●	●	●	●	●	●	●	●	●	●

List ❷ Vacuum Entry–Mounting

		Symbol	Thread dia/Port size	ø2~ø 8	ø10~ø16	ø20~ø32	ø40~ø50
Vacuum entry	One-touch fitting*	04	ø4 Tube	●	●	●	
		06	ø6 Tube	●	●	●	●
		08	ø8 Tube			●	●
Mounting	Male thread	A5	M5 x 0.8	●	●		
		A6	M6 x 1	●	●	●	●
		A8	M8 x 1			●	●
	Female thread	B4	M4 x 0.7	●			
		B5	M5 x 0.8	●	●	●	
		B6	M6 x 1		●	●	●
		B8	M8 x 1.25			●	●

* 5/32" and 5/16" tube may be substituted for 4mm and 8mm respectively. (Check leakage)

Horizontal Type Vacuum Entry: With Buffer, With One-Touch Tube Fitting

Specifications

Vacuum entry	Entry		Horizontal type
	Connection		With one-touch tube fitting *
	Applicable tube dia.	ø2~ø8	ø4, ø6 tube
		ø10~ø16	ø4, ø6 tube
		ø20~ø32	ø4, ø6, ø8 tube
		ø40~ø50	ø6, ø8 tube
Mounting	Thread dia.	ø2~ø8	M8 x 1 Male thread
		ø10~ø16	M10 x 1 Male thread
		ø20~ø32	M10 x 1 Male thread
		ø40~ø50	M14 x 1 Male thread

Buffer type	360° Rotating type (J), Non-rotation type (K)
Buffer stroke	Pad size ø2~ø8: Std. 6mm; Optional see page 120
	Pad size ø10~ø50: Std. 10mm; Optional see page 120

Pad Type	Flat type	Flat w/ribs	Deep type	Bellows type
Pad dia. (mm)	2, 4, 6, 8, 10, 13, 16, 20, 25, 32, 40, 50	10, 13, 16, 20, 25, 32, 40, 50	10, 16, 25, 40	6, 8, 10, 13, 16, 20, 25, 32, 40, 50
Material (color)	NBR (black), Silicone (white), Urethane (brown), Fluorine (black with mark)			
Durometer	NBR (50°), Silicone rubber (40°), Urethane rubber • Fluorine rubber (60°)			

* 5/32" and 5/16" tube may be substituted for 4mm and 8mm respectively. (Check leakage)

Spring force

(kgf)

Pad dia. (mm)	0 stroke	Stroke end
ø2 ~ ø 8	0.08	0.12
ø10 ~ ø32	0.1	0.3
ø40 ~ ø50	0.2	0.5

How to Order

ZPR **02** **U** **N** **J6** — **04** — **A8**

Pad dia. (mm)
02 — ø2
04 — ø4
06 — ø6
08 — ø8
10 — ø10
13 — ø13
16 — ø16
20 — ø20
25 — ø25
32 — ø32
40 — ø40
50 — ø50

Pad type
(Avail. diameters: Refer to List ❶)
U — Flat type
C — Flat with rib
D — Deep type
B — Bellows type

Material
N — NBR
S — Silicone rubber
U — Urethane rubber
F — Fluorine rubber
GN — Conductive NBR (ø2~ø16)
GS — Conductive Silicone (ø2~ø16)

With standard buffer
J6 — With buffer stroke 6mm (for ø2~ø8)
J10 — With buffer stroke 10mm (for ø10~ø50)
K6 — Non-rotation type with buffer stroke 6mm (for ø2~ø8)
K10 — Non-rotation type with buffer stroke 10mm (for ø10~ø50)

Vacuum entry (Application: Refer to List ❷)

Mounting thread
(Application: Refer to List ❷)

List ❶ Pad Dia. – Pad Type

Type \ Dia. (mm)	2	4	6	8	10	13	16	20	25	32	40	50
Flat	●	●	●	●	●	●	●	●	●	●	●	●
Flat with rib					●	●	●	●	●	●	●	●
Deep					●		●		●		●	
Bellows type			●	●	●	●	●	●	●	●	●	●

List ❷ Vacuum Entry–Mounting

		Symbol	Thread dia/Port size	ø2~ø8	ø10~ø16	ø20~ø32	ø40~ø50
Vacuum entry	One-touch tube fitting	04	ø4 Tube*	●	●	●	
		06	ø6 Tube	●	●	●	●
		08	ø8 Tube*			●	●
Mounting	Male thread	A8	M8 x 1	●			
		A10	M10 x 1		●	●	
		A14	M14 x 1				●

* 5/32" and 5/16" tube may be substituted for 4mm and 8mm respectively. (Check leakage)

Horizontal Type Vacuum Entry: Without Buffer, With Barbed Fitting

Specifications

Vacuum entry	Entry		Horizontal type	
	Connection		With barbed fitting	
	Applicable tube dia.	ø2~ø 8	ø4 • ø6 Nylon tube, ø4 • ø6 Urethane tube	
		ø10~ø16	ø4 • ø6 Nylon tube, ø4 • ø6 Urethane tube	
		ø20~ø32	ø4 • ø6 Nylon tube, ø4 • ø6 Urethane tube	
		ø40~ø50	ø6 Nylon tube, ø6 Urethane tube	
Mounting	Connection		Male thread	Female thread
	Thread dia.	ø2~ø 8	M5 x 0.8, M6 x 1	M4 x 0.7, M5 x 0.8
		ø10~ø16	M5 x 0.8, M6 x 1	M5 x 0.8, M6 x 1
		ø20~ø32	M6 x 1, M8 x 1	M5 x 0.8, M6 x 1, M8 x 1.25
		ø40~ø50	M6 x 1, M8 x 1	M6 x 1, M8 x 1.25

Pad Type	Flat type	Flat w/ribs	Deep type	Bellows type
Pad dia. (mm)	2, 4, 6, 8, 10, 13, 16, 20, 25, 32, 40, 50	10, 13, 16, 20 25, 32, 40, 50	10, 16, 25, 40	6, 8, 10, 13, 16, 20 25, 32, 40, 50
Material (color)	NBR (black), Silicone (white), Urethane (brown), Fluorine (black with mark), Conductive NBR (black with mark), Conductive Silicone (black with mark)			
Durometer	NBR (50°), Silicone rubber (40°), Urethane rubber • Fluorine rubber (60°)			

ow to Order

ZPY 02 U N — N4 — A5

ad dia. (mm)
2 — ø2
4 — ø4
5 — ø6
8 — ø8
0 — ø10
3 — ø13
6 — ø16
0 — ø20
5 — ø25
2 — ø32
0 — ø40
0 — ø50

Pad type
(Avail. diameters: Refer to List ❶)
U — Flat type
C — Flat with rib
D — *Deep type*
B — Bellows type

Material
N — NBR
S — Silicone rubber
U — Urethane rubber
F — Fluorine rubber
GN — *Conductive NBR (ø2~ø16)*
GS — Conductive Silicone (ø2~ø16)

Vacuum entry
(Application: Refer to List ❷)

Mounting thread (Application: Refer to List ❷)

t ❶ Pad Dia. – Pad Type

Dia. (mm) / ype	2	4	6	8	10	13	16	20	25	32	40	50
at	●	●	●	●	●	●	●	●	●	●	●	●
at with rib					●	●	●	●	●	●	●	●
eep					●		●		●		●	
ellows type			●	●	●	●	●	●	●	●	●	●

List ❷ Vacuum Entry–Mounting

		Symbol	Thread dia/Port size	ø2~ø 8	ø10~ø16	ø20~ø32	ø40~ø50
Vacuum entry	Barbed fitting	**N4**	ø4 Nylon tube	●	●	●	
		N6	ø6 Nylon tube	●	●	●	●
		U4	ø4 Urethane tube	●	●	●	
		U6	ø6 Urethane tube	●	●	●	●
Mounting	Male thread	**A5**	M5 x 0.8	●	●		
		A6	M6 x 1	●	●	●	●
		A8	M8 x 1			●	●
	Female thread	***B4***	*M4 x 0.7*	●			
		B5	M5 x 0.8	●	●	●	●
		B6	M6 x 1		●	●	●
		B8	M8 x 1.25			●	●

Horizontal Type Vacuum Entry: With Buffer, With Barbed Fitting

Specifications

Vacuum entry	Entry		Horizontal type
	Connection		With barbed fitting
	Applicable tube dia.	ø2~ø8	ø4 • ø6 Nylon tube, ø4 • ø 6 Urethane tube
		ø10~ø16	ø4 • ø6 Nylon tube, ø4 • ø 6 Urethane tube
		ø20~ø32	ø4 • ø6 Nylon tube, ø4 • ø 6 Urethane tube
		ø40~ø50	ø6 Nylon tube, ø 6 Urethane tube
Mounting	Thread dia.	ø2~ø8	M8 x 1 Male thread
		ø10~ø16	M10 x 1 Male thread
		ø20~ø32	M10 x 1 Male thread
		ø40~ø50	M14 x 1 Male thread

Buffer type	360° Rotation type (J), Non-rotation type (K)
Buffer stroke	Pad size ø2~ø8: Std. 6mm; Optional see page 120
	Pad size ø10~ø50: Std. 10mm; Optional see page 120

Spring force

(kgf)

Pad dia. (mm)	0 stroke	Stroke end
ø2 - ø 8	0.08	0.12
ø10 - ø32	0.1	0.3
ø40 - ø50	0.2	0.5

Pad Type	Flat type	Flat w/ribs	Deep type	Bellows type
Pad dia. (mm)	2, 4, 6, 8, 10, 13, 16, 20, 25, 32, 40, 50	10, 13, 16, 20, 25, 32, 40, 50	10, 16, 25, 40	6, 8, 10, 13, 16, 20, 25, 32, 40, 50
Material (color)	NBR (black), Silicone (white), Urethane (brown), Fluorine (black with mark)			
Durometer	NBR (50°), Silicone rubber (40°), Urethane rubber • Fluorine rubber (60°)			

How to Order

ZPY **02** **U** **N** **J6** — **N4** — **A8**

Pad dia. (mm)
02 — ø2
04 — ø4
06 — ø6
08 — ø8
10 — ø10
13 — ø13
16 — ø16
20 — ø20
25 — ø25
32 — ø32
40 — ø40
50 — ø50

Pad type
(Avail. diameters: Refer to List ❶)
U — Flat type
C — Flat with rib
D — Deep type
B — Bellows type

Material
N — NBR
S — Silicone rubber
U — Urethane rubber
F — Fluorine rubber
GN — Conductive NBR (ø2~ø16)
GS — Conductive Silicone (ø2~ø16)

With standard buffer
J6 — With buffer stroke 6mm (for ø2~ø8)
J10 — With buffer stroke 10mm (for ø10~ø50)
K6 — Non-rotation type with buffer stroke 6mm (for ø2~ø8)
K10 — Non-rotation type with buffer stroke 10mm (for ø10~ø50)

Vacuum entry (Application: Refer to List ❷)

Mounting thread
(Application: Refer to List ❷)

List ❶ Pad Dia. – Pad Type

Type \ Dia. (mm)	2	4	6	8	10	13	16	20	25	32	40	50
Flat	●	●	●	●	●	●	●	●	●	●	●	●
Flat with rib					●	●	●	●	●	●	●	●
Deep					●		●		●		●	
Bellows type			●	●	●	●	●	●	●	●	●	●

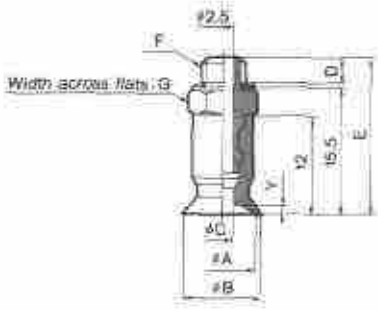
List ❷ Vacuum Entry–Mounting

		Symbol	Thread dia/Port size	ø2~ø8	ø10~ø16	ø20~ø32	ø40~ø50
Vacuum entry	Barbed fitting	N4	ø4 Nylon tube	●	●	●	
		N6	ø6 Nylon tube	●	●	●	●
		U4	ø4 Urethane tube	●	●	●	
		U6	ø6 Urethane tube	●	●	●	●
Mounting	Male thread	A8	M8 x 1	●			
		A10	M10 x 1		●	●	
		A14	M14 x 1				●

Connection Male Thread | **Vacuum Entry** Vertical | **Mounting** Use Connection For Vacuum Entry

Pad Diameters ø2 • ø4 • ø6 • ø8

Flat type

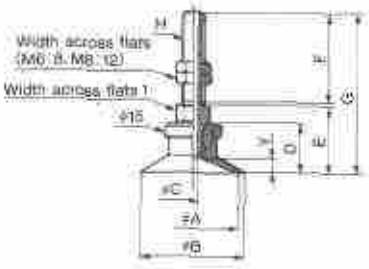


Flat type

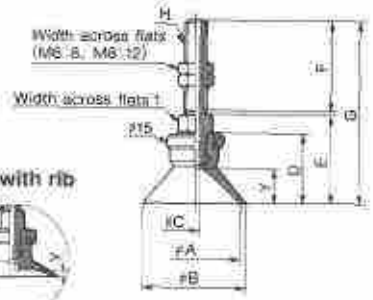
Model	øA	øB	øC	F: M5 x 0.8			F: M6 x 1			Y	
				D	E	G	D	E	G		
ZPT02U	2	2.6	1.2	3	19	7	4	20	8	0.8	
ZPT04U	4	4.8	1.6								
ZPT06U	6	7	2.5								
ZPT08U	8	9								1	

Pad Diameters ø20 • ø25 • ø32

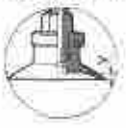
Flat type



Deep type/ZPT25D only



Flat with rib



Flat type – Flat with rib

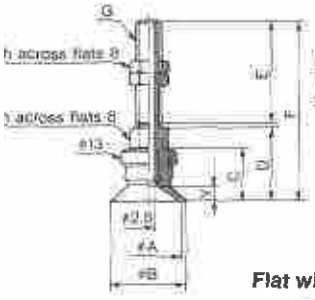
Model	øA	øB	D	H: M6 x 1					H: M8 x 1					Y	
				øC	E	F	G	I	øC	E	F	G	I	Flat	Flat with rib
ZPT20 U C	20	23	14	3	19	25	45	8	3.5	24	15	40	12	4	1.7
ZPT25 U C	25	28	14	3	19	25	45	8	3.5	24	15	40	12	4	1.8
ZPT32 U C	32	35	14.5	3	19.5	25	45	8	3.5	24.5	15	40.5	12	4.5	2.3

Deep type

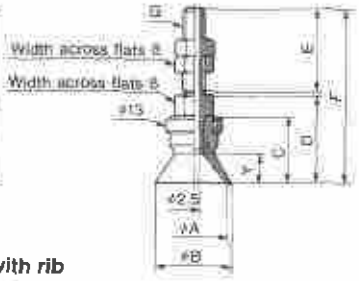
Model	øA	øB	D	H: M6 x 1					H: M8 x 1					Y
				øC	E	F	G	I	øC	E	F	G	I	
ZPT25D	25	28	20	3	25.5	25	51	8	3.5	30.5	15	46	12	10

Pad Diameters ø10 • ø13 • ø16

Flat type



Deep type/ZPT10D • 16D only



Flat with rib

Flat type

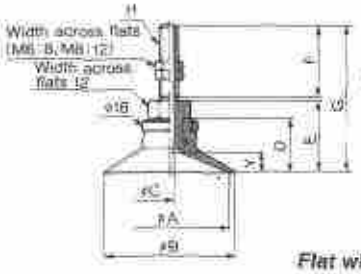
Model	øA	øB	C	D	G: M5 x 0.8		G: M6 x 1		Y	
					E	F	E	F	Flat	Flat with rib
ZPT10 U C	10	12	12	17	20	38	25	43	3	1.7
ZPT13 U C	13	15	12	17	20	38	25	43	3	1.8
ZPT16 U C	16	18	12.5	17.5	20	38.5	25	43.5	3.5	1.2

Deep type

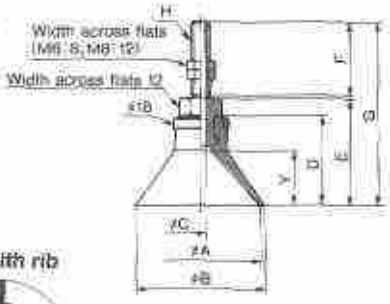
Model	øA	øB	C	D	G: M5 x 0.8		G: M6 x 1		Y
					E	F	E	F	
ZPT10D	10	12	15	20	20	41	25	46	6
ZPT16D	16	18	16	21	20	42	25	47	7

Pad Diameters ø40 • ø50

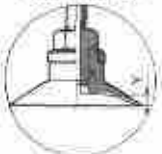
Flat type



Deep type/ZPT40D only



Flat with rib



Flat type

Model	øA	øB	D	E	H: M6 x 1			H: M8 x 1			Y	
					øC	F	G	øC	F	G	Flat	Flat with rib
ZPT40 U C	40	43	16.5	24.5	3	25	50.5	4.5	15	40.5	6.5	3.3
ZPT50 U C	50	53	19.5	25.5	3	25	51.5	4.5	15	41.5	7.5	3.8

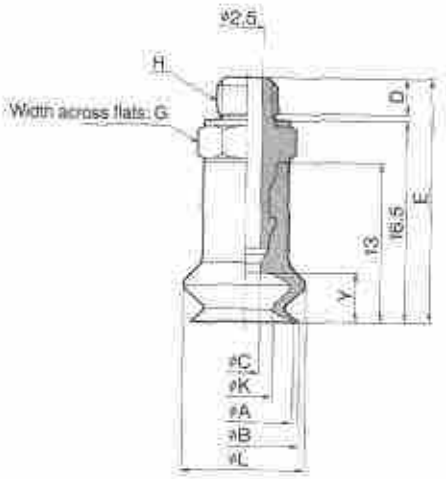
Deep type

Model	øA	øB	D	E	H: M6 x 1			H: M8 x 1			Y
					øC	F	G	øC	F	G	
ZPT40D	40	43	29	35.5	3	25	61	4.5	15	51	17

Connection Male Thread | **Vacuum Entry** Vertical | **Mounting** Use Connection For Vacuum Entry

Pad Diameters ø6 • ø8

Bellows type

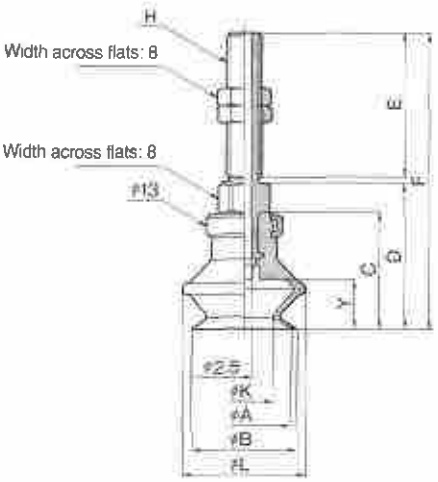


Bellows type

Model	øA	øB	øC	H: M5 x 0.8			H: M6 x 1			øK	øL	Y
				D	E	G	D	E	G			
ZPT06B	6	7	2.5	3	20	7	4	21	8	3.3	9.1	4
ZPT08B	8	9								4.7	10.1	

Pad Diameters ø10 • ø13 • ø16

Bellows type

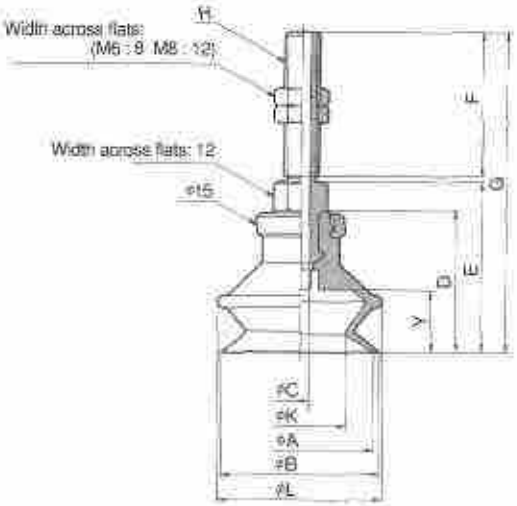


Bellows type

Model	øA	øB	øC	D	H:M5 x 0.8		H:M6 x 1		øK	øL	Y
					E	F	E	F			
ZPT10B	10	12	16	21	20	42	26	47	5.5	13.8	5.5
ZPT13B	13	15	18.5	23.5		44.5		49.5	8.7	19	7.5
ZPT16B	16	18	20	25		46		51	9.9	21	8.5

Pad Diameters ø20 • ø25 • ø32

Bellows type

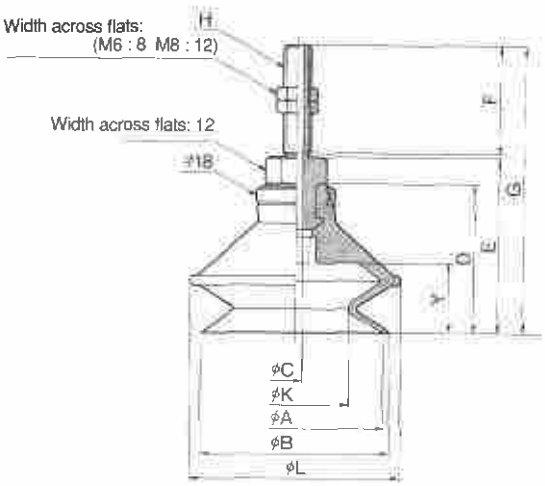


Bellows type

Model	øA	øB	D	H: M6 x 1					H: M8 x 1					øK	øL	Y
				øC	E	F	G	I	øC	E	F	G	I			
ZPT20B	20	22	23.5	3	28.5	25	54.5	8	3.5	33.5	15	49.5	12	12.4	25	10.5
ZPT25B	25	27	24		29		55			34		50		15.8	28	10.5
ZPT32B	32	34	29		34		60			39		55		18.9	37	14

Pad Diameters ø40 • ø50

Bellows type



Bellows type

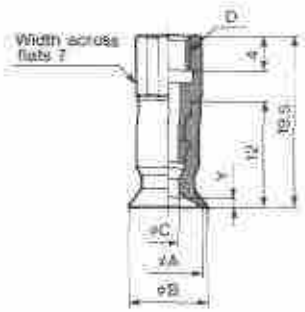
Model	øA	øB	D	E	H: M6 x 1			H: M8 x 1			øK	øL	Y
					øC	F	G	øC	F	G			
ZPT40B	40	43	34	40	3	25	66	4.5	15	56	24.4	48	16
ZPT50B	50	53	38	44			70			60	32.4	57	19

ZPT Series
Without Buffer

Connection	Female Thread	Vacuum Entry	Vertical	Mounting	Use Connection For Vacuum Entry

Pad Diameters ø2 • ø4 • ø6 • ø8

Flat type

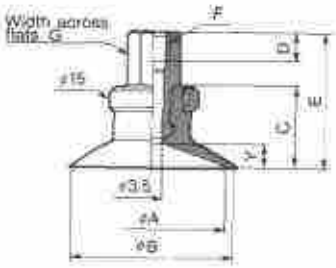


Flat type

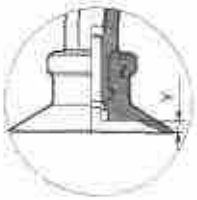
Model	øA	øB	C	D	Y
ZPT02U	2	2.6	1.2	M4 x 0.7 M5 x 0.8	0.8
ZPT04U	4	4.8	1.6		
ZPT06U	6	7	2.5		1
ZPT08U	8	9			

Pad Diameters ø20 • ø25 • ø32

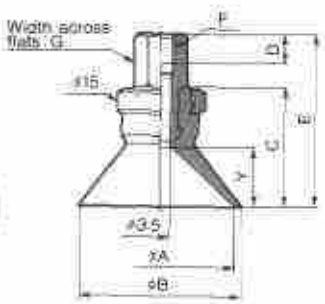
Flat type



Flat with rib



Deep type/ZPT25D only



Flat type – Flat with rib

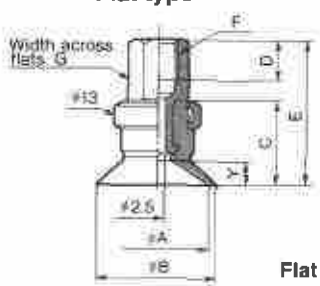
Model	øA	øB	C	F: M5 x 0.8			F: M6 x 1			F: M8 x 1.25			F: 5/16			Y	
				D	E	G	D	E	G	D	E	G	D	E	G	Flat	Flat with rib
ZPT20 U C	20	23	14	5	23	8	6	23	8	8	29	12	6.2	29	12	4	1.7
ZPT25 U C	25	28	14	5	23	8	6	23	8	8	29	12	6.2	29	12	4	1.8
ZPT32 U C	32	35	14.5	5	23.5	8	6	23.5	8	8	29.5	12	6.2	29.5	12	4.5	2.3

Deep type

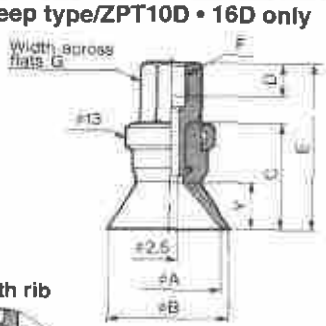
Model	øA	øB	C	F: M5 x 0.8			F: M6 x 1			F: M8 x 1.25			F: 5/16			Y
				D	E	G	D	E	G	D	E	G	D	E	G	
ZPT25D	25	28	20	5	29	8	6	29	8	8	35	12	6.2	35	12	10

Pad Diameters ø10 • ø13 • ø16

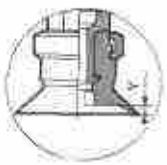
Flat type



Deep type/ZPT10D • 16D only



Flat with rib



Flat type

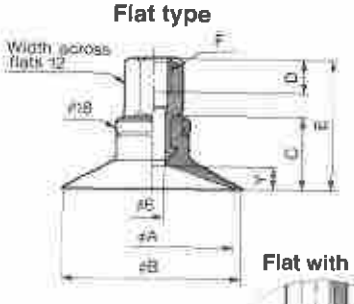
Model	øA	øB	C	F: M5 x 0.8			F: M6 x 1			F: 5/16			Y	
				D	E	G	D	E	G	D	E	G	Flat	Flat with rib
ZPT10 U C	10	12	12	5	21	8	6	21	8	6.2	27	12	3	1.7
ZPT13 U C	13	15	12	5	21	8	6	21	8	6.2	27	12	3	1.8
ZPT16 U C	16	18	12.5	5	21.5	8	6	21.5	8	6.2	27.5	12	3.5	1.2

Deep type

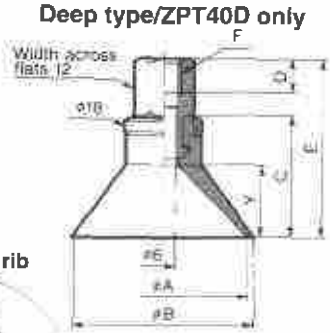
Model	øA	øB	C	F: M5 x 0.8			F: M6 x 1			F: 5/16			Y
				D	E	G	D	E	G	D	E	G	
ZPT10D	10	12	15	5	24	8	6	24	8	6.2	30	12	6
ZPT16D	16	18	16	5	25	8	6	25	8	6.2	31	12	7

Pad Diameters ø40 • ø50

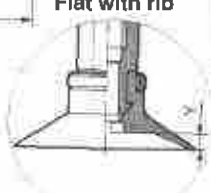
Flat type



Deep type/ZPT40D only



Flat with rib



Flat type

Model	øA	øB	C	F: M6 x 1	F: M8 x 1.25	F: 5/16	E	Y	
				D	D	D		Flat	Flat with rib
ZPT40 U C	40	43	18.5	6	8	6.2	32	6.5	3.3
ZPT50 U C	50	53	19.5	6	8	6.2	32	7.5	3.8

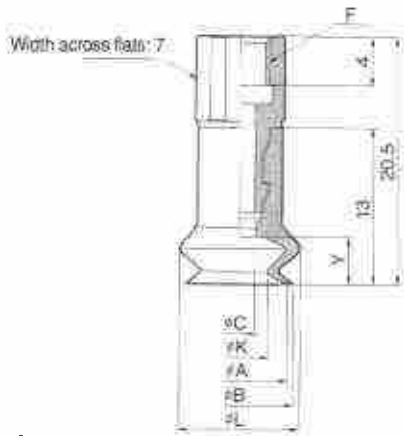
Deep type

Model	øA	øB	C	F: M6 x 1	F: M8 x 1.25	F: 5/16	E	Y
				D	D	D		
ZPT40D	40	43	29	6	8	6.2	42.5	17

Connection	Female Thread	Vacuum Entry	Vertical	Mounting	Use Connection For Vacuum Entry

Pad Diameters ø6 • ø8

Bellows type

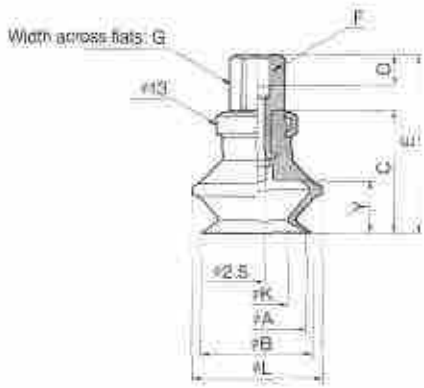


Bellows type

Model	øA	øB	øC	F	øK	øL	Y
ZPT06B	6	7	2.5	M4 x 0.7	3.3	9.1	4
ZPT08B	8	9		M5 x 0.8	4.7	10.1	

Pad Diameters ø10 • ø13 • ø16

Bellows type

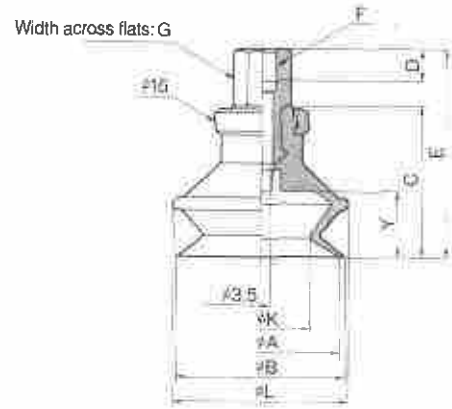


Bellows type

Model	øA	øB	øC	F:M5 x 0.8			F:M6 x 1			F:Rc (PT) 1/8			øK	øL	Y
				D	E	G	D	E	G	D	E	G			
ZPT10B	10	12	16	5	25	8	6	25	8	6.2	31	12	5.5	13.8	5.5
ZPT13B	13	15	18.5		27.5			27.5			33.5		8.7	19	7.5
ZPT16B	16	18	20		29			29			35		9.9	21	8.5

Pad Diameters ø20 • ø25 • ø32

Bellows type

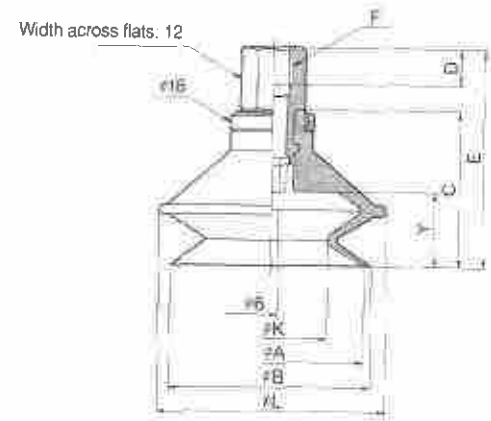


Bellows type

Model	øA	øB	C	F:M5x0.8			F:M6 x 1			F:M8 x 1.25			F:Rc (PT) 1/8			øK	øL	Y
				D	E	G	D	E	G	D	E	G	D	E	G			
ZPT20B	20	22	23.5	5	32.5	8	6	32.5	8	8	38.5	12	6.2	38.5	12	12.4	25	10.5
ZPT25B	25	27	24		33			33			39			39		15.6	28	10.5
ZPT32B	32	34	29		36			36			44			44		18.9	37	14

