Vacuum Pad

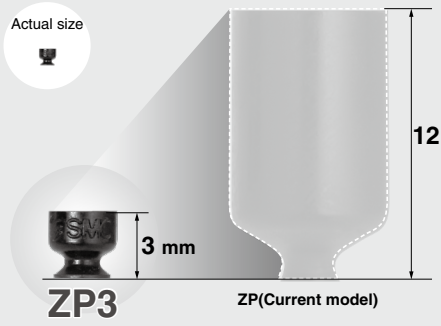
ZP3 Series

ø1.5, ø2, ø3.5, ø4, ø6, ø8, ø10, ø13, ø16

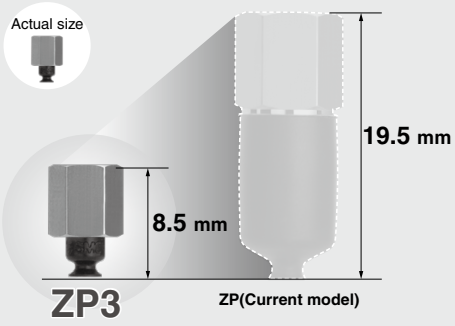
RoHS

Overall length is shortened. In the case of Flat type (Pad diameter: ø2)

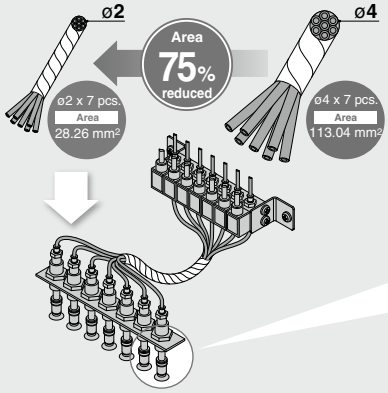
Pad unit Max. 9 mm shortened



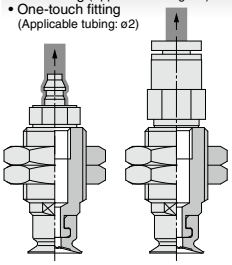
With adapter Max. 11 mm shortened



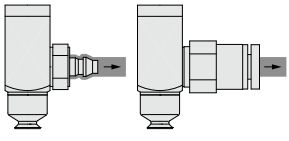
Space-saving ø2 piping reduces working space!



Vertical
- Male thread
- Female thread
- Barb fitting (Applicable tubing: ø2)
- One-touch fitting (Applicable tubing: ø2)



Lateral
- Female thread
- Barb fitting (Applicable tubing: ø2)
- One-touch fitting (Applicable tubing: ø2)



Variations Pad diameter ø1.5 added!

Type	Pad diameter								
	ø1.5	ø2	ø3.5	ø4	ø6	ø8	ø10	ø13	ø16
Flat	●	●	●						
Flat with groove				●	●	●	●	●	●
Bellows				●	●	●	●	●	●

Excellent functions

◎Excellent functions

Adsorption surface is shot-blasted

Micro-dents and bumps on the surface facilitate easy removal.

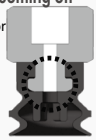
With groove

Less contact surface with the workpiece makes it easy to remove.

◎Construction to prevent pad from coming off

Pad diameter from ø1.5

New shape for connecting with the adapter prevents the pad from coming off.

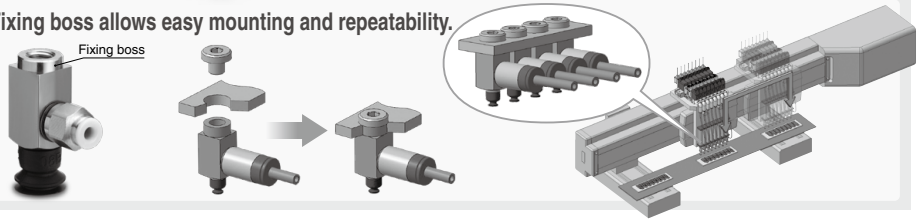


◎Easier identification

SMC logo mark

◎Fixing boss allows easy mounting and repeatability.

Fixing boss

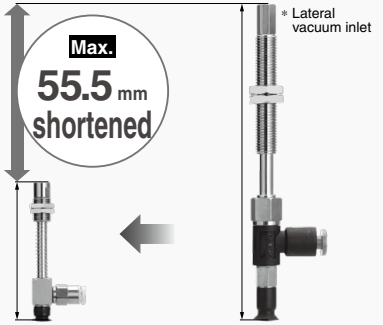


Compact buffer body

◎Overall length is shortened.

Max. 55.5 mm shortened

∗ Lateral vacuum inlet



ZP3 ZP

Pad diameter ø8, Flat, With one-touch fitting

ZP3

Stroke	Overall length (mm)
3	40
6	46
10	56
15	59
20	66.5
25	—

ZP

Stroke	Overall length (mm)
3	—
6	78.5
10	109.5
15	114.5
20	—
25	124.5

◎Short stroke type: 3 mm added

3 mm 6 mm 10 mm 15∗ mm 20∗ mm

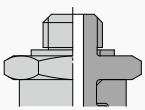
Buffer stroke

(∗ With bushing)

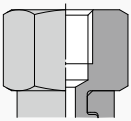
Pad diameter	Buffer specifications	Stroke (mm)				
		3	6	10	15	20
ø1.5, ø2, ø3.5	Rotating, Non-rotating	●	●	—	—	—
ø4, ø6, ø8 ø10, ø13, ø16	Rotating	●	●	●	—	—
	Rotating, With bushing	—	—	—	●	●
	Non-rotating	●	●	●	●	●

Wide selection of piping

Male thread

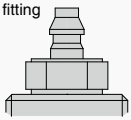


Female thread

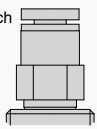


For ø2 piping!

Barb fitting

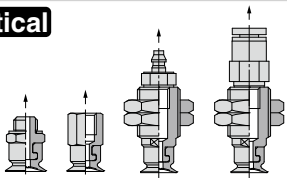
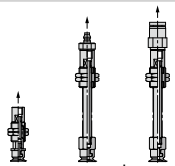
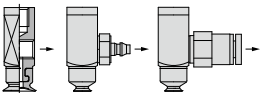
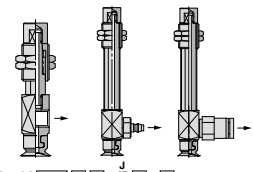


One-touch fitting



Series Variations

Type	Pad diameter									Material	Page
	ø1.5	ø2	ø3.5	ø4	ø6	ø8	ø10	ø13	ø16		
Flat **For adsorption of general workpieces** For adsorption of work pieces with flat and not deformed surface	●	●	●							NBR Silicone rubber Urethane rubber FKM Conductive NBR Conductive silicone rubber	P.324
Flat with groove **For a workpiece which is likely to deform** For releasing a workpiece certainly				●	●	●	●	●	●		
Bellows **For adsorption of work pieces with inclined surface**				●	●	●	●	●	●		

Vacuum inlet direction	Buffer attachment	Vacuum inlet		Page
Vertical  ZP3-T □□□-□	Without buffer (with adapter)	Male thread	M3, M5	P.326
		Female thread	M3, M5	
		Barb fitting	Polyurethane tubing ø2	
			Soft nylon/ Polyurethane tubing ø4, ø6	
		One-touch fitting	ø2, ø4, ø6	
Vertical  ZP3-T □□□-J/JB/K□-□	Stroke with buffer 3 mm 6 mm 10 mm 15 mm 20 mm	Female thread	M3, M5	P.338
		Barb fitting	Polyurethane tubing ø2	
			Soft nylon/ Polyurethane tubing ø4, ø6	
		One-touch fitting	ø2, ø4, ø6	
Lateral  ZP3-Y □□□-□-□	Without buffer (with adapter)	Female thread	M3, M5	P.348
		Barb fitting	Polyurethane tubing ø2	
			Soft nylon/ Polyurethane tubing be ø4, ø6	
		One-touch fitting	ø2, ø4, ø6	
Lateral  ZP3-Y □□□-J/JB/K□-□	Stroke with buffer 3 mm 6 mm 10 mm 15 mm 20 mm	Female thread	M3, M5	P.354
		Barb fitting	Polyurethane tubing ø2	
			Soft nylon/ Polyurethane tubing ø4, ø6	
		One-touch fitting	ø2, ø4, ø6	

Construction ····· P.364
Adapter Applicable Pad List ····· P.365
Buffer Applicable Pad List ····· P.366
Mounting Adapter Part No. ····· P.370
Buffer Assembly Part No. ····· P.372

Vacuum Equipment
Model Selection

CONTENTS

1 Features and Precautions for Vacuum Adsorption

Vacuum adsorption system as a method to hold a workpiece has the following features.

- Easy construction
- Compatible with any place where adsorption is possible.
- No need for accurate positioning
- Compatible with soft and easily-deformed work pieces

However, special care is required in the following conditions.

- Workpiece may drop under certain conditions since it is transferred being adsorbed.
- Liquid or foreign matter around the workpiece may be sucked into the equipment.
- Large adsorption area is necessary to get large gripping force.
- Vacuum pad (rubber) may deteriorate.

Fully understand the features above and select the equipment that suits your operating conditions.

2 Vacuum Pad Selection

Before selecting the product model, read “How to Order”, “Vacuum Equipment Precautions”, and “Safety Instructions.”
The operating range and performance data and values shown in this catalog are the guidelines for selecting a model. In actual operation, there is a possibility that a general specification is not applicable due to unexpected factors or conditions.
Before using the product, determine whether or not the values shown in this catalog are applicable to expected usage, and accept all danger and responsibility caused thereby. SMC cannot take any responsibility for any items which are not shown in this catalog.

● Vacuum Pad Selection Procedures

1) Fully taking into account the balance of a workpiece, identify the suction position, number of pads and applicable pad diameter (or pad area).
   * When selecting the model based on product weight, there is a possibility that the workpiece cannot be adsorbed or it is dropped depending on the operating conditions (workpiece balance, transfer acceleration, pressure or friction force applied to the workpiece during transfer etc.).
2) Find the theoretical lifting force from the identified adsorption area (pad area x number of pads) and vacuum pressure, and then find the lifting force considering actual lifting and safety factor of transfer condition.
   * Use the calculated values as a guideline (reference value) and check the actual values by performing a suction test as necessary.
3) Determine the necessary pad diameter (pad area) and suction position (workpiece balance) so that the lift force is larger than weight of the workpiece.
4) Determine the pad form and materials, and the necessity of buffer based on the operating environment, and the workpiece shape and materials.
5) This product is not designed to hold a vacuum.
6) Perform a suction test with actual equipment to determine whether or not the product can be used.

The above shows selection procedures for general vacuum pads; thus, they will not be applicable for all pads. Customers are required to conduct a test on their own and to select applicable suction conditions and pads based on the test results.

● Points for Selecting Vacuum Pads

A. Theoretical Lifting Force

- The theoretical lifting force is determined by vacuum pressure and adsorption area of the vacuum pad.
- Since the theoretical lifting force is the value measured at the static state, the safety factor responding to the actual operating conditions must be estimated in the actual operation.
- It is not necessarily true that higher vacuum pressure is better. Extremely high vacuum pressure may cause problems.
  - When the vacuum pressure is unnecessarily high, pads are likely to be worn out earlier or cracked, causing shorter pad service life. Doubling the vacuum pressure makes the theoretical lifting force double, while to doubling the pad diameter makes the theoretical lifting force quadruple.
- When the vacuum pressure (set pressure) is high, it makes not only response time longer, but also the necessary energy to generate a vacuum larger.

Example) Theoretical lifting force = Pressure x Area

2 times

Pad diameter	Area (cm^2)	**Vacuum pressure [-40 kPa]**	Vacuum pressure [-80 kPa]
ø20	3.14	**Theoretical lifting force 12 N**	Theoretical lifting force 25 N
ø40	12.56	**Theoretical lifting force 50 N**	Theoretical lifting force 100 N

4 times

B. Shear Force and Moment Applied to Vacuum Pad

- Vacuum pads are not resistant to shear force (parallel force with adsorption surface) and moment.
- Minimize the moment applied to the vacuum pad with the position of the workpiece center of gravity in mind.
- The acceleration rate of the movement must be as small as possible, and make sure to take into consideration the wind pressure and impact. If measures to slow down the acceleration rate are introduced, safety to prevent the workpiece from dropping will improve.
- Avoid lifting the workpiece by adsorbing the vertical side with a vacuum pad (vertical lifting) if possible. When it is unavoidable, a sufficient safety factor must be secured.

Lifting Force, Moment, Horizontal Force

To lift a workpiece vertically, make sure to take into consideration the acceleration rate, wind pressure, impact, etc., in addition to the mass of the workpiece. (Refer to Fig. 1)
Because the pads are susceptible to moments, mount the pad so as not to allow the workpiece to create a moment. (Refer to Fig. 2)
When a workpiece that is suspended horizontally is moved laterally, the workpiece could shift depending on the extent of the acceleration rate or the size of the friction coefficient between the pad and the workpiece. Therefore, the acceleration rate of the lateral movement must be minimized. (Refer to Fig. 3)

Fig. 1

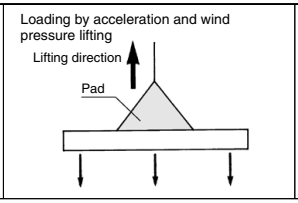


Fig. 2

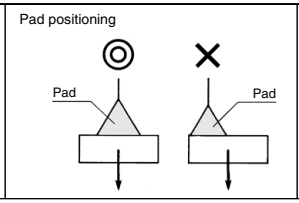
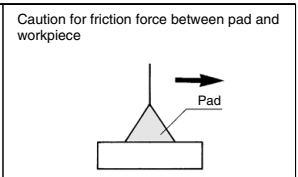
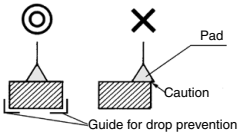


Fig. 3

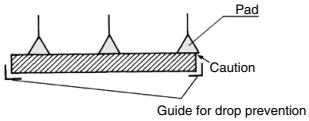


Balance of Pad and Workpiece

Make sure that the pad's suction surface is not larger than the surface of the workpiece to prevent vacuum leakage and unstable picking.



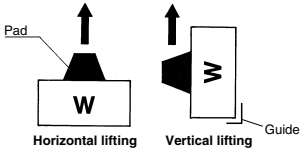
If multiple pads are used for transferring a flat object with a large surface area, properly allocate the pads to maintain balance. Also make sure that the pads are aligned properly to prevent them from becoming disengaged along the edges.



Provide an auxiliary device (example: a guide for preventing the workpieces from dropping) as necessary.

Mounting Position

As a rule, the unit must be installed horizontally. Although a diagonal or a vertical installation should be avoided whenever possible, if the unit must be installed in such a manner, be certain to guarantee guide and absolute safety.



● Lifting Force and Vacuum Pad Diameter

1. Theoretical Lifting Force

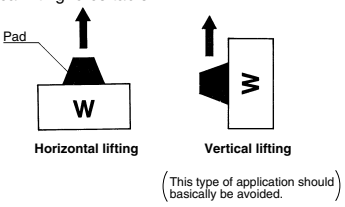
- Set the vacuum pressure below the pressure that has been stabilized after adsorption.
- However, when a workpiece is permeable or has a rough surface, note that the vacuum pressure drops since the workpiece takes air in. In such a case, carry out an adsorption test for confirmation.
- The vacuum pressure when using an ejector is approximately –60 kPa as a guide.

The theoretical lifting force of a pad can be found by calculation or from the theoretical lifting force table.

Calculation

$$W = P \times S \times 0.1 \times \frac{1}{t}$$

W : Lifting force (N)
P : Vacuum pressure (kPa)
S : Pad area (cm²)
t : Safety factor Horizontal lifting: 4 or more
Vertical lifting: 8 or more



Horizontal lifting **Vertical lifting**

(This type of application should basically be avoided.)