Pad Diameters ø40 • ø50

Bellows type



Bellows type

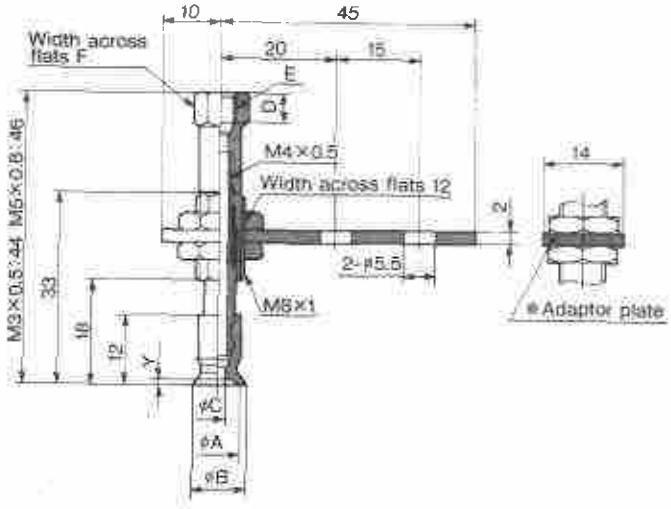
Model	øA	øB	C	F:M8 x 1	F:M8 x 1.25	F:Rc (PT) 1/8	E	øK	øL	Y
				D	D	D				
ZPT40B	40	43	34	6	8	6.2	56	24.4	48	16
ZPT50B	50	53	38				60	32.4	57	19

ZPT Series
With Buffer

Connection Female Thread | **Vacuum Entry** Vertical | **Mounting** Buffer Body

Pad Diameters ø2 • ø4 • ø6 • ø8

Flat type



Adaptor plate: Provided as standard

Flat type

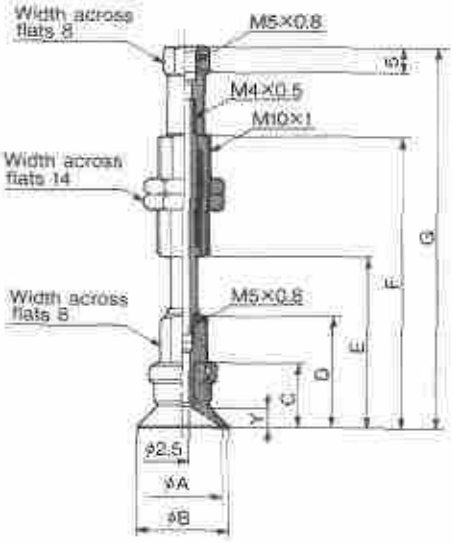
Model	øA	øB	C	E: M3 x 0.5		E: M5 x 0.8		Y
				D	F	D	F	
ZPT02U	2	2.6	1.2	3	6	5	8	0.8
ZPT04U	4	4.8	1.6	3	6	5	8	0.8
ZPT06U	6	7	2.5	3	6	5	8	0.8
ZPT08U	8	9	2.5	3	6	5	8	1

Female Thread/Weight List (gf)

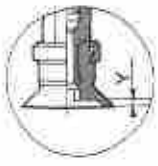
Model	Flat type			Flat with rib		Deep type	
	M3	M5	1/8	M5	1/8	M5	1/8
ZPT02 ~ ZPT08	26	28	—	—	—	—	—
ZPT10	—	29	—	29	—	29	—
ZPT13						29	
ZPT16						29.5	
ZPT20	—	31	—	31	—	—	—
ZPT25		31.5		31.5		32	
ZPT32		32.5		32.5		—	
ZPT40	—	95	95	95	95	95	95
ZPT50						—	—

Pad Diameters ø10 • ø13 • ø16

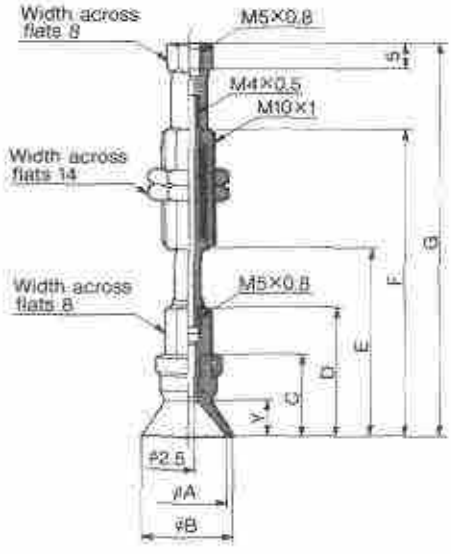
Flat type



Flat with rib



Deep type/ZPT10D • 16D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	G	Y	
								Flat	Flat with rib
ZPT10U/C	10	12	12	21	32.5	55.5	68.5	3	1.7
ZPT13U/C	13	15	12	21	32.5	55.5	68.5	3	1.9
ZPT16U/C	16	18	12.5	21.5	33	56	69	3.5	1.2

Deep type

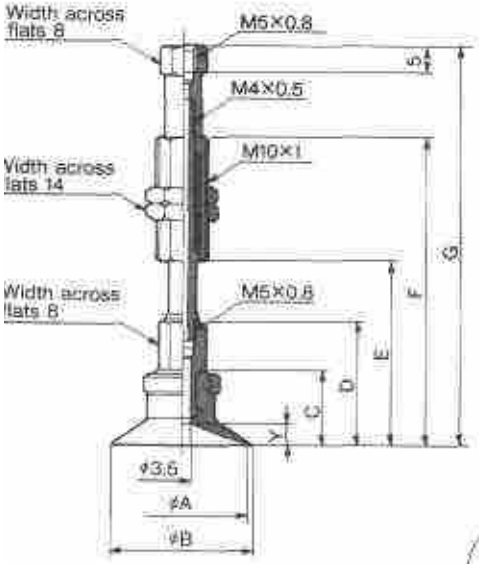
Model	øA	øB	C	D	E	F	G	Y
ZPT40D	10	12	15	24	35.5	58.5	71.5	6
ZPT40D	16	18	16	25	36.5	59.5	72.5	7

ZPT Series With Buffer

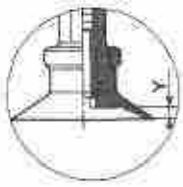
Connection Female Thread | **Vacuum Entry** Vertical | **Mounting** Buffer Body

Pad Diameters ø20 • ø25 • ø32

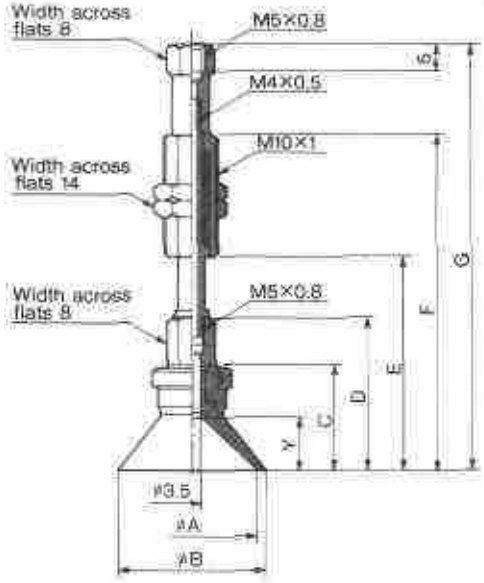
Flat type



Flat with rib



Deep type/ZPT25D only



Flat type • Flat with rib

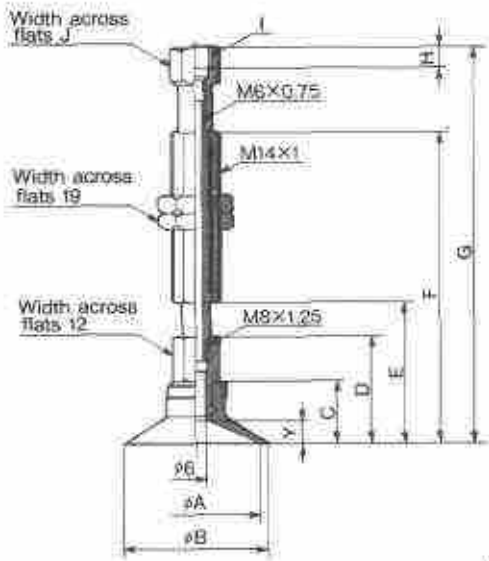
Model	øA	øB	C	D	E	F	G	Y	
								Flat	Flat with rib
ZPT20 U C	20	23	14	23	34.5	57.5	70.5	4	1.7
ZPT25 U C	25	28	14	23	34.5	57.5	70.5	4	1.8
ZPT32 U C	32	35	14.5	23.5	35	58	71	4.5	2.3

Deep type

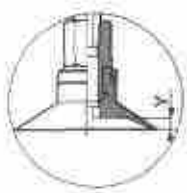
Model	øA	øB	C	D	E	F	G	Y
ZPT25D	25	28	20	29	40.5	63.5	76.5	10

Pad Diameters ø40 • ø50

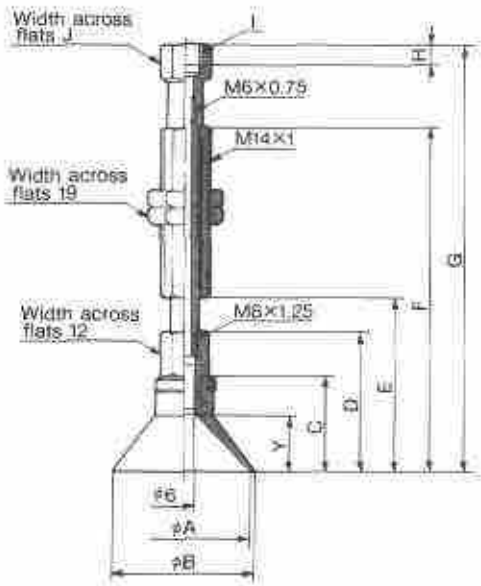
Flat type



Flat with rib



Deep type/ZPT40D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	G	I:M5×0.8		1:1/8		Y	
								H	J	H	J	Flat	Flat with rib
ZPT40 U C	40	43	18.5	32	44.5	94.5	108.5	5	10	6.2	13	6.5	3.3
ZPT50 U C	50	53	19.5	33	45.5	95.5	110.5	5	10	6.2	13	7.5	3.8

Deep type

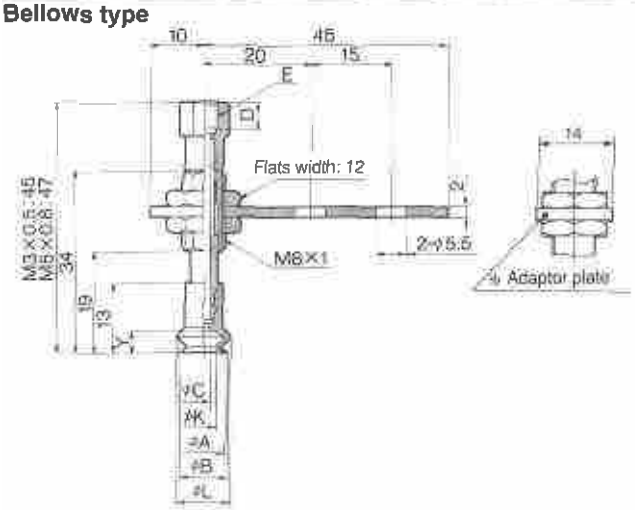
Model	øA	øB	C	D	E	F	G	I:M5×0.8		1:1/8		Y
								H	J	H	J	
ZPT40D	40	43	29	42.5	55	105	120	5	10	6.2	13	17

ZPT Series
With Buffer

Connection	Female Thread	Vacuum Entry	Vertical	Mounting	Buffer Body

Pad Diameters ø6 • ø8

Bellows type

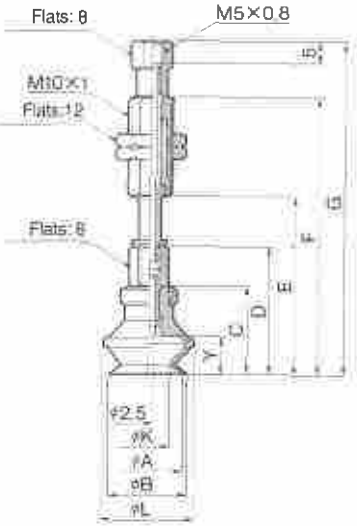


Bellows type

Model	øA	øB	øC	E:M3x0.5		E:M5x0.8		øK	øL	Y
ZPT06B	6	7	2.5	3	6	5	8	3.3	9.1	4
ZPT08B	8	9						4.7	10.1	

Pad Diameters ø10 • ø13 • ø16

Bellows type

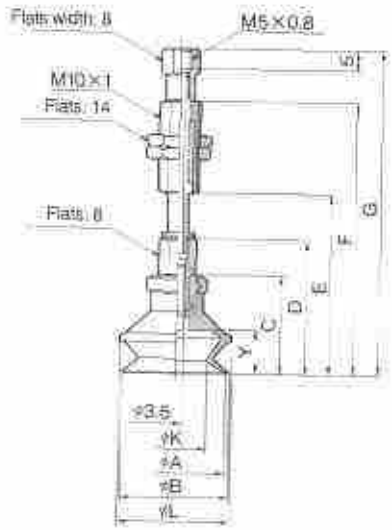


Bellows type

Model	øA	øB	C	D	E	F	G	øK	øL	Y
ZPT10B	10	12	16	25	36.5	59.5	72.5	5.5	13.8	5.5
ZPT13B	13	15	18.5	27.5	39	62	75	8.7	19	7.5
ZPT16B	16	18	20	29	40.5	63.5	76.5	9.9	21	8.5

Pad Diameters ø20 • ø25 • ø32

Bellows type

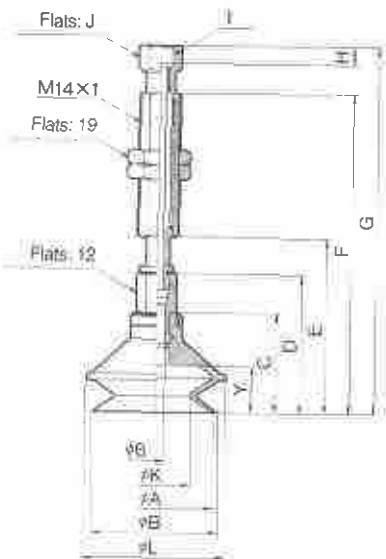


Bellows type

Model	øA	øB	C	D	E	F	G	øK	øL	Y
ZPT20B	20	22	23.5	32.5	44	67	80	12.4	25	10.5
ZPT25B	25	27	24	33	44.5	67.5	80.5	15.6	28	10.5
ZPT32B	32	34	29	38	49.5	72.5	85.5	18.9	37	14

Pad Diameters ø40 • ø50

Bellows type



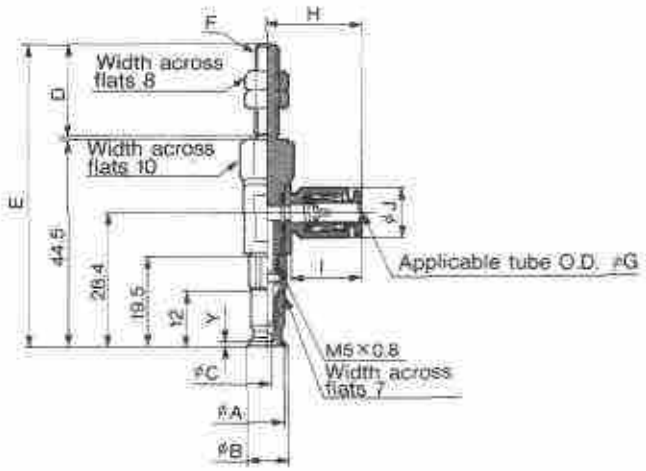
Bellows type

Model	øA	øB	C	D	E	F	I:M5x0.8			I:Rc(PT)1/8			øK	øL	Y
							G	H	J	G	H	J			
ZPT40B	40	43	34	47.5	60	110	125	5	10	126.5	6.2	13	24.4	48	16
ZPT50B	50	53	38	51.5	64	114	129			130.5			32.4	57	19

Connection One-Touch Fitting | **Vacuum Entry** Horizontal | **Mounting** Male Thread

Pad Diameters ø2 • ø4 • ø6 • ø8

Flat type



* Adaptor plate: Provided as standard

Flat type

Model	øA	øB	øC	F: M5 x 0.8		F: M8 x 1		Y
				D	E	D	E	
ZPR02U	2	2.6	1.2	20	65.5	25	70.5	0.8
ZPR04U	4	4.8	1.6	20	65.5	25	7.05	0.8
ZPR06U	6	7	2.5	20	65.5	25	70.5	0.8
ZPR08U	8	9	2.5	20	65.5	25	70.5	1

Applicable Tube

Applicable tube O.D.	øG	H	I	øJ
ø4*	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

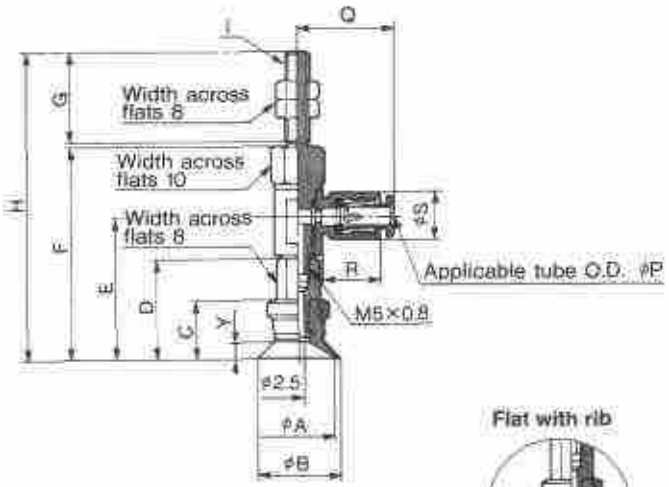
* 5/32" tube may be substituted for 4mm. (Check leakage)

Male Thread/Weight List (gf)

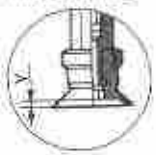
Model	Flat type			Flat with rib			Deep type		
	M5	M6	M8	M5	M8	M8	M5	M8	M8
ZPR02 ~ ZPR08	26	27	—	—	—	—	—	—	—
ZPR10	29	31	—	29	31	—	29	30	—
ZPR13							—	—	—
ZPR16							31	31	—
ZPR20	—	57	61	—	57	61	—	—	—
ZPR25							—	65	68
ZPR32							—	—	—
ZPR40	—	64	67	—	64	67	—	65	68
ZPR50	—	66	69	—	67	70	—	—	—

Pad Diameters ø10 • ø13 • ø16

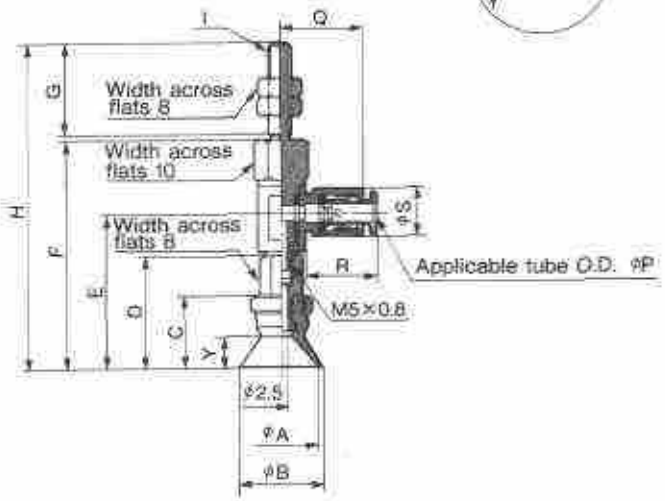
Flat type



Flat with rib



Deep type/ZPR10D • 16D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	I:M5x0.8		I:M6x1		Y	
							G	H	G	H	Flat	Flat with rib
ZPR10$^{U}_{C}$	10	12	12	21	29.9	46	20	67	25	72	3	1.7
ZPR13$^{U}_{C}$	13	15	12	21	29.9	46	20	67	25	72	3	1.8
ZPR16$^{U}_{C}$	16	18	12.5	21.5	30.4	46.5	20	67.5	25	72.5	3.5	1.2

Deep type

Model	øA	øB	C	D	E	F	I:M5x0.8		I:M6x1		Y
							G	H	G	H	
ZPR10D	10	12	15	24	32.9	49	20	70	25	75	6
ZPR16D	16	18	16	25	33.9	50	20	71	25	76	7

Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4*	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

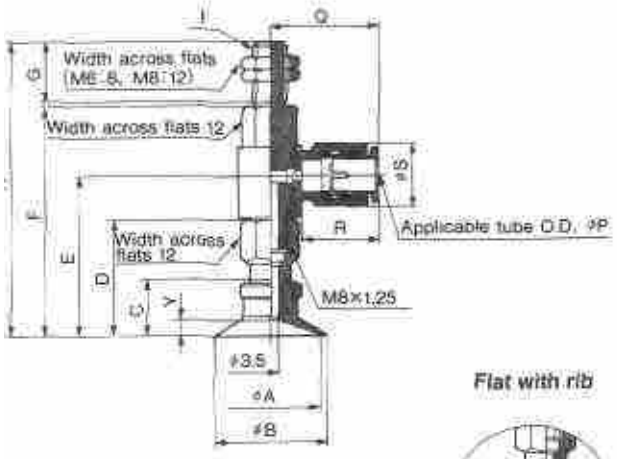
* 5/32" tube may be substituted for 4mm. (Check leakage)

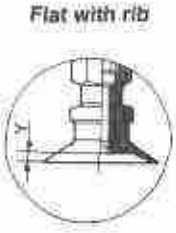
ZPR Series
Without Buffer

Connection One-Touch Fitting | **Vacuum Entry** Horizontal | **Mounting** Male Thread

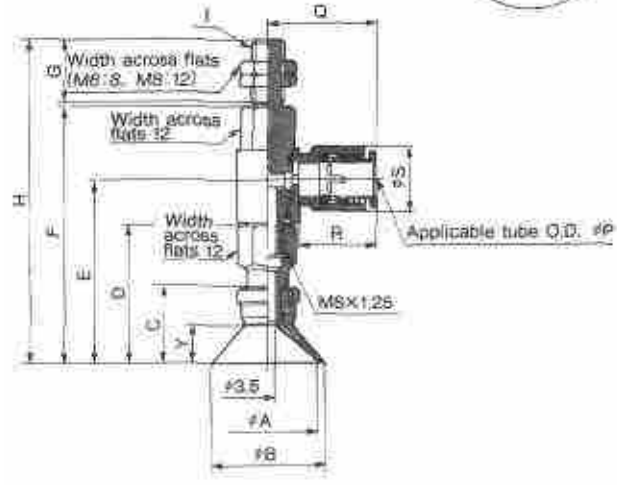
Pad Diameters ø20 • ø25 • ø32

Flat type





Deep type/ZPR25D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	I:M8x1 G	I:M8x1 H	I:M8x1 G	I:M8x1 H	Y Flat	Y Flat with rib
ZPR20U/C	20	23	14	29	39.8	57.6	25	83.5	15	73.5	4	1.7
ZPR25U/C	25	28	14.5	29	39.8	57.6	25	83.5	15	73.5	4	1.8
ZPR32U/C	32	35	14.5	29.5	40.3	58.1	25	84	15	74	4.5	2.3

Deep type

Model	øA	øB	C	D	E	F	I:M8x1 G	I:M8x1 H	I:M8x1 G	I:M8x1 H	Y
ZPR25D	25	28	20	35	48.5	83.6	25	89.5	15	79.5	10

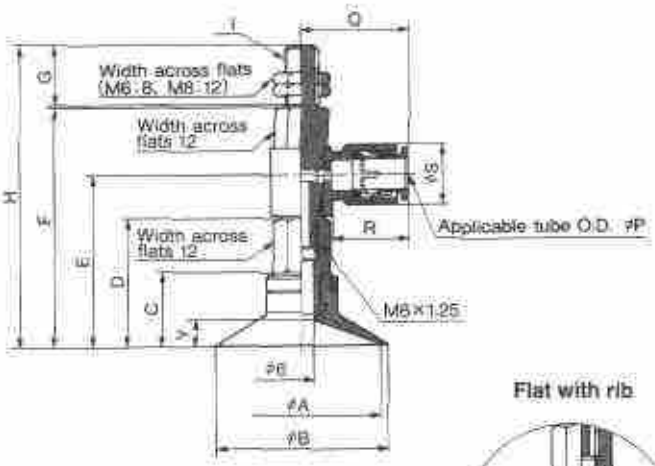
Applicable Tube

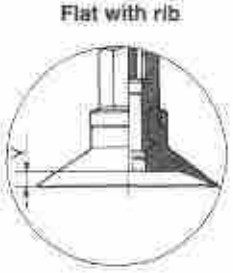
Applicable tube O.D.	øP	Q	R	øS
ø4*	4	23.3	15.8	10.4
ø6	6	24.3	16.8	12.8
ø8*	8	26.2	18.7	15.2

ø4" and 5/16" tube may be substituted for 4mm and 8mm respectively. (Check leakage)

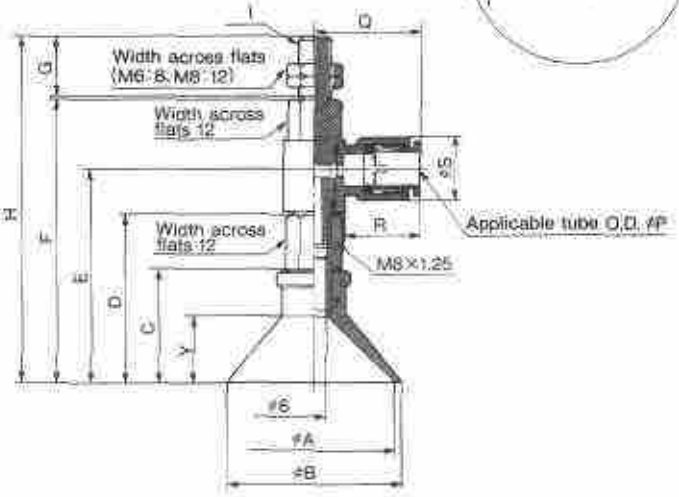
Pad Diameters ø40 • ø50

Flat type





Deep type/ZPR40D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	I:M8x1 G	I:M8x1 H	I:M8x1 G	I:M8x1 H	Y Flat	Y Flat with rib
ZPR40U/C	40	43	18.5	32	42.8	60.6	25	86.5	15	76.5	6.5	3.3
ZPR50U/C	50	53	19.5	33	43.8	61.6	25	87.5	15	77.5	7.5	3.8

Deep type

Model	øA	øB	C	D	E	F	I:M8x1 G	I:M8x1 H	I:M8x1 G	I:M8x1 H	Y
ZPR40D	40	43	29	42.5	53.3	71.1	25	97	15	87	17

Applicable Tube

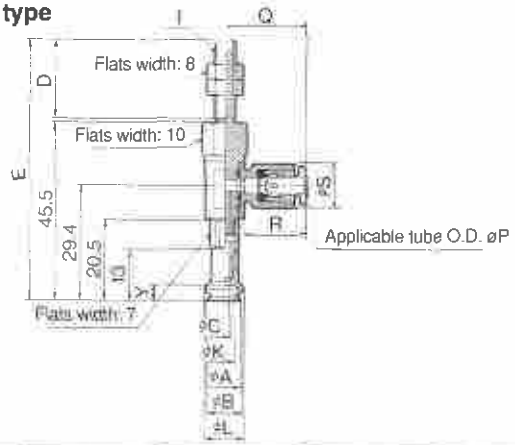
Applicable tube O.D.	øP	Q	R	øS
ø6	6	24.3	16.8	12.8
ø8*	8	26.2	18.7	15.2

* 5/16" tube may be substituted for 8mm. (Check leakage)

Connection One-Touch Fitting | **Vacuum Entry** Horizontal | **Mounting** Male Thread

Pad Diameters ø6 • ø8

Bellows type



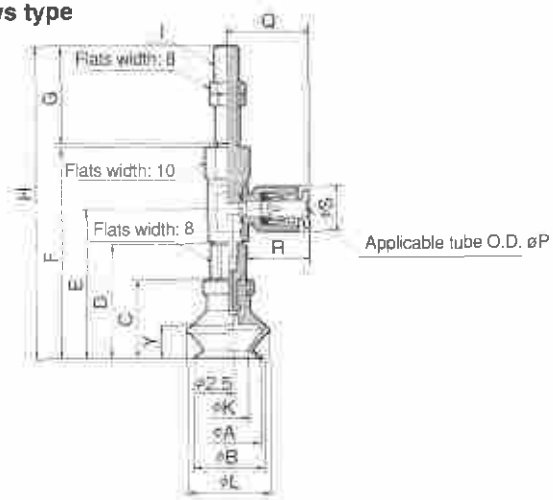
Model	øA	øB	øC	I:M5x0.8 D	I:M5x0.8 E	I:M6x1 D	I:M6x1 E	øK	øL	Y
ZPR06B	6	7	2.5	20	66.5	25	71.5	3.3	9.1	4
ZPR08B	8	9						4.7	10.1	

Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

Pad Diameters ø10 • ø13 • ø16

Bellows type



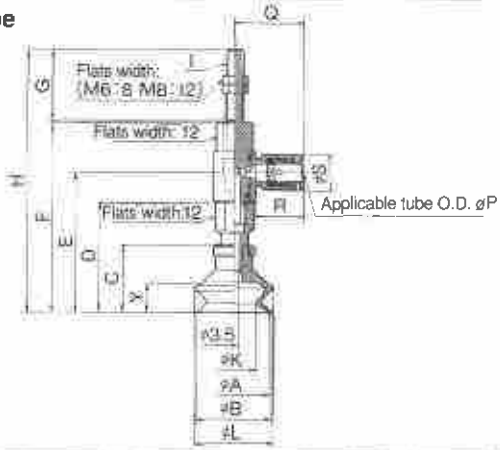
Model	øA	øB	C	D	E	F	I:M5x0.8 G	I:M5x0.8 H	I:M8x1 G	I:M8x1 H	øK	øL	Y
ZPR10B	10	12	16	25	33.9	50	20	71	25	76	5.5	13.8	5.5
ZPR13B	13	15	18.5	27.5	36.4	52.5		73.5		78.5	8.7	19	7.5
ZPR16B	16	18	20	29	37.9	54		75		80	9.9	21	8.5

Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

Pad Diameters ø20 • ø25 • ø32

Bellows type



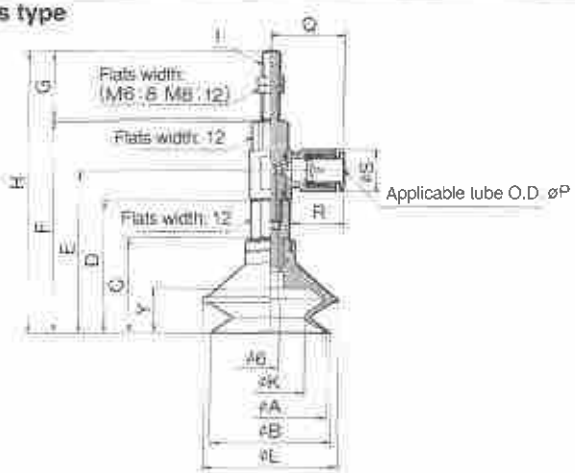
Model	øA	øB	C	D	E	F	I:M8x1 G	I:M8x1 H	I:M8x1 G	I:M8x1 H	øK	øL	Y
ZPR20B	20	22	23.5	38.5	49.3	67.1	25	93	19	83	12.4	25	10.5
ZPR25B	25	27	24	39	49.8	67.6		93.5		83.5	15.6	28	10.5
ZPR32B	32	34	29	44	54.8	72.6		98.5		88.5	18.9	37	14

Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4	4	23.3	15.8	10.4
ø6	6	24.3	16.8	12.8
ø8	8	26.2	18.7	15.2

Pad Diameters ø40 • ø50

Bellows type



Model	øA	øB	C	D	E	F	I:M6x1 G	I:M6x1 H	I:M8x1 G	I:M8x1 H	øK	øL	Y
ZPR40B	40	43	34	47.5	58.3	76.1	25	102	15	92	24.4	48	16
ZPR50B	50	53	38	51.5	62.3	80.1		106		96	32.4	57	19

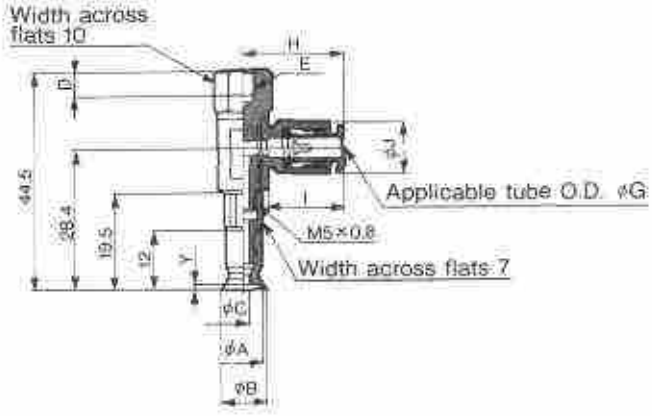
Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø6	6	24.3	16.8	12.8
ø8	8	26.2	18.7	15.2

Connection	One-Touch Fitting	Vacuum Entry	Horizontal	Mounting	Female Thread

ad Diameters ø2 • ø4 • ø6 • ø8

at type



lat type

Model	øA	øB	øC	E: M4 x 0.7 D	E: M5 x 0.8 D	Y
ZPR02U	2	2.6	1.2	4	5	0.8
ZPR04U	4	4.8	1.6	4	5	0.8
ZPR06U	6	7	2.5	4	5	0.8
ZPR08U	8	9	2.5	4	5	1

pplicable Tube

Applicable tube O.D.	G	H	I	øJ
ø4*	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

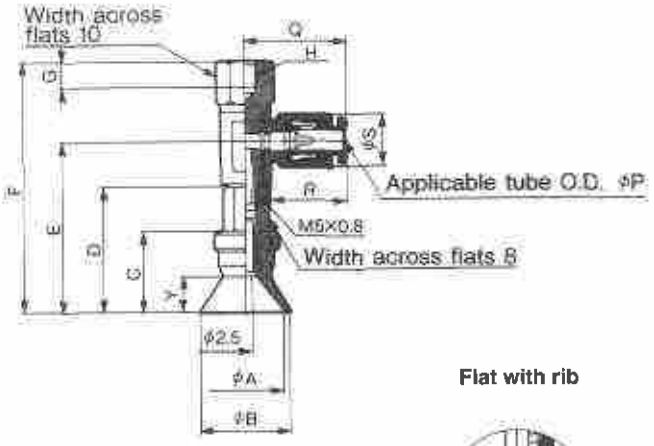
*32" tube may be substituted for 4mm. (Check leakage)

lale Thread/Weight List (gf)

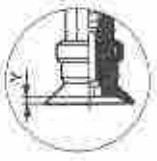
Model	Flat type				Flat with rib			Deep type		
	M4	M5	M6	M8	M5	M6	M8	M5	M6	M8
ZPR02 ~ ZPR08	19	20	—	—	—	—	—	—	—	—
ZPR10	—	23	22	—	23	22	—	23	22	—
ZPR13								—	—	—
ZPR16								23	22	—
ZPR20	—	51	50	48	51	50	48	—	—	—
ZPR25								51		
ZPR32								—	—	—
ZPR40	—	—	56	54	—	56	54	—	57	55
ZPR50			58	56	—	59	57	—	—	—

Pad Diameters ø10 • ø13 • ø16

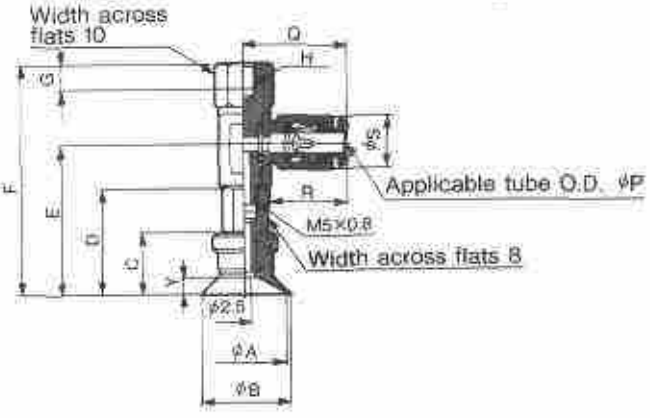
Flat type



Flat with rib



Deep type/ZPR10D • 16D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	H:M5x0.8 G	H:M6x1 G	Y Flat	Y Flat with rib
ZPR10[U/C]	10	12	12	21	29.9	46	5	6	3	1.7
ZPR13[U/C]	13	15	12	21	29.9	46	5	6	3	1.8
ZPR16[U/C]	16	18	12.5	21.5	30.4	46.5	5	6	3.5	1.2

Deep type

Model	øA	øB	C	D	E	F	M:M5x0.8 G	M:M6x1 G	Y
ZPR10D	10	12	15	24	32.9	49	5	6	6
ZPR16D	16	18	16	25	33.9	50	5	6	7

Applicable Tube

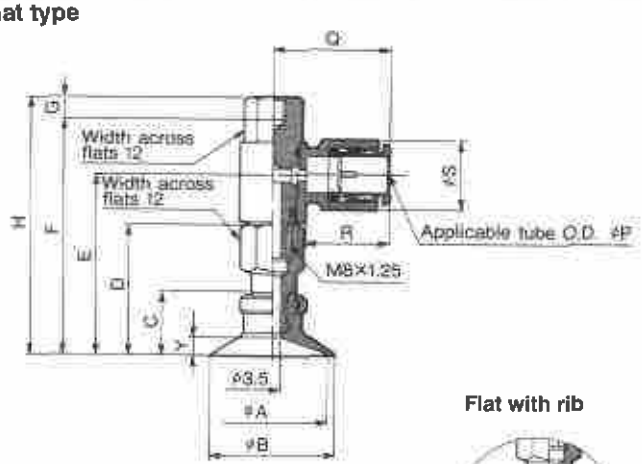
Applicable tube O.D.	øP	Q	R	øS
ø4*	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

* 5/32" tube may be substituted for 4mm. (Check leakage)

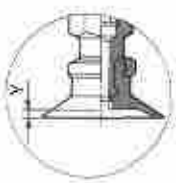
Connection	One-Touch Fitting	Vacuum Entry	Horizontal	Mounting	Female Thread

Pad Diameters ø20 • ø25 • ø32

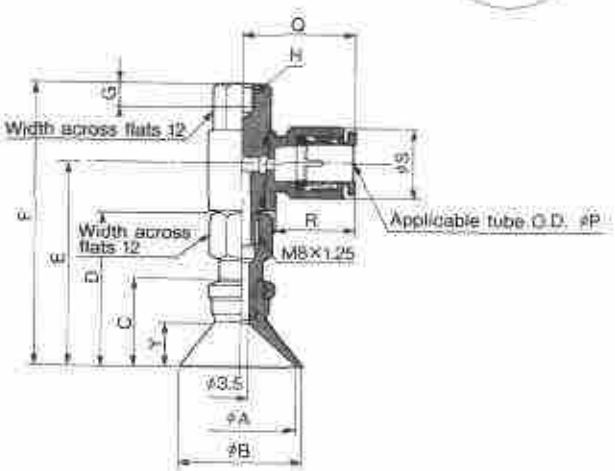
Flat type



Flat with rib



Deep type/ZPR25D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	H-M6x1 G	H-M8x1 G	H-M8x1.25 G	Y Flat	Y Flat with rib
ZPR20 U C	20	23	14	29	39.8	57.6	5	6	8	4	1.7
ZPR25 U C	25	28	14.5	29	39.8	57.6	5	6	8	4	1.8
ZPR32 U C	32	35	14.5	29.5	40.3	58.1	5	6	8	4.5	2.3

Deep type

Model	øA	øB	C	D	E	F	H-M6x1 G	H-M8x1 G	H-M8x1.25 G	Y
ZPR25D	25	28	20	35	48.5	63.6	5	6	8	10

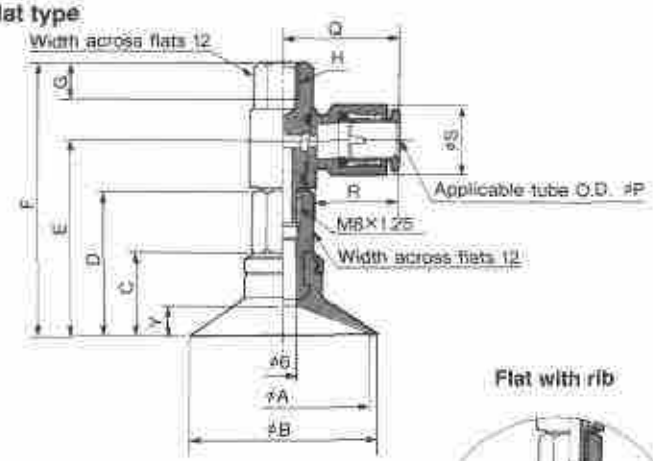
Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4*	4	23.3	15.8	10.4
ø6	6	24.3	16.8	12.8
ø8*	8	26.2	18.7	15.2

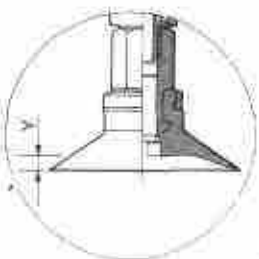
*1/32" and 5/16" tube may be substituted for 4mm and 8mm respectively. (Check leakage)

Pad Diameters ø40 • ø50

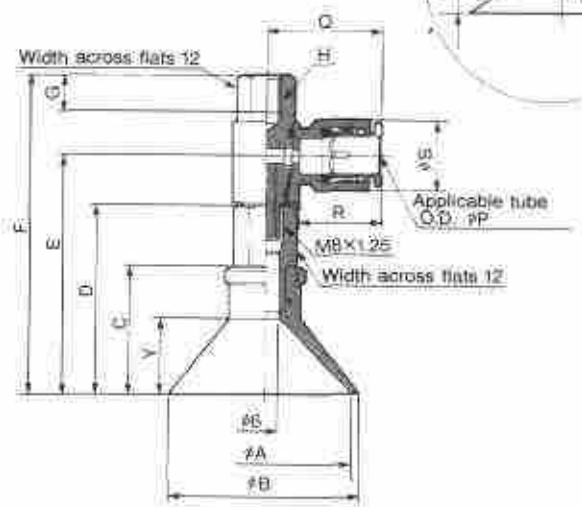
Flat type



Flat with rib



Deep type/ZPR40D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	H-M6x1 G	H-M8x1 H	Y Flat	Y Flat with rib
ZPR40 U C	40	43	18.5	32	42.8	60.6	6	8	6.5	3.3
ZPR50 U C	50	53	19.5	33	43.8	61.6	6	8	7.5	3.8

Deep type

Model	øA	øB	C	D	E	F	H-M6x1 G	H-M8x1 H	Y
ZPR40D	40	43	29	42.5	53.3	71.1	6	8	17

Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø6	6	24.3	16.8	12.8
ø8*	8	26.2	18.7	15.2

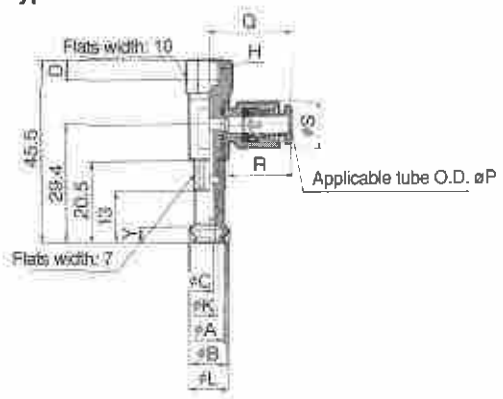
*5/16" tube may be substituted for 8mm. (Check leakage)

ZPR Series
Without Buffer

Connection One-Touch Fitting | **Vacuum Entry** Horizontal | **Mounting** Female Thread

Pad Diameters ø6 • ø8

Bellows type



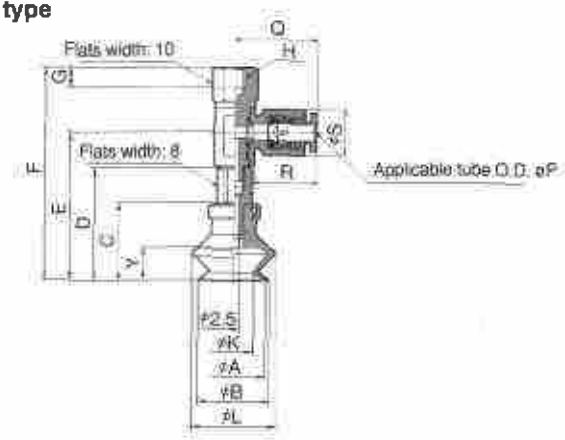
Model	øA	øB	øC	H:M4x0.7 D	H:M5x0.8 D	øK	øL	Y
ZPR06B	6	7	2.5	4	5	3.3	9.1	4
ZPR08B	8	9				4.7	10.1	

Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

Pad Diameters ø10 • ø13 • ø16

Bellows type



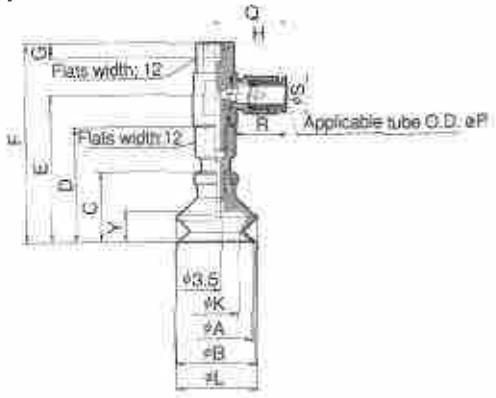
Model	øA	øB	C	D	E	F	H:M5x0.8 G	H:M6x1 G	øK	øL	Y
ZPR10B	10	12	16	25	33.9	50	5	6	5.5	13.6	5.5
ZPR13B	13	15	18.5	27.5	36.4	52.5			8.7	19	7.5
ZPR16B	16	18	20	29	37.9	54			9.9	21	8.5

Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

Pad Diameters ø20 • ø25 • ø32

Bellows type



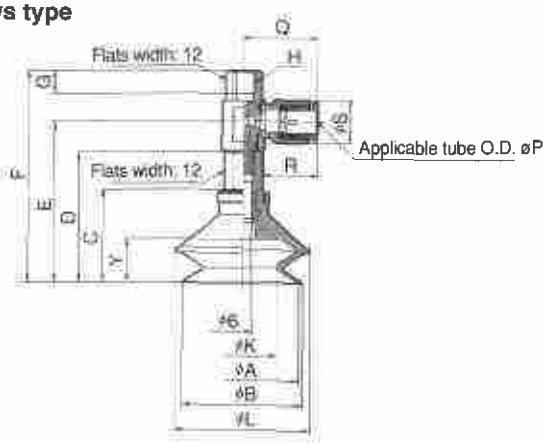
Model	øA	øB	C	D	E	F	H:M5x0.8 G	H:M6x1 G	H:M6x1.25 G	øK	øL	Y
ZPR20B	20	22	23.5	38.5	49.3	67.1	5	6	8	12.4	25	10.5
ZPR25B	25	27	24	39	49.8	67.6				15.6	28	10.5
ZPR32B	32	34	29	44	54.8	72.6				18.9	37	14

Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4	4	23.3	15.6	10.4
ø6	6	24.3	16.8	12.8
ø8	8	26.2	18.7	15.2

Pad Diameters ø40 • ø50

Bellows type



Model	øA	øB	C	D	E	F	H:M6x1 G	H:M6x1.25 G	øK	øL	Y
ZPR40B	40	43	34	47.5	58.3	76.1	6	8	24.4	48	16
ZPR50B	50	53	38	51.5	62.3	80.1			32.4	57	19

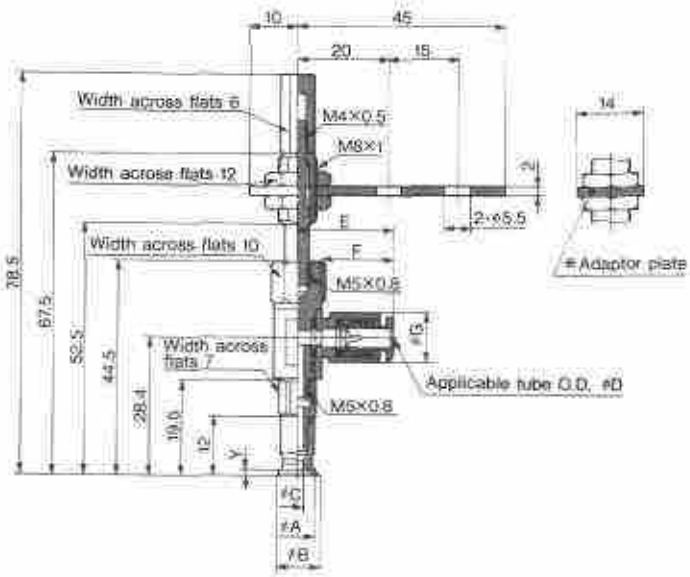
Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø6	6	24.3	16.8	12.8
ø8	8	26.2	18.7	15.2

Connection One-Touch Fitting | **Vacuum Entry** Horizontal | **Mounting** Buffer Body

Pad Diameters ø2 • ø4 • ø6 • ø8

Flat type



Flat type

Model	øA	øB	øC	øD: ø4			øD: ø6			Y
				E	F	øG	E	F	øG	
ZPR02U	2	2.6	1.2	20.6	15.6	10.4	21.6	16.6	12.8	0.8
ZPR04U	4	4.8	1.6							0.8
ZPR06U	5	7	2.5							0.8
ZPR08U	8	9	2.5							1

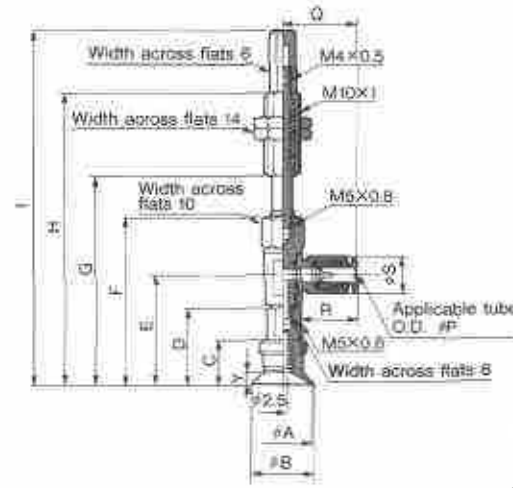
Applicable Tube

Applicable tube O.D.	øE
ø4*	10.4
ø6	12.8

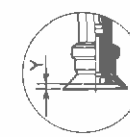
*5/32" tube may be substituted for 4mm. (Check leakage)

Pad Diameters ø10 • ø13 • ø16

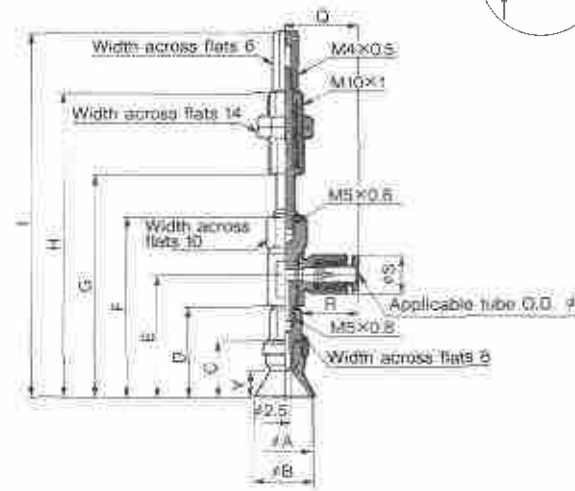
Flat type



Flat with rib



Deep type/ZPR10D • 16D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	G	H	I	Y	
										Flat	Flat with rib
ZPR10$^{U}_{C}$	10	12	12	21	29.9	46	57	80	91	3	1.7
ZPR13$^{U}_{C}$	13	15	12	21	29.9	46	57	80	91	3	1.8
ZPR16$^{U}_{C}$	16	18	12.5	21.5	30.4	46.5	57.5	80.5	91.5	3.5	1.2

Deep type

Model	øA	øB	C	D	E	F	G	H	I	Y
ZPR10D	10	12	15	24	32.9	49	60	83	94	6
ZPR16D	16	18	16	25	33.9	50	61	84	95	7

Applicable Tube

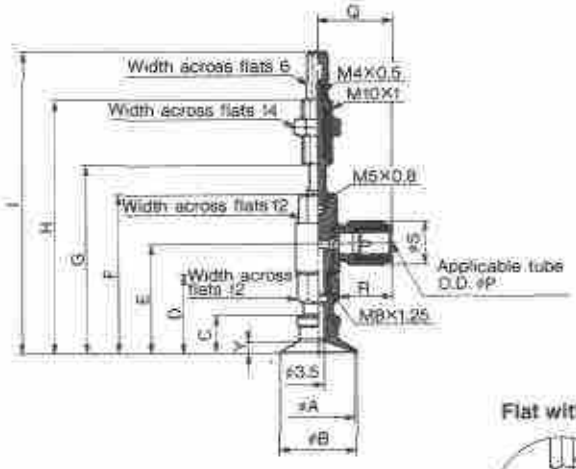
Applicable tube O.D.	øP	Q	R	øS
ø4*	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

*5/32" tube may be substituted for 4mm. (Check leakage)

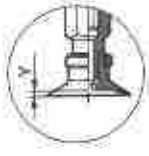
Connection One-Touch Fitting | **Vacuum Entry** Horizontal | **Mounting** Buffer Body

Pad Diameters ø20 • ø25 • ø32

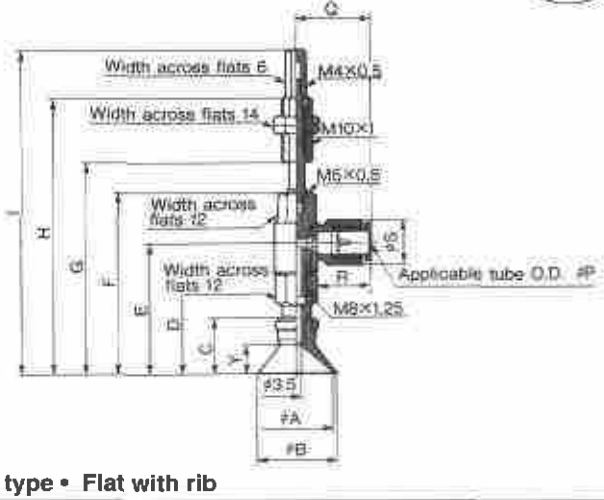
Flat type



Flat with rib



Deep type/ZPR25D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	G	H	I	Y	
										Flat	Flat with rib
ZPR20$^{U}_{C}$	20	23	14	29	39.6	57.6	68.6	91.5	102.6	4	1.7
ZPR25$^{U}_{C}$	25	28	14.5	29	39.8	57.6	68.6	91.5	102.6	4	1.8
ZPR32$^{U}_{C}$	32	35	14.5	29.5	40.3	58.1	69.2	92	103.1	4.5	2.3

Deep type

Model	øA	øB	C	D	E	F	G	H	I	Y
ZPR25D	25	28	20	35	48.5	63.6	74.6	97.6	108.6	10

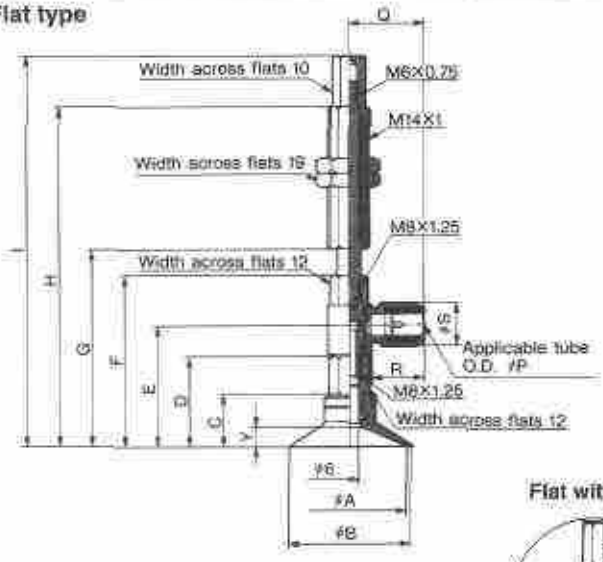
Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4*	4	23.3	15.8	10.4
ø6	6	24.3	16.8	12.8
ø8*	8	26.2	18.7	15.2

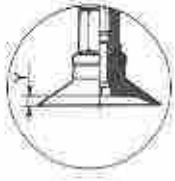
*5/32" and 1/8" tube may be substituted for 4mm and 8mm respectively. (Check leakage)

Pad Diameters ø40 • ø50

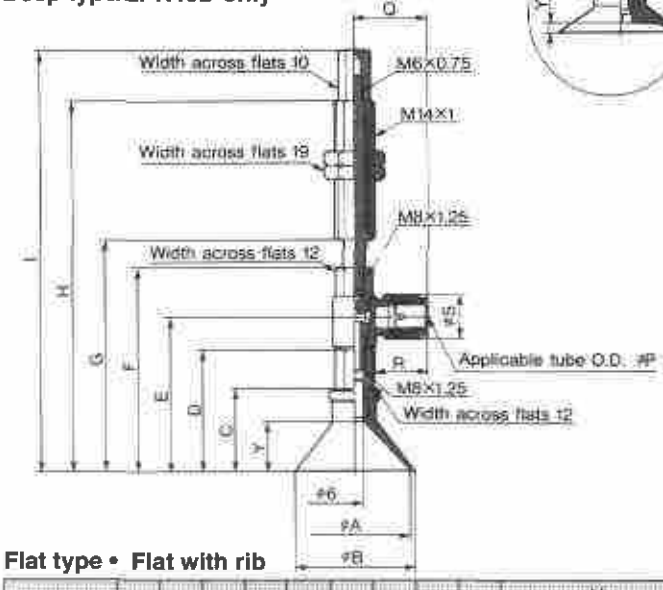
Flat type



Flat with rib



Deep type/ZPR40D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	G	H	I	Y	
										Flat	Flat with rib
ZPR40$^{U}_{C}$	40	43	16.5	32	42.8	60.6	72.6	122.6	140.6	6.5	3.3
ZPR50$^{U}_{C}$	50	53	19.5	33	43.8	61.6	73.6	123.6	141.6	7.5	3.8

Deep type

Model	øA	øB	C	D	E	F	G	H	I	Y
ZPR40D	40	43	29	42.5	53.3	71.1	81.1	133.1	151.1	17

Applicable Tube

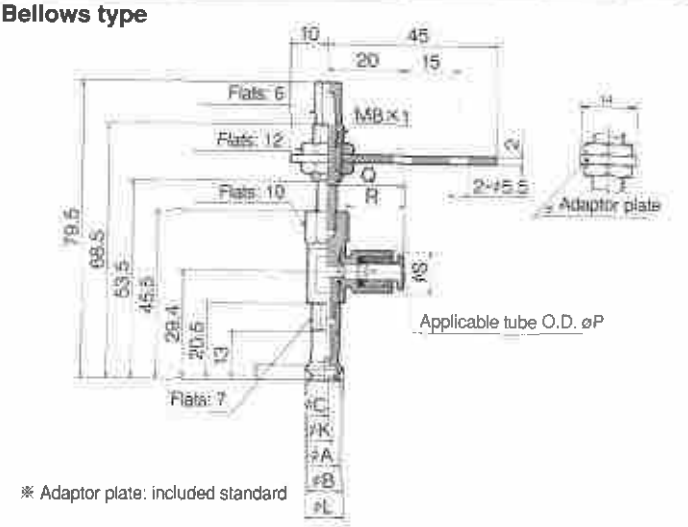
Applicable tube O.D.	øP	Q	R	øS
ø6	6	24.3	16.8	12.8
ø8*	8	26.2	18.7	15.2

*5/32" and 1/8" tube may be substituted for 4mm and 8mm respectively. (Check leakage)

Connection One-Touch Fitting | **Vacuum Entry** Horizontal | **Mounting** Buffer Body

Pad Diameters ø6 • ø8

Bellows type

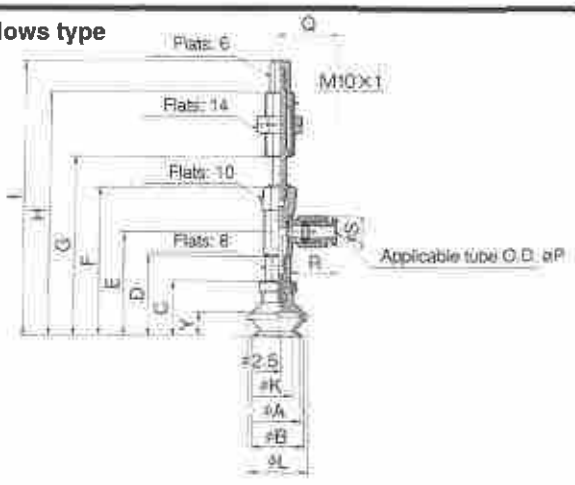


※ Adaptor plate: included standard

Model	øA	øB	øC	øP: ø4			øP: ø6			øK	øL	Y
				Q	R	øS	Q	R	øS			
ZPR06B	6	7	2.5	20.6	15.6	10.4	21.6	16.6	12.8	3.3	9.1	4
ZPR08B	8	9								4.7	10.1	

Pad Diameters ø10 • ø13 • ø16

Bellows type



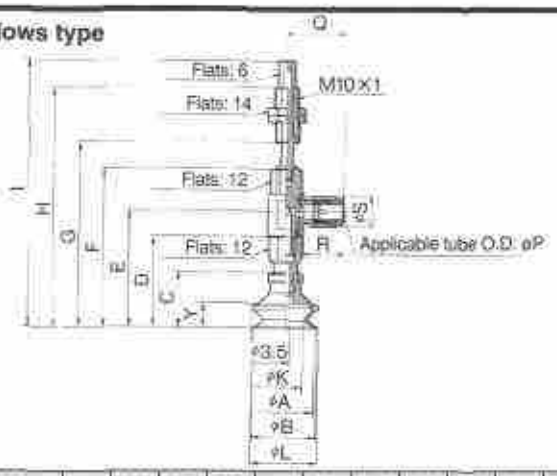
Model	øA	øB	C	D	E	F	G	H	I	øK	øL	Y
ZPR10B	10	12	16	25	33.9	50	61	84	95	5.5	13.6	5.5
ZPR13B	13	15	18.5	27.5	36.4	52.5	63.5	86.5	97.5	8.7	19	7.5
ZPR16B	16	18	20	29	37.9	54	65	88	99	9.9	21	8.5

Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

Pad Diameters ø20 • ø25 • ø32

Bellows type



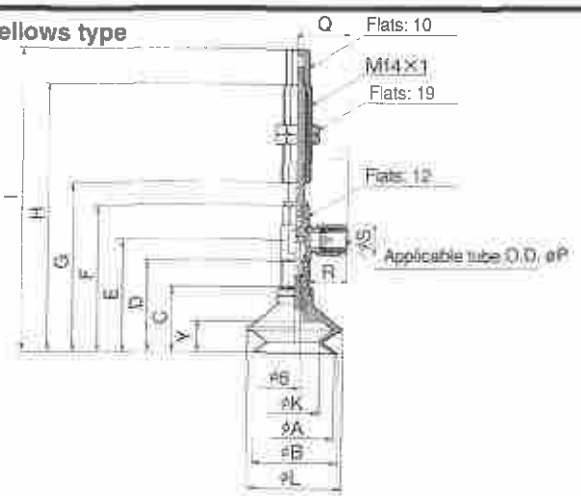
Model	øA	øB	C	D	E	F	G	H	I	øK	øL	Y
ZPR20B	20	22	23.5	38.5	49.3	67.1	78.1	101.1	112.1	12.4	25	10.5
ZPR25B	25	27	24	39	49.8	67.6	78.6	101.6	112.6	15.6	28	10.5
ZPR32B	32	34	29	44	54.8	72.6	83.6	106.6	117.6	18.9	37	14

Applicable Tube

Applicable tube O.D.	øP	Q	R	øS
ø4	4	23.3	15.8	10.4
ø6	6	24.3	16.8	12.8
ø8	8	26.2	18.7	15.2

Pad Diameters ø40 • ø50

Bellows type



Model	øA	øB	C	D	E	F	G	H	I	øK	øL	Y
ZPR40B	40	43	34	47.5	58.3	76.1	88.1	138.1	156.1	24.4	48	16
ZPR50B	50	53	38	51.5	62.3	80.1	92.1	142.1	160.1	32.4	57	19

Applicable Tube

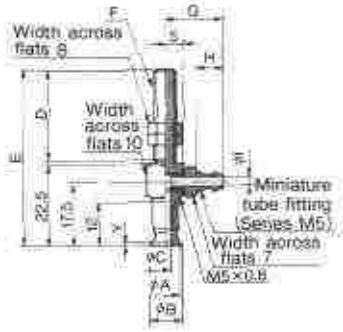
Applicable tube O.D.	øP	Q	R	øS
ø6	6	24.3	16.8	12.8
ø8	8	26.2	18.7	15.2

?PY Series
Without Buffer

Connection Barbed Fitting | **Vacuum Entry** Horizontal | **Mounting** Male Thread

ad Diameters ø2 • ø4 • ø6 • ø8

at type



at type

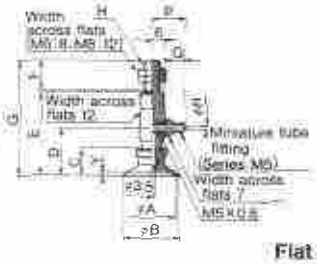
Model	øA	øB	øC	F:M5x0.8 D	F:M5x0.8 E	F:M6x1 D	F:M6x1 E	Y
PY02U	2	2.6	1.2	20	44	25	49.5	0.8
PY04U	4	4.8	1.6					0.8
PY06U	6	7	2.5					0.8
PY08U	8	9	2.5					1

Applicable tube

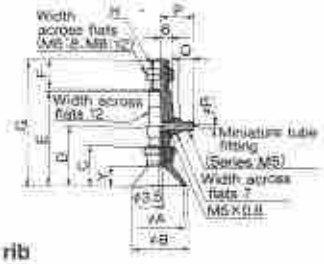
Applicable Tube OD/ID	G	H	ø!
N4 (Nylon tube ø4/2.5)	13.5	5	1.8
N6 (Nylon tube ø6/4)	15.5	7	2.5
U4 (Soft tube ø4/2.5)	13.5	5	1.8
U6 (Soft tube ø6/4)	15.5	7	2.5

Pad Diameters ø20 • ø25 • ø32

Flat type



Deep Type/ZPY25D only



Flat with rib

Flat type

Model	øA	øB	C	D	E	H:M6x1 F	H:M6x1 G	H:M8x1 F	H:M8x1 G	Y Flat	Y Rib
ZPY20 U C	20	23	14	24	42	25	68	15	58	4	1.7
ZPY25 U C	25	28	14	24	42		68		58	4	1.8
ZPY32 U C	32	35	14.5	24.5	42.5		68.5		58.5	4.5	2.3

Deep type

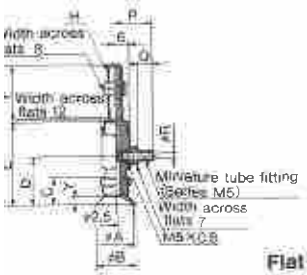
Model	øA	øB	C	D	E	H:M6x1 F	H:M6x1 G	H:M8x1 F	H:M8x1 G	Y
ZPY25D	25	28	20	30	48	25	74	15	64	10

Applicable tube

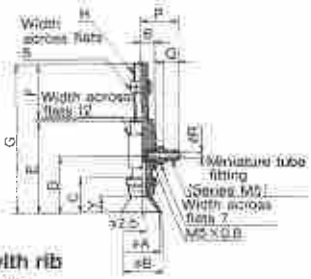
Applicable Tube OD/ID	P	O	øR
N4 (Nylon tube ø4/2.5)	14.5	5	1.8
N6 (Nylon tube ø6/4)	16.5	7	2.5
U4 (Soft tube ø4/2.5)	14.5	5	1.8
U6 (Soft tube ø6/4)	16.5	7	2.5

ad Diameters ø10 • ø13 • ø16

at type



Deep Type/ZPY10D • 16D only



Flat with rib

at type • Flat with rib

Model	øA	øB	C	D	E	H:M5x0.8 F	H:M5x0.8 G	H:M6x1 F	H:M6x1 G	Y Flat	Y Rib
PY10 U C	10	12	12	22	38	20	59	25	64	3	1.7
PY13 U C	13	15	12	22	39		59		64	3	1.8
PY16 U C	16	18	12.5	22.5	38.5		59.5		64.5	3.5	1.2

eep type

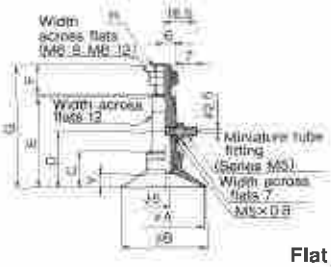
Model	øA	øB	øC	D	E	H:M5x0.8 F	H:M5x0.8 G	H:M6x1 F	H:M6x1 G	Y
PY10D	10	12	15	25	41	63	62	68	67	6
PY16D	16	18	16	26	42		63		68	7

Applicable tube

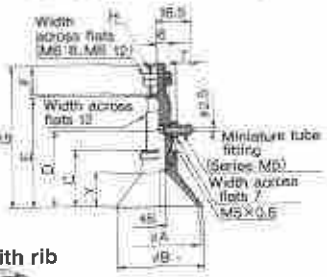
Applicable Tube OD/ID	P	Q	øR
N4 (Nylon tube ø4/2.5)	14.5	5	1.8
N6 (Nylon tube ø6/4)	16.5	7	2.5
U4 (Soft tube ø4/2.5)	14.5	5	1.8
U6 (Soft tube ø6/4)	16.5	7	2.5

Pad Diameters ø40 • ø50

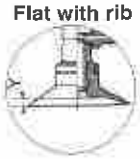
Flat type



Deep Type/ZPY40D only



Flat with rib



Flat type • Flat with rib

Model	øA	øB	C	D	E	H:M6x1 F	H:M6x1 G	H:M8x1 F	H:M8x1 G	Y Flat	Y Rib
ZPY40 U C	40	43	18.5	28.5	46.5	25	72.5	15	62.5	6.5	3.3
ZPY50 U C	50	53	18.5	29.5	47.5		73.5		63.5	7.5	3.8

Deep type

Model	øA	øB	C	D	E	H:M6x1 F	H:M6x1 G	H:M8x1 F	H:M8x1 G	Y
ZPY40D	40	43	29	39	57	25	83	15	73	17

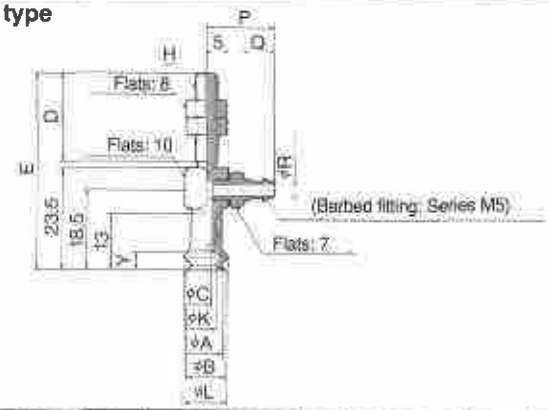
Applicable tube

Applicable Tube OD/ID	G	H	ø!
N4 (Nylon tube ø4/2.5)	14.5	5	1.8
N6 (Nylon tube ø6/4)	16.5	7	2.5
U4 (Soft tube ø4/2.5)	14.5	5	1.8
U6 (Soft tube ø6/4)	16.5	7	2.5

Connection Barbed Fitting | **Vacuum Entry** Horizontal | **Mounting** Male Thread

Pad Diameters ø6 • ø8

Bellows type



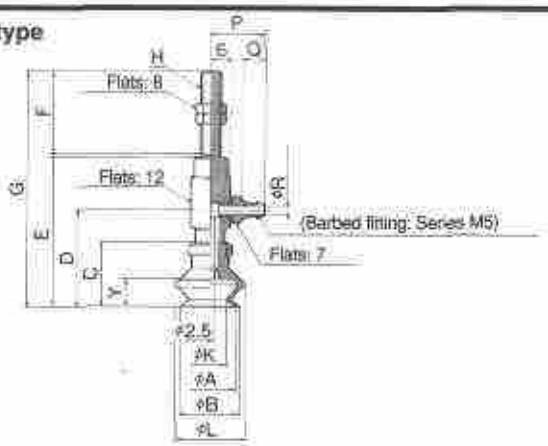
Model	øA	øB	øC	H:M5x0.8		H:M6x1		øK	øL	Y
				D	E	D	E			
ZPY06B	6	7	2.5	20	45	25	50.5	3.3	9.1	4
ZPY08B	8	9						4.7	10.1	

Applicable Tube

Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	13.5	5	1.8
N6 (Nylon tube, ø6/4)	15.5	7	2.5
U4 (Soft tube, ø4/2.5)	13.5	5	1.8
U6 (Soft tube, ø6/4)	15.5	7	2.5

Pad Diameters ø10 • ø13 • ø16

Bellows type



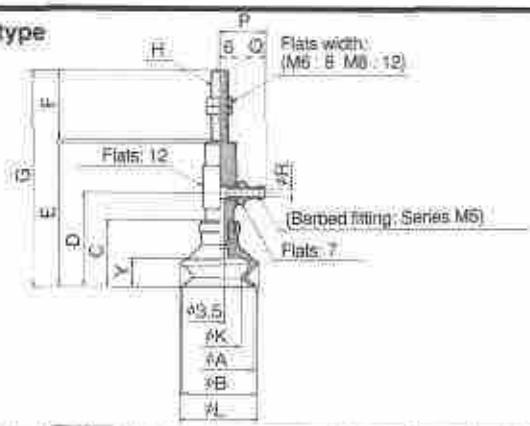
Model	øA	øB	C	D	E	H:M5x0.8		H:M6x1		øK	øL	Y
						F	G	F	G			
ZPY10B	10	12	16	26	42	20	63	25	68	5.5	13.8	5.5
ZPY13B	13	15	18.5	28.5	44.5		65.5		70.5	8.7	19	7.5
ZPY16B	16	18	20	30	46		67		72	9.9	21	8.5

Applicable Tube

Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	14.5	5	1.8
N6 (Nylon tube, ø6/4)	16.5	7	2.5
U4 (Soft tube, ø4/2.5)	14.5	5	1.8
U6 (Soft tube, ø6/4)	16.5	7	2.5

Pad Diameters ø20 • ø25 • ø32

Bellows type



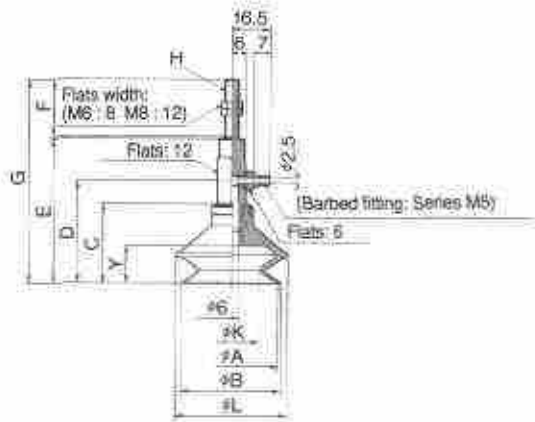
Model	øA	øB	C	D	E	H:M6x1		H:M8x1		øK	øL	Y
						F	G	F	G			
ZPY20B	20	22	23.5	33.5	53.5	25	79.5	15	69.5	12.4	25	10.5
ZPY25B	25	27	24	34	54		80		70	15.6	28	10.5
ZPY32B	32	34	29	39	59		85		75	18.9	37	14

Applicable Tube

Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	14.5	5	1.8
N6 (Nylon tube, ø6/4)	16.5	7	2.5
U4 (Soft tube, ø4/2.5)	14.5	5	1.8
U6 (Soft tube, ø6/4)	16.5	7	2.5

Pad Diameters ø40 • ø50

Bellows type

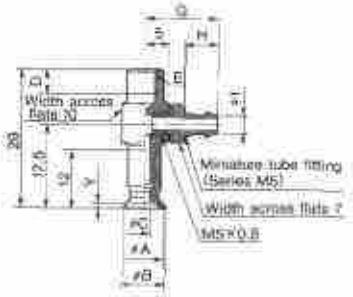


Model	øA	øB	C	D	E	H:M6x1		H:M8x1		øK	øL	Y
						F	G	F	G			
ZPY40B	40	43	34	44	62	25	88	15	78	24.4	48	16
ZPY50B	50	53	38	48	66		92		82	32.4	57	19

Connection Barbed Fitting | **Vacuum Entry** Horizontal | **Mounting** Female Thread

Pad Diameters ø2 • ø4 • ø6 • ø8

Flat type



Flat type

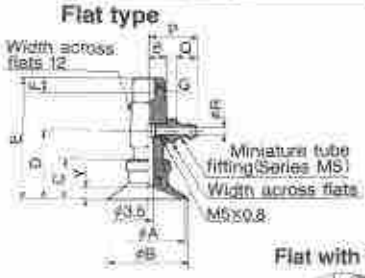
Model	øA	øB	øC	E:M4x0.7 D	F:M5x0.8 D	Y
ZPY02U	2	2.6	1.2	4	5	0.8
ZPY04U	4	4.8	1.6			0.8
ZPY06U	6	7	2.5			0.8
ZPY08U	8	9	2.5			1

Applicable tube

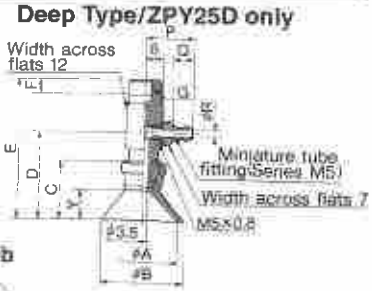
Applicable Tube OD/ID	G	H	øI
N4 (Nylon tube ø4/2.5)	13.5	5	1.8
N6 (Nylon tube ø6/4)	15.5	7	2.5
U4 (Soft tube ø4/2.5)	13.5	5	1.8
U6 (Soft tube ø6/4)	15.5	7	2.5

Pad Diameters ø20 • ø25 • ø32

Flat type



Deep Type/ZPY25D only



Flat with rib

Flat type

Model	øA	øB	C	D	E	F	F	F	Y Flat	Y Flat w/Rib
ZPY20	20	23	14	24	42	5	6	8	4	1.7
ZPY25	25	28	14	24	42				4	1.8
ZPY32	32	35	14.5	24.5	42.5				4.5	2.3

Deep type

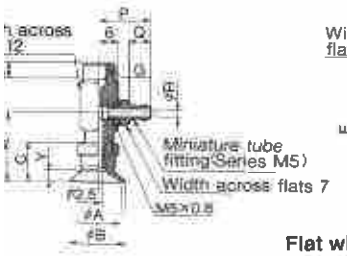
Model	øA	øB	C	D	E	F	F	F	Y
ZPY25D	25	28	20	30	48	5	6	8	10

Applicable tube

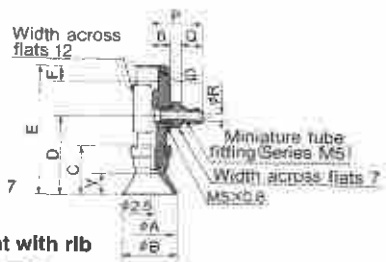
Applicable Tube OD/ID	P	Q	øR
N4 (Nylon tube ø4/2.5)	14.5	5	1.8
N6 (Nylon tube ø6/4)	16.5	7	2.5
U4 (Soft tube ø4/2.5)	14.5	5	1.8
U6 (Soft tube ø6/4)	16.5	7	2.5

Pad Diameters ø10 • ø13 • ø16

Flat type



Deep Type/ZPY10D • 16D only



Flat with rib

Flat type • Flat with rib

Model	øA	øB	C	D	E	G:M5x0.8 F	G:M6x1 F	Y Flat	Y Flat w/Rib
ZPY10	10	12	12	22	38	5	6	3	1.7
ZPY13	13	15	12	22	38			3	1.8
ZPY16	16	18	12.5	22.5	38.5			3.5	1.2

Deep type

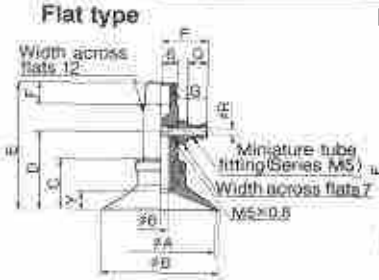
Model	øA	øB	øC	D	E	G:M5x0.8 F	G:M6x1 F	Y
ZPY10D	10	12	15	25	41	5	6	6
ZPY16D	16	18	15	26	42			7

Applicable tube

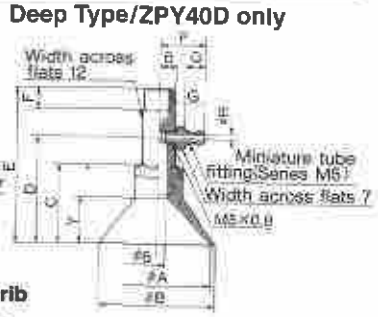
Applicable Tube OD/ID	P	Q	øR
N4 (Nylon tube ø4/2.5)	14.5	5	1.8
N6 (Nylon tube ø6/4)	16.5	7	2.5
U4 (Soft tube ø4/2.5)	14.5	5	1.8
U6 (Soft tube ø6/4)	16.5	7	2.5

Pad Diameters ø40 • ø50

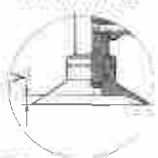
Flat type



Deep Type/ZPY40D only



Flat with rib



Flat type • Flat with rib

Model	øA	øB	C	D	E	H:M6x1 F	H:M8x1.25 F	Y Flat	Y Flat w/Rib
ZPY40	40	43	18.5	28.5	46.5	6	8	8.5	3.3
ZPY50	50	53	19.5	29.5	47.5			7.5	3.8

Deep type

Model	øA	øB	C	D	E	H:M6x1 F	H:M8x1 F	Y
ZPY40D	40	43	29	39	57	6	8	17

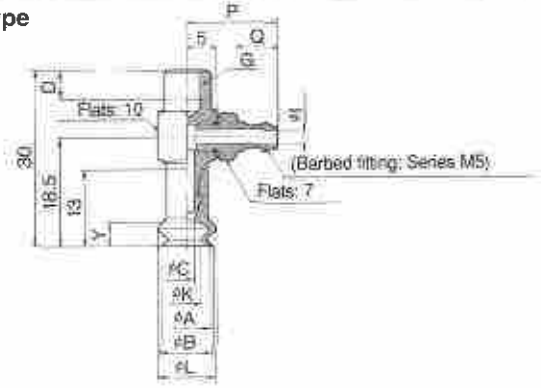
Applicable tube

Applicable Tube OD/ID	P	Q	øR
N6 (Nylon tube ø6/4)	16.5	7	2.5
U6 (Soft tube ø6/4)	16.5	7	2.5

Connection Barbed Fitting | **Vacuum Entry** Horizontal | **Mounting** Female Thread

Pad Diameters ø6 • ø8

Bellows type



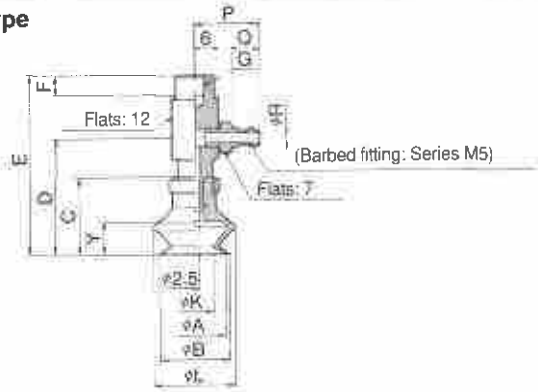
Model	øA	øB	øC	G:M4x0.7 D	G:M5x0.8 D	øK	øL	Y
ZPY06B	6	7	2.5	4	5	3.3	9.1	4
ZPY08B	8	9				4.7	10.1	

Applicable Tube

Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	13.5	5	1.8
N6 (Nylon tube, ø6/4)	15.5	7	2.5
U4 (Soft tube, ø4/2.5)	13.5	5	1.8
U6 (Soft tube, ø6/4)	15.5	7	2.5

Pad Diameters ø10 • ø13 • ø16

Bellows type



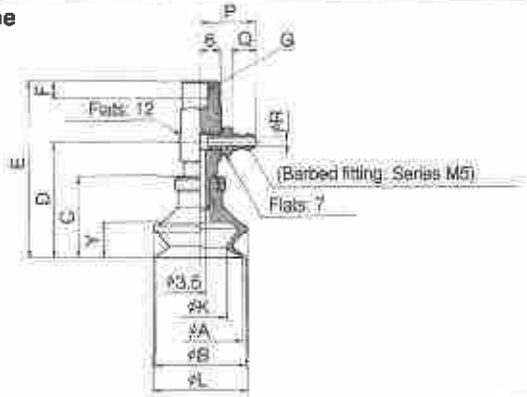
Model	øA	øB	C	D	E	G:M5x0.8 F	G:M6x1 F	øK	øL	Y
ZPY10B	10	12	16	26	42	5	6	5.5	13.8	5.5
ZPY13B	13	15	18.5	28.5	44.5			8.7	19	7.5
ZPY16B	16	18	20	30	46			9.9	21	8.5

Applicable Tube

Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	14.5	5	1.8
N6 (Nylon tube, ø6/4)	16.5	7	2.5
U4 (Soft tube, ø4/2.5)	14.5	5	1.8
U6 (Soft tube, ø6/4)	16.5	7	2.5

Pad Diameters ø20 • ø25 • ø32

Bellows type



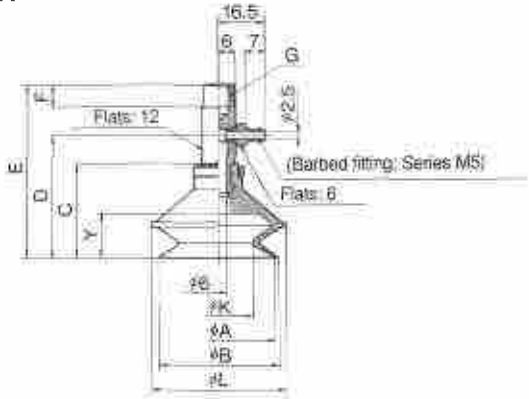
Model	øA	øB	C	D	E	G:M5x0.8 F	G:M6x1 F	G:M8x1.25 F	øK	øL	Y
ZPY20B	20	22	23.5	33.5	53.5	5	6	8	12.4	25	10.5
ZPY25B	25	27	24	34	54				15.6	28	10.5
ZPY32B	32	34	29	39	59				18.9	37	14

Applicable Tube

Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	14.5	5	1.8
N6 (Nylon tube, ø6/4)	16.5	7	2.5
U4 (Soft tube, ø4/2.5)	14.5	5	1.8
U6 (Soft tube, ø6/4)	16.5	7	2.5

Pad Diameters ø40 • ø50

Bellows type

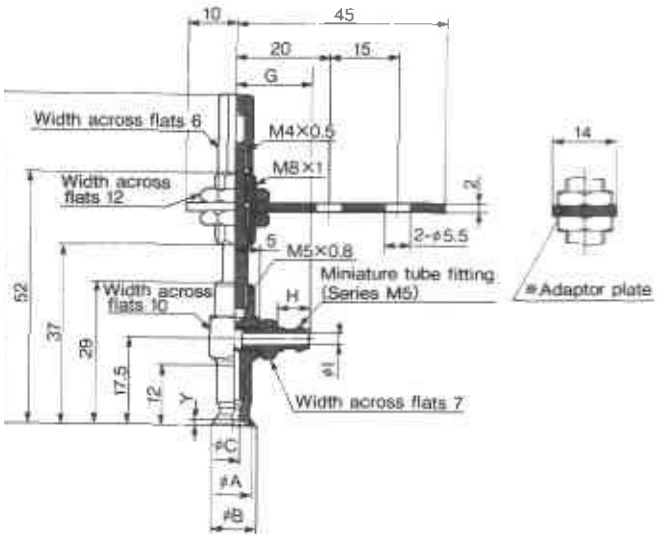


Model	øA	øB	C	D	E	G:M6x1 F	G:M8x1.25 F	øK	øL	Y
ZPY40B	40	43	34	44	62	6	8	24.4	48	16
ZPY50B	50	53	38	48	66			32.4	57	19

Connection Barbed Fitting | **Vacuum Entry** Horizontal | **Mounting** Buffer Body

Pad Diameters ø2 • ø4 • ø6 • ø8

Flat type



Flat type

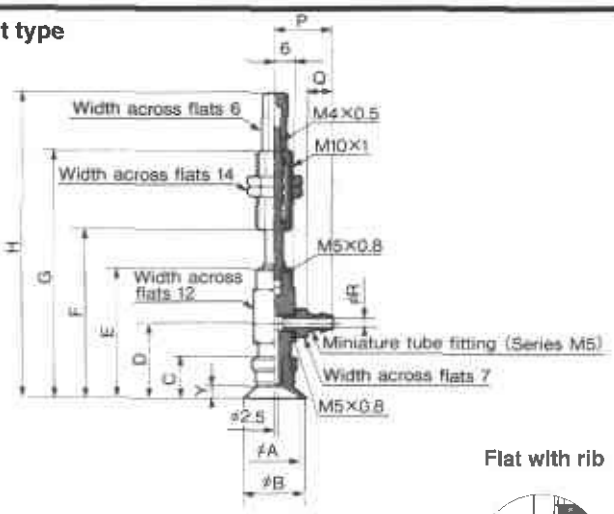
Model	øA	øB	øC	Y
ZPY02U	2	2.6	1.2	0.8
ZPY04U	4	4.8	1.6	0.8
ZPY06U	6	7	2.5	0.8
ZPY08U	8	9	2.5	1

Applicable Tube

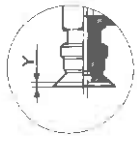
Tube O.D./I.D.	G	H	ø1
4 (Nylon tube, ø4/2.5)	13.5	5	1.8
6 (Nylon tube, ø6/4)	15.5	7	2.5
4 (Soft tube, ø4/2.5)	13.5	5	1.8
6 (Soft tube, ø6/4)	15.5	7	2.5

Pad Diameters ø10 • ø13 • ø16

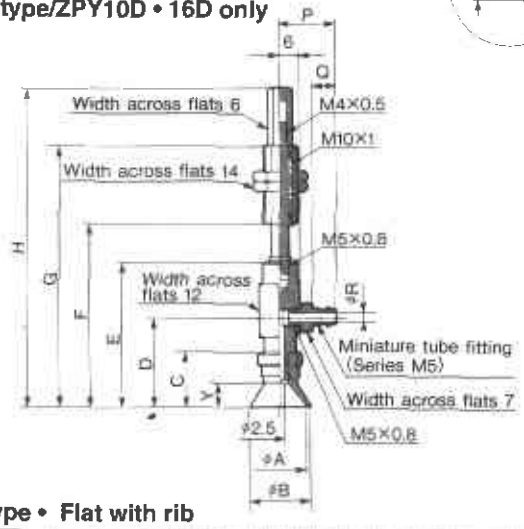
Flat type



Flat with rib



Deep type/ZPY10D • 16D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	G	H	Y	
									Flat	Flat with rib
ZPY10U/C	10	12	12	22	38	49	72	83	3	1.7
ZPY13U/C	13	15	12	22	38	49	72	83	3	1.8
ZPY16U/C	16	18	12.5	22.5	38.5	49.5	72.5	83.5	3.5	1.2

Deep type

Model	øA	øB	C	D	E	F	G	H	Y
ZPY10D	10	12	15	25	41	52	75	86	6
ZPY16D	16	18	12.5	26	42	53	76	87	7

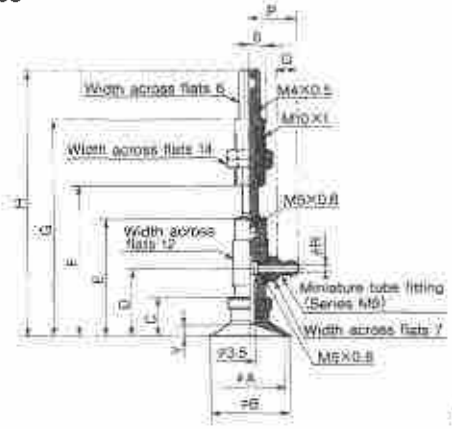
Applicable Tube

Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	14.5	5	1.8
N6 (Nylon tube, ø6/4)	16.5	7	2.5
U4 (Soft tube, ø4/2.5)	14.5	5	1.8
U6 (Soft tube, ø6/4)	16.5	7	2.5

Connection Barbed Fitting | **Vacuum Entry** Horizontal | **Mounting** Buffer Body