Theoretical Lifting Force

The theoretical lifting force (not including the safety factor) is found from the pad diameter and vacuum pressure.
The required lifting force is then found by dividing the theoretical lifting force by the safety factor **t**.

Lifting force = **Theoretical lifting force** ÷ **t**

(1) Theoretical Lifting Force (Theoretical lifting force = P x S x 0.1)

Pad Diameter (ø1.5 to ø50) (N)

Pad diameter (mm)		ø1.5	ø2	ø3.5	ø4	ø6	ø8	ø10	ø13	ø16	ø20	ø25	ø32	ø40	ø50
Pad area S (cm²)		0.02	0.03	0.10	0.13	0.28	0.50	0.79	1.33	2.01	3.14	4.91	8.04	12.6	19.6
Vacuum pressure (kPa)	–85	0.15	0.27	0.82	1.07	2.40	4.2	6.6	11	17	26	41	68	106	166
	–80	0.14	0.25	0.77	1.00	2.26	4.0	6.2	10	16	25	39	64	100	157
	–75	0.13	0.24	0.72	0.94	2.12	3.7	5.8	10	15	23	36	60	94	147
	–70	0.12	0.22	0.67	0.88	1.98	3.5	5.5	9.3	14	22	34	56	87	137
	–65	0.11	0.20	0.63	0.82	1.84	3.2	5.1	8.6	13	20	31	52	81	127
	–60	0.11	0.19	0.58	0.75	1.70	3.0	4.7	8.0	12	18	29	48	75	117
	–55	0.10	0.17	0.53	0.69	1.55	2.7	4.3	7.3	11	17	27	44	69	107
	–50	0.09	0.16	0.48	0.63	1.41	2.5	3.9	6.7	10	15	24	40	62	98
	–45	0.08	0.14	0.43	0.57	1.27	2.2	3.5	6.0	9.0	14	22	36	56	88
	–40	0.07	0.13	0.38	0.50	1.13	2.0	3.1	5.3	8.0	12	19	32	50	78

Pad Diameter (ø63 to ø340) (N)

Pad diameter (mm)		ø63	ø80	ø100	ø125	ø150	ø200	ø250	ø300	ø340
Pad area S (cm²)		31.2	50.2	78.5	122.7	176.6	314.0	490.6	706.5	907.5
Vacuum pressure (kPa)	–85	265	427	667	1043	1501	2669	4170	6005	7714
	–80	250	402	628	982	1413	2512	3925	5652	7260
	–75	234	377	589	920	1325	2355	3680	5299	6806
	–70	218	351	550	859	1236	2198	3434	4946	6353
	–65	203	326	510	798	1148	2041	3189	4592	5899
	–60	187	301	471	736	1060	1884	2944	4239	5445
	–55	172	276	432	675	971	1727	2698	3886	4991
	–50	156	251	393	614	883	1570	2453	3533	4538
	–45	140	226	353	552	795	1413	2208	3179	4084
	–40	125	201	314	491	706	1256	1962	2826	3630

Oval Pad (2 x 4 to 8 x 30, 30 x 50) (N)

Pad diameter (mm)		2 x 4	3.5 x 7	4 x 10	5 x 10	6 x 10	4 x 20	5 x 20	6 x 20	8 x 20	4 x 30	5 x 30	6 x 30	8 x 30	30 x 50
Pad area S (cm²)		0.07	0.21	0.36	0.44	0.52	0.76	0.94	1.12	1.46	1.16	1.44	1.72	2.26	13.07
Vacuum pressure (kPa)	–85	0.60	1.79	3.0	3.7	4.4	6.4	7.9	9.5	12.4	9.8	12.2	14.6	19.2	112
	–80	0.56	1.68	2.8	3.5	4.1	6.0	7.5	8.9	11.6	9.2	11.5	13.7	18.0	105
	–75	0.53	1.58	2.7	3.3	3.9	5.7	7.0	8.4	10.9	8.7	10.8	12.9	16.9	98
	–70	0.49	1.47	2.5	3.0	3.6	5.3	6.5	7.8	10.2	8.1	10.0	12.0	15.8	92
	–65	0.46	1.37	2.3	2.8	3.3	4.9	6.1	7.2	9.4	7.5	9.3	11.1	14.6	85
	–60	0.42	1.26	2.1	2.6	3.1	4.5	5.6	6.7	8.7	6.9	8.6	10.3	13.5	79
	–55	0.39	1.16	1.9	2.4	2.8	4.1	5.1	6.1	8.0	6.3	7.9	9.4	12.4	72
	–50	0.35	1.05	1.8	2.2	2.6	3.8	4.7	5.6	7.3	5.8	7.2	8.6	11.3	66
	–45	0.32	0.95	1.6	1.9	2.3	3.4	4.2	5.0	6.5	5.2	6.4	7.7	10.1	59
	–40	0.28	0.84	1.4	1.7	2.0	3.0	3.7	4.4	5.8	4.6	5.7	6.8	9.0	53

Model Selection

● Vacuum Pad Type

• Vacuum pads are available in flat, deep, bellows, thin flat, with rib, and oval types, etc. Select the optimal shape in accordance with the workpiece and operating environment. Please contact SMC for shapes not included in this catalog.

Pad Type

Pad shape	Application
Flat 	To be used when adsorption surface of work is flat and not deformed.
Flat with rib 	To be used when work is likely to deform or in the case of releasing work certainly.
Deep 	To be used when work is curved shape.
Bellows 	To be used when there is not enough space to install buffer or adsorption surface of work is slanted.
Oval 	To be used when work has limited adsorption surface or long in length and work is required to locate precisely.

Pad shape	Application
Ball joint 	To be used when adsorption surface of work is not horizontal.
Long stroke buffer 	To be used when work height is not even or cushioning toward work is required.
Large 	To be used when work is heavy weight.
Conductive 	As one of the countermeasures against the static electricity, rubber material with reduced resistance is used. For antistatic measures

● Vacuum Pad Material

• It is necessary to determine vacuum pad materials carefully taking into account the workpiece shape, adaptability in the operating environment, effect after being adsorbed, electrical conductivity, etc.
• Based on the workpiece transfer example for each material, select after confirming the characteristics (adaptability) of rubber.

Vacuum Pad/Example of Workpiece Transfer

Material

Material	Application
NBR	Transfer of general workpieces, Corrugated board, Veneer plate, Iron plate and others
Silicone rubber	Semiconductor, Removing from die-casting, Thin workpieces, Food processor
Urethane rubber	Corrugated board, Iron plate, Veneer plate
FKM	Chemical workpieces
Conductive NBR	General workpieces of semiconductor (Static electricity resistance)
Conductive silicone rubber	Semiconductor (Static electricity)

◎ = Excellent --- Not affected at all, or almost no effect
○ = Good --- Affected a little, but adequate resistance depending on conditions
△ = Better not to use if possible
× = Unsuitable for usage. Severely affected.

● Rubber Material and Properties

	General name	NBR (Nitrile rubber)	Silicone rubber	Urethane rubber	FKM (Fluoro rubber)	CR (Chloroprene rubber)	EPR (Ethylene-propylene rubber)	Conductive NBR (Nitrile rubber)	Conductive silicone rubber	Conductive silicone sponge	Conductive CR sponge (Chloroprene sponge)
	Main features	Good oil resistance, abrasion resistance, and aging resistance	Excellent heat resistance, and cold resistance	Excellent mechanical strength	Best heat resistance, and chemical resistance	Well balanced weather resistance, ozone resistance, and chemical resistance	Good aging resistance, ozone resistance, and electrical properties	Good oil resistance, abrasion resistance, and aging resistance. Conductive	Very excellent heat resistance, and cold resistance. Conductive	Excellent heat insulation, and impact resilience	Excellent impact resilience, and sound insulation. Flame retardance
	Pure gum property (specific gravity)	1.00-1.20	0.95-0.98	1.00-1.30	1.80-1.82	1.15-1.25	0.86-0.87	1.00-1.20	0.95-0.98	0.4g/cm^3	0.161g/cm^3
Physical properties of blended gum	Impact resilience	○	◎	◎	△	◎	○	○	◎	× to △	× to △
	Abrasion resistance	◎	× to △	◎	◎	◎	○	◎	× to △	×	×
	Tear resistance	○	× to △	◎	○	○	△	○	× to △	×	×
	Flex crack resistance	○	× to ○	◎	○	○	○	○	× to ○	×	×
	Maximum operation temperature °C	120	200	60	250	150	150	100	200	180	120
	Minimum operation temperature °C	0	−30	0	0	−40	−20	0	−10	−30	−20
	Volume resistivity (Ωcm)	—	—	—	—	—	—	10^4 or less	10^4 or less	4.8 x 10^4	3.8 x 10^4
	Heat aging	○	◎	△	◎	○	○	○	◎	△	△
	Weather resistance	○	◎	◎	◎	◎	○	○	◎	△	△
	Ozone resistance	△	◎	◎	◎	○	◎	△	◎	△	△
	Gas permeability resistance	○	× to △	× to △	× to △	○	× to △	○	× to △	×	×
Chemical resistance Oil resistance	Gasoline/Gas oil	◎	× to △	◎	◎	○	×	◎	× to △	×	×
	Benzene/Toluene	× to △	×	× to △	◎	× to △	×	× to △	×	×	×
	Alcohol	◎	◎	△	△ to ◎	◎	◎	◎	◎	△	△
	Ether	× to △	× to △	×	× to △	× to △	○	× to △	× to △	×	×
	Ketone (MEK)	×	○	×	×	△ to ○	◎	×	○	×	×
	Ethyl acetate	× to △	△	× to △	×	× to △	◎	× to △	△	×	×
Alkaline resistance Acid resistance	Water	◎	○	△	◎	◎	◎	◎	○	○	○
	Organic acid	× to △	○	×	△ to ○	× to △	×	× to △	○	×	×
	Organic acid of high concentration	△ to ○	△	×	◎	○	○	△ to ○	△	×	×
	Organic acid of low concentration	○	○	△	◎	◎	◎	○	○	×	×
	Strong alkali	○	◎	×	○	◎	◎	○	◎	△	△
	Weak alkali	○	◎	×	○	◎	◎	○	◎	△	△

* The indicated physical properties, chemical resistance and other numerical values are only approximate values used for reference. They are not guaranteed values.
· The above general characteristics may change according to the working conditions and the working environment.
· When determining the material, carry out adequate confirmation and verification in advance.
· SMC will not bear responsibility concerning the accuracy of data or any damage arising from this data.

● Color and Identification (ZP/ZP2)

General name	NBR (Nitrile rubber)	Silicone rubber	Urethane rubber	FKM (Fluoro-rubber)	CR (Chloroprene rubber)	EPR (Ethylene-propylene rubber)	Conductive NBR (Nitrile rubber)	Conductive silicone rubber	Conductive silicone sponge	Conductive CR sponge (Chloroprene sponge)
Color of rubber	Black	White	Brown	Black	Black	Black	Black	Black	Black	Black
Identification (Dot or stamp)	—	—	—	· Green 1 dot · Ⓕ	· Red 1 dot · Ⓒ	· Ⓔ	· Silver 1 dot	· Silver 2 dots	—	—
Rubber hardness HS (±5°)	A50/S	Other than Heavy duty A40/S Heavy duty A50/S	A60/S	A60/S	A50/S	A50/S	A50/S	A50/S	20	15

● Color and Identification (ZP3)

General name	NBR (Nitrile rubber)	Silicone rubber	Urethane rubber	FKM (Fluororubber)	Conductive NBR (Nitrile rubber)	Conductive silicone rubber
Color of rubber	Black	White	Brown	Black	Black	Black
Identification (Dot)	—	—	—	· Green 1 dot	· Silver 1 dot	· Pink 1 dot
Rubber hardness HS (±5°)	A60/S					

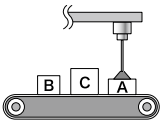
Note) The hardness of rubber shall conform to JIS K 6253. The hardness of sponge shall conform to SRIS 0101.

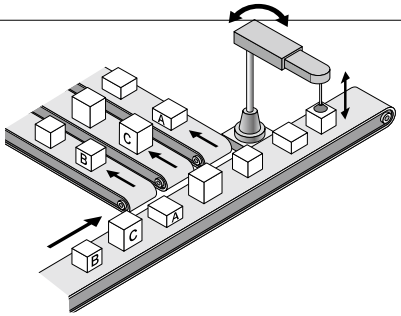
● Buffer Attachment

• Choose buffer type when the workpieces are of varying heights, the workpieces are fragile, or you need to reduce the impact to the pad. If rotation needs to be limited, use non-rotating buffer.

Unsteady Distance between Pad and Workpiece

When the workpieces are of varying heights, use the buffer type pad with built-in spring. The spring creates a cushion effect between the pad and the workpieces. If rotation needs to be limited further, use non-rotating buffer type.





● Notes for Attachment

The buffer is manufactured for the purpose of protecting the pad from impact when the pad is applied to a workpiece. An eccentric load applied to the buffer caused by piping (tubing) or the position of the attachment, or an improper tightening torque used when the buffer is attached may lead to poor sliding or a shortened product life. Also, minimize the load in the lateral direction.

● Tube Piping Reference

Prevent eccentric loads caused by piping (tubing) from being applied to the buffer. Route the tube piping with some degree of freedom, and ensure that it extends in the direction of the fitting. Also, make adjustments as required as the long piping, piping bundles, piping material, etc., may become a load.

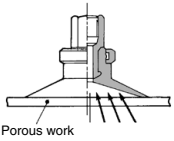
● Use the buffer within the stroke.

● Pad Selection by Workpiece Type

• Carefully select a pad for the following workpieces.

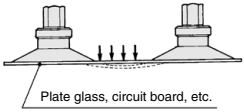
1. Porous Workpiece

To pick a permeable workpiece such as paper, select a pad with a small diameter that is sufficient to lift the workpiece. Because a large amount of air leakage could reduce the pad's suction force, it may be necessary to increase the capacity of an ejector or vacuum pump or enlarge the conductance area of the piping passage.



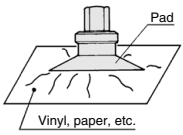
2. Flat Plate Workpiece

When a workpiece with a large surface area such as sheet glass or PCB is suspended, the workpiece could move in a wavelike motion if a large force is applied by wind pressure or by an impact. Therefore, it is necessary to ensure the proper allocation and size of pads.



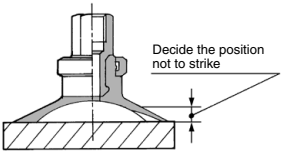
3. Soft Workpiece

If a soft workpiece such as vinyl, paper, or thin sheet is picked up, the vacuum pressure could cause the workpiece to deform or wrinkle. In such a case, it will be necessary to use a small pad or a ribbed pad and reduce the vacuum pressure.



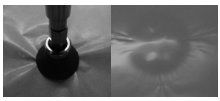
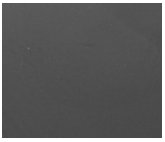
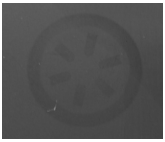
4. Impact to Pad

When pushing a pad to a workpiece, make sure not to apply an impact or a large force which would lead to premature deformation, cracking, or wearing of the pad. The pad should be pushed against the workpiece to the extent that its skirt portion deforms or that its ribbed portion comes into slight contact with the workpiece.
Especially, when using a smaller diameter pad, make sure to locate it correctly.