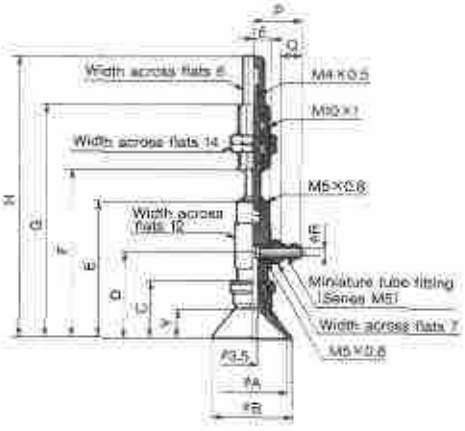
Pad Diameters ø20 • ø25 • ø32

Flat type



Flat with rib

Deep type/ZPY25D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	G	H	Y	
									Flat	Flat with rib
ZPY20$^{U}_{C}$	20	23	14	24	42	53	76	87	4	1.7
ZPY25$^{U}_{C}$	25	26	14	24	42	53	76	87	4	1.8
ZPY32$^{U}_{C}$	32	35	14.5	24.5	42.5	53.5	76.5	87.5	4.5	2.3

Deep type

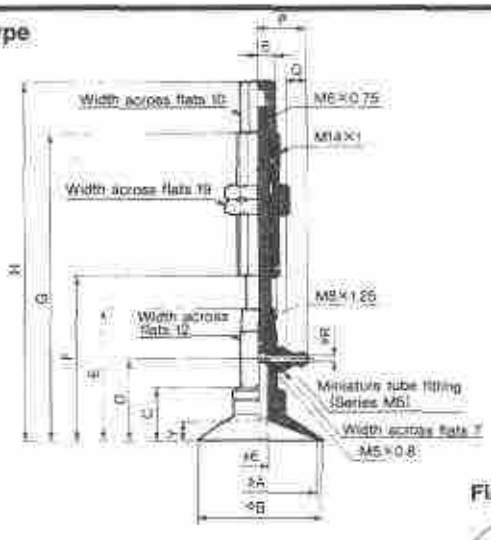
Model	øA	øB	C	D	E	F	G	H	Y
ZPY25D	25	28	20	30	48	59	82	93	10

Applicable Tube

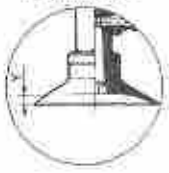
Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	14.5	5	1.8
N6 (Nylon tube, ø6/4)	16.5	7	2.5
U4 (Soft tube, ø4/2.5)	14.5	5	1.8
U6 (Soft tube, ø6/4)	16.5	7	2.5

Pad Diameters ø40 • ø50

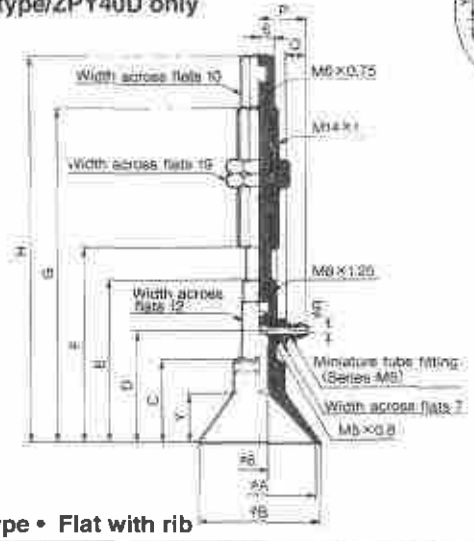
Flat type



Flat with rib



Deep type/ZPY40D only



Flat type • Flat with rib

Model	øA	øB	C	D	E	F	G	H	Y	
									Flat	Flat with rib
ZPR40$^{U}_{C}$	40	43	16.5	28.5	46.5	58.5	108.5	126.5	6.5	3.3
ZPR50$^{U}_{C}$	50	53	19.5	29.5	47.5	59.5	109.5	127.5	7.5	3.8

Deep type

Model	øA	øB	C	D	E	F	G	H	Y
ZPY40D	40	43	29	39	57	69	119	137	17

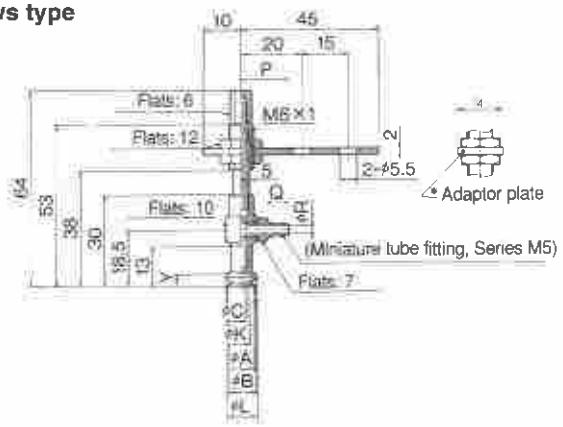
Applicable Tube

Tube O.D./I.D.	P	Q	øR
N6 (Nylon tube, ø6/4)	16.5	7	2.5
U6 (Soft tube, ø6/4)	16.5	7	2.5

Connection Barbed Fitting | **Vacuum Entry** Horizontal | **Mounting** Buffer Body

Pad Diameters ø6 • ø8

Bellows type



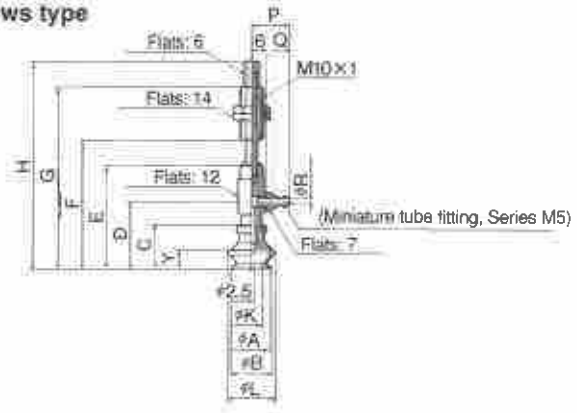
Model	øA	øB	øC	øK	øL	Y
ZPY06B	6	7	2.5	3.3	9.1	4
ZPY08B	8	9		4.7	10.1	

Applicable Tube

Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	13.5	5	1.8
N6 (Nylon tube, ø6/4)	15.5	7	2.5
U4 (Soft tube, ø4/2.5)	13.5	5	1.8
U6 (Soft tube, ø6/4)	15.5	7	2.5

Pad Diameters ø10 • ø13 • ø16

Bellows type



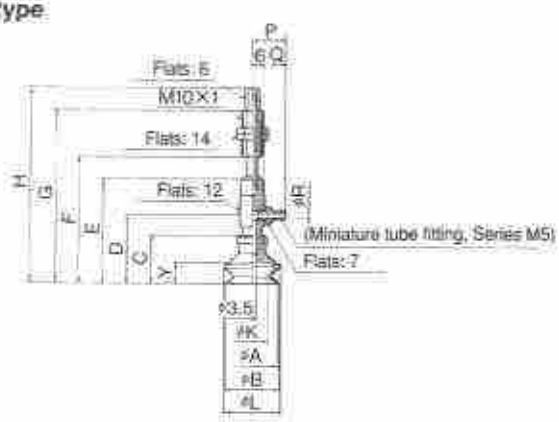
Model	øA	øB	C	D	E	F	G	H	øK	øL	Y
ZPY10B	10	12	16	26	42	53	76	87	5.5	13.8	5.5
ZPY13B	13	15	18.5	28.5	44.5	55.5	78.5	89.5	8.7	19	7.5
ZPY16B	16	18	20	30	46	57	80	91	9.9	21	8.5

Applicable Tube

Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	14.5	5	1.8
N6 (Nylon tube, ø6/4)	16.5	7	2.5
U4 (Soft tube, ø4/2.5)	14.5	5	1.8
U6 (Soft tube, ø6/4)	16.5	7	2.5

Pad Diameters ø20 • ø25 • ø32

Bellows type



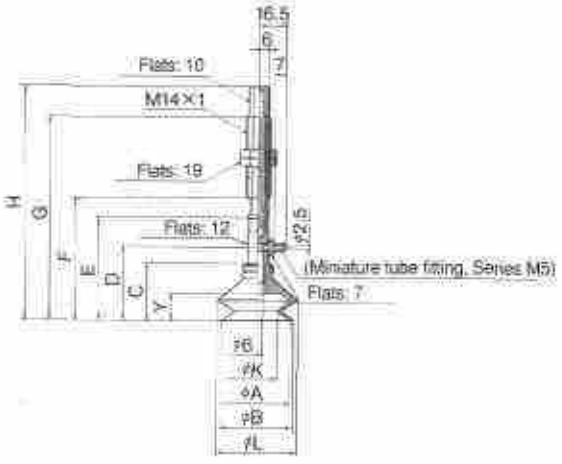
Model	øA	øB	C	D	E	F	G	H	øK	øL	Y
ZPY20B	20	22	23.5	33.6	53.5	64.5	79.5	89.5	12.4	25	10.5
ZPY25B	25	27	24	34	54	65	88	99	15.6	28	10.5
ZPY32B	32	34	29	39	59	70	93	110	18.9	37	14

Applicable Tube

Tube O.D./I.D.	P	Q	øR
N4 (Nylon tube, ø4/2.5)	14.5	5	1.8
N6 (Nylon tube, ø6/4)	16.5	7	2.5
U4 (Soft tube, ø4/2.5)	14.5	5	1.8
U6 (Soft tube, ø6/4)	16.5	7	2.5

Pad Diameters ø40 • ø50

Bellows type

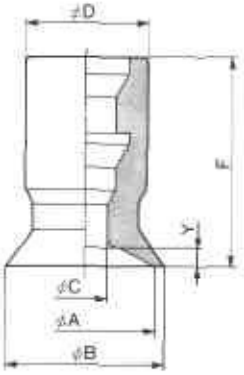


Model	øA	øB	C	D	E	F	G	H	øK	øL	Y
ZPY40B	40	43	34	44	62	74	124	142	24.4	48	16
ZPY50B	50	53	38	48	66	78	128	146	32.4	57	19

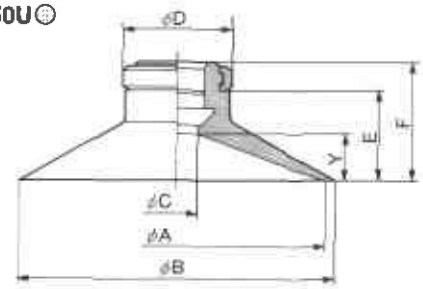
Part/Pad (With Lock Ring)

Flat type pad

ZP02U○ ~ 08U○



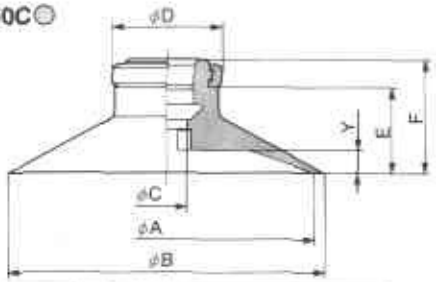
ZP10U○ ~ 50U○



Part No.	Type	øA	øB	øC	D	E	F	Y
ZP02U○	U02	2	2.6	1.2	7	—	12	0.8
ZP04U○	U04	4	4.8	1.6	7	—	12	0.8
ZP06U○	U06	6	7	2.5	7	—	12	0.8
ZP08U○	U08	8	9	2.5	7	—	12	1
ZP10U○	U10	10	12	4	13	7.7	12	3
ZP13U○	U13	13	15	4	13	7.7	12	3
ZP16U○	U16	16	18	4	13	8.2	12.5	3.5
ZP20U○	U20	20	23	4	15	9.5	14	4
ZP25U○	U25	25	28	4	15	9.5	14	4
ZP32U○	U32	32	35	4	15	10	14.5	4.5
ZP40U○	U40	40	43	7	18	13.7	18.5	6.5
ZP50U○	U50	50	53	7	18	14.7	19.5	7.5

Flat type pad with rib

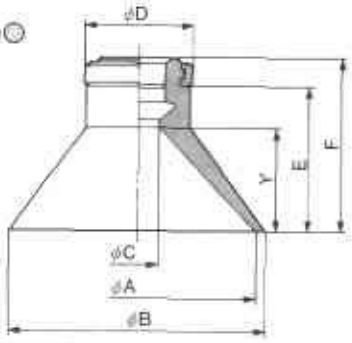
ZP10C○ ~ 50C○



Part No.	Type	øA	øB	øC	øD	E	F	Y
ZP10C○	C10	10	12	4	13	7.7	12	1.7
ZP13C○	C13	13	15	4	13	7.7	12	1.8
ZP16C○	C16	16	18	4	13	8.2	12.5	1.2
ZP20C○	C20	20	23	4	15	9.5	14	1.7
ZP25C○	C25	25	28	4	15	9.5	14	1.8
ZP32C○	C32	32	35	4	15	10	14.5	2.3
ZP40C○	C40	40	43	7	18	13.7	18.5	3.3
ZP50C○	C50	50	53	7	18	14.7	19.5	3.3

Deep type pad

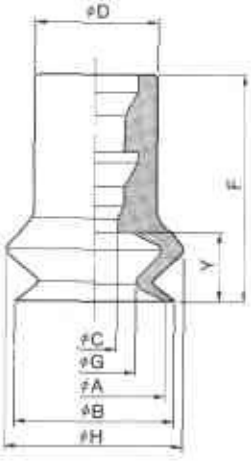
ZP10D○ ~ 40D○



Part No.	Type	øA	øB	øC	øD	E	F	Y
ZP10D○	D10	10	12	4	13	10.7	15	6
ZP16D○	D16	16	18	4	13	11.7	16	7
ZP25D○	D25	25	28	4	15	15.5	20	10
ZP40D○	D40	40	43	7	18	24.2	29	17

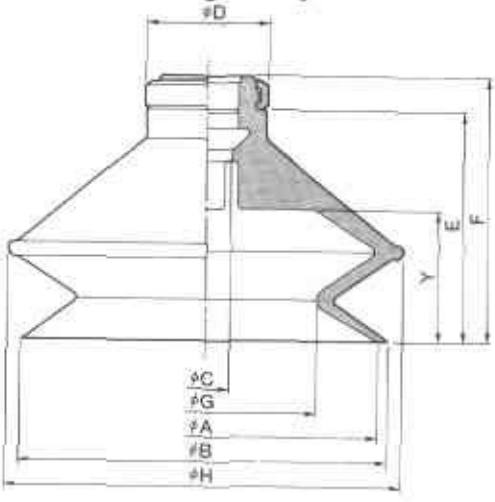
Bellows type pad

ZP06B○ ~ 08B○



Bellows type pad

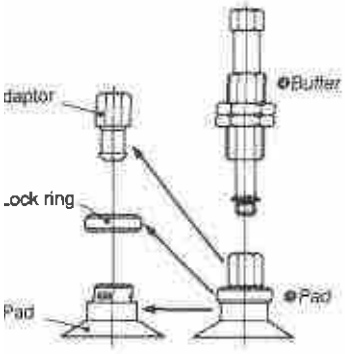
ZP10B○ ~ 50B○



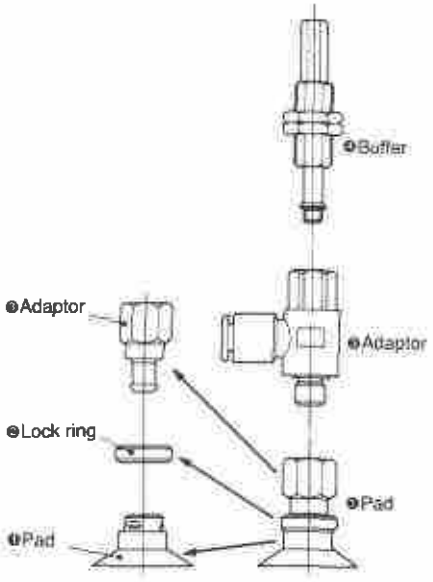
Part No.	Type	øA	øB	øC	øD	E	F	øG	øH	Y
ZP06B○	B06	6	7	2.5	7	—	13	3.3	9.1	4
ZP08B○	B08	8	9	2.5	7	—	13	4.7	10.1	4
ZP10B○	B10	10	12	4	13	11.7	16	5.5	13.8	5.5
ZP13B○	B13	13	15	4	13	14.2	18.5	8.7	19	7.5
ZP16B○	B16	16	18	4	13	15.7	20	9.9	21	8.5
ZP20B○	B20	20	22	4	15	19	23.5	12.4	25	10.5
ZP25B○	B25	25	27	4	15	19.5	24	15.6	28	10.5
ZP32B○	B32	32	34	4	15	24.5	29	18.9	37	14
ZP40B○	B40	40	43	7	18	29.2	34	24.4	48	16
ZP50B○	B50	50	53	7	18	33.2	38	32.4	57	19

Assembly Configuration

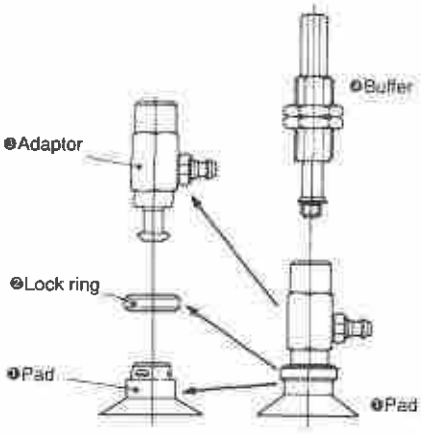
ries ZPT



Series ZPR



Series ZPY



ffer mounting bracket: ZPB1
for ø02 ~ ø08 diameter pads)

ividual Pad Lock Rings:
02~ø08: not used
10~ø16: **ZPL1**
20~ø32: **ZPL2**
40~ø50: **ZPL3**

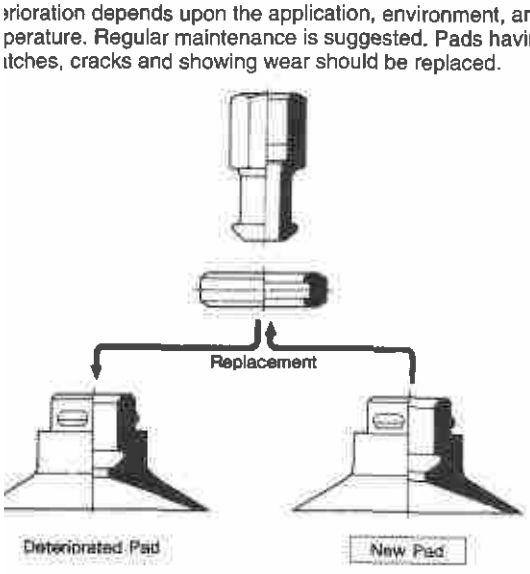
Buffer Mounting Nuts:
M8x1: **SNJ-010A**
M10x1: **SNJ-015A**
M14x1: **SN-015A**

Main Parts

No.	Parts	Material	Note
❶	Pad	NBR, Silicone rubber, Urethane rubber, Fluorine rubber	
❷	Lock ring	Aluminum alloy	Black alumite
❸	Adaptor	Brass	Electroless Nickel plated
❹	Buffer	Brass	Electroless Nickel plated

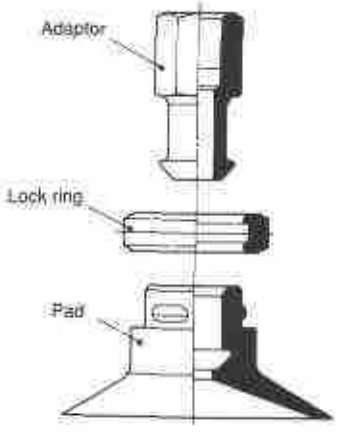
d Maintenance

is made of rubber and will deteriorate with use. The rate of rioration depends upon the application, environment, and perature. Regular maintenance is suggested. Pads having itches, cracks and showing wear should be replaced.



How To Replace

- Pull lock ring up until it is above top edge of old pad.
- Pull old pad off of the metal adaptor.
- Carefully push new pad into place and pull lock ring down.
- Make sure the lock ring is secure and the new pad is locked in place.
- Check to be sure there is a good seal between the pad and adaptor to prevent leakage.



Vacuum Pad Cylinder

ZCU Series

■ Meets the needs of Air Cylinder+Vacuum Pad in a single unit. Free mount cylinder provided with passage for vacuum to rod.

Provides a compact package with high mounting accuracy. Rectangular body cylinder (Series CU) facilitates easy mounting and space savings.

Tubing clearance normally required for rod tip vacuum connection is eliminated.

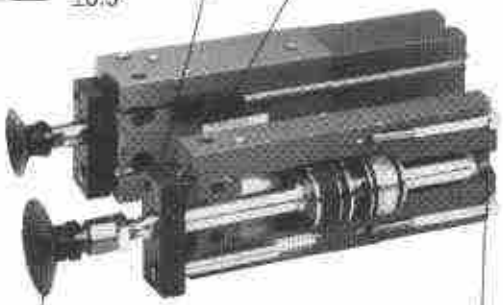
Cap porting option for vacuum supply eliminates repetitive movement of tubing, reducing tube wear and leakage potential.

Non-rotating piston rod

Standardly equipped wth guide rod.
Non-rotating accuracy:
ø10, ø16 —— ±0.8°
ø20, ø25, ø32 —— ±0.5°

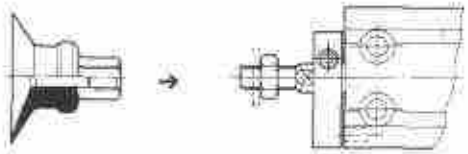
Auto switch

Reed switch: D-90, D-97 (With lamp)
Solid state auto switch: D-F9N (3-wire type, NPN, w/LED)
D-F9P (3-wire type, PNP, w/LED)
D-F9B (2-wire type, w/LED)

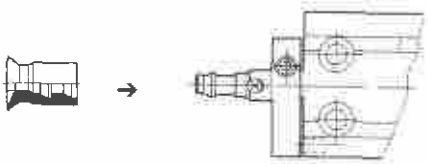


Vacuum pad (Pad dia.: ø2~ø50)

<Female thread mounting> **<Male rod end>**



<Direct mounting type>



Tubing system for vacuum entry

Cap porting
The piston rod on the vacuum side is not projected externally.
The vacuum entry tube does not move under operation of the piston.
Pressure range at the vacuum port:
–29.5 inHg~85 PSI (760 mmHg~6kgf/cm²).

Rod tubing
Lightweight and compact.
Also possible to use for air blow.
Pressure range at the vacuum port:
–29.5 inHg~85 PSI (760 mmHg~6kgf/cm²).

Vacuum Pad Cylinder
ZCU Series

How to Order

Free Mount Cylinder (w/vacuum rod) — **ZCDUK C 16 – 20 D – 90 S** (Order vacuum pad separately below)

Type (vacuum entry) / (rod tip)

C	Cap porting/Male thread
D	Cap porting/Pad direct mtg.
Q	Rod porting/Male thread
R	Rod porting/Pad direct mtg.

Bore size (mm)

10	10mm
16	16mm
20	20mm
25	25mm
32	32mm

Bore	Stroke (mm)
(10, 16)	5, 10, 15, 20, 25, 30
(20, 25, 32)	5, 10, 15, 20, 25, 30, 40, 50

Cyl. type
D – Double acting

No. of Autoswitches (Quantity)

(blank)	2 switches
S	1 switch

Note: For 5mm stroke 1 switch (S) is std.

Autoswitch

(blank)	Without switch
Reed Switch	
90	D-90 (DC only)
97	D-97 (w/LED, DC only)
90A	D-90A (AC or DC)
93A	D-93A (w/LED, AC or DC)
Solid State Switch	
F9N	D-F9N (w/LED•••••3 wire, NPN)
F9P	D-F9P (w/LED•••••3 wire, PNP)
F9B	D-F9B (w/LED•••••2 wire)

Note: Standard leads are 0.5m. "L" is added for 3m length option (all models).
Ex.) F9NL•••••D-F9NL

Autoswitch set screws

	Part No.
Set screw (split pin set screw)	BU-1

Options highlighted in blue:
Preferred Option Program
(See page 2)

Vacuum Pad/How to Order

● For applying to male thread rod tip:

ZPT 02 U N – B4

Pad dia. (mm)
02 —— ø2
04 —— ø4
06 —— ø6
08 —— ø8
10 —— ø10
13 —— ø13
16 —— ø16
20 —— ø20
25 —— ø25
32 —— ø32
40 —— ø40
50 —— ø50

Material
N —— NBR
S —— Silicone rubber
U —— Urethane rubber
F —— Fluorine rubber
GN — Conductive NBR (ø2~ø16)
GS — Conductive silicone (ø2~ø16)

Mounting Thread (Must match cyl. rod end – see dimens.)

	Symbol	Thread Dia.	ø2~ø8	ø10~ø16	ø20~ø32	ø40•ø50
Female Thread	B4	M4 x 0.7	●	—	—	—
	B5	M5 x 0.8	●	●	—	—
	B6	M6 x 1	—	●	●	—
	B8	M8 x 1.25	—	—	●	●
	B10	M10 x 1.25	—	—	●	●

Pad type (application: Refer to list ❶)
U —— Flat type
C —— Flat with rib
D —— Deep type
B —— Bellows type

List ❶ Pad dia.—Pad type

Type \ Dia.(mm)	2	4	6	8	10	13	16	20	25	32	40	50
Flat type	●	●	●	●	●	●	●	●	●	●	●	●
Flat with rib	—	—	—	—	●	●	●	●	●	●	●	●
Deep type	—	—	—	—	●	—	●	—	●	—	●	—
Bellows	—	—	●	●	●	●	●	●	●	●	●	●

● For applying to direct mounting rod tip:

ZP 10 U N – X11

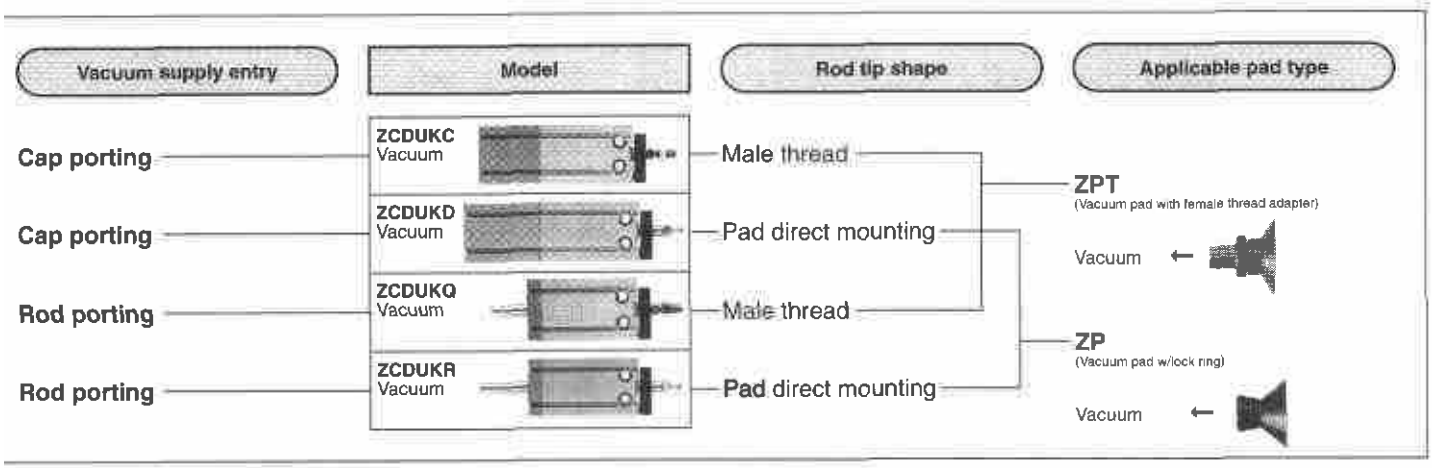
Pad dia. (mm)
02 —— ø2
04 —— ø4
06 —— ø6
08 —— ø8
10 —— ø10
13 —— ø13
16 —— ø16
20 —— ø20
25 —— ø25
32 —— ø32
40 —— ø40
50 —— ø50

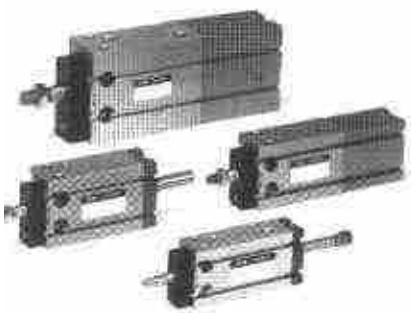
Suffix symbol

Symbol	Applicable cylinder bore
X11	ø10
(blank)	ø16~ø32

Material
N —— NBR
S —— Silicone rubber
U —— Urethane rubber
F —— Fluorine rubber
GN – Conductive NBR (ø2~ø16)
GS – Conductive silicone (ø2~ø16)

Pad type
U —— Flat type
C —— Flat with rib
D —— Deep type
B —— Bellows type





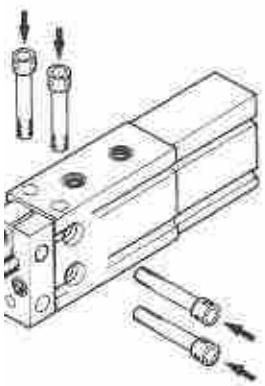
Specifications

Cylinder bore		10, 16, 20, 25, 32
Type		Double acting type/Non-rotating piston rod
Fluid		Air
Proof pressure		150 PSI (10.5kgf/cm²)
Max. operating pressure		100 PSI (7kgf/cm²)
Min operating pressure		ø10, ø16——10 PSI (0.7kgf/cm²) ø20, ø25, ø32—8.5 PSI (0.6kgf/cm²)
Vacuum port pressure		VAC ~ 85 PSI (Note1) (For vacuum breaking 0~85 PSI)
Ambient and fluid temperature		4 ~ 140°F (5~60°C)
Lubrication		Not required
Cushion		Both sides (rubber cushion)
Stroke allowance		+1.0
Mounting		Basic type
Cylinder bore		ø10 / ø16 / ø20 / ø25 / ø32
Non-rotation accuracy		±0.8° / ±0.5°
Auto switch Refer to p.135 for detail.	Reed switch	D-90 — Lead wire length 0.5m D-90L — Lead wire length 3m D-97 — With lamp, lead length 0.5m D-97L — With lamp, lead wire length 3m
	Solid state auto switch	D-F9N — 3 wire NPN, w/lamp, lead 0.5m D-F9NL — 3 wire NPN, w/lamp, lead 3m D-F9P — 3 wire PNP, w/lamp, leads 0.5m D-F9PL — 3 wire PNP, w/lamp, leads 3m D-F9B — 3 wire NPN, w/lamp, leads 0.5m D-F9BL — 3 wire NPN, w/lamp, lead s3m
Applicable pad		Refer to P97 for detail.

(Note 1) For the cap type, only when vacuum is released should it be pressurized. However, the pressure used should be less than the cylinder pressure.

Mounting

ounting Flexibility
op of body)



(Through side of body)

Standard Stroke

Cylinder bore (mm)	Double acting•single rod type, Non-rotating piston rod Stroke (mm)							
	5	10	15	20	25	30	40	50
10	●	●	●	●	●	●	—	—
16	●	●	●	●	●	●	—	—
20	●	●	●	●	●	●	●	●
25	●	●	●	●	●	●	●	●
32	●	●	●	●	●	●	●	●

Theoretical Force/Double Acting Type Unit:kgf (lbf)

Cylinder bore (mm)	Rod dia. (mm)	Effective area (cm²)	Operating pressure (kgf/cm²)		
			3	5	7
10	4	0.66	1.9(4.2)	3.3(7.3)	4.6(10.1)
16	6	1.73	5.1(11.2)	8.6(18.9)	12.1(26.6)
20	8	2.64	7.9(17.4)	13.1(28.8)	18.4(40.5)
25	10	4.12	12.3(27.1)	20.6(45.3)	28.8(63.4)
32	12	6.91	20.7(45.5)	34.5(75.9)	48.3(106.3)

Cylinder-Applicable Pad (See also section for ZP Vacuum Pads, p. 87)

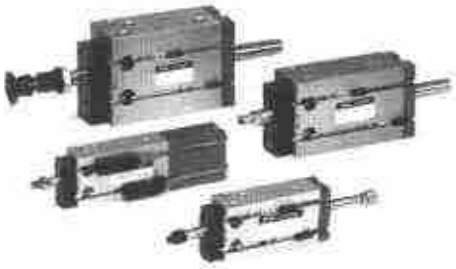
● In case of rod tip male thread

Cylinder Model	Bore (mm)	Pad (ZPT02~50◎◎-B4~B10) Pad dia. (mm) 2	4	6	8	10	13	16	20	25	32	40	50	Thread dia.
ZCDUKC ZCDUKQ	10	●	●	●	●	–	–	–	–	–	–	–	–	M4 x 0.7
	16	●	●	●	●	●	●	●	–	–	–	–	–	M5 x 0.8
	20	–	–	–	–	●	●	●	●	●	●	–	–	M6 x 1.0
	25	–	–	–	–	–	–	–	●	●	●	●	●	M8 x 1.25
	32	–	–	–	–	–	–	–	●	●	●	●	●	M10 x 1.25

● In case of pad direct mounting

Cylinder Model	Bore (mm)	Pad (ZP02~50◎◎) Pad dia. (mm) 2	4	6	8	10	13	16	20	25	32	40	50
ZCDUKD ZCDUKR	10*	●	●	●	●	–	–	–	–	–	–	–	–
	16	●	●	●	●	–	–	–	–	–	–	–	–
	20	–	–	–	–	●	●	●	–	–	–	–	–
	25	–	–	–	–	–	–	–	●	●	●	–	–
	32	–	–	–	–	–	–	–	–	–	–	●	●

* (Note 1) Pad should be type ZP02~08U◎-X11.

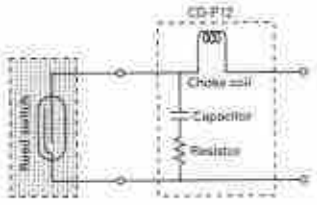


Auto Switch Specifications

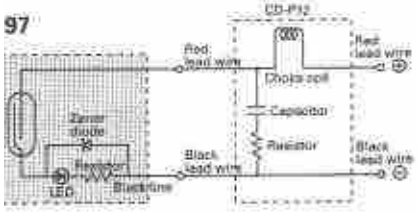
Auto switch model, type	Reed switch		Solid state auto switch		
	D-90	D-97	D-F9N (3-wire NPN)	D-F9P (3-wire PNP)	D-F9B (2-wire)
Application / Item	IC circuit, Relay, Sequence controller	Relay, Sequence controller	Relay, Sequence Controller		24VDC Relay, Sequence controller
Load voltage	24VDC or less	24VDC	28VDC or less	–	24VDC (10-28VDC)
Internal voltage drop	0	2.4V Max.	0.4V or less	1.5V or less	4.5V or less
Leakage current	0	0	24VDC@10μA or less		24VDC@1mA or less
Operating time	1.2mS	1.2mS	1mS		
Indicator lamp	None	ON: Red light emitting diode			
Lead wire entry	Grommet				
Lead wire	Heat resistant vinyl sheathed lead wire 0.2mm², 2 core 0.5m		Oil resistant vinyl sheathed lead wire ø2.7, 0.15mm² (3-core); ø3.2, 0.18mm² (2-core)		
			3 core (Red, White, Black) 0.5m		2 core (Red, Black) 0.5m
Impact resistance	30G		100G		
Insulation resistance	500MΩ or more for 500VDC (Between case and cable)				
Withstand voltage	For 1 min. at 1000VAC (Between case and cable)				
Ambient temp.	40 ~ 140°F (5~60°C)		14 ~ 140°F (-10~60°C)		
Environmental protection	IEC Standard IP67 (Water & oil proof)		IEC Standard IP65 (water & oil resistant)		

uto Switch Internal Circuit

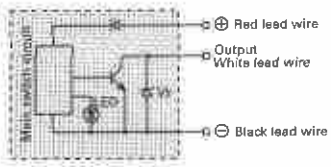
90



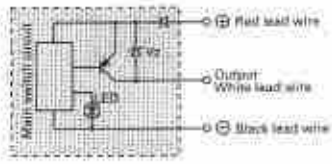
97



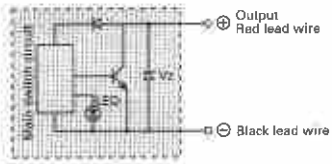
F9N



F9P

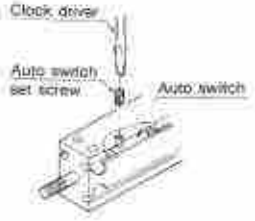


F9B



ow To Mount Switch

·9
·F9



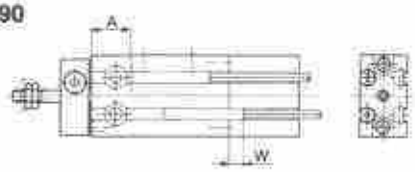
When tightening the auto switch set screw, e a small screwdriver. Tightening torque ould be 0.9 ~ 1.7 in-lbf (1~2 kgf-cm). Auto switch set screw is a special split-pin ɔe (with urethane damper) which is captive this application.

Auto Switch / Setting Position

(Figures in millimeters)

Reed Switch

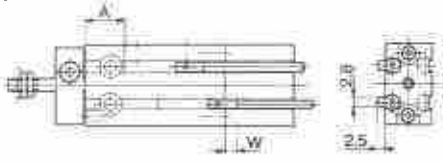
D-90



(Note) Negative figures in the table indicate the dimensions of mounting non-external to the body

Cylinder bore (mm)	For switch detection at stroke end			
	Without shield plate		With shield plate	
	A	W	A	W
10	13	1	–	–
16	12	0	13	-6
20	18	1	20	-1
25	20	-1	21	-2
32	17	-4	19	-6

D-97



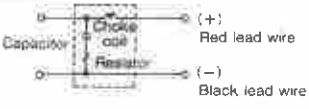
Cylinder bore (mm)	For switch detection at stroke end			
	Without shield plate		With shield plate	
	A	W	A	W
10	13	7	–	–
16	12	6	13	4
20	18	7	20	5
25	20	5	21	4
32	17	2	19	0

Contact Protection Box

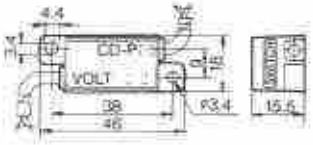
● D-9 type switches have no internal contact protection cicuit. If current load is inductive and lead wire length is greater than 5m, the contact protection box is necessary.

Part No.	Voltage	Lead wire length
CD-P12	24VDC	Switch side 0.5m Load side 0.5m

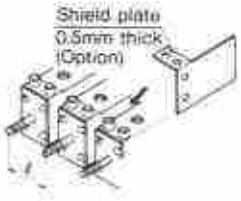
Contact Protection Box / Internal Circuit



Contact Protection Box / Dimensions



How To Use Shield Plate



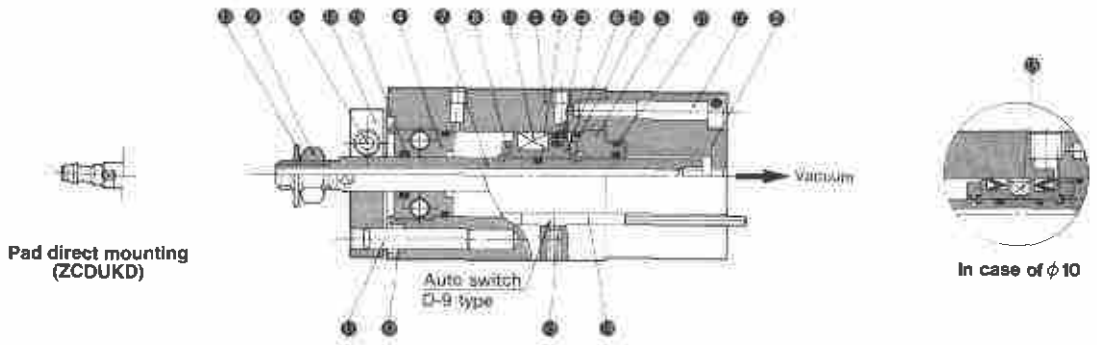
● When using cylinders with autoswitches in bore sizes of ø16 or more, if the mounting pitch 1 (see illustration) is within the range shown in the table then the shield plate should be used.
Autoswitches may perform erratically if plate is not used. (Not necessary for bore ø10)

Shield Plate/Parts No. (Options)

Bore size (mm)	Mounting Pitch (1)	Shield plates/Part Nos. Applicable stroke (mm)			
		5,10,15	20,25,30	40	50
16	33	CU-S016A	CU-S016B	–	–
20	40	CU-S020A	CU-S020B	CU-S020C	CU-S020D
25	46	CU-S025A	CU-S025B	CU-S025C	CU-S025D
32	56	CU-S032A	CU-S032B	CU-S032C	CU-S032D

Construction/Parts List

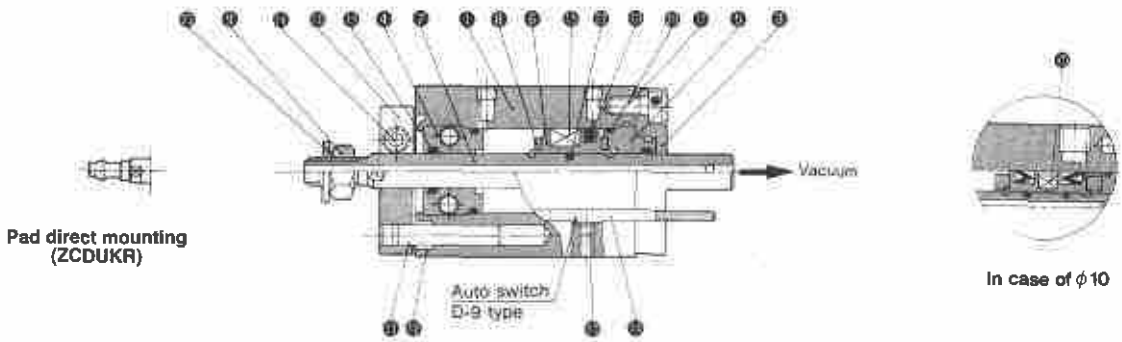
Cap porting, Male thread type (ZCDUKC)



Pad direct mounting
(ZCDUKD)

In case of ϕ10

Rod porting, Male thread type (ZCDUKQ)



Pad direct mounting
(ZCDUKR)

In case of ϕ10

Parts List

No.	Description		Material	Remarks
❶	Body		Aluminum alloy	Hard alumite
❷	Cap		Aluminum alloy	Hard alumite
❸	Rod cover retainer plate		Aluminum alloy	Hard alumite
❹	Rod cover A		Aluminum bearing alloy	Hard alumite
❺	Rod cover B		Aluminum bearing alloy	Chromate
❻	Piston	ø10	Brass	—
		ø16~ø32	Aluminum alloy	Chromate
❼	Piston rod		Stainless Steel	—
❽	Damper		Urethane	—

Parts List

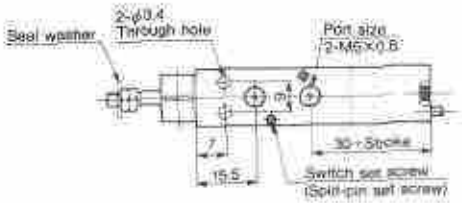
No.	Description	Material	Remarks
❾	Rod end nut	Carbon steel	Nickel plated
❿	Plate	Aluminum alloy	Black alumite
⓫	Guide rod	Stainless steel	—
⓬	Bushing	Oil impregnated sintered metal	—
⓭	Split-pin set screw	Carbon steel, urethane	
⓮	Auto switch	—	—
⓯	Magnet	Magnetic material	—
⓰	Hexagonal head cap screw	Carbon steel	Black zinc chromate
⓱	Hexagonal head cap screw	Carbon steel	Nickel plated

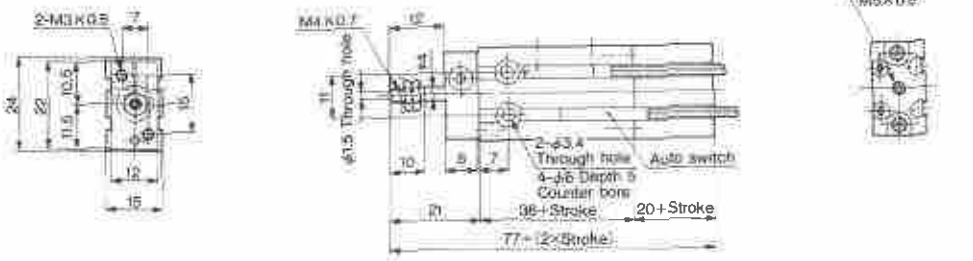
Seals

No.	Description	Material	Part No.				
			ø10	ø16	ø20	ø25	ø32
❻	**Piston seal**	NBR	**DYP-10**	NLP-16A	NLP-20A	NLP-25A	NLP-32A
❼	**Rod seal**	NBR	**DYR-4K**	DYR-6K	DYR-8K	DYR-10SK	DYR-12
❽	Gasket	NBR	ø10x ø8 x ø1	ø16 x ø14 x ø1	C18	C22	C29
❽	Gasket for cap	NBR	ø11 x ø9 x ø1	ø15 x ø13 x ø9	C16	C18	C22
❾	Piston gasket	**NBR**	ø4.21 x ø2.79 x ø0.71	ø6.35 x ø4.35 x ø1	ø8.25 x ø5.79 x ø1.4	C8	C10
❿	Seal washer	NBR • Rolled steel	WCS4 x 0.7	WCS5 x 0.8	WCS6 x 1	WCS8 x 1	WCS10 x 1

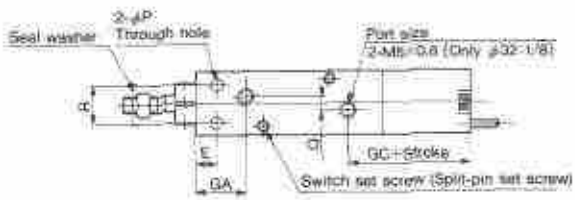
Vacuum Supply Entry: Cap Porting/Rod End Shape: Male Thread — ZCDUKC (Cylinder bore)—(Stroke) D (mm)

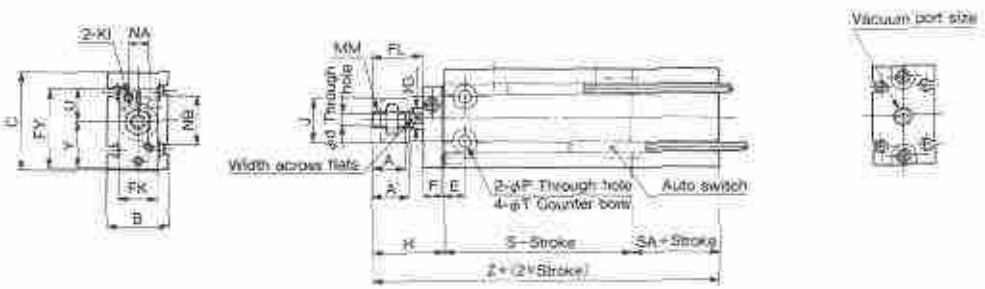
ø10





ø16~ø32





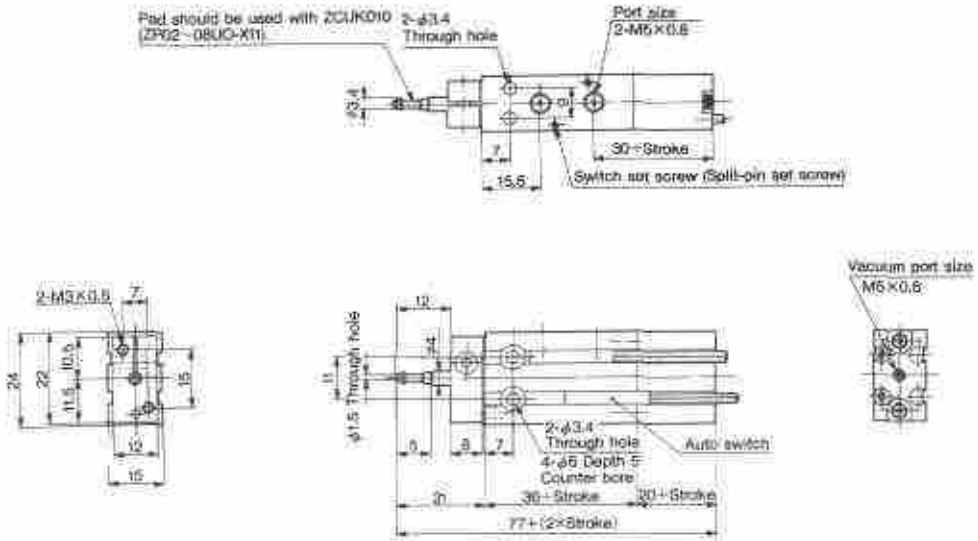
Model	Port size		Stroke range (mm)	A	A'	B	C	ød	øD	E	F	FK	FL	FY	GA	GC
	Air port	Vacuum port														
ZCDUKC16	M5 x 0.8	M5 x 0.8	5–30	11	12.5	20	32	2	6	7	8	13	17	28	16.5	31
ZCDUKC20	M5 x 0.8	1/8 (PT)	5–50	12	14	26	40	3	8	9	8	16	20	33	19	33.5
ZCDUKC25	M5 x 0.8	1/8 (PT)	5–50	15.5	16	32	50	4	10	10	10	20	22	43.5	21	34
ZCDUKC32	1/8 (PT)	1/8 (PT)	5–50	19.5	22	40	62	5	12	11	12	24	29	51.5	22	35

Model	H	J	KI	L	MM	NA	NB	øP	Q	R	S*	SA	øT	U	Y	Z*
ZCDUKC16	26	14	M4 x 0.7	5	M5 x 0.8	6	18	4.5	4	12	40	19.5	7.6 Depth 6.5	12.5	15.5	85.5
ZCDUKC20	29	16	M4 x 0.7	6	M6 x 1.0	8	20	5.5	9	16	46	21	9.5 Depth 8	13.5	19.5	96
ZCDUKC25	33	20	M5 x 0.8	8	M8 x 1.25	10	28	5.5	9	20	50	21	9.5 Depth 9	19	24.5	104
ZCDUKC32	42	24	M5 x 0.8	10	M10x 1.25	12	32	6.6	13.5	24	52	22	11 Depth 11.5	21	30.5	116

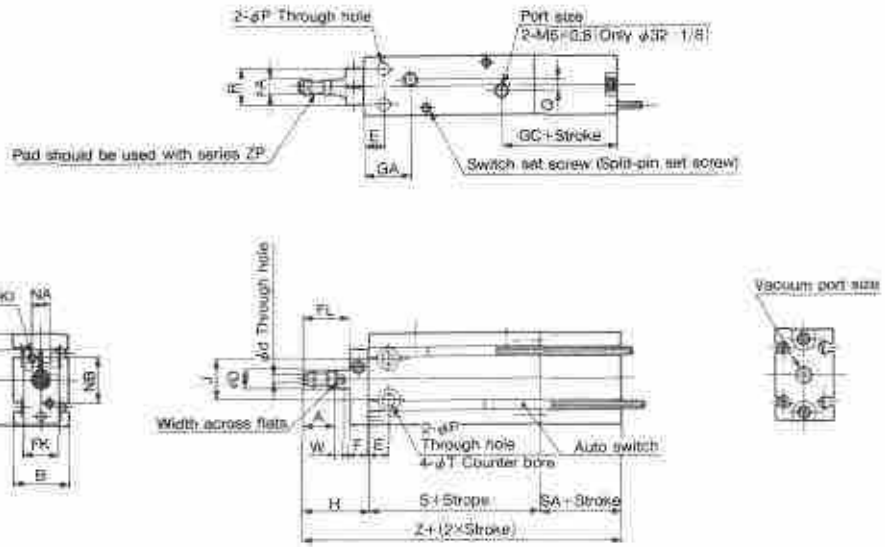
* Shorter profile units are available, without magnet for autoswitch capability

Vacuum Supply Entry: Cap Porting/Rod End Shape: Direct Mounting ZCDUKD (Cylinder bore)—(Stroke) D (mm)

ø10



ø16~ø32



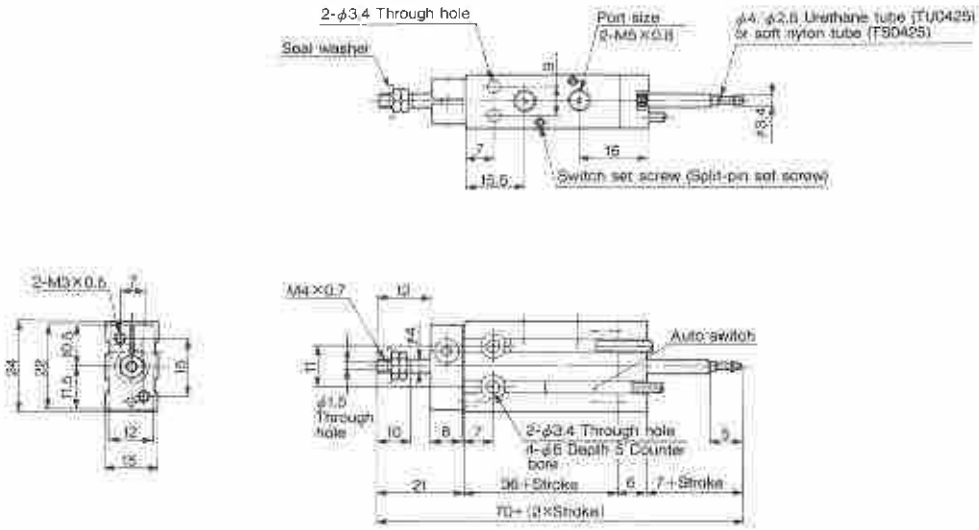
Model	Port size		Stroke range (mm)	øA	A'	B	C	ød	øD	E	F	FK	FL	FY	GA	GC
	Air port	Vacuum port														
ZCDUKD16	M5 x 0.8	M5 x 0.8	5~30	5	7	20	32	2	6	7	8	13	17	28	16.5	31
ZCDUKD20	M5 x 0.8	1/8 (PT)	5~50	6.6	8	26	40	3	8	9	8	16	20	33	19	33.5
ZCDUKD25	M5 x 0.8	1/8 (PT)	5~50	8	9	32	50	4	10	10	10	20	22	43.5	21	34
ZCDUKD32	1/8 (PT)	1/8 (PT)	5~50	11.5	10.5	40	62	5	12	11	12	24	29	51.5	22	35

Model	H	J	KI	L	NA	NB	øP	Q	R	S*	SA	øT	U	W	Y	Z*
ZCDUKD16	26	14	M4 x 0.7	5	6	18	4.5	4	12	40	19.5	7.6 Depth 6.5	12.5	3.5	15.5	85.5
ZCDUKD20	29	16	M4 x 0.7	6	8	20	5.5	9	16	46	21	9.5 Depth 8	13.5	5	19.5	96
ZCDUKD25	33	20	M5 x 0.8	8	10	28	5.5	9	20	50	21	9.5 Depth 9	19	5	24.5	104
ZCDUKD32	42	24	M5 x 0.8	10	12	32	6.6	13.5	24	52	22	11 Depth 11.5	21	5	30.5	116

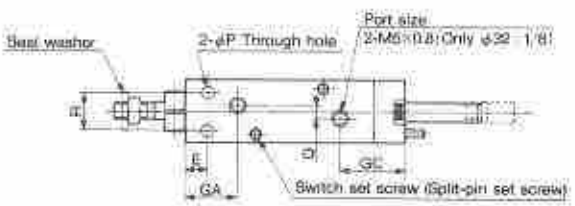
* Shorter profile units are available, without magnet for autoswitch capability.

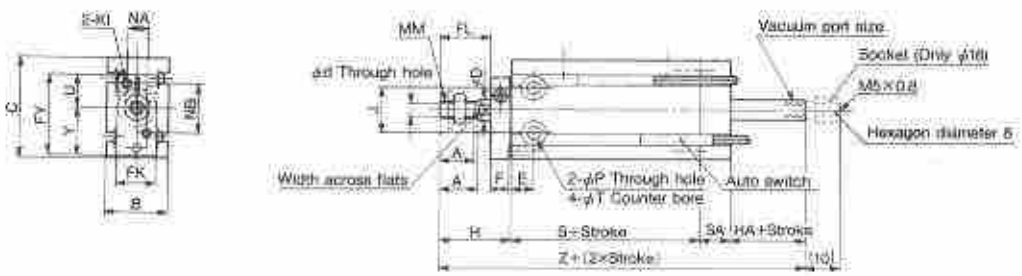
Vacuum supply entry: Rod Porting/Rod End Shape: Male Thread | **ZCDUKQ (Cylinder bore)—(Stroke) D (mm)**

10



16~ø32





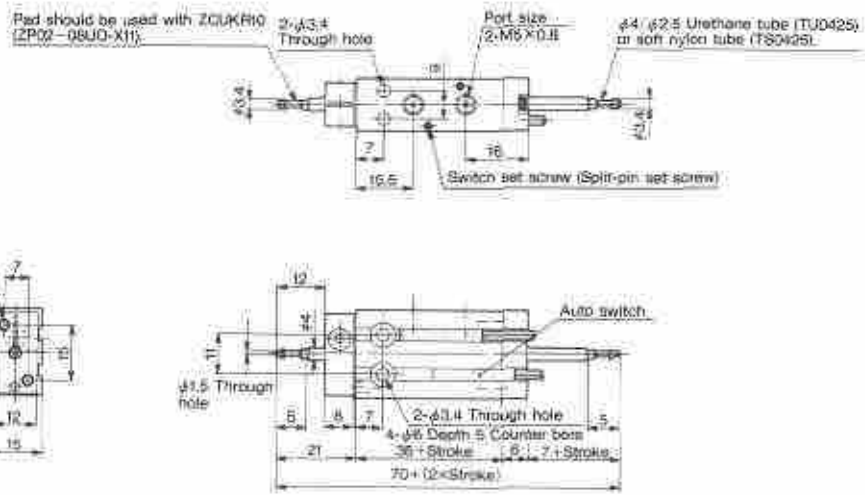
Model	Port size		Stroke range (mm)	A	A'	B	C	ød	øD	E	F	FK	FL	FY	GA	GC
	Air port	Vacuum port														
ZCDUKQ16	M5 x 0.8	M4 x 0.7	5~30	11	12.5	20	32	2	6	7	8	13	17	28	16.5	19
ZCDUKQ20	M5 x 0.8	M5 x 0.8	5~50	12	14	26	40	3	8	9	8	16	20	33	19	21.5
ZCDUKQ25	M5 x 0.8	M5 x 0.8	5~50	15.5	18	32	50	4	10	10	10	20	22	43.5	21	22
ZCDUKQ32	1/8 (PT)	1/8 (PT)	5~50	19.5	22	40	62	5	12	11	12	24	29	51.5	22	23

Model	H	HA	J	KI	L	MM	NA	NB	øP	Q	R	S*	SA	øT	U	Y	Z*
ZCDUKQ16	26	5	14	M4 x 0.7	5	M5 x 0.8	6	18	4.5	4	12	40	7.5	7.6 Depth 6.5	12.5	15.5	78.5
ZCDUKQ20	29	5	16	M4 x 0.7	6	M6 x 1.0	8	20	5.5	9	16	46	9	9.5 Depth 8	13.5	19.5	89
ZCDUKQ25	33	5	20	M5 x 0.8	8	M8 x 1.25	10	28	5.5	9	20	50	9	9.5 Depth 9	19	24.5	97
ZCDUKQ32	42	5	24	M5 x 0.8	10	M10 x 1.25	12	32	6.6	13.5	24	52	10	11 Depth 11.5	21	30.5	109

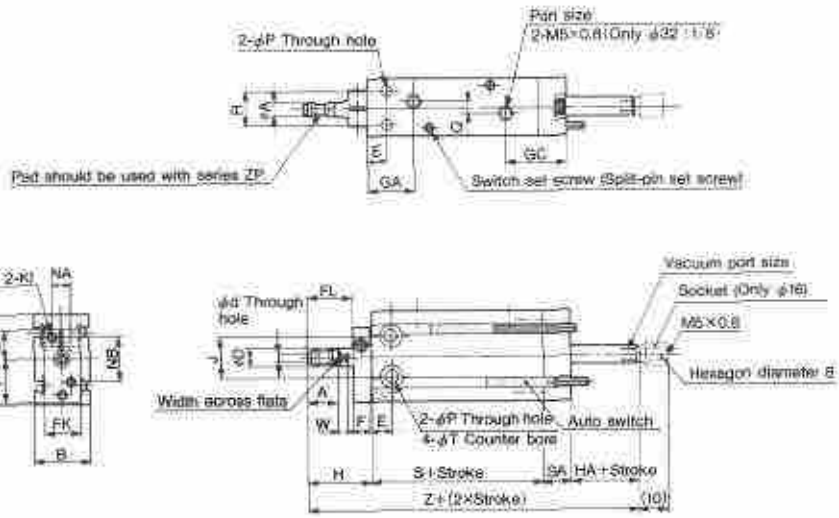
Shorter profile units are available, without magnet for autoswitch capability.

Vacuum Supply Entry: Rod Porting/Rod End Shape: Direct Mounting — ZCDUKR (Cylinder bore)—(Stroke) D (mm)

ø10



ø16~ø32



Model	Port size		Stroke range (mm)	A	A'	B	C	ød	øD	E	F	FK	FL	FY	GA	GC
	Air port	Vacuum port														
ZCDUKR16	M5 x 0.8	M5 x 0.8	5~30	11	12.5	20	32	2	6	7	8	13	17	28	16.5	31
ZCDUKR20	M5 x 0.8	1/8 (PT)	5~50	12	14	26	40	3	8	9	8	16	20	33	19	33.5
ZCDUKR25	M5 x 0.8	1/8 (PT)	5~50	15.5	18	32	50	4	10	10	10	20	22	43.5	21	34
ZCDUKR32	1/8 (PT)	1/8 (PT)	5~50	19.5	22	40	62	5	12	11	12	24	29	51.5	22	35

Model	H	HA	J	KI	L	NA	NB	øP	Q	R	S*	SA	øT	U	W	Y	Z*
ZCDUKR16	26	5	14	M4 x 0.7	5	6	18	4.5	4	12	40	7.5	7.6 Depth 6.5	12.5	3.5	15.5	78.5
ZCDUKR20	29	5	16	M4 x 0.7	6	8	20	5.5	9	16	46	9	9.5 Depth 8	13.5	5	19.5	89
ZCDUKR25	33	5	20	M5 x 0.8	8	10	28	5.5	9	20	50	9	9.5 Depth 9	19	5	24.5	97
ZCDUKR32	42	5	24	M5 x 0.8	10	12	32	6.6	13.5	24	52	10	11 Depth 11.5	21	5	30.5	109

* Shorter profile units are available, without magnet for autoswitch capability.