5. Adsorption Mark

The main adsorption marks are as follows:

	Before suction	After suction	Countermeasure
● Mark due to deformed (lined) workpiece			1) Reduce the vacuum pressure. If lifting force is inadequate, increase the number of pads. 2) Select a pad with a smaller center area.
	Suction conditions Workpiece: Vinyl Vacuum pad: ZP20CS Vacuum pressure: –40 kPa		
● Mark due to components contained in the rubber pad (material) moving to the workpiece.			Use the following products. 1) Mark-free NBR pad 2) ZP2 series • Stuck fluororesin pad • Resin attachment
	Suction conditions Workpiece: Glass Vacuum pad: ZP20CS Vacuum pressure: –40 kPa		
● A mark which remains on the rough surface of the workpiece due to wear-out of the rubber (pad material).			Use the following products. 1) ZP2 series • Stuck fluororesin pad • Resin attachment
	Suction conditions Workpiece: Resin plate (Surface roughness 2.5 μ) Vacuum pad: ZP20CS Vacuum pressure: –80 kPa		

Vacuum Pad Durability

- Need to be careful of the vacuum pad (rubber) deterioration.
- When the vacuum pad is used continuously, the following problems may occur.
  1) Wear-out of the adsorption surface.
     Shrinkage of the pad dimensions, sticking of the part where the rubber materials come into contact with each other (bellows pad)
  2) Weakening of the rubber parts (skirt of the adsorption surface, bending parts, etc.)

  ∗ It may occur at an early stage depending on the operating conditions (high vacuum pressure, suction time [vacuum holding], etc.).
- Decide when to replace the pads, referring to the signs of deterioration, such as changes in the appearance due to wear, reduction in the vacuum pressure or delay in the transport cycle time.

3 Selection of Vacuum Ejector and Vacuum Switching Valve

● Calculating Vacuum Ejector and Switching Valve Size with the Formula

Average suction flow rate for achieving adsorption response time

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

$$T_2 = 3 \times T_1$$

Q : Average suction flow rate L/min (ANR)
V : Piping capacity (L)
T_1 : Arrival time to stable **Pv** 63% after adsorption (sec)
T_2 : Arrival time to stable **Pv** 95% after adsorption (sec)
Q_L: Leakage volume during workpiece adsorption L/min (ANR) Note 1)

Max. suction flow rate

Qmax = (2 to 3) x Q L/min (ANR)

<Selection Procedure>

- **Ejector**
  Select the ejector with the greater maximum suction flow rate from the **Qmax** indicated above.
- **Direct operation valve**

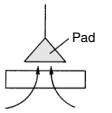
$$\text{Conductance } C = \frac{Qmax}{55.5} \text{ [dm}^3\text{/(s·bar)]}$$

∗ Select a valve (solenoid valve) having a conductance that is greater than that of the conductance **C** formula given above from the related equipment (page 793).

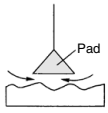
Note 1) Q_L: **0** when no leakage occurs during adsorbing a workpiece.
If there is leakage during adsorbing a workpiece, find the leakage volume based on "4. Leakage Volume during Workpiece Adsorption."
Note 2) Tube piping capacity can be found in "8. Data: Piping Capacity by Tube I.D. (Selection Graph (2))."

4 Leakage Volume during Workpiece Adsorption

Air could be drawn in depending on the type of workpiece. As a result, the vacuum pressure in the pad becomes reduced and the amount of vacuum that is necessary for adsorption cannot be attained.
When this type of workpiece must be handled, it is necessary to select the proper size of the ejector and the vacuum switching valve by taking into consideration the amount of air that could leak through the workpiece.



Ventilation workpiece



Rough workpiece surface

● Leakage Volume from Conductance of Workpiece

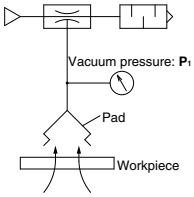
Leakage volume $Q_L = 55.5 \times C_L$

Q_L: Leakage volume L/min (ANR)
C_L: Conductance between workpiece and pad, and workpiece opening area [dm³/(s·bar)]

● Leakage Volume from Adsorption Test

As described in the illustration below, pick up the workpiece with the ejector, using an ejector, pad and a vacuum gauge.

At this time, read vacuum pressure P_1, obtain the suction flow rate from the flow rate characteristics graph for the ejector that is being used, and render this amount as the leakage of the workpiece.



Exercise: Using a supply pressure of 0.45 MPa, when the ejector (ZH07□S) picks up a workpiece that leaks air, the vacuum gauge indicated a pressure of –53 kPa. Calculate the leakage volume from the workpiece.

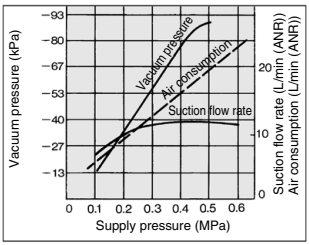
<Selection Procedure>

When obtaining the suction flow rate at a vacuum pressure of –53 kPa from the ZH07DS flow rate characteristics graph, the suction flow rate is 5 L/min (ANR). (Ⓐ→Ⓑ→Ⓒ)

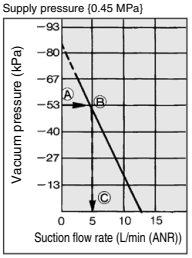
Leakage volume ≈ Suction flow rate 5 L/min (ANR)

ZH07BS, ZH07DS

Exhaust Characteristics



Flow rate Characteristics
Supply pressure {0.45 MPa}



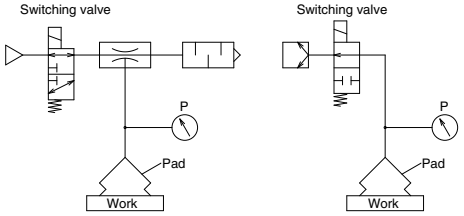
5 Adsorption Response Time

When a vacuum pad is used for the adsorption transfer of a workpiece, the approximate adsorption response time can be obtained (the length of time it takes for the pad's internal vacuum pressure to reach the pressure that is required for adsorption after the supply valve {vacuum switching valve} has been operated). An approximate adsorption response time can be obtained through formulas and selection graphs.

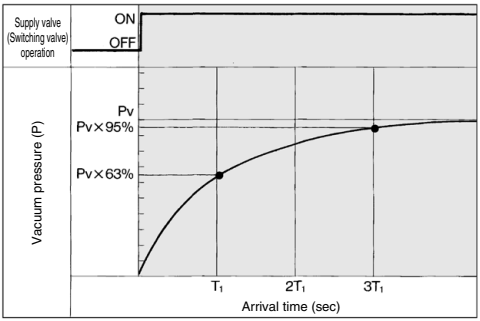
● Relationship between Vacuum Pressure and Response Time after Supply Valve (Switching Valve) is Operated

The relationship between vacuum pressure and response time after the supply valve (switching valve) is operated as shown below.

Vacuum System Circuit



Vacuum Pressure and Response Time after Supply Valve (Switching Valve) is Operated



Pv: Final vacuum pressure
T1 : Arrival time to 63% of final vacuum pressure **Pv**
T2 : Arrival time to 95% of final vacuum pressure **Pv**

● Calculating Adsorption Response Time with the Formula

Adsorption response times **T1** and **T2** can be obtained through the formulas given below.

Adsorption response time $T_1 = \frac{V \times 60}{Q}$

Adsorption response time $T_2 = 3 \times T_1$

Piping capacity

$V = \frac{3.14}{4} D^2 \times L \times \frac{1}{1000}$ (L)

T1 : Arrival time to 63% of final vacuum pressure **Pv** (sec)
T2 : Arrival time to 95% of final vacuum pressure **Pv** (sec)
Q1: Average suction flow rate L/min [ANR]
Calculation of average suction flow rate
• Ejector
Q1 = (1/2 to 1/3) x Ejector max. suction flow rate L/min [ANR]
• Vacuum pump
Q1 = (1/2 to 1/3) x 55.5 x Conductance of vacuum pump [dm³/(s·bar)]
D : Piping diameter (mm)
L : Length from ejector and switch valve to pad (m)
V : Piping capacity from ejector and switching valve to pad (L)
Q2: Max. flow from ejector and switching valve to pad by piping system
Q2 = C x 55.5 L/min [ANR]
Q : Smaller one between the **Q1** and **Q2** L/min [ANR]
C : Conductance of piping [dm³/(s·bar)]

For the conductance, the equivalent conductance can be found in "8. Data: Conductance by Tube I.D. (Selection Graph (3))."

Model Selection

● Adsorption Response Time from the Selection Graph

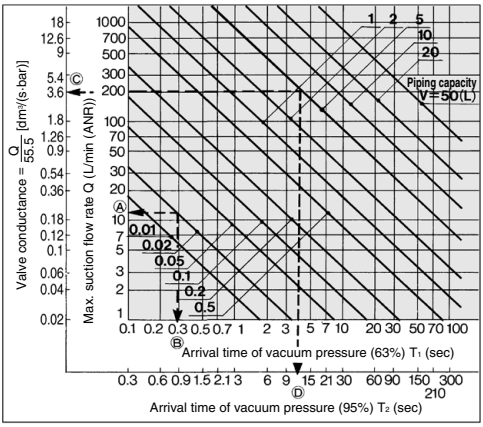
1. Tube Piping Capacity

Piping capacity from the ejector and switching valve at vacuum pump to the pad can be found in “8. Data: Piping Capacity by Tube I.D. (Selection Graph (2)).”

2. Obtain the adsorption response times.

By operating the supply valve (switching valve) that controls the ejector (vacuum pump), the adsorption response times **T_1** and **T_2** that elapsed before the prescribed vacuum pressure is reached can be obtained from the Selection Graph (1).

Selection Graph (1) Adsorption Response Time



∗ Conversely, the size of the ejector or the size of the switching valve of the vacuum pump system can be obtained from the adsorption response time.

How to read the graph

Example 1: For obtaining the adsorption response time until the pressure in the piping system with a piping capacity of 0.02 L is discharged to 63% (**T_1**) of the final vacuum pressure through the use of the vacuum ejector ZH07□S with a maximum suction flow rate of 12 L/min (ANR).

<Selection Procedure>

From the point at which the vacuum ejector’s maximum vacuum suction flow rate of 12 L/min (ANR) and the piping capacity of 0.02 L intersect, the adsorption response time **T_1** that elapses until 63% of the maximum vacuum pressure is reached can be obtained. (Sequence in Selection Graph (1), Ⓐ→Ⓑ) **$T_1 \approx$ 0.3 seconds.**

Example 2: For obtaining the discharge response time until the internal pressure in the 5 L tank is discharged to 95% (**T_2**) of the final vacuum pressure through the use of a valve with a conductance of 3.6 [dm³/(s·bar)].

<Selection Procedure>

From the point at which the valve’s conductance of 3.6 [dm³/(s·bar)] and the piping capacity of 5 L intersect, the discharge response time (**T_2**) that elapses until 95% of the final vacuum pressure is reached can be obtained. (Sequence in Selection Graph (1), Ⓒ→Ⓓ) **$T_2 \approx$ 12 seconds.**

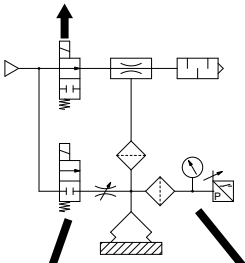
6 Precautions on Vacuum Equipment Selection and SMC's Proposal

● Safety Measures

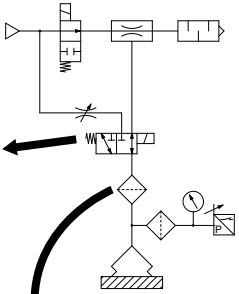
- Make sure to provide a safe design for a vacuum pressure drop due to a disruption of power supply, or a lack of supply air. Drop prevention measures must be taken in particular when dropping a workpiece presents some degree of danger.

● Precautions on Vacuum Equipment Selection

As a countermeasure for power outages, select a supply valve that is normally open or one that is equipped with a self-holding function.

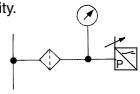


Be aware that the composite conductance consisting of the areas from the pad to the ejector of a vacuum switching valve does not decrease.



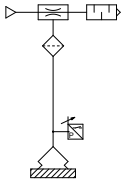
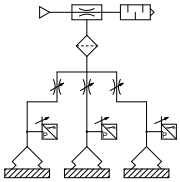
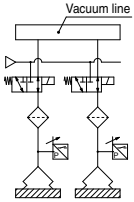
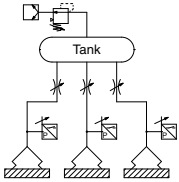
For the release valve, select a 2/3 port valve with a low vacuum specification. Also, use a needle valve to regulate the release flow rate.

- During the adsorption and transfer of a workpiece, verification of the vacuum switch is recommended.
- In addition, visually verify the vacuum gauge when handling a heavy or a hazardous item.
- Install a filter (ZFA, ZFB, ZFC series) before the pressure switch if the ambient air is of low quality.



Use a suction filter (ZFA, ZFB, ZFC series) to protect the switching valve and to prevent the ejector from becoming clogged. Also, a suction filter must be used in a dusty environment. If only the unit's filter is used, it will become clogged quickly.

● Vacuum Ejector or Pump and Number of Vacuum Pads

Ejector and number of pads		Vacuum pump and number of pads	
			
Ideally, one pad should be used for each ejector.	When more than one pad is attached to a single ejector, if one of the workpieces becomes detached, the vacuum pressure will drop, causing other workpieces to become detached. Therefore, the countermeasures listed below must be taken. • Adjust the needle valve to minimize the pressure fluctuation between adsorption and non-adsorption operations. • Provide a vacuum switching valve to each individual pad to minimize the influences on other pads if an adsorption error occurs.	Ideally, one pad should be used for each line.	When more than one pad is attached to a single vacuum line, take the countermeasures listed below. • Adjust the needle valve to minimize the pressure fluctuation between adsorption and non-adsorption operation. • Include a tank and a vacuum pressure reduction valve (vacuum pressure regulator valve) to stabilize the source pressure. • Provide a vacuum switching valve to each individual pad to minimize the influences on other pads if an adsorption error occurs.

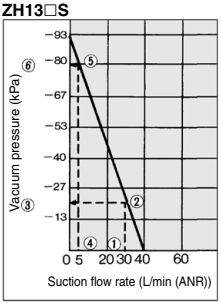
Model Selection

● Vacuum Ejector Selection and Handling Precautions

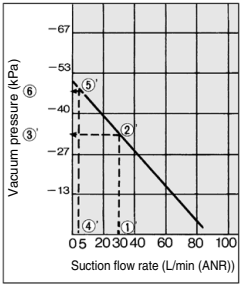
Ejector Selection

There are 2 types of ejector flow rate characteristics: the high vacuum type (S type) and the high flow type (L type).
During the selection, pay particular attention to the vacuum pressure when adsorbing workpieces that leak.

High Vacuum Type Flow Rate Characteristics/ ZH13□S

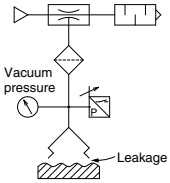


High Flow Type Flow Rate Characteristics/ ZH13□L



The vacuum pressure varies in accordance with the leakage volumes indicated in the above diagrams.
If the leakage volume is 30 L/min (ANR), the vacuum pressure of the S type is –20 kPa ① → ② → ③, and for the L type it is –33 kPa ①' → ②' → ③'. If the leakage volume is 5 L/min (ANR), the vacuum pressure of the S type is –80 kPa ④ → ⑤ → ⑥, and for the L type it is –47 kPa ④' → ⑤' → ⑥'. Thus, if the leakage volume is 30 L/min (ANR) the L type can attain a higher vacuum pressure, and if the leakage volume is 5 L/min (ANR), the S type can attain a higher vacuum pressure.
Thus, during the selection process, make sure to take the flow rate characteristics of the high vacuum type (S type) and the high flow type (L type) into consideration in order to select the type that is optimal for your application.

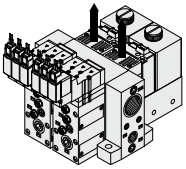
Ejector Nozzle Diameter Selection



If a considerable amount of leakage occurs between the workpiece and the pad, resulting in incomplete adsorption, or to shorten the adsorption and transfer time, select an ejector nozzle with a larger diameter from the ZH, ZR, or ZL series.

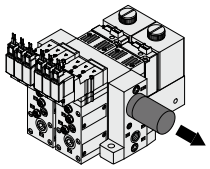
Manifold Use

Individual exhaust



If there are a large number of ejectors that are linked on a manifold and operate simultaneously, use the built-in silencer type or the port exhaust type.

Centralized exhaust



If there are a large number of ejectors that are linked on a manifold, which exhaust collectively, install a silencer at both ends. If the exhaust must be discharged outdoors through piping, make the diameter of the piping larger to control its back pressure to 5 kPa or less so that the back pressure will not affect the operation of the ejectors.

- If the vacuum ejector makes an intermittent noise (abnormal noise) from exhaust at a certain supply pressure, the vacuum pressure will not be stable. It will not be any problem if the vacuum ejector is used under this condition. However, if the noise is disturbing or might affect the operation of the vacuum pressure switch, lower or raise supply pressure a little at a time, and use in an air pressure range that does not produce the intermittent noise.

● Supply Pressure of Vacuum Ejector

- It is recommended to use the vacuum ejector at the standard supply pressure.
  The maximum vacuum pressure and suction flow rate can be obtained when the vacuum ejector is used at the standard supply pressure, and as a result, adsorption response time also improves. From the viewpoint of energy-saving, it is the most effective to use the ejector at the standard supply pressure. Since using it at an excessive supply pressure may cause the ejector performance to lower, it is recommended to use at the standard supply pressure.

● Timing for Vacuum Generation and Suction Verification

A. Timing for Vacuum Generation

The time for opening/closing the valve will be counted if a vacuum is generated after the adsorption pad descends to adsorb a workpiece. Also, there is a timing delay risk for the generating vacuum since the operational pattern for the verification switch, which is used for detecting the descending vacuum pad, is not even.
To solve this issue, we recommend that vacuum be generated in advance, before the vacuum pad begins to descend to the workpiece. Adopt this method after confirming that there will be no misalignment resulting from the workpiece's light mass.

B. Suction Verification

When lifting the vacuum pad after absorbing a workpiece, confirm that there is a suction verification signal from the vacuum pressure switch, before the vacuum pad is lifted. If the vacuum pad is lifted, based on the timing of a timer, etc., there is a risk that the workpiece may be left behind.
In general adsorption transfer, the time for adsorbing a workpiece is slightly different since the position of the vacuum pad and the workpiece are different after every operation. Therefore, program a sequence in which the suction completion is verified by a vacuum pressure switch, etc. before moving to the next operation.

C. Set Pressure for Vacuum Pressure Switch

Set the optimum value after calculating the required vacuum pressure for lifting a workpiece.
If a higher pressure than required is set, there is a possibility of being unable to confirm the suction even though the workpiece is adsorbed. This will result in a suction error.
When setting vacuum pressure switch set values, you should set using a lower pressure, with which a workpiece can be adsorbed, only after considering the acceleration or vibration when a workpiece is transferred. The set value of the vacuum pressure switch shortens the time to lift a workpiece. Since the switch detects whether the workpiece is lifted or not, the pressure must be set high enough to detect it.

Vacuum Pressure Switch (ZSE Series), Flow Sensor (PFMV Series), Vacuum Pressure Gauge (GZ Series)

When adsorbing and transferring a workpiece, verify at the vacuum pressure switch as much as possible (In addition, visually verify the vacuum gauge, especially when handling a heavy or a hazardous item.).

Approx. ø1 adsorption nozzle
The difference in pressure between ON and OFF becomes small depending on the capacity of the ejector and vacuum pump. In such a case, it is necessary to use the digital pressure switch ZSE10 or ZSE30A with a fine smallest settable increment or a flow switch for flow rate detection.

Note) • **A vacuum generator with a large suction capacity will not be detected properly,** so an ejector with an appropriate capacity must be selected.
• Since the hysteresis is small, vacuum pressure must be stabilized.

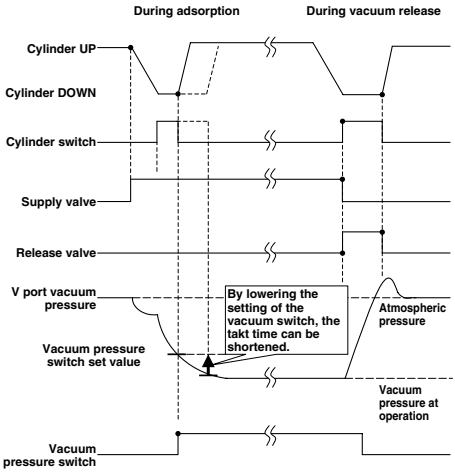
Vacuum pressure switch
ZSE10, ZSE30A

Flow sensor
PFMV

Vacuum pressure gauge
GZ46

Refer to the Best Pneumatics No. 8 for details.

Timing Chart Example



● Dust Handling of Vacuum Equipment

- When the vacuum equipment is used, not only the workpiece, but also dust in the surrounding environment is taken in the equipment. Preventing the intrusion of dust is required more than for any other pneumatic equipment. Some of SMC's vacuum equipment comes with a filter, but when there is a large amount of dust, an additional filter must be installed.
- When vaporized materials such as oil or adhesive are sucked into the equipment, they accumulate inside, which may cause problems.
- It is important to prevent dust from entering the vacuum equipment as much as possible.
  (1) Make sure to keep the working environment and surrounding area of the workpiece clean so that dust will not be sucked in the equipment.
  (2) Check the amount and types of dust before using the equipment and install a filter, etc., in the piping when necessary.
  (3) Conduct a test and make sure that operating conditions are cleared before using the equipment.
  (4) Perform filter maintenance depending on the amount of dirt.
  (5) Filter clogging generates a pressure difference between the adsorption and ejector parts. This requires attention, since clogging can prevent proper adsorption from being achieved.

Air Suction Filter (ZFA, ZFB, ZFC Series)

- To protect the switching valve and the ejector from becoming clogged, a suction filter in the vacuum circuit is recommended.
- When using an ejector in a dusty environment, the unit's filter will become clogged quickly, so it is recommended that the ZFA, ZFB or ZFC series be used concurrently.

Vacuum Line Equipment Selection

Determine the volume of the suction filter and the conductance of the switching valve in accordance with the maximum suction flow rate of the ejector and the vacuum pump. Make sure that the conductance is greater than the value that has been obtained through the formula given below. (If the devices are connected in series in the vacuum line, their conductances must be combined.)

$$C = \frac{Q_{max}}{55.5}$$

C: Conductance [dm³/(s·bar)]
Q_{max}: Max. suction flow rate L/min (ANR)

7 Vacuum Equipment Selection Example

● Transfer of Semiconductor Chips

Selection conditions:

(1) Workpiece: Semiconductor chips
Dimensions: 8 mm x 8 mm x 1 mm, Mass: 1 g
(2) Vacuum piping length: 1 m
(3) Adsorption response time: 300 msec or less

1. Vacuum Pad Selection

(1) Based on the workpiece size, the pad diameter is 4 mm (1 pc.).

(2) Using the formula on page 303, confirm the lifting force.

W = P x S x 0.1 x 1/t
0.0098 = P x 0.13 x 0.1 x 1/4
P = 3.0 kPa

W = 1 g = 0.0098 N
S = $\pi/4 \times (0.4)^2 = 0.13$ cm^2
t = 4 (Horizontal lifting)

According to the calculation, –3.0 kPa or more of vacuum pressure can adsorb the workpiece.

(3) Based on the workpiece shape and type, select:
Pad type: Flat with groove
Pad material: Silicone rubber

(4) According to the results above, select a vacuum pad part number ZP3-04UMS.

2. Vacuum Ejector Selection

(1) Find the vacuum piping capacity.
Assuming that the tube I.D. is 2 mm, the piping capacity is as follows:

$V = \pi/4 \times D^2 \times L \times 1/1000 = \pi/4 \times 2^2 \times 1 \times 1/1000$
$= 0.0031$ L

(2) Assuming that leakage (Q_L) during adsorption is 0, find the average suction flow rate to meet the adsorption response time using the formula on page 308.

$Q = (V \times 60)/T_1 + Q_L = (0.0031 \times 60)/0.3 + 0 = 0.62$ L

From the formula on page 308, the maximum suction flow rate Q_{max} is

Q_{max} = (2 to 3) x Q = (2 to 3) x 0.62
= 1.24 to 1.86 L/min (ANR)

According to the maximum suction flow rate of the vacuum ejector, a nozzle with a 0.5 diameter can be used.
If the vacuum ejector ZX series is used, representative model ZX105□ can be selected.
(Based on the operating conditions, specify the complete part number for the vacuum ejector used.)

3. Adsorption Response Time Confirmation

Confirm the adsorption response time based on the characteristics of the vacuum ejector selected.

(1) The maximum suction flow rate of the vacuum ejector ZX105□ is 5 L/min (ANR). From the formula on page 309, the average suction flow rate Q_1 is as follows:

Q_1 = (1/2 to 1/3) x Ejector max. suction flow rate
= (1/2 to 1/3) x 5 = 2.5 to 1.7 L/min (ANR)

(2) Next, find the maximum flow rate Q_2 of the piping. The conductance **C is 0.22** from the Selection Graph (3).
From the formula on page 309, the maximum flow rate is as follows:

$Q_2 = C \times 55.5 = 0.22 \times 55.5 = 12.2$ L/min (ANR)

(3) Since Q_2 is smaller than Q_1, **Q = Q_1**.
Thus, from the formula on page 309, the adsorption response time is as follows:

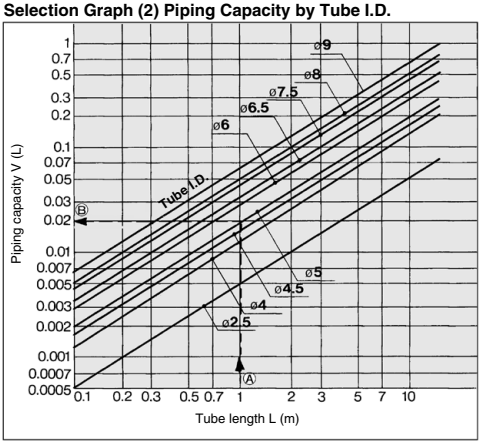
$T = (V \times 60)/Q = (0.0031 \times 60)/1.7 = 0.109$ seconds
= 109 msec

It is possible to confirm that the calculation result satisfies the required specification of 300 msec.

8 Data

● Selection Graph

Selection Graph (2) Piping Capacity by Tube I.D.



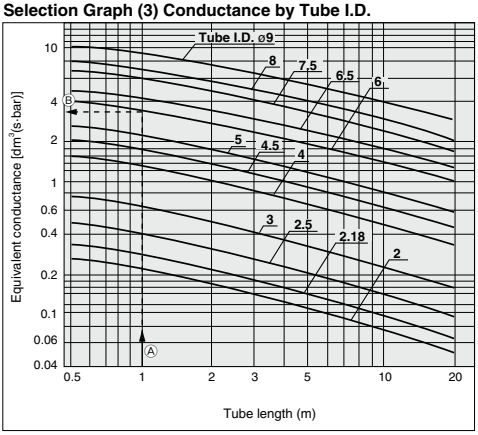
How to read the graph
Example: For obtaining the capacity of tube I.D. ø5 and 1 meter length

<Selection Procedure>

By extending leftward from the point at which the 1 meter tube length on the horizontal axis intersects the line for a tube I.D. ø5, the piping capacity approximately equvalent to 0.02 L can be obtained on the vertical axis.

Piping capacity ≈ 0.02 L

Selection Graph (3) Conductance by Tube I.D.



How to read the graph
Example: Tube size ø8/ø6 and 1 meter length

<Selection Procedure>

By extending leftward from the point at which the 1 meter tube length on the horizontal axis intersects the line for a tube I.D. ø6, the equivalent conductance approximately 3.6 [dm³/(s·bar)] can be obtained on the vertical axis.

Equivalent conductance ≈ 3.6 [dm³/(s·bar)]

● Glossary of Terms

Terms	Description
(Max.) suction flow rate	Volume of air taken in by the ejector. The maximum value is the volume of air taken in without having anything connected to the vacuum port.
Maximum vacuum pressure	The maximum value of the vacuum pressure generated by the ejector
Air consumption	The compressed volume of air consumed by the ejector
Standard supply pressure	The optimal supply pressure for operating the ejector
Exhaust characteristics	The relationship between the vacuum pressure and the suction flow rate when the supply pressure to the ejector has been changed.
Flow rate characteristics	The relationship between the vacuum pressure and the suction flow rate with the standard supply pressure supplied to the ejector.
Vacuum pressure switch	Pressure switch for verifying the adsorption of a workpiece
(Air) supply valve	Valve for supplying compressed air to the ejector
(Vacuum) release valve	Valve for supplying positive pressure or air for breaking the vacuum state of the adsorption pad
Flow adjustment valve	Valve for adjusting the volume of air for breaking the vacuum
Pilot pressure	Pressure for operating the ejector valve
External release	The action of breaking the vacuum using externally supplied air instead of using the ejector unit
Vacuum port	Port for generating vacuum
Exhaust port	Port for exhausting air consumed by the ejector, and air taken in from the vacuum port.
Supply port	Port for supplying air to the ejector
Back pressure	Pressure inside the exhaust port
Leakage	The entry of air into the vacuum passage, such as from an area between a workpiece and a pad, or between a fitting and a tube. The vacuum pressure decreases when leakage occurs.
Response time	The time from the application of the rated voltage to the supply valve or release valve,until V port pressure reaches the specified pressure.
Average suction flow rate	The suction flow rate by the ejector or pump for calculating the response speed. It is 1/2 to 1/3 of the maximum suction flow rate.
Conductive pad	A low electrical resistance pad for electrostatic prevention measure
Vacuum pressure	Any pressure below the atmospheric pressure. When the atmospheric pressure is used as a reference, the pressure is presented by –kPa (G), and when the absolute pressure is used as a reference, the pressure is represented by kPa (abs). When referencing a piece of vacuum equipment such as an ejector, the pressure is generally represented by –kPa.
Ejector	A unit for generating vacuum by discharging the compressed air from a nozzle at a high speed, based on the phenomenon in which the pressure is reduced when the air around the nozzle is sucked.
Air suction filter	Vacuum filter provided in the vacuum passage for preventing the dust intrusion into the ejector, vacuum pump, or peripheral equipment

● Countermeasures for Vacuum Adsorption System Problems (Troubleshooting)

Condition & Description of improvement	Contributing factor	Countermeasure
Initial adsorption problem (During trial operation)	Adsorption area is small. (Lifting force is lower than the workpiece mass.)	Recheck the relationship between workpiece mass and lifting force. • Use a vacuum pad with a large adsorption area. • Increase the quantity of vacuum pads.
	Vacuum pressure is low. (Leakage from adsorption surface) (Air permeable workpiece)	Eliminate (reduce) leakage from adsorption surface. • Reconsider the shape of a vacuum pad. Check the relationship between suction flow rate and arrival pressure of vacuum ejector. • Use a vacuum ejector with a high suction flow rate. • Increase adsorption area.
	Vacuum pressure is low. (Leakage from vacuum piping)	Repair leakage point.
	Internal volume of vacuum circuit is large.	Check the relationship between internal volume of the vacuum circuit and suction flow rate of the vacuum ejector. • Reduce internal volume of the vacuum circuit. • Use a vacuum ejector with a high suction flow rate.
	Pressure drop of vacuum piping is large.	Reconsider vacuum piping. • Use a shorter or larger tube (with appropriate diameter).
	Inadequate supply pressure of vacuum ejector	Measure supply pressure in vacuum generation state. • Use standard supply pressure. • Reconsider compressed air circuit (line).
	Clogging of nozzle or diffuser (Infiltration of foreign matter during piping)	Remove foreign matter.
	Supply valve (switching valve) is not being activated.	Measure supply voltage at the solenoid valve with a tester. • Reconsider electric circuits, wiring and connectors. • Use in the rated voltage range.
	Workpiece deforms during adsorption.	Since a workpiece is thin, it deforms and leakage occurs. • Use a pad for adsorption of thin objects.
Late vacuum achieving time (Shortening of response time)	Internal volume of vacuum circuit is large.	Check the relationship between internal volume of the vacuum circuit and suction flow rate of the vacuum ejector. • Reduce internal volume of the vacuum circuit. • Use a vacuum ejector with a high suction flow rate.
	Pressure drop of vacuum piping is large.	Reconsider vacuum piping. • Use a shorter or larger tube (with appropriate diameter).
	Using the product as close to the highest vacuum power in the specifications.	Set vacuum pressure to minimum necessary value by optimizing the pad diameter etc. As the vacuum power of an ejector (venturi) rises, the vacuum flow actually lowers. When an ejector is used at its highest possible vacuum value, the vacuum flow will lower. Due to this, the amount of time needed to achieve adsorption is lengthened. One should consider an increase in the diameter of the ejector nozzle or an increase the size of the vacuum pad utilized in order to lower the required vacuum pressure, maximum the vacuum flow, and speed up the adsorption process.
	Setting of vacuum pressure switch is too high.	Set to suitable setting pressure.
Fluctuation in vacuum pressure	Fluctuation in supply pressure	Reconsider compressed air circuit (line). (Addition of a tank etc.)
	Vacuum pressure may fluctuate under certain conditions due to ejector characteristics.	Lower or raise supply pressure a little at a time, and use in a supply pressure range where vacuum pressure does not fluctuate.
Occurrence of abnormal noise (intermittent noise) from exhaust of vacuum ejector	Intermittent noise may occur under certain conditions due to ejector characteristics.	Lower or raise supply pressure a little at a time, and use in a supply pressure range where the intermittent noise does not occur.
Air leakage from vacuum port of manifold type vacuum ejector	Exhaust air from the ejector enters the vacuum port of another ejector that is stopped.	Use a vacuum ejector with a check valve. (Please contact SMC for the part number of an ejector with a check valve.)