Weight Table

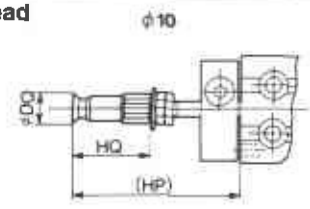
weight:g

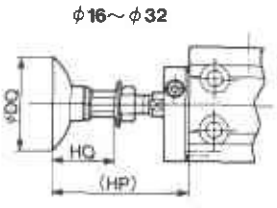
Model	Bore (mm)	Stroke (mm) 5	10	15	20	25	30	40	50
ZC(D)UKC	10	63(68)	69(79)	75(85)	81(91)	87(97)	93(103)	—	—
	16	103(128)	115(145)	127(157)	139(169)	151(181)	163(193)	—	—
	20	180(214)	204(244)	228(267)	252(292)	276(316)	300(340)	348(388)	396(436)
	25	304(358)	343(402)	382(441)	421(480)	460(832)	499(558)	577(636)	655(714)
	32	514(587)	574(652)	634(712)	694(772)	754(832)	814(892)	934(1012)	1054(1132)
ZC(D)UKQ	10	49(54)	53(63)	57(67)	61(71)	65(137)	69(79)	—	—
	16	79(104)	86(116)	93(123)	100(130)	107(240)	114(144)	—	—
	20	145(179)	159(198)	173(212)	187(226)	201(240)	215(254)	243(282)	271(310)
	25	259(313)	279(338)	299(358)	319(378)	339(398)	359(418)	399(458)	439(498)
	32	421(494)	451(529)	481(559)	511(589)	541(619)	571(694)	631(709)	691(769)

) Numbers in parenthesis are with 0-90 Limit Switches

Dimension of Pad Mounting

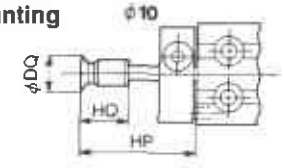
)d end shape: Male thread

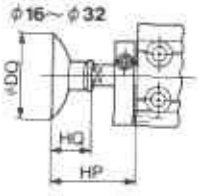




Model	Pad dia. (mm)	Flat type, Flat with rib, (Bellows type) 2	4	6	8	10	13	16	20	25	32	40	50	Deep type 10	16	25	40	Applicable pad model
ZCDUK$^{C}_{Q}$10	øDQ	2.6	4.8	7(7)	9(9)	–	–	–	–	–	–	–	–	–	–	–	–	ZPT -B4
	HQ	19.5	19.5	19.5(20.5)	19.5(20.5)	–	–	–	–	–	–	–	–	–	–	–	–	
	HP	36.5	36.5	36.5(37.5)	36.5(37.5)	–	–	–	–	–	–	–	–	–	–	–	–	
ZCDUK$^{C}_{Q}$16	øDQ	2.6	4.8	9	9	12(12)	15(15)	18(18)	–	–	–	–	–	12	18	–	–	ZPT -B5
	HQ	19.5	19.5	19.5	19.5	21(25)	21(27.5)	21.5(29)	–	–	–	–	–	24	25	–	–	
	HP	41.5	41.5	41.5	41.5	42(46)	42(48.5)	42.5(50)	–	–	–	–	–	45	46	–	–	
ZCDUK$^{C}_{Q}$20	øDQ	–	–	–	–	12(12)	15(15)	18(18)	23(22)	28(27)	35(34)	–	–	12	18	28	–	ZPT -B6
	HQ	–	–	–	–	21(25)	21(27.5)	21.5(29)	29(32.5)	23(33)	23.5(38)	–	–	24	25	29	–	
	HP	–	–	–	–	44(48)	44(50.5)	44.5(52)	46(36.5)	46(56)	46.5(61)	–	–	47	48	52	–	
ZCDUK$^{C}_{Q}$25	øDQ	–	–	–	–	–	–	–	23(22)	28(27)	35(34)	43(43)	53(53)	–	–	28	34	ZPT -B8
	HQ	–	–	–	–	–	–	–	29(36.5)	29(39)	29.5(44)	32(47.5)	39(51.5)	–	–	35	42.5	
	HP	–	–	–	–	–	–	–	54(63.5)	54(64)	54.5(69)	57(72.5)	58(76.5)	–	–	60	67.5	
ZCDUK$^{C}_{Q}$32	øDQ	–	–	–	–	–	–	–	23(22)	28(27)	35(34)	43(43)	53(53)	–	–	28	43	ZPT -B10
	HQ	–	–	–	–	–	–	–	32(38.5)	32(42)	32.5(47)	35(50.5)	38(54.5)	–	–	38	45.5	
	HP	–	–	–	–	–	–	–	64(73.5)	64(74)	64.5(79)	67(82.5)	68(86.5)	–	–	70	77.5	

)d end shape: Direct mounting

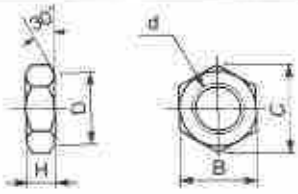




Model	Pad dia. (mm)	Flat type, Flat with rib, (Bellows type) 2	4	6	8	10	13	16	20	25	32	40	50	Deep type 10	16	25	40	Applicable pad model
CDUK$^{D}_{R}$10	øDQ	2.6	4.8	7	9	–	–	–	–	–	–	–	–	–	–	–	–	ZP U -X11
	HQ	10	10	10	10	–	–	–	–	–	–	–	–	–	–	–	–	
	HP	26	26	26	26	–	–	–	–	–	–	–	–	–	–	–	–	
CDUK$^{D}_{R}$16	øDQ	2.6	4.8	7(7)	9(9)	–	–	–	–	–	–	–	–	–	–	–	–	ZP
	HQ	12	12	12(13)	12(13)	–	–	–	–	–	–	–	–	–	–	–	–	
	HP	31	31	31(32)	31(32)	–	–	–	–	–	–	–	–	–	–	–	–	
CDUK$^{D}_{R}$20	øDQ	–	–	–	–	12(12)	15(15)	18(18)	–	–	–	–	–	12	18	–	–	ZP
	HQ	–	–	–	–	12(16)	12(18.5)	12.5(20)	–	–	–	–	–	15	16	–	–	
	HP	–	–	–	–	33(37)	33(38.5)	33.5(41)	–	–	–	–	–	36	37	–	–	
CDUK$^{D}_{R}$25	øDQ	–	–	–	–	–	–	–	23(22)	28(27)	35(34)	–	–	–	–	28	–	ZP
	HQ	–	–	–	–	–	–	–	14(23.5)	14(24)	14.5(29)	–	–	–	–	20	–	
	HP	–	–	–	–	–	–	–	36(47.5)	36(48)	36.5(53)	–	–	–	–	44	–	
CDUK$^{D}_{R}$32	øDQ	–	–	–	–	–	–	–	–	–	–	43(43)	53(53)	–	–	–	43	ZP
	HQ	–	–	–	–	–	–	–	–	–	–	18.5(34)	19.5(38)	–	–	–	29	
	HP	–	–	–	–	–	–	–	–	–	–	50(65.5)	51(69.5)	–	–	–	60.5	

Accessory Fitting Dimension (Attach only to male thread rod end type.)

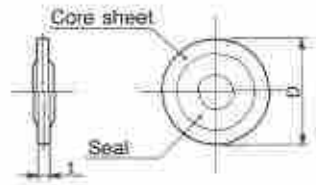
Rod end nut



Material: Carbon steel

Parts No.	Applicable cylinder bore (mm)	d	H	B	C	D
NTP-010	10	M4 x 0.7	2.4	7	8.1	6.8
NTJ-015A	16	M5 x 0.8	4	8	9.2	7.8
NT-015A	20	M6 x 1.0	5	10	11.5	9.8
NT-02	25	M8 x 1.25	5	13	15.0	12.5
NT-03	32	M10 x 1.25	6	17	19.6	16.5

Seal washer



Material: Core sheet — Rolled steel
Seal — NBR

Parts No.	Applicable cylinder bore (mm)	t	D
WCS4 x 0.7	10	1.2	11.5
WCS5 x 0.8	16	1.2	12.5
WCS6 x 1	20	1.2	14.0
WCS8 x 1	25	1.6	15.5
WCS10 x 1	32	1.6	18.0

Accessories

Vacuum Accessory Components • Vacuum Circuit Peripherals

Section Index

Vacuum Regulator

IRV 144

Vacuum Gauges

Series GZ46 148
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Vacuum Valves

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Series KJ, KQ, M-3, M5. 149
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Electro-Vacuum Regulator

ITV0090, ITV2090 150

Vacuum Regulator
Series IRV1000/2000/3000

Symbol

Standard Specifications

Model	IRV1000	IRV2000	IRV3000
Fluid	Air		
Regulating pressure range Note 1)	−100 to −1.3kPa		
Atmospheric intake consumption Note 2)	0.6ℓ/min (ANR) or less		1.1ℓ/min (ANR) or less
Knob resolution	0.13kPa or less		
Ambient and fluid temperature	5 to 60°C		
Port size	Rc 1/8	Rc 1/4	Rc 1/4, 3/8, 1/2
Pressure gauge port size	Rc 1/8 (2 locations)		
Weight (kg) [without accessory]	0.12	0.27	0.7

Note 1) Note that the pressure range fluctuates depending on the vacuum pump pressure.
Note 2) Air is always supplied from the atmosphere.

How to Order

IRV 1 000 − □ 01 □ − □

Vacuum regulator

Body size

1	IRV1000
2	IRV2000
3	IRV3000

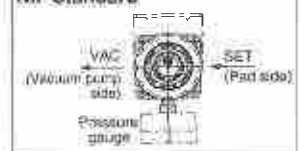
Thread type

Nil	Rc
N*	NPT
F*	G

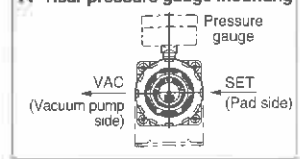
* Optional

Pressure gauge position

Nil Standard



R Rear pressure gauge mounting



Accessory

Nil	None
B	With bracket Note
G	With pressure gauge

Note) Brackets are shipped with the package (unassembled).

Port size

Symbol	Size	Applicable model IRV1000	IRV2000	IRV3000
01	1/8	●	—	—
02	1/4	—	●	●
03	3/8	—	—	●
04	1/2	—	—	●

Specification Combinations

● Standard specification ○ Valid combination [ ] Invalid combination

Specification		Symbol	Applicable model IRV1000	IRV2000	IRV3000
Standard specifications	Connection Rc 1/8	01	●		
	Connection Rc 1/4	02		●	●
	Connection Rc 3/8	03			●
	Connection Rc 1/2	04			●
Accessories	Bracket	B	○	○	○
	Pressure gauge	G	○	○	○
Options	Rear pressure gauge mounting	R	○	○	○
	Connection NPT 1/8	N01	○		
	Connection NPT 1/4	N02		○	○
	Connection NPT 3/8	N03			○
	Connection NPT 1/2	N04			○
	Connection G 1/8	F01	○		
	Connection G 1/4	F02		○	○
	Connection G 3/8	F03			○
	Connection G 1/2	F04			○

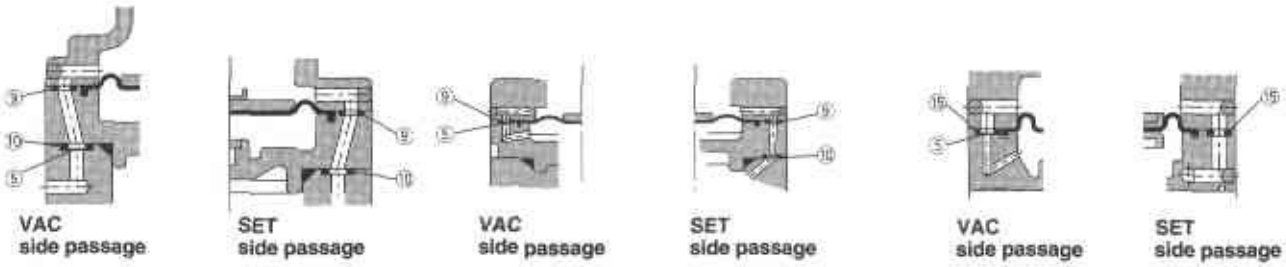
Accessory (Optional) Part Nos.

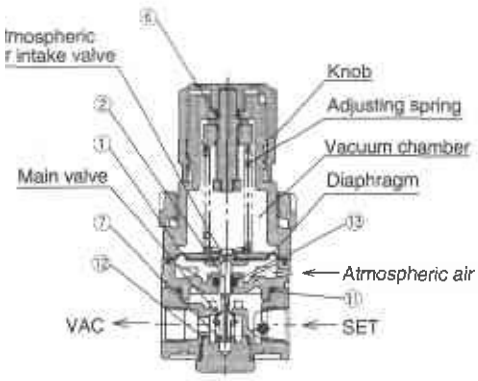
Description	Part no. IRV1000	IRV2000	IRV3000
Bracket	P53801018	P53802016	P53803013
Pressure gauge*	GZ33-K-01	GZ43-K-01	GZ43-K-01

* Pressure gauge accuracy: ±3% (full span)

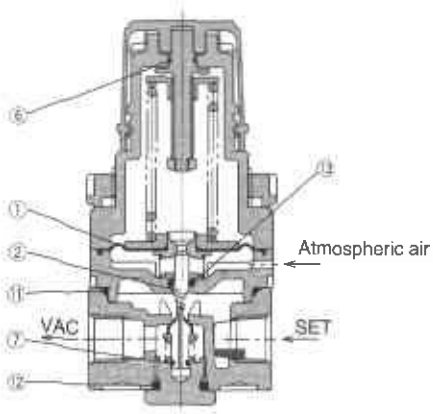
Series IRV1000/2000/3000

Construction

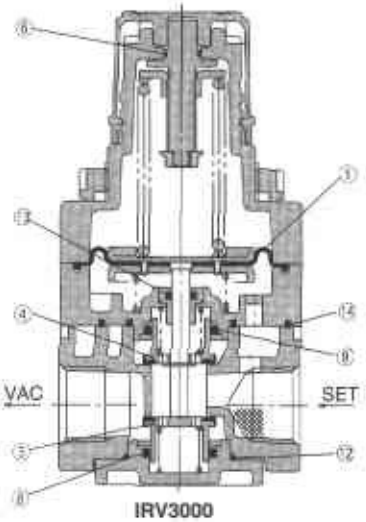




IRV1000



IRV2000



IRV3000

Working principle (for IRV1000)

When the knob is turned to the right, the adjusting spring's generated force pushes down the diaphragm and the main valve. This connects the VAC side and SET side, and the degree of vacuum on the SET side increases (becomes closer to an absolute vacuum). Furthermore, the SET side vacuum pressure moves through the air passage into the vacuum chamber, where it is applied to the top side of the diaphragm and counters the adjusting spring's compression force; and this adjusts the SET side pressure. When the degree of vacuum on the SET side is higher than the designated setting value (becomes closer to an absolute vacuum), the balance between the adjusting spring and the SET side pressure in the vacuum chamber is lost, and the diaphragm is pushed up. This causes the main valve to close and the atmospheric intake valve to open, which lets atmospheric air into the SET side. When the adjusting spring's compression force and the SET side pressure are balanced, the SET side pressure is set. Also, when the degree of vacuum of the SET side pressure is lower than the designated setting value (becomes closer to the atmosphere), the balance between the adjusting spring and the SET side pressure of the vacuum chamber is lost, and the diaphragm is pushed down. This causes the atmospheric intake valve to close and the main valve to open, which lets air into the VAC side. When the adjusting spring's compression force and the SET side pressure are balanced, the SET side pressure is set.

Replacement parts

No.	Description	Material	Part no.		
			IRV1000	IRV2000	IRV3000
1	Diaphragm assembly	H-NBR, etc	P538010-6	P538020-3	P538030-5
2	Valve	Stainless steel, H-NBR	P53801005	P53802005	—
3	Valve	Brass, H-NBR	—	—	P53803015
4	Valve	Brass, H-NBR	—	—	P53803016
5	Fixed orifice	SUS304	P36202018	P36202018	P36203017
6	O-ring	H-NBR	ø4.35 x 1	ø6 x 1	ø8.31 x 1
7	O-ring	H-NBR	ø2 x 0.6	ø3.2 x 1	—
8	O-ring	NBR	—	—	JISB2401 P16 Note 1)
9	O-ring	NBR	ø1.7 x 0.85	ø2.5 x 1	—
10	O-ring	NBR	ø2.5 x 1	ø3 x 1	—
11	O-ring	NBR	ø24 x 1.5	ø39.5 x 2	—
12	O-ring	NBR	ø10 x 1.3	JISB2401 P11	ø27.8 x 1.5
13	O-ring	NBR	JISB2401 P3 Note 1)	JISB2401 P4 Note 1)	JISB2401 P5 Note 1)
14	Seal (A)	NBR	—	—	P36203015
15	Seal (B)	NBR	—	—	P36203016
	Repair kit no. (A set of above nos. ① to ⑮.)		KT-IRV1000	KT-IRV2000	KT-IRV3000

Note 1) For O-ring numbers 8 and 13, use mini-flicking type.
Note 2) Replacement part numbers correspond to the item numbers in the figures.

Compact 15mm

With a simplified high-density circuit board design, an extremely compact size has been achieved.

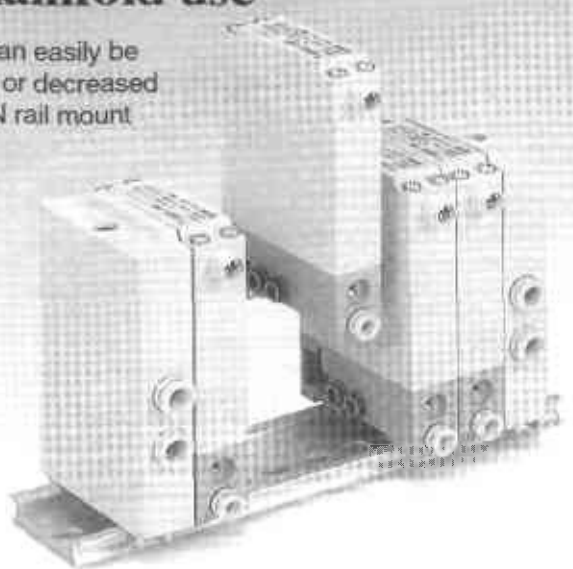
Full scale

Lightweight 100g

Compact Electro-pneumatic Regulator Series ITV0000

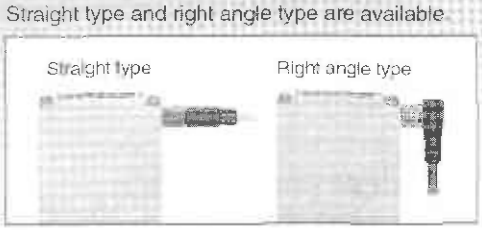
Realizes space savings and reduction of weight for manifold use

Stations can easily be increased or decreased due to DIN rail mount design.



Cable connectors

Straight type and right angle type are available

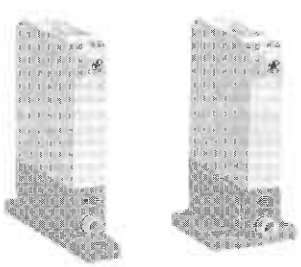


Built-in One-touch fitting

With error indication LED

Brackets

Flat and L brackets are available.



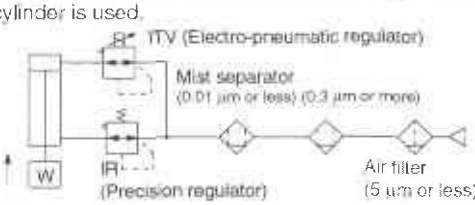
Flat bracket L bracket

Model	Pressure range	Power supply voltage	Input signal	Output signal	Option
ITV001□	0.1MPa	24VDC	4 to 20mA	Analog output 1 to 5V	• Cable connectors Straight type Right angle type • Brackets Flat bracket L bracket
ITV003□	0.5MPa		0 to 20mA		
ITV005□	0.9MPa	12VDC	0 to 5VDC		
ITV009□	−100kPa		0 to 10VDC		

- **Equivalent to IP65**
- **Linearity within ±1%** (full span)
  Hysteresis 0.5% (full span)
  Repeatability ±0.5% (full span)
- **High-speed response time 0.1sec** (without load)

High stability

Stable pressure control is possible even when a metal cylinder is used.



Compact Electro-pneumatic Regulator

Series ITV0000

How to Order

Single unit and single unit for manifolds

ITV00 [1] [0] – [3] [ ] [ ] [ ] [N]

Pressure range

1	0.1MPa
3	0.5MPa
5	0.9MPa
9*	–100kPa

* Option

Power supply voltage

0	24VDC
1*	12 to 15VDC

* Option

Input signal

0*	Current type 4 to 20mADC
1*	Current type 0 to 20mADC
2*	Current type 0 to 5VDC
3	Current type 0 to 10VDC

* Option

Built-in One-touch fitting type

For single unit

Symbol		SUP (VAC) 1	OUT 2	EXH (ATM) 3
Nil	Metric size (light gray)	ø4		
U	Inch size (orange)	ø5/32"		

For manifolds

Symbol		SUP (VAC) 1	OUT 2	EXH (ATM) 3
Nil	Metric size (light gray)	ø6	ø4	ø6
U	Inch size (orange)	ø1/4"	ø5/32"	ø1/4"

Cable connector (option)

N	Without cable connector
S	Straight type 3m
L	Right angle type 2m

Bracket (option for single unit only)

Nil	Without bracket
B	Flat bracket 
C	L bracket 

Base type

Nil	For single unit
M	For manifold

Manifolds

IITV00 – [02] – [n]

Stations

02	2 stations
03	3 stations
:	:
10	10 stations

Option

If a DIN rail longer than the specified stations is required, specify the applicable stations in two digits.
(Maximum10 stations)
Example) **IITV00-05-07**

Note) A DIN rail with the length specified by the number of stations is attached to the manifold. For dimensions of the DIN rail, refer to page 8.

How to Order Manifold Assemblies (Example)

Indicate the part numbers of electro-pneumatic regulators and options to be mounted below the manifold part number.

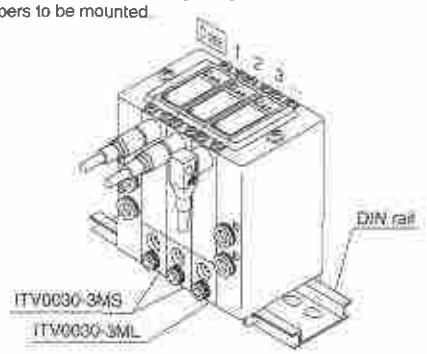
Example)
Due to the common supply/exhaust feature, note that different pressure range combinations are not available.

IITV00-03 ..... 1 set (Manifold part number)
- ITV0030-3MS ... 2 sets [Electro-pneumatic regulator part number (1, 2 stations)]
- ITV0030-3ML ... 1 set [Electro-pneumatic regulator part number (3 stations)]

Indicate part numbers in order starting from the first station on the D side.

Note: Due to the common supply/exhaust feature, different pressure range combinations are not available.

The asterisk (*) specifies mounting.
Add an asterisk (*) at the beginning of electro-pneumatic regulator part numbers to be mounted.



Specifications

Model		ITV001□	ITV003□	ITV005□	ITV009□
Minimum supply pressure		Set pressure + 0.1MPa			Set pressure −1kPa
Maximum supply pressure		0.2MPa	1.0MPa		−101kPa
Set pressure range		0.001 to 0.1MPa	0.001 to 0.5MPa	0.001 to 0.9MPa	−1 to −100kPa
Maximum flow rate		3.5ℓ/min (ANR) (Supply pressure: 0.2MPa)	6ℓ/min (ANR) (Supply pressure: 0.6MPa)	6ℓ/min (ANR) (Supply pressure: 0.6MPa)	2ℓ/min (ANR) (Supply pressure: −101kPa)
Power supply	Voltage	24VDC ±10%, 12 to 15VDC			
	Current consumption	Power supply voltage 24VDC type: 0.12A or less Power supply voltage 12 to 15VDC type: 0.18A or less			
Input signal	Voltage type	0 to 5VDC, 0 to 10VDC			
	Current type	4 to 20mADC, 0 to 20mADC			
Input impedance	Voltage type	Approx. 10kΩ			
	Current type	Approx. 250kΩ			
Output signal	Analog output	1 to 5 VDC (Load impedance: 1kΩ or more) Output accuracy: Within ±6% (full span)			
Linearity		Within ±1% (full span)			
Hysteresis		Within ±0.5% (full span)			
Repeatability		Within ±0.5% (full span)			
Sensitivity		Within 0.2% (full span)			
Temperature characteristics		Within ±0.12% (full span)/°C			
Operating temperature range		0 to 50°C (with no condensation)			
Enclosure		Equivalent to IP65*			
Connection type		Built-in One-touch fitting			
Connection size	For single unit	Metric size	[1], [2], [3]: ø4		
		Inch size	[1], [2], [3]: ø5/32"		
	Manifold	Metric size	[1], [3]: ø6, [2]: ø4		
		Inch size	[1], [3]: ø1/4", [2]: ø5/32"		
Weight Note 1)		100g or less (without options)			

Note 1) Indicates the weight of a single unit.
For ITV00-n
Total weight (g) ≤ Stations (n) x 100 + 130 (Weight of end block A, B assembly) + Weight (g) of DIN rail

Note 2) Specifications other than the following are optional.
Pressure range: 0.1MPa, 0.5MPa, 0.9MPa, Power supply voltage: 24VDC, Input signal: 0 to 10VDC

Note 3) When there is a downstream flow consumption, pressure may become unstable depending on piping conditions.

* When used under conditions equivalent to IP65, use the regulator after piping a fitting/tube to the breathing hole. (For details, refer to "Specific Product Precautions 1" on page 11.)

Accessories (Optional)

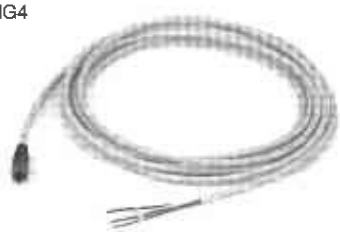
Bracket

Flat bracket assembly
P39800022

L bracket assembly
P39800023

Cable connector

Straight type
M8-4DSX3MG4

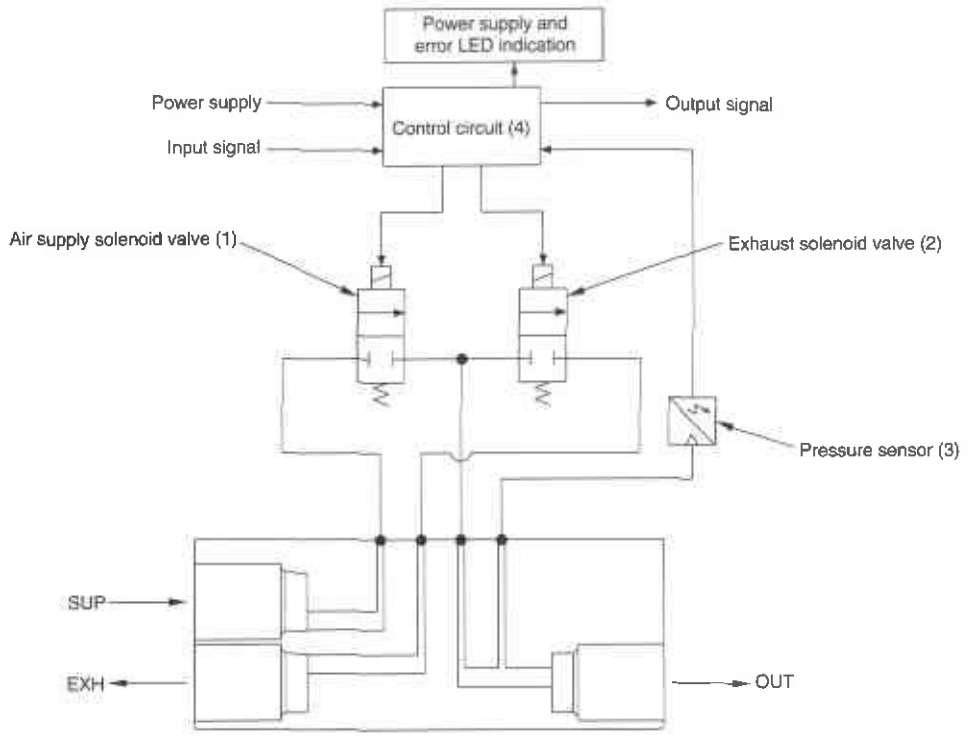


Right angle type
ELWIKA-KV4408 PVC025 2M

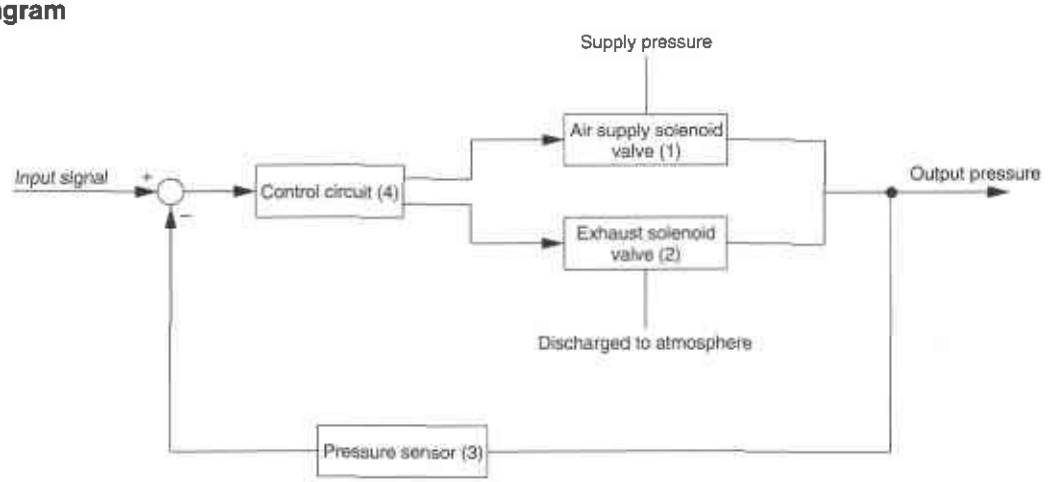
/orking Principle

hen the input signal rises, the air supply solenoid valve (1) turns ON. Due to this, part of the supply pressure passes through the supply solenoid valve (1) and changes to output pressure. This output pressure feeds back to the control circuit (4) via the essure sensor (3). Here, pressure corrections continue until output pressure becomes proportional to the input signal, enabling tput pressure that is proportional to the input signal.