Condition & Description of improvement	Contributing factor	Countermeasure
Adsorption problem over time (Adsorption is normal during trial operation.)	Clogging of suction filter	Replace filters. Improve installation environment.
	Clogging of sound absorbing material	Replace sound absorbing materials. Add a filter to supply (compressed) air circuit. Install an additional suction filter.
	Clogging of nozzle or diffuser	Remove foreign matter. Add a filter to supply (compressed) air circuit. Install an additional suction filter.
	Vacuum pad (rubber) deterioration, cracking, etc.	Replace vacuum pads. Check the compatibility of vacuum pad material and workpiece.
Workpiece is not released.	Inadequate release flow rate	Open release flow adjustment needle.
	Vacuum pressure is high. Excessive force (adhesiveness of the rubber + vacuum pressure) is applied to the pad (rubber part).	Reduce the vacuum pressure. If inadequate lifting force causes a problem in transferring the workpieces, increase the number of pads.
	Effects due to static electricity	Use a conductive pad.
	Adhesiveness of the rubber increases due to the operating environment or wearing of the pad. • Adhesiveness of the rubber material is high. • Adhesiveness increases due to wearing of the vacuum pad (rubber).	Replace pads. Reconsider the pad material and check the compatibility of pad material and workpiece. Reconsider the pad form. (Changes to rib, groove, blast options) Reconsider the pad diameter and quantity of pads.

● Non-conformance Examples

Phenomenon	Possible causes	Countermeasure
No problem occurs during the test, but adsorption becomes unstable after starting operation.	• Setting of the vacuum switch is not appropriate. Supply pressure is unstable. Vacuum pressure does not reach the set pressure. • There is leakage between the workpiece and the vacuum pad.	1) Set the pressure for the vacuum equipment (supply pressure, if using an ejector) to the necessary vacuum pressure during the adsorption of the workpieces. And set the set pressure for the vacuum switch to the necessary vacuum pressure for adsorption. 2) It is presumed that there was leakage during the test, but it was not serious enough to prevent adsorption. Reconsider the vacuum ejector and the shape, diameter, and material of the vacuum pad. Reconsider the vacuum pad.
Adsorption becomes unstable after replacing the pad.	• Initial setting conditions (vacuum pressure, vacuum switch setting, height of the pad) have changed. Settings have changed because the pad was worn out or had permanent setting due to the operating environment. • When the pad was replaced, leakage was generated from the screw connection part, or the engagement between the pad and the adapter.	1) Reconsider the operating conditions including vacuum pressure, the set pressure of the vacuum switch, and the height of the pad. 2) Reconsider the engagement.
Identical pads are used to adsorb identical workpieces, but some of the pads cannot adsorb the workpieces.	• There is leakage between the workpiece and the vacuum pad. • The supply circuit for the cylinder, the solenoid valve and the ejector is in the same pneumatic circuit system. The supply pressure decreases when they are used simultaneously. (Vacuum pressure does not increase.) • There is leakage from the screw connection part or the engagement between the pad and the adapter.	1) Reconsider the pad diameter, shape, material, vacuum ejector (suction flow rate), etc. 2) Reconsider the pneumatic circuit. 3) Reconsider the engagement.
Generation of sticking of bellows of the bellows pad and/or recovery delays. (It may occur at an early stage.)	When the vacuum pad (bellows type) reaches the end of its life, weakening of bent parts, wearing, or sticking of rubber parts occurs.	The operating conditions will determine the product life. Inspect it sufficiently and determine the replacement time. • Replace pads. • Reconsider the diameter, form, and material of vacuum pads. • Reconsider the quantity of vacuum pads.
	Vacuum pressure is higher than necessary, so excessive force (adhesiveness of the rubber + vacuum pressure) is applied to the pad (rubber part).	Reduce the vacuum pressure. If inadequate lifting force causes a problem in transferring the workpieces due to the reduction of vacuum pressure, increase the number of pads.
	Load is applied to the bellows due to the following operations, leading to sticking of rubber parts or reduction of the pad recovery performance. • Pushing exceeding pad displacement (operating range), external load. • Workpiece holding/waiting Waiting 10 seconds or more while the workpiece is being held ＊ Even when under 10 seconds, pads sticking or a recovery delay issues may occur earlier depending on the operating environment and operating method. Longer workpiece holding times lead to longer recovery times and a shorter life.	Reduce the load applied to the pad. • Review the equipment so that an external load exceeding the pad displacement (operating range) is not applied. • Avoid workpiece holding and waiting. The operating conditions will determine the product life. Inspect it and determine the replacement time.
The product life is shortened after replacement of the product (pad, buffer, etc.).	• The settings of the product changed. • Tube had been pulled. Unbalanced load in clockwise direction increased. • The transfer speed increased. • The workpiece to be transferred was changed. (Shape, center of gravity, weight, etc.) • The mounting orientation was at an angle. • The operating environment changed. • The buffer (mounting nut) was not tightened with the appropriate torque.	If the problem (cannot adsorb) does not occur when starting operation, the product may reach the end of its life due to the customer's specification conditions. Reconsider the piping and operation (specifications). The selected model may not be appropriate for the current workpiece to be transferred or the specifications. Select the product model again by reconsidering the pad shape, diameter, quantity, and suction balance.
Pad comes out from the adapter during operation. Cracks are generated on the pad.	Load is applied to the pad (rubber part) due to the following factors. • Inadequate lifting force • Incorrect suction balance • Loads due to transfer acceleration are not considered when selecting the product model.	The selected model may not be appropriate for the current workpiece to be transferred or the specifications. Select the product model again by reconsidering the pad shape, diameter, quantity, and suction balance.

Phenomenon	Possible causes	Countermeasure
Cracks are generated on the rubber (NBR, conductive NBR). 	• The product is operated in an ozone environment. • An ionizer is used. * This phenomenon occurs earlier if pushing or the high vacuum pressure is used.	Reconsider the operating environment. Reconsider the materials to be used.
Even when a mark-free pad is used, the pad end wears out quickly. (Suction marks are generated.)	If the pad adsorbs a highly clean workpiece, slippage is minimized, and a load (impact) is applied to the pad end.	Use the following products. • Stuck fluororesin pad • Clean attachment
Even when a mark-free pad is used, suction marks are generated.	• Incorrect application (The mark was generated due to a deformation.) • Contamination (insufficient cleaning) on the pad when installing the equipment, dust in the operating environment etc.	Check the mark generated on the workpiece. 1) Mark due to deformed (lined) workpiece Reconsider the pad diameter, form, material, vacuum ejector (suction flow rate), etc. 2) Mark due to worn rubber Reconsider the pad diameter, form, material, vacuum ejector (suction flow rate), etc. 3) Mark generated by moving components If the suction mark disappears or becomes smaller after wiping with cloth or waste cloth (without using solutions), clean the pad as it may have been contaminated. Refer to "Cleaning method (Mark-free NBR pad)" on page 559 of this catalog.

■When mounted with the nut, sometimes the buffer operation is not smooth, or the buffer does not slide.

[Possible causes]

- The tightening torque of the nut for mounting the buffer is too high.
- Particles stuck to the sliding surface, or it is scratched.
- Lateral load applied to the piston rod, causing eccentric wearing.

[Remedy]

Tighten the nut to the recommended tightening torque.

The nut may become loose depending on the operating conditions and environment. Be sure to perform regular maintenance.

ZP/ZP2

Product specifications			Nut tightening torque
Pad diameter	Product part no.	Mounting thread size	
ø2 to ø16 2004 to 4010	ZP□ (02 to 08) U, B□ ZP□ (10 to 16) UT, C□ ZP□ (2004 to 4010) U□	M8 x 1	1.5 to 2.0 N·m
ø10 to ø32	ZP□ (10 to 32) U, C, B, D□ ZP□ (10 to 16) F□	M10 x 1	2.5 to 3.5 N·m
ø20 to ø50	ZP□ (40, 50) U, C, B, D□ ZP□ (20 to 50) F□	M14 x 1	6.5 to 7.5 N·m

ZP3

Product specifications			Nut tightening torque
Pad diameter	Product part no.	Mounting thread size	
ø1.5 to ø3.5	ZP3-*(015 to 035) U*	M6 x 0.75	1.5 to 1.8 N·m
		M8 x 0.75	2.0 to 2.5 N·m
ø4 to ø16	ZP3-*(04 to 16) UM,B* ZP3-*(10 to 16) UM,B*	M8 x 0.75	2.0 to 2.5 N·m

Heavy-duty Pad

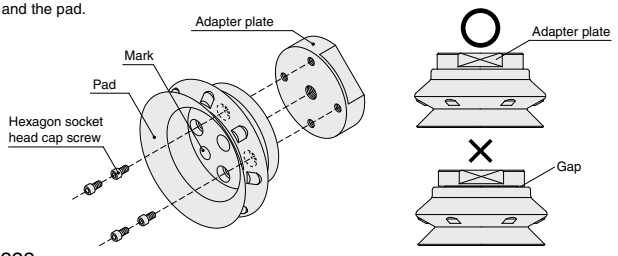
Product specifications					Nut tightening torque
Pad diameter	Product part no.		Mounting thread size	Buffer body material	
ø40, ø50	ZP□ (40/50) H□ ZP□ (40/50) HB□	J JB □ JF	M18 x 1.5	Aluminum alloy	9.5 to 10.5 N·m
				Brass	28 to 32 N·m
				Steel	48 to 52 N·m
ø63, ø80	ZP□ (63/80) H□ ZP□ (63/80) HB□	J JB □ JF	M18 x 1.5	Aluminum alloy	9.5 to 10.5 N·m
				Brass	28 to 32 N·m
				Steel	48 to 52 N·m
ø100, ø125	ZP□ (100/125) H□ ZP□ (100/125) HB□	J JB □ JF	M22 x 1.5	Aluminum alloy	9.5 to 10.5 N·m
				Brass	45 to 50 N·m
				Steel	75 to 80 N·m

Heavy-duty Ball Joint Pad

Product specifications					Nut tightening torque
Pad diameter	Product part no.		Mounting thread size	Buffer body material	
ø40, ø50	ZP2-□F (40/50) H□ ZP2-□F (40/50) HB□	JB □ JF	M18 x 1.5	Brass	28 to 32 N·m
				Steel	48 to 52 N·m
ø63, ø80	ZP2-□F (63/80) H□ ZP2-□F (63/80) HB□	JB □ JF	M22 x 1.5	Brass	45 to 50 N·m
				Steel	75 to 80 N·m
ø100, ø125	ZP2-□F (100/125) H□ ZP2-□F (100/125) HB□	JB □ JF	M22 x 1.5	Brass	45 to 50 N·m
				Steel	75 to 80 N·m

How to Replace the Pad

Remove bolts with a hex. key wrench from the pad underside. Tighten new pad with the bolts ensuring there is no gap between the adapter plate and the pad.



●Time of Replacement of Vacuum Pad

The vacuum pad is disposable. Replace it on a regular basis.

Continued use of the vacuum pad will cause wear and tear on the adsorption surface, and the exterior dimensions will gradually get smaller and smaller. As the pad diameter gets smaller, lifting force will decrease, though adsorption is possible.

It is extremely difficult to provide advice on the frequency of vacuum pad exchange. This is because there are numerous factors at work, including surface roughness, operating environment (temperature, humidity, ozone, solvents, etc.), and operating conditions (vacuum pressure, workpiece weight, pressing force of the vacuum pad on the workpiece, presence or absence of a buffer, etc.).

(Weakening of bent parts, wear, or sticking of rubber parts may occur with the bellows type pad.)

Thus, the customer should decide when the vacuum pad should be exchanged, based on its condition at time of initial use.

The bolt may become loose depending on the operating conditions and environment. Be sure to perform regular maintenance.

Recommended Tightening Torque for Replacement of Heavy-duty Pad

Product specifications			Bolt tightening torque
Pad diameter	Product part no.	Bolt	
ø40, ø50	ZP (40/50) H□ ZP (40/50) HB□	M3 x 8	0.7 to 0.9 N·m
ø63, ø80	ZP (63/80) H□ ZP (63/80) HB□	M4 x 8	0.9 to 1.1 N·m
ø100, ø125	ZP (100/125) H□ ZP (100/125) HB□	M5 x 10	2.3 to 2.7 N·m

Tighten the nut to the recommended tightening torque.

Compact Pad

Pad diameter ø1.5, ø2, ø3.5, ø4, ø6, ø8, ø10, ø13, ø16

Symbol/Type
U: Flat
UM: Flat with groove
B: Bellows

How to Order

Pad unit **ZP3 − 015 U N**

Pad diameter

Symbol	Pad diameter
015	ø1.5
02	ø2
035	ø3.5
04	ø4
06	ø6
08	ø8
10	ø10
13	ø13
16	ø16

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

Pad type—Pad diameter

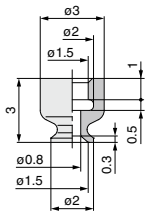
Pad type \ Pad diameter (Symbol)	015	02	035	04	06	08	10	13	16
U (Flat)	●	●	●	—	—	—	—	—	—
UM (Flat with groove)	—	—	—	●	●	●	●	●	●
B (Bellows)	—	—	—	●	●	●	●	●	●

∗ Sales unit
ø1.5 to ø8 : 10 pcs.
ø10 to ø16 : 5 pcs.

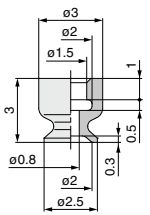
Dimensions: Pad Unit

Flat

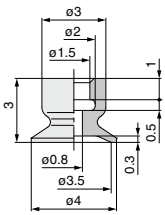
ZP3-015U□ [Weight: 0.1 g]



ZP3-02U□ [Weight: 0.1 g]

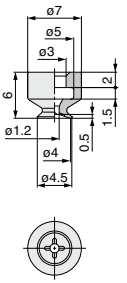


ZP3-035U□ [Weight: 0.1 g]

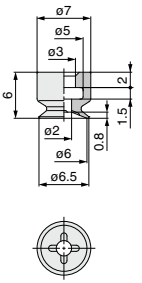


Flat with groove

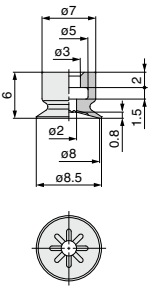
ZP3-04UM□ [Weight: 0.3 g]



ZP3-06UM□ [Weight: 0.3 g]



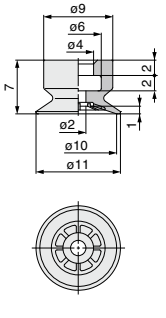
ZP3-08UM□ [Weight: 0.3 g]



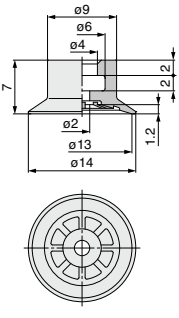
Dimensions: Pad Unit

Flat with groove

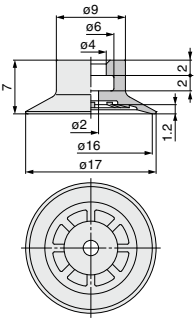
ZP3-10UM□ [Weight: 0.6 g]



ZP3-13UM□ [Weight: 0.7 g]

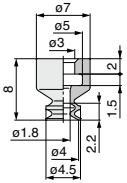


ZP3-16UM□ [Weight: 0.8 g]

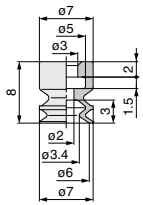


Bellows

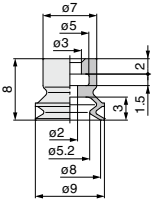
ZP3-04B□ [Weight: 0.3 g]



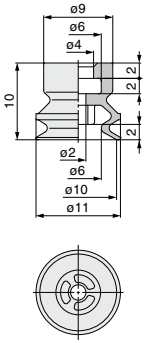
ZP3-06B□ [Weight: 0.3 g]



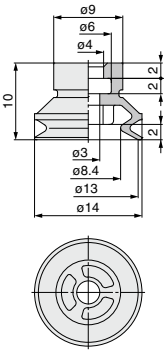
ZP3-08B□ [Weight: 0.4 g]



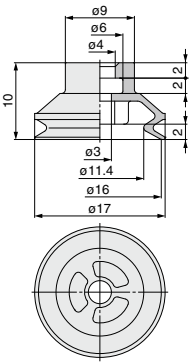
ZP3-10B□ [Weight: 0.8 g]



ZP3-13B□ [Weight: 1.0 g]



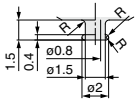
ZP3-16B□ [Weight: 1.1 g]



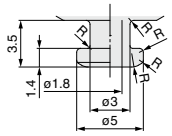
Pad Mounting Dimensions

If an adapter will be made by the customer, design the adapter with the dimensions shown below.

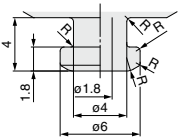
Applicable pad 015U/02U/035U



Applicable pad 04UM/06UM/08UM/04B/06B/08B

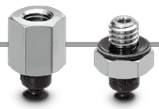


Applicable pad 10UM/13UM/16UM/10B/13B/16B



Note) R part has to be smooth with no corners. *Refer to pages 370 and 371 for applicable adapter.

How to Order



Vertical vacuum inlet/ With adapter

ZP3 – T 015 U N – A6 – B3

Vacuum inlet direction

Symbol	Direction
T	Vertical

Pad diameter

Symbol	Pad diameter	Symbol	Pad diameter
015	ø1.5	**08**	ø8
02	ø2	**10**	ø10
035	ø3.5	**13**	ø13
04	ø4	**16**	ø16
06	ø6		

Pad type—Pad diameter

Pad type \ Pad diameter (Symbol)	015	02	035	04	06
U (Flat)	●	●	●	—	—
UM (Flat with groove)	—	—	—	●	●
B (Bellows)	—	—	—	●	●

Pad type \ Pad diameter (Symbol)	08	10	13	16
U (Flat)	—	—	—	—
UM (Flat with groove)	●	●	●	●
B (Bellows)	●	●	●	●

Vacuum inlet (◇)

Symbol	Vacuum inlet	Mounting thread size		
		A6	**A10**	**A12**
B3	M3 x 0.5 female thread	●	—	—
B5	M5 x 0.8 female thread	—	●	●
U2	ø2 tubing/barb fitting *1	●	●	●
U4	ø4 tubing/barb fitting *2	●	●	●
U6	ø6 tubing/barb fitting *2	—	—	●
02	ø2 tubing	●	●	●
04	ø4 tubing	●	●	●
06	ø6 tubing	—	—	●
Nil	—	**A3/A5/B3/B5**		

*1 Polyurethane tube piping
*2 Soft nylon/Polyurethane tube piping

Pad material (□)

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

Mounting thread size

	Symbol	Mounting Thread size	ø1.5 to ø3.5	ø4 to ø8	ø10 to ø16
Male thread	**A3***	M3 x 0.5	●	—	—
	A5*	M5 x 0.8	—	●	●
	A6	M6 x 0.75	●	—	—
	A10	M10 x 1	—	●	—
	A12	M12 x 1	—	—	●
Female thread	**B3***	M3 x 0.5	●	—	—
	B5*	M5 x 0.8	—	●	●

* indicates vacuum inlet symbol is "Nil".

Replacement Part No.

Pad diameter: ø1.5 to ø3.5

Model	Pad unit part no.	Adapter part no.
ZP3-T (015/02/035) U□-A3	ZP3-(015/02/035)U□	ZP3A-T1-A3
ZP3-T (015/02/035) U□-B3		ZP3A-T1-B3
ZP3-T (015/02/035) U□-A6-◇		ZP3A-T1-A6-B3

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-3AU-2, U4: M-3AU-4-X83
02: KJH02-M3, 04: KJH04-M3-X83

Pad diameter: ø4 to ø8

Model	Pad unit part no.	Adapter part no.
ZP3-T (04/06/08) UM□-A5	ZP3- (04/06/08) UM□	ZP3A-T2-A5
ZP3-T (04/06/08) B□-A5	ZP3- (04/06/08) B□	
ZP3-T (04/06/08) UM□-B5	ZP3- (04/06/08) UM□	ZP3A-T2-B5
ZP3-T (04/06/08) B□-B5	ZP3- (04/06/08) B□	
ZP3-T (04/06/08) UM□-A10-◇	ZP3- (04/06/08) UM□	ZP3A-T2-A10-B5
ZP3-T (04/06/08) B□-A10-◇	ZP3- (04/06/08) B□	
ZP3-T (04/06/08) UM□-A10-04	ZP3- (04/06/08) UM□	ZP3A-T2-A10-04
ZP3-T (04/06/08) B□-A10-04	ZP3- (04/06/08) B□	

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-5AU-2, U4: M-5AU-4-X83,
02: KJH02-M5

Pad diameter: ø10 to ø16

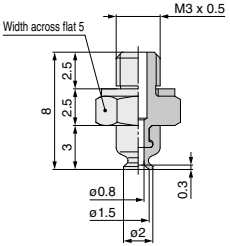
Model	Pad unit part no.	Adapter part no.
ZP3-T (10/13/16) UM□-A5	ZP3- (10/13/16) UM□	ZP3A-T3-A5
ZP3-T (10/13/16) B□-A5	ZP3- (10/13/16) B□	
ZP3-T (10/13/16) UM□-B5	ZP3- (10/13/16) UM□	ZP3A-T3-B5
ZP3-T (10/13/16) B□-B5	ZP3- (10/13/16) B□	
ZP3-T (10/13/16) UM□-A12-◇	ZP3- (10/13/16) UM□	ZP3A-T3-A12-B5
ZP3-T (10/13/16) B□-A12-◇	ZP3- (10/13/16) B□	
ZP3-T (10/13/16) UM□-A12-04	ZP3- (10/13/16) UM□	ZP3A-T3-A12-04
ZP3-T (10/13/16) B□-A12-04	ZP3- (10/13/16) B□	
ZP3-T (10/13/16) UM□-A12-06	ZP3- (10/13/16) UM□	ZP3A-T3-A12-06
ZP3-T (10/13/16) B□-A12-06	ZP3- (10/13/16) B□	

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-5AU-2, U4: M-5AU-4-X83
U6: M-5AU-6-X83, 02: KJH02-M5

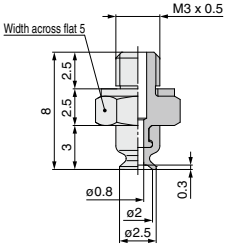
Dimensions/With Adapter: Vacuum Inlet **Vertical**

Pad diameter ø1.5 to ø3.5
Pad type Flat

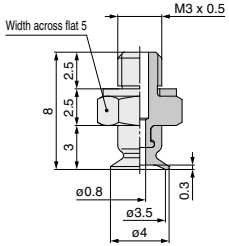
ZP3-T015U□-A3
[Weight: 0.6 g]



ZP3-T02U□-A3
[Weight: 0.6 g]



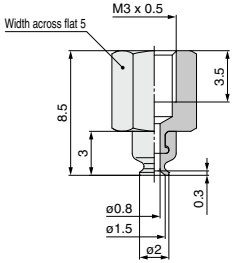
ZP3-T035U□-A3
[Weight: 0.6 g]



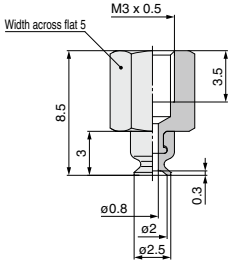
Pad diameter ø1.5 to ø3.5
Pad type Flat

Dimensions/With Adapter: Vacuum Inlet Vertical

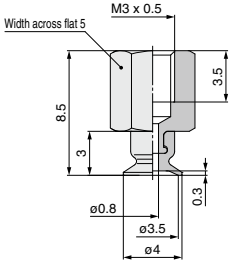
ZP3-T015U□-B3
[Weight: 0.9 g]



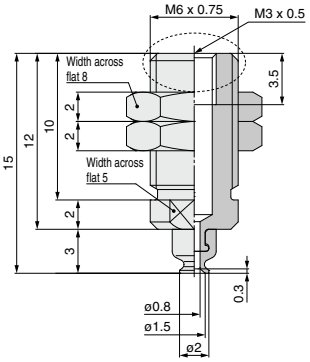
ZP3-T02U□-B3
[Weight: 0.9 g]



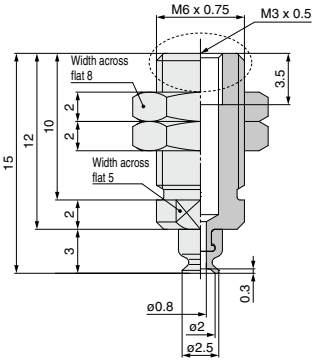
ZP3-T035U□-B3
[Weight: 0.9 g]



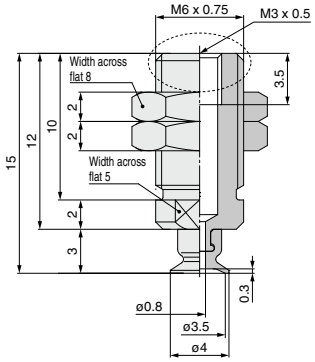
ZP3-T015U□-A6-B3
[Weight: 2.8 g]



ZP3-T02U□-A6-B3
[Weight: 2.8 g]

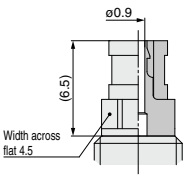
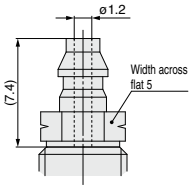


ZP3-T035U□-A6-B3
[Weight: 2.8 g]

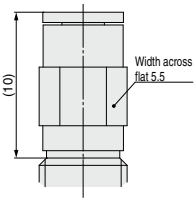
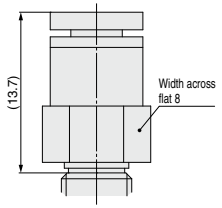


Vacuum Inlet Dimensions

Barb fitting

ZP3-T015U□-A6-U2 ZP3-T02U□-A6-U2 ZP3-T035U□-A6-U2	ZP3-T015U□-A6-U4 ZP3-T02U□-A6-U4 ZP3-T035U□-A6-U4
	
M-3AU-2 [Weight: 0.7 g]*2	**M-3AU-4-X83** [Weight: 0.7 g]*2

One-touch fitting

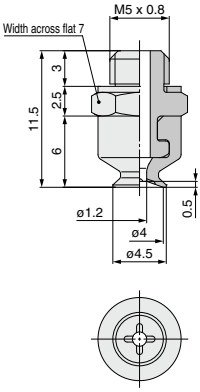
ZP3-T015U□-A6-02 ZP3-T02U□-A6-02 ZP3-T035U□-A6-02	ZP3-T015U□-A6-04 ZP3-T02U□-A6-04 ZP3-T035U□-A6-04
	
KJH02-M3 [Weight: 1.1 g]*2	**KJH04-M3-X83** [Weight: 1.9 g]*2

*1 Refer to "ZP3-T▲▲▲U□-A6-B3" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲▲U□-A6-B3".