Working principle diagram

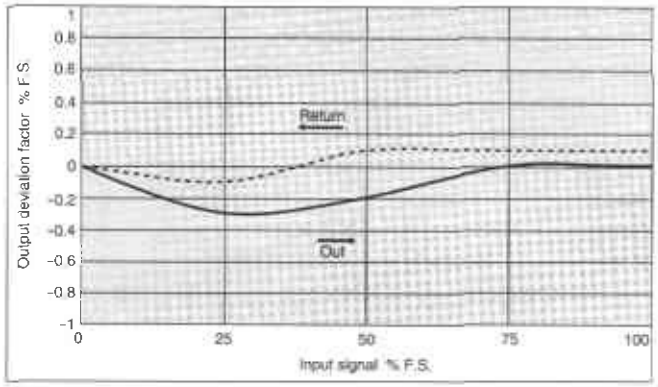


Block diagram



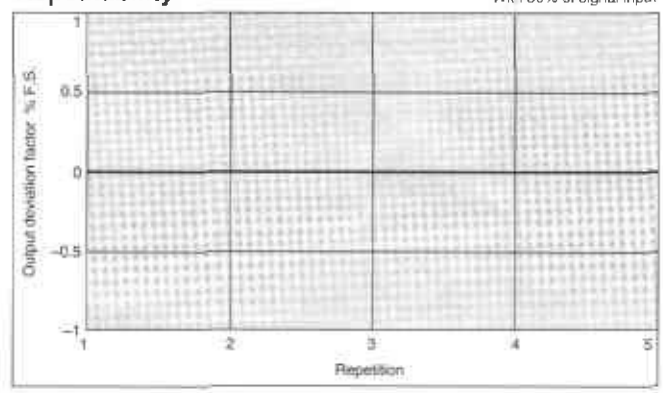
Series ITV001□

Linearity, hysteresis



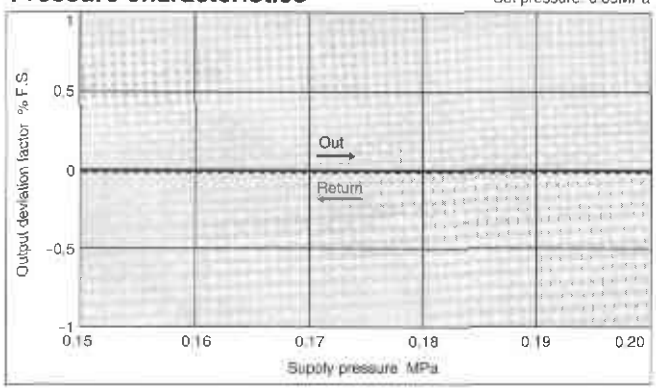
Repeatability

With 50% of signal input



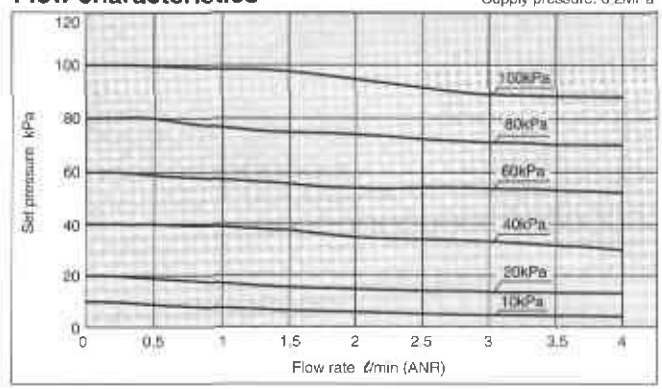
Pressure characteristics

Set pressure: 0.05MPa



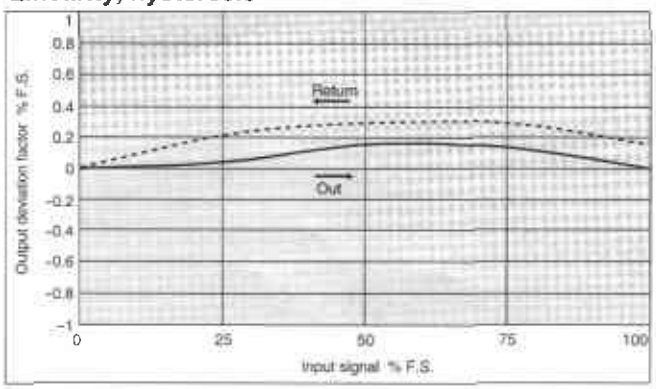
Flow characteristics

Supply pressure: 0.2MPa



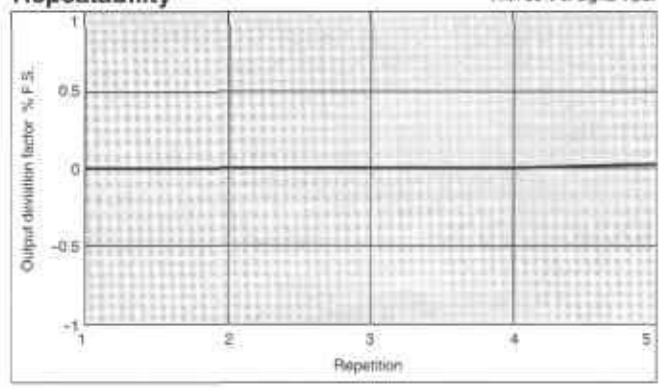
Series ITV003□

Linearity, hysteresis



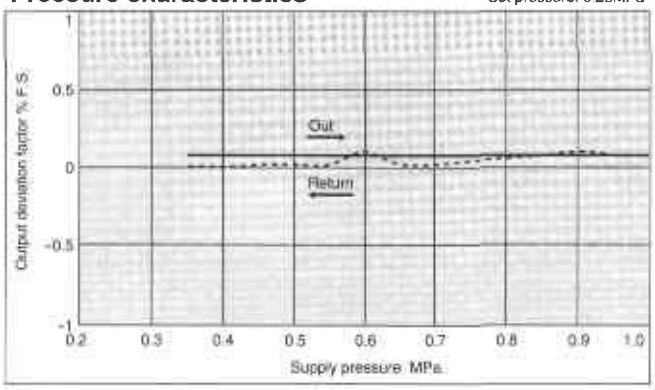
Repeatability

With 50% of signal input



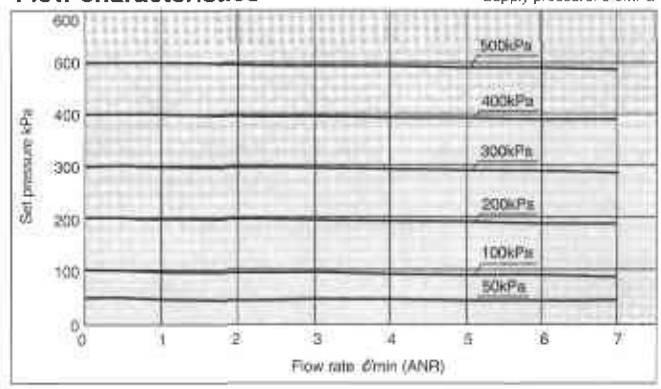
Pressure characteristics

Set pressure: 0.25MPa



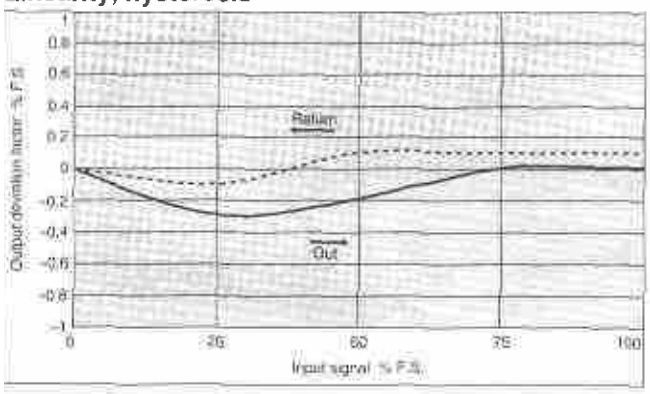
Flow characteristics

Supply pressure: 0.6MPa



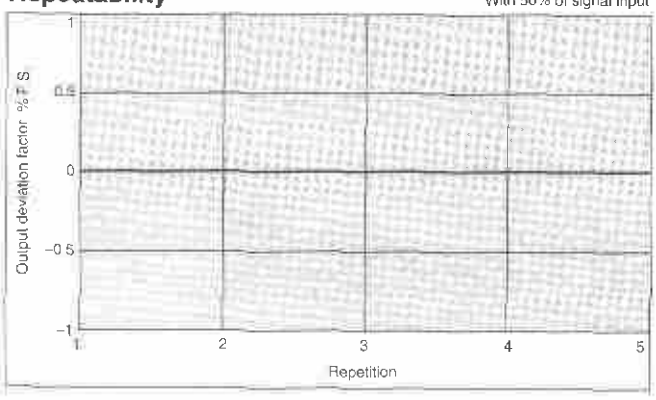
Series ITV001□

Linearity, hysteresis



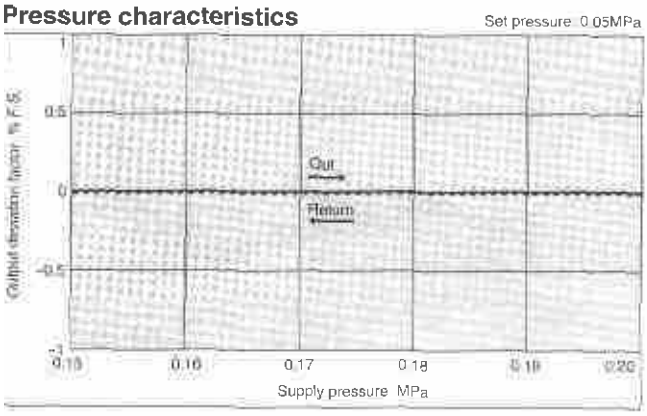
Repeatability

With 50% of signal input



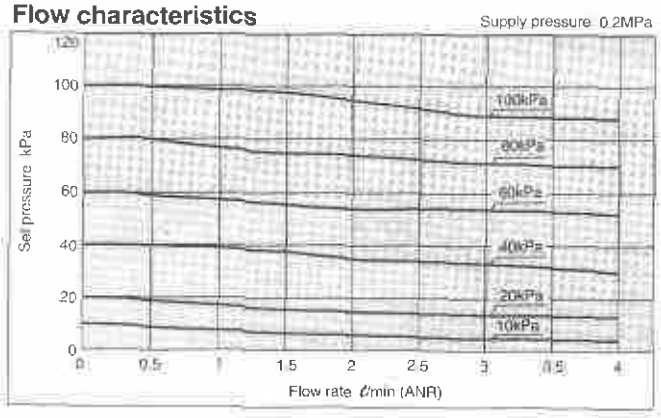
Pressure characteristics

Set pressure 0.05MPa



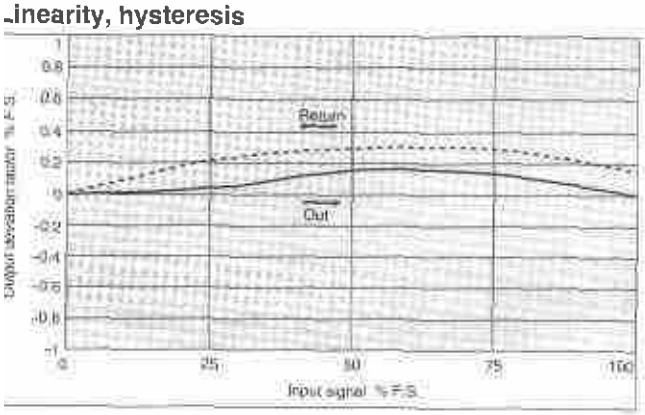
Flow characteristics

Supply pressure 0.2MPa



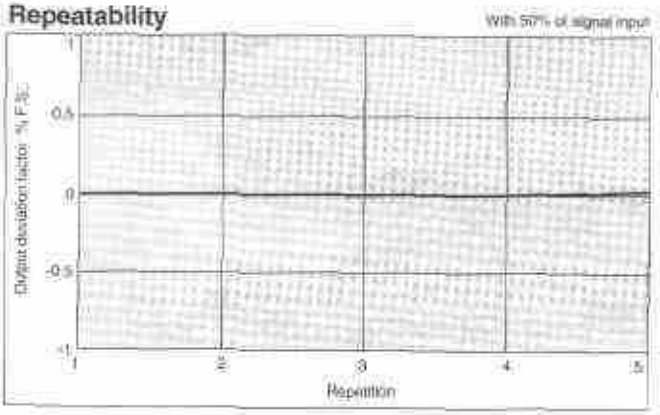
Series ITV003□

Linearity, hysteresis



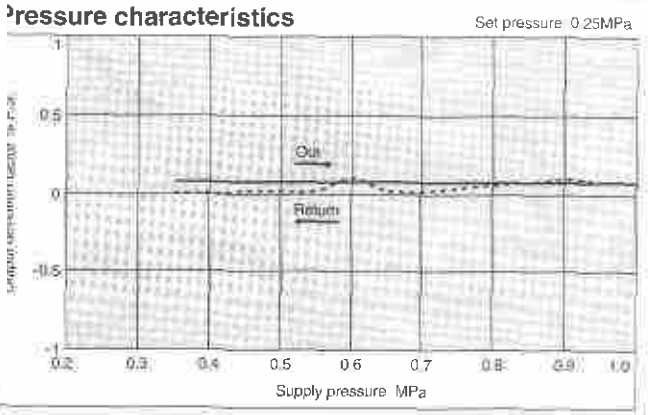
Repeatability

With 50% of signal input



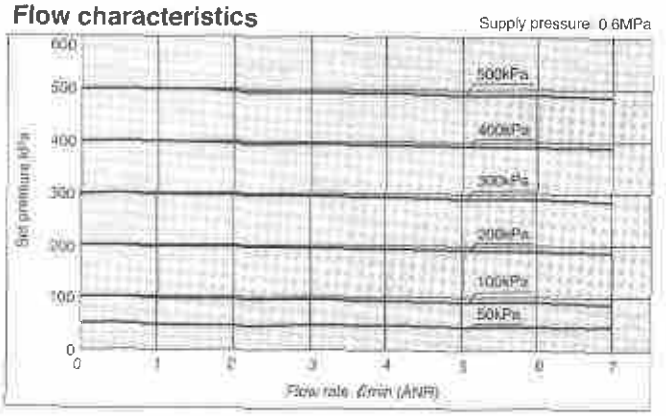
Pressure characteristics

Set pressure 0.25MPa



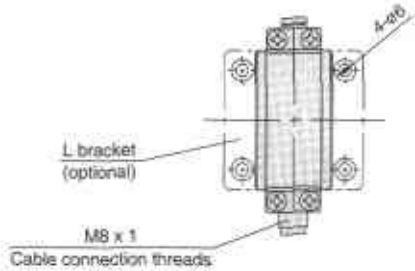
Flow characteristics

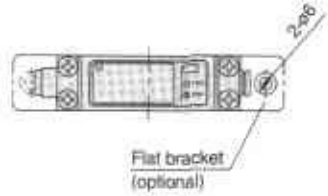
Supply pressure 0.6MPa



Dimensions

Single unit

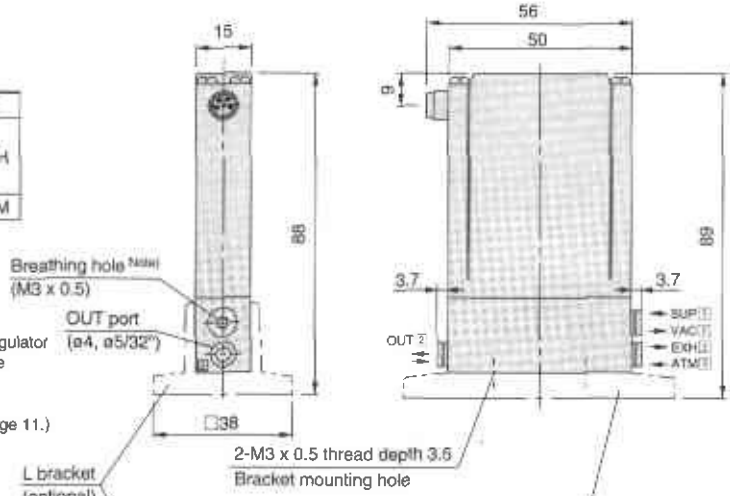


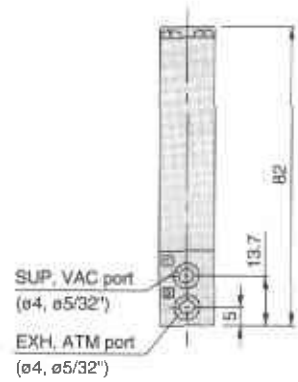


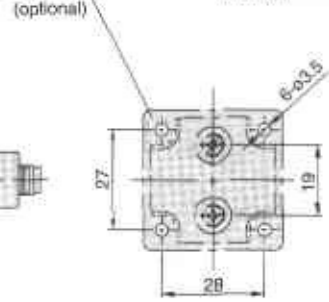
Port position

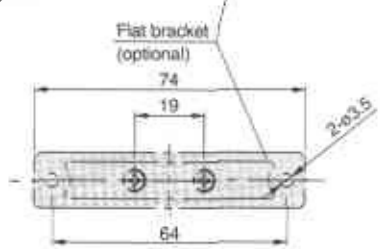
No.	1	2	3
ITV003□ 5	SUP	OUT	EXH
ITV009□	VAC		ATM

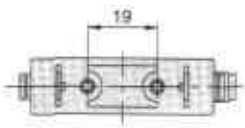
Note) When used under conditions equivalent to IP65, use the regulator after piping a fitting/tube to the breathing hole.
(For details, refer to "Specific Product Precautions 1" on Page 11.)

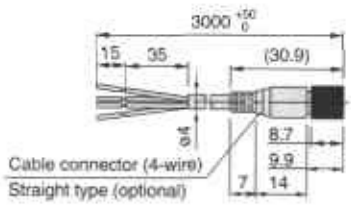


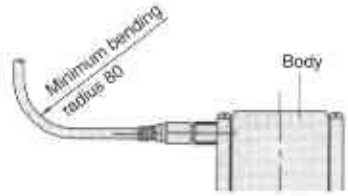


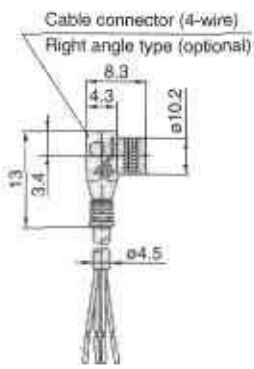


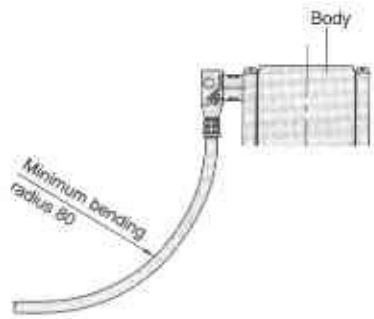






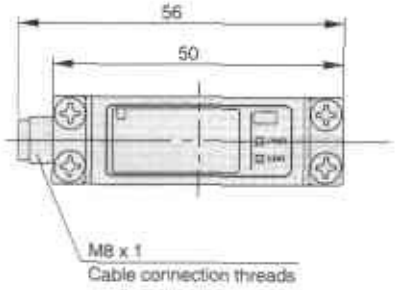


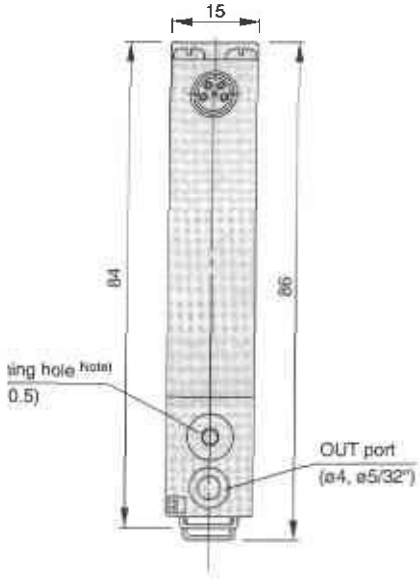




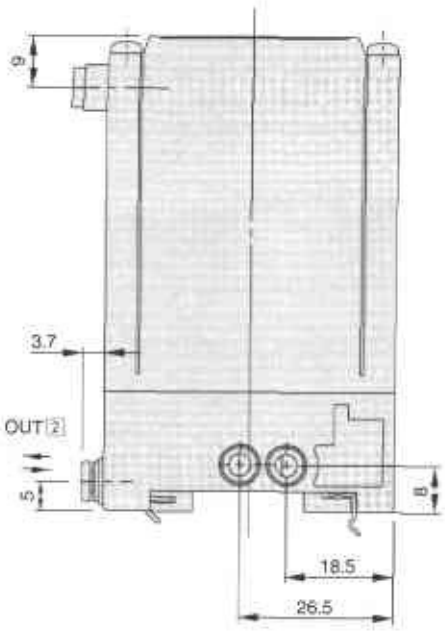
imensions

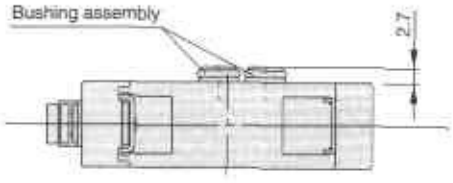
ngle unit for manifolds





When used under the conditions equivalent to IP65, use the regulator after piping a fitting/tube into a breathing hole. (For details, refer to "Specific Product Precautions 1" on Page 11.)

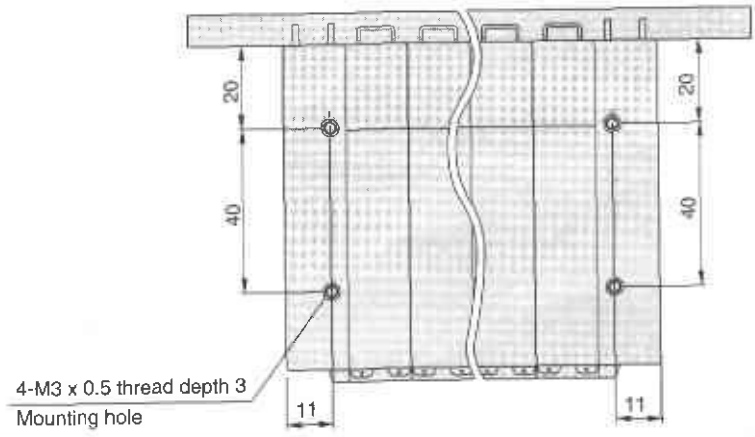




For dimensions of the cable connector, refer to single unit on page 6.

Dimensions

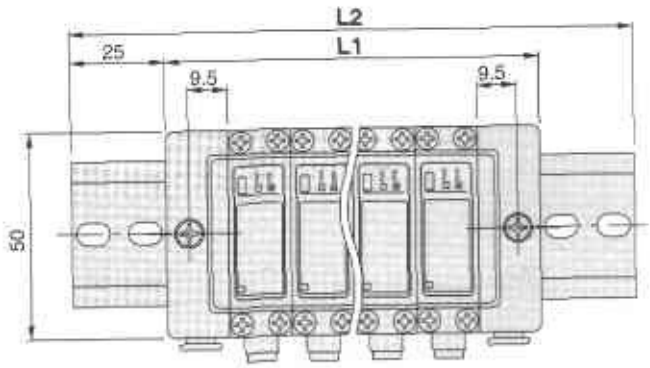
Manifolds

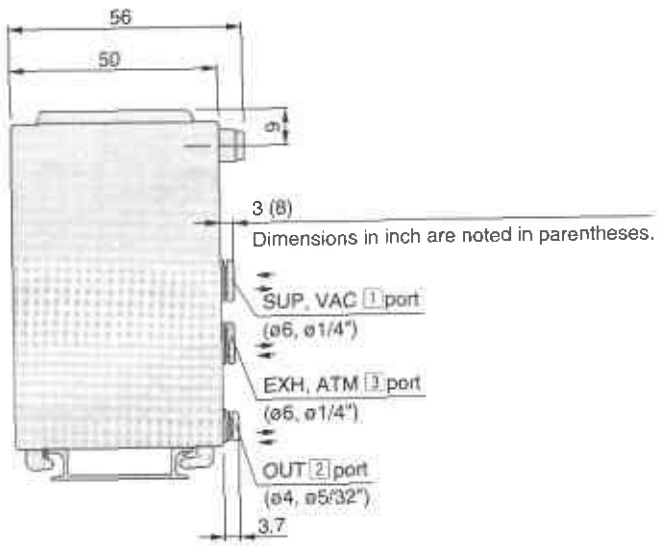


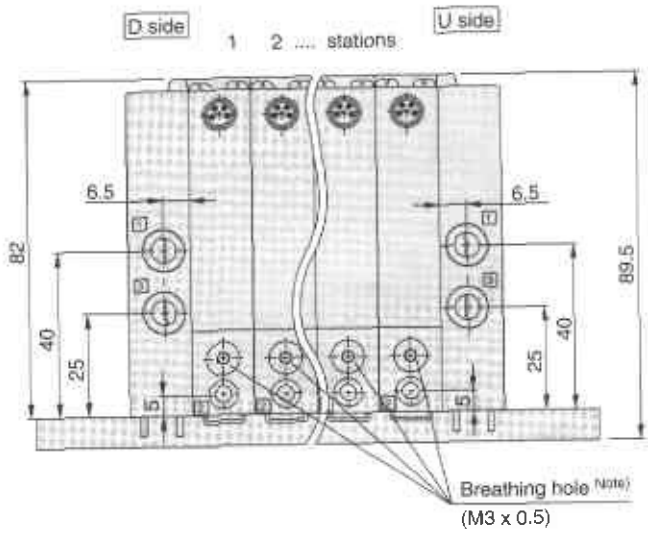
Port position

No.	1	2	3
1 ITV00 3□ 5	SUP	OUT	EXH
ITV009□	VAC		ATM

Note) Stations are counted starting from the D side.







Note) For dimensions of the cable connector, refer to single unit on page 6.

Note) When used under conditions equivalent to IP65, use the after piping a fitting/tube to the breathing hole. (For details, refer to "Specific Product Precautions 1" on

(mm)

Manifold stations n	2	3	4	5	6	7	8	9	10
L1	60	75	90	105	120	135	150	165	180
L2	110.5	123	148	160.5	173	185.5	198	223	235.5

Vacuum Gauges

GZ46

Specifications

Type		Back mount (male thread)
Class		class 3
Accuracy		±3% F.S. (Full Span)
Pressure range*		-760 ~ 0 mmHg -30 ~ 0 PSI
Needle rotation		270°
Port thread		1/8, 1/4
M5 internal thread		special order
Material	Case	Rolled plate (Black melamine treatment)
	Clear cover	Polycarbonate
	Thread	Brass
Attachment		Cover ring assembly (for panel mount)

* Combination VAC and positive pressure scale is available by special request.

de Mount Vacuum Gauge

t No.	Vacuum range	Port size
21V	0~30inHg	1/8"NPT

ensions: Height ..... 2.1"
Thickness ..... 0.9"
Width (diameter) ..... 1.5"

How to Order

GZ46 — C — N — 01 — M — C

Vacuum pressure units
A – mmHg
C – inch Hg

Port thread
(blank) – Rc (PT)
N – NPT

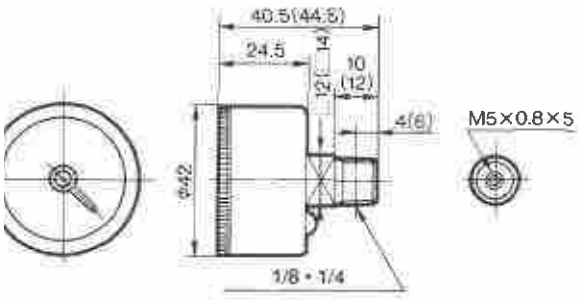
Port size
01 – 1/8
02 – 1/4

Internal thread
M – M5 (10-32 nom.) female

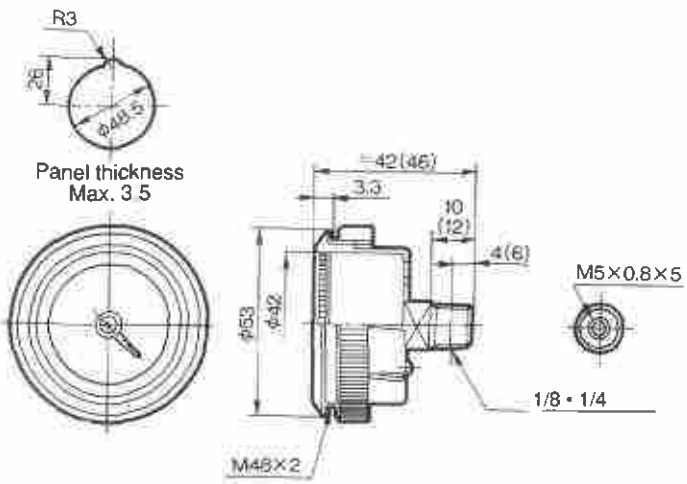
Mounting
(blank) – Std.
C —— Panel mounting

ensions (GZ46 type)

(mm)



Gauge with Panel Mounting Ass'y
(dimensions for mtg. hole)



2•3 Port Valves for Vacuum Applications

SYJ Series

NVZ Series

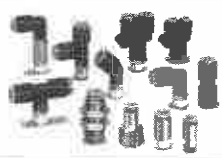
NVS Series

VX Series

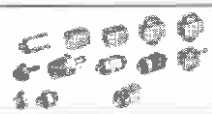
Valve Series	Type of Actuation			Port Size	Effect. Orifice (mm²) (Cv factor)
	Dir. Sol.	Sol. w/Ext. Pilot	Air pilot		
SY100A	●	–	–	M3	0.22 (0.012)
SYJ300	–	●	●	M3	0.9 (0.05)
NVZ300	–	●	●	M5	3.6 (0.2)
NVZ500	–	●	●	1/8	9.0 (0.5)
NVZ200	–	●	–	M5	3.24 (0.18)
NVZ400	–	●	–	1/8	9.0 (0.5)
NVS3115	●	–	●	1/8, 1/4	19.8 (1.1)
NVS3135	●	–	●	1/4, 3/8, 1/2	46.5 (2.58)
NVS3145	●	–	●	1/2, 3/4	81 (4.5)
VX2	●	–	●	1/8~1/2	3~31 (0.17~1.7)
VX3	●	–	●	1/8, 3/8, 1/4	1.4~9 (0.08~0.5)
VXZ2	●	–	–	1/4 ~ 1	34~215 (1.9~12)

Fittings & Tubing

■ **KJ Series**
Miniature One-Touch Fittings
- thread sealant standard (1/8 only)
- electroless nickel plating option (-X2)

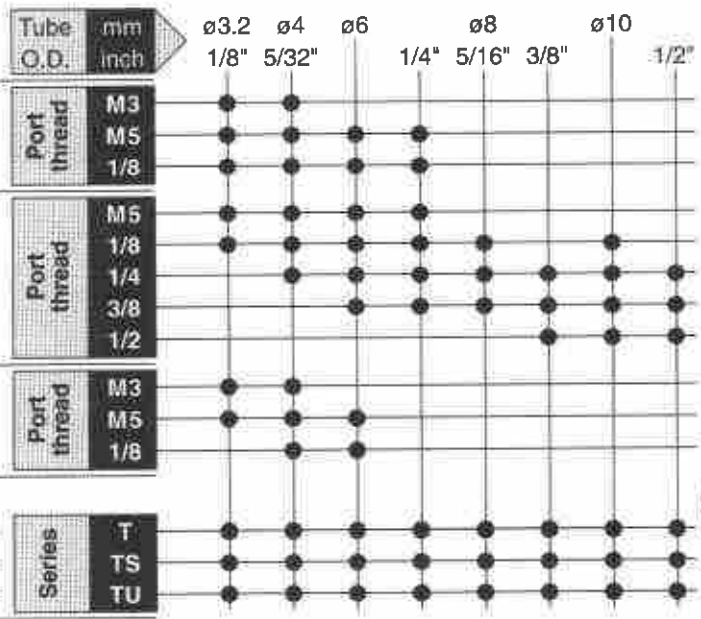


■ **KQ Series**
Standard On-Touch Fittings
- thread sealant standard (1/8, 1/4, 3/8, 1/2)
- electroless nickel plating option (-X2)
- wide range of configurations



■ **M Series**
Miniature Barbed Fittings
- electroless nickel plating (std.)

■ **T Series**
Nylon Tubing
Soft Nylon Tubing
Polyurethane Tubing



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