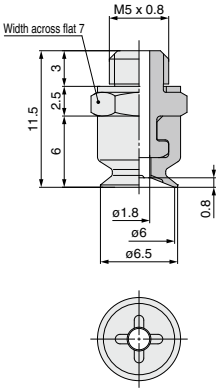
Dimensions/With Adapter: Vacuum Inlet **Vertical**

Pad diameter ø4 to ø8
Pad type Flat with groove

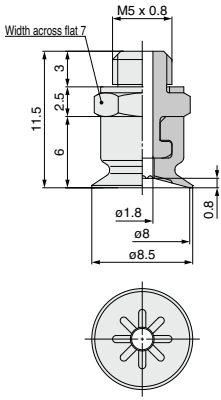
ZP3-T04UM□-A5
[Weight: 1.7 g]



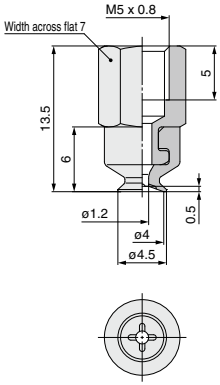
ZP3-T06UM□-A5
[Weight: 1.7 g]



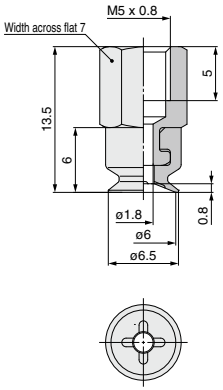
ZP3-T08UM□-A5
[Weight: 1.7 g]



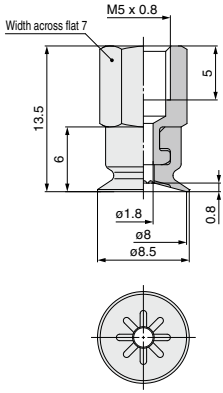
ZP3-T04UM□-B5
[Weight: 2.3 g]



ZP3-T06UM□-B5
[Weight: 2.3 g]



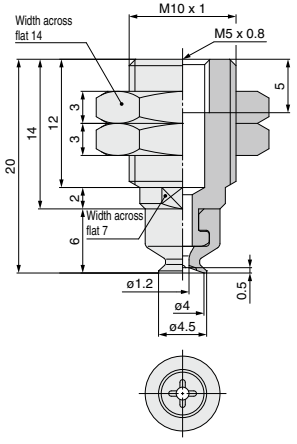
ZP3-T08UM□-B5
[Weight: 2.3 g]



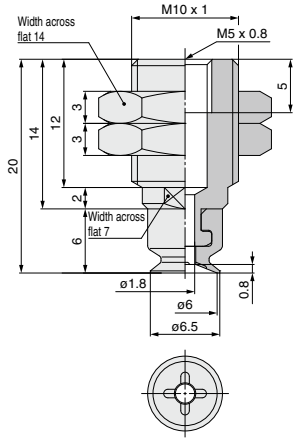
Pad diameter ø4 to ø8
Pad type Flat with groove

Dimensions/With Adapter: Vacuum Inlet **Vertical**

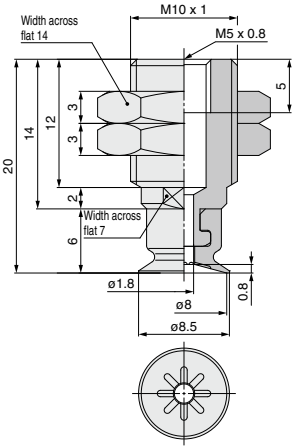
ZP3-T04UM□-A10-B5
[Weight: 11.0 g]



ZP3-T06UM□-A10-B5
[Weight: 11.0 g]

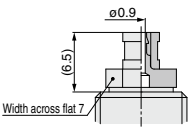
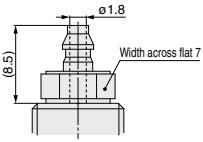


ZP3-T08UM□-A10-B5
[Weight: 11.0 g]

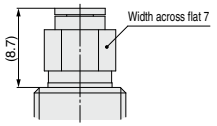


Vacuum Inlet Dimensions

Barb fitting

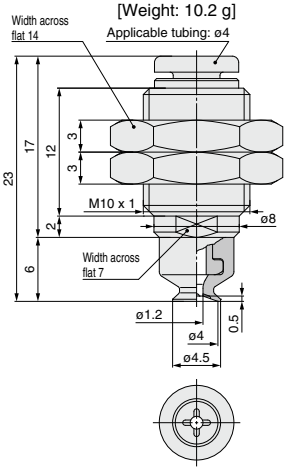
ZP3-T04UM□-A10-U2 ZP3-T06UM□-A10-U2 ZP3-T08UM□-A10-U2	ZP3-T04UM□-A10-U4 ZP3-T06UM□-A10-U4 ZP3-T08UM□-A10-U4
	
M-5AU-2 [Weight: 1.5 g]*2	**M-5AU-4-X83** [Weight: 1.6 g]*2

One-touch fitting

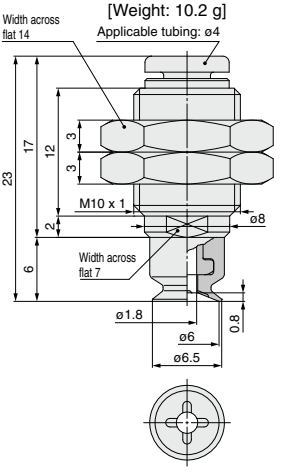
ZP3-T04UM□-A10-02 ZP3-T06UM□-A10-02 ZP3-T08UM□-A10-02

KJH02-M5 [Weight: 1.9 g]*2

*1 Refer to "ZP3-T▲▲UM□-A10-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲UM□-A10-B5".

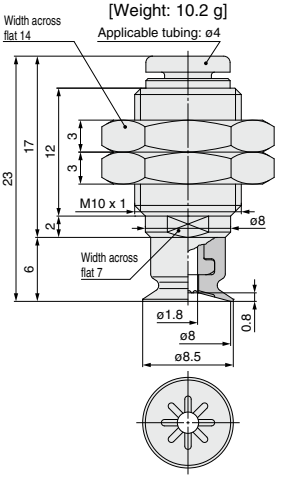
ZP3-T04UM□-A10-04
[Weight: 10.2 g]



ZP3-T06UM□-A10-04
[Weight: 10.2 g]



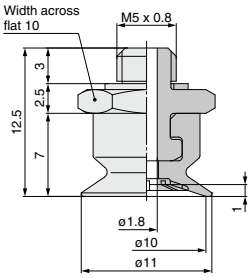
ZP3-T08UM□-A10-04
[Weight: 10.2 g]

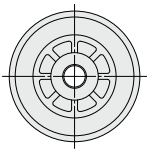


Pad diameter ø10 to ø16
Pad type Flat with groove

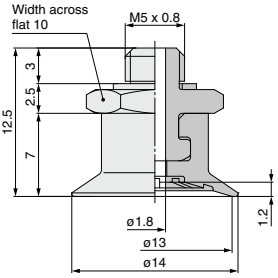
Dimensions/With adapter: Vacuum inlet **Vertical**

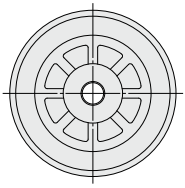
ZP3-T10UM□-A5
[Weight: 3.0 g]



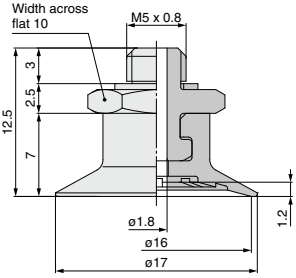


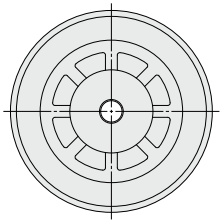
ZP3-T13UM□-A5
[Weight: 3.1 g]



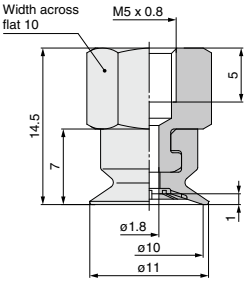


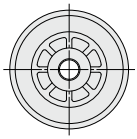
ZP3-T16UM□-A5
[Weight: 3.2 g]



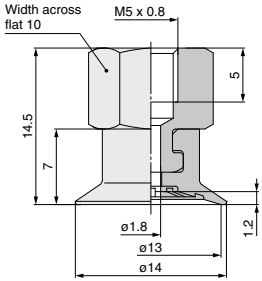


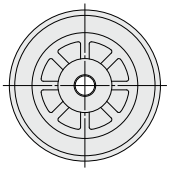
ZP3-T10UM□-B5
[Weight: 5.7 g]



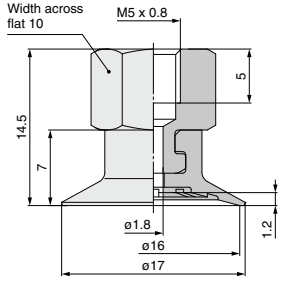


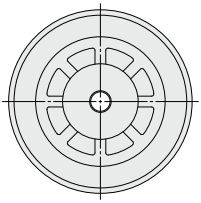
ZP3-T13UM□-B5
[Weight: 5.8 g]





ZP3-T16UM□-B5
[Weight: 5.9 g]

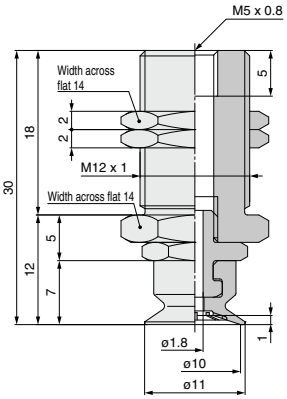


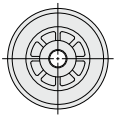


Pad diameter ø10 to ø16
Pad type Flat with groove

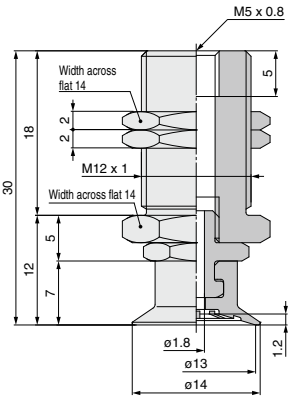
Dimensions/With Adapter: Vacuum Inlet Vertical

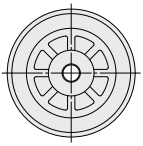
ZP3-T10UM□-A12-B5
[Weight: 18.8 g]



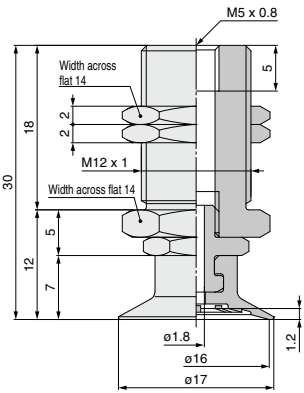


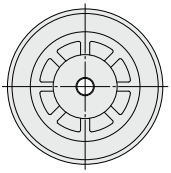
ZP3-T13UM□-A12-B5
[Weight: 18.9 g]





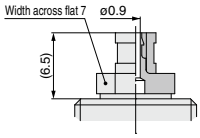
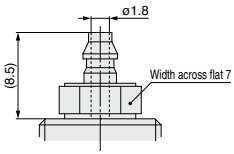
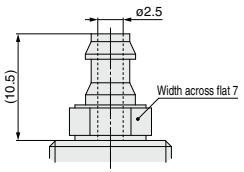
ZP3-T16UM□-A12-B5
[Weight: 19.0 g]



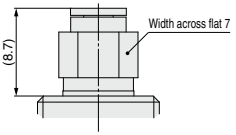


Vacuum Inlet Dimensions

Barb fitting

ZP3-T10UM□-A12-U2 ZP3-T13UM□-A12-U2 ZP3-T16UM□-A12-U2	ZP3-T10UM□-A12-U4 ZP3-T13UM□-A12-U4 ZP3-T16UM□-A12-U4	ZP3-T10UM□-A12-U6 ZP3-T13UM□-A12-U6 ZP3-T16UM□-A12-U6
		
M-5AU-2 [Weight: 1.5 g]*2	**M-5AU-4-X83** [Weight: 1.6 g]*2	**M-5AU-6-X83** [Weight: 1.8 g]*2

One-touch fitting

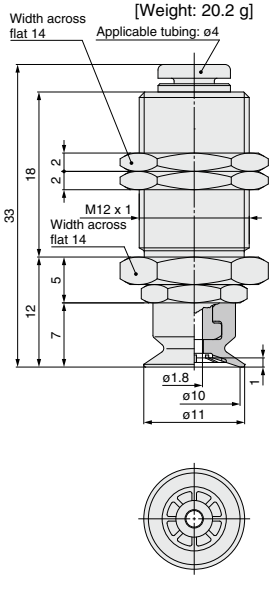
ZP3-T10UM□-A12-02 ZP3-T13UM□-A12-02 ZP3-T16UM□-A12-02

KJH02-M5 [Weight: 1.9 g]*2

*1 Refer to "ZP3-T▲▲UM□-A12-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲UM□-A12-B5".

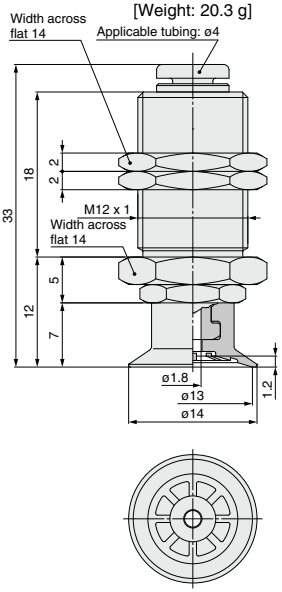
Pad diameter ø10 to ø16
Pad type Flat with groove

Dimensions/With Adapter: Vacuum Inlet **Vertical**

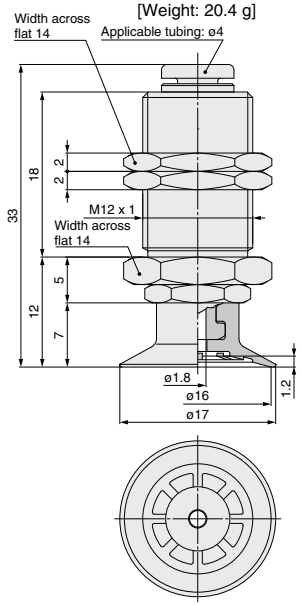
ZP3-T10UM□-A12-04
[Weight: 20.2 g]



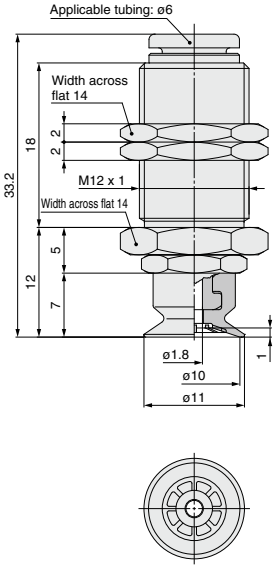
ZP3-T13UM□-A12-04
[Weight: 20.3 g]



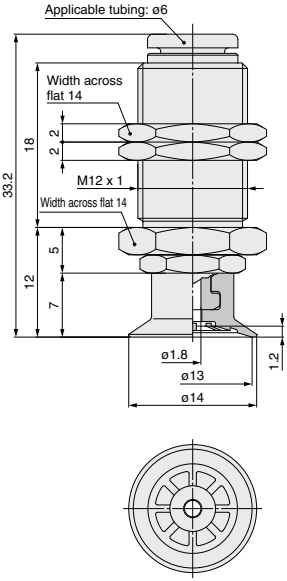
ZP3-T16UM□-A12-04
[Weight: 20.4 g]



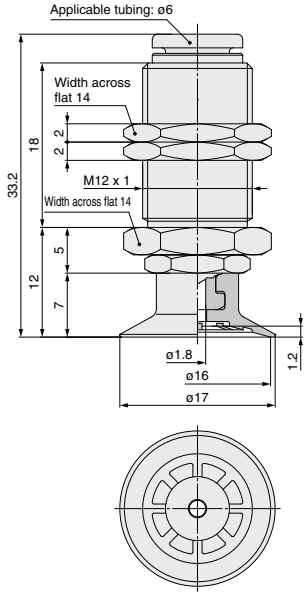
ZP3-T10UM□-A12-06
[Weight: 18.1 g]



ZP3-T13UM□-A12-06
[Weight: 18.2 g]



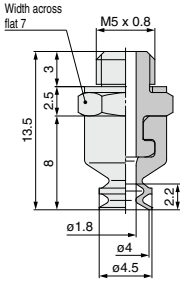
ZP3-T16UM□-A12-06
[Weight: 18.3 g]



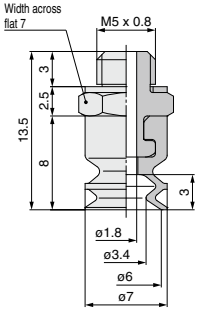
Dimensions/With Adapter: Vacuum Inlet Vertical

Pad diameter ø4 to ø8
Pad type Bellows

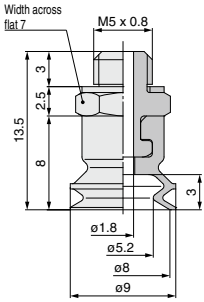
ZP3-T04B□-A5
[Weight: 1.7 g]



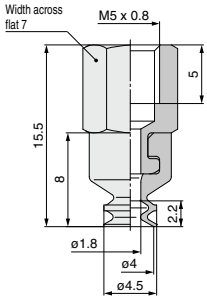
ZP3-T06B□-A5
[Weight: 1.7 g]



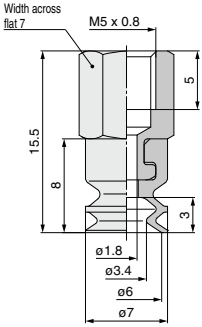
ZP3-T08B□-A5
[Weight: 1.8 g]



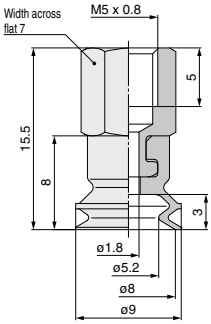
ZP3-T04B□-B5
[Weight: 2.3 g]



ZP3-T06B□-B5
[Weight: 2.3 g]



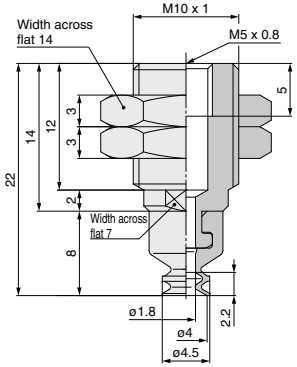
ZP3-T08B□-B5
[Weight: 2.4 g]



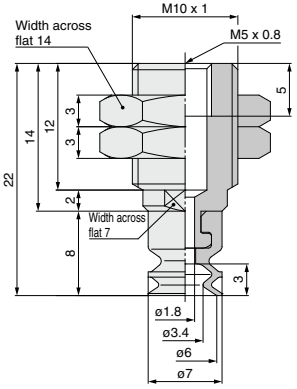
Dimensions/With Adapter: Vacuum Inlet **Vertical**

Pad diameter: ø4 to ø8
Pad type: Bellows

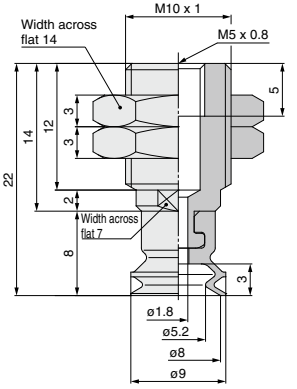
ZP3-T04B□-A10-B5
[Weight: 11.0 g]



ZP3-T06B□-A10-B5
[Weight: 11.0 g]

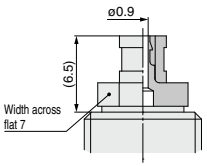
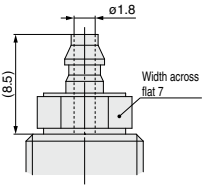


ZP3-T08B□-A10-B5
[Weight: 11.1 g]

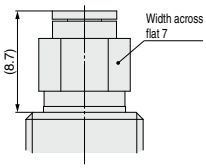


Vacuum Inlet Dimensions

Barb fitting

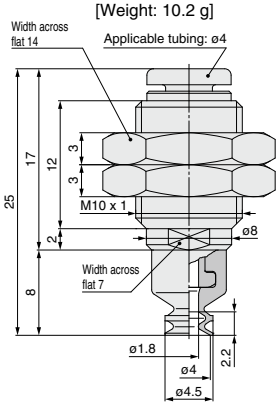
ZP3-T04B□-A10-U2 ZP3-T06B□-A10-U2 ZP3-T08B□-A10-U2	ZP3-T04B□-A10-U4 ZP3-T06B□-A10-U4 ZP3-T08B□-A10-U4
	
M-5AU-2 [Weight: 1.5 g]*2	**M-5AU-4-X83** [Weight: 1.6 g]*2

One-touch fitting

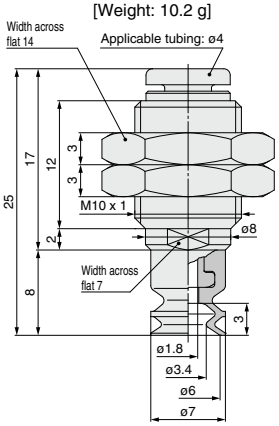
ZP3-T04B□-A10-02 ZP3-T06B□-A10-02 ZP3-T08B□-A10-02

KJH02-M5 [Weight: 1.8 g]*2

*1 Refer to "ZP3-T▲▲B□-A10-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲B□-A10-B5".

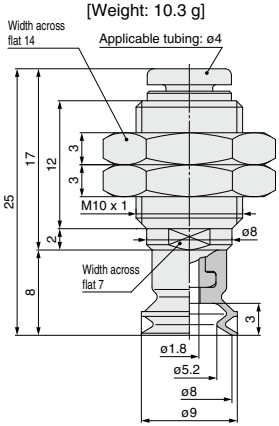
ZP3-T04B□-A10-04
[Weight: 10.2 g]



ZP3-T06B□-A10-04
[Weight: 10.2 g]



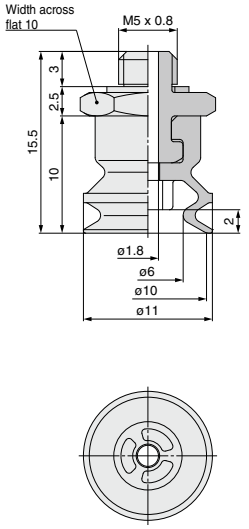
ZP3-T08B□-A10-04
[Weight: 10.3 g]



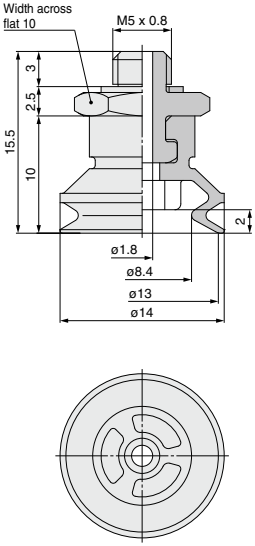
Pad diameter ø10 to ø16
Pad type Bellows

Dimensions/With Adapter: Vacuum Inlet Vertical

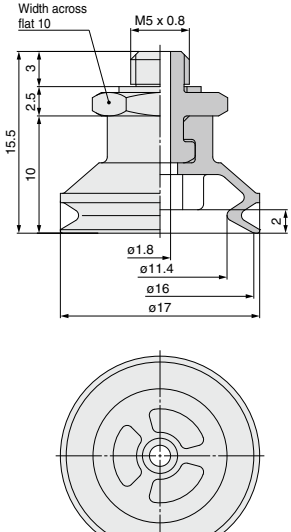
ZP3-T10B□-A5
[Weight: 3.2 g]



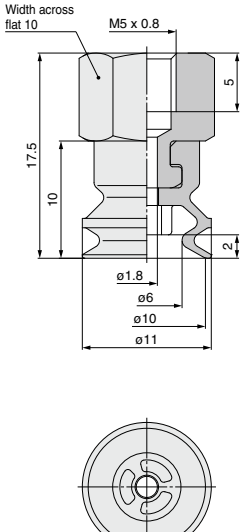
ZP3-T13B□-A5
[Weight: 3.4 g]



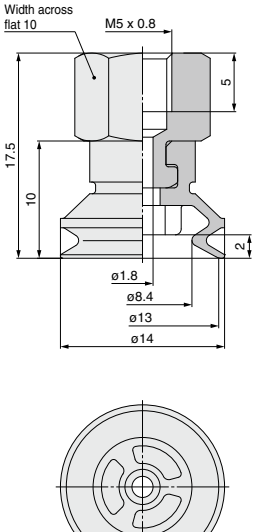
ZP3-T16B□-A5
[Weight: 3.5 g]



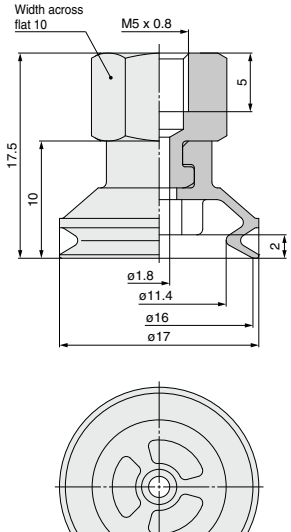
ZP3-T10B□-B5
[Weight: 5.9 g]



ZP3-T13B□-B5
[Weight: 6.1 g]



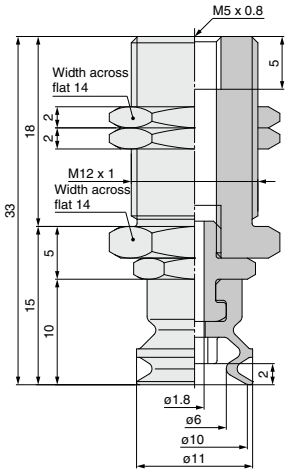
ZP3-T16B□-B5
[Weight: 6.2 g]

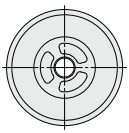


Dimensions/With Adapter: Vacuum Inlet **Vertical**

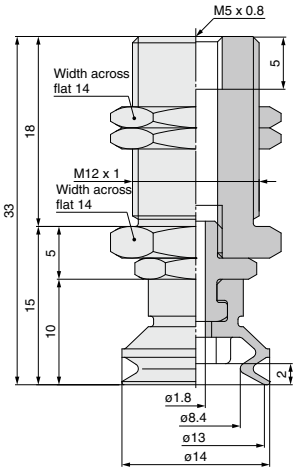
Pad diameter ø10 to ø16
Pad type Bellows

ZP3-T10B□-A12-B5
[Weight: 19.0 g]

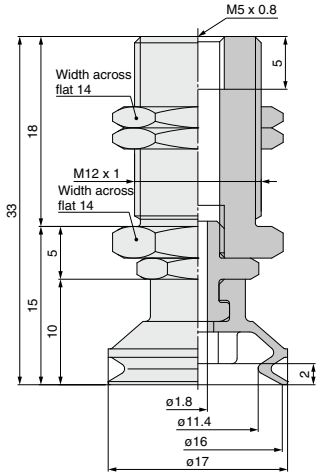


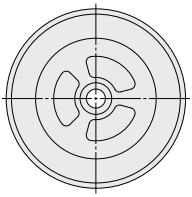


ZP3-T13B□-A12-B5
[Weight: 19.2 g]



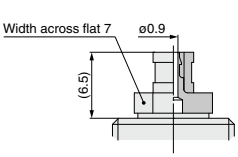
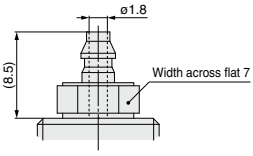
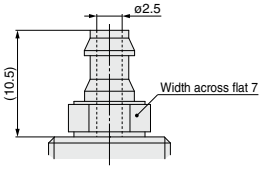
ZP3-T16B□-A12-B5
[Weight: 19.3 g]



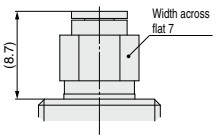


Vacuum Inlet Dimensions

Barb fitting

ZP3-T10B□-A12-U2 ZP3-T13B□-A12-U2 ZP3-T16B□-A12-U2	ZP3-T10B□-A12-U4 ZP3-T13B□-A12-U4 ZP3-T16B□-A12-U4	ZP3-T10B□-A12-U6 ZP3-T13B□-A12-U6 ZP3-T16B□-A12-U6
		
M-5AU-2 [Weight: 1.5 g]*2	**M-5AU-4-X83** [Weight: 1.6 g]*2	**M-5AU-6-X83** [Weight: 1.8 g]*2

One-touch fitting

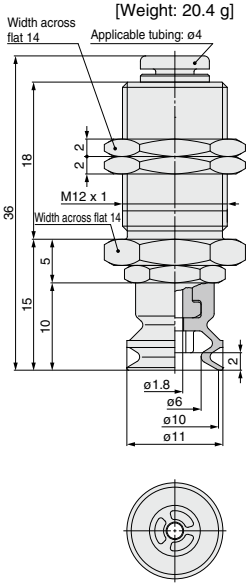
ZP3-T10B□-A12-02 ZP3-T13B□-A12-02 ZP3-T16B□-A12-02

KJH02-M5 [Weight: 1.9 g]*2

*1 Refer to "ZP3-T▲▲B□-A12-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲B□-A12-B5".

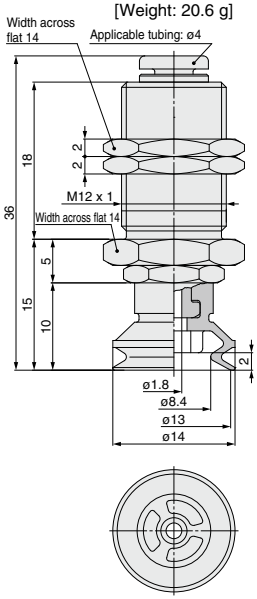
Pad diameter ø10 to ø16
Pad type Bellows

Dimensions/With Adapter: Vacuum Inlet **Vertical**

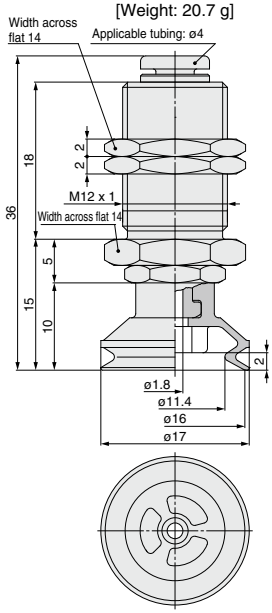
ZP3-T10B□-A12-04
[Weight: 20.4 g]



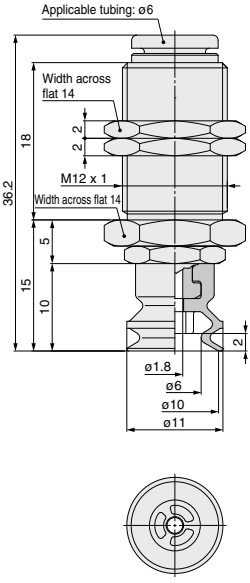
ZP3-T13B□-A12-04
[Weight: 20.6 g]



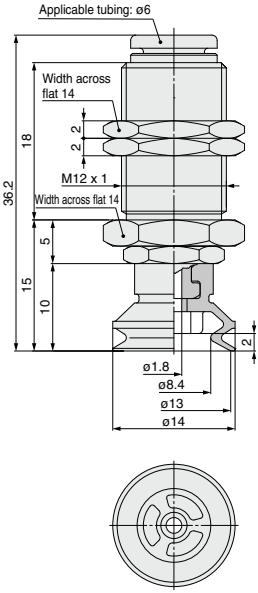
ZP3-T16B□-A12-04
[Weight: 20.7 g]



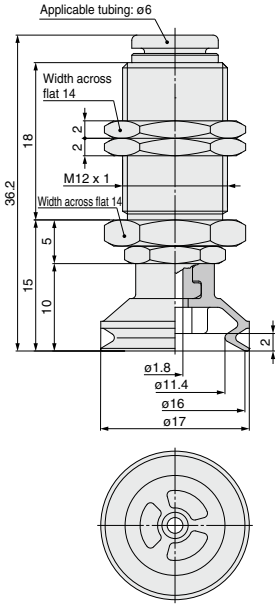
ZP3-T10B□-A12-06
[Weight: 18.3 g]



ZP3-T13B□-A12-06
[Weight: 18.5 g]



ZP3-T16B□-A12-06
[Weight: 18.6 g]



How to Order

Vertical vacuum inlet/ With buffer

ZP3 – T 015 U N J 3 – B3

Vacuum inlet direction

Symbol	Direction
T	Vertical

Pad diameter

Symbol	Pad diameter
015	ø1.5
02	ø2
035	ø3.5
04	ø4
06	ø6
08	ø8
10	ø10
13	ø13
16	ø16

Pad type—Pad diameter

Pad type \ Pad diameter (Symbol)	015	02	035	04	06
U (Flat)	●	●	●	—	—
UM (Flat with groove)	—	—	—	●	●
B (Bellows)	—	—	—	●	●

Pad type \ Pad diameter (Symbol)	08	10	13	16
U (Flat)	—	—	—	—
UM (Flat with groove)	●	●	●	●
B (Bellows)	●	●	●	●

Pad material (□)

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

Vacuum inlet (◇)

	Symbol	Connection	ø1.5 to ø3.5	ø4 to ø8	ø10 to ø16
Female thread	**B3**	M3 x 0.5	●	—	—
	B5	M5 x 0.8	—	●	●
Barb fitting	**U2**	ø2 tubing *1	●	●	●
	U4	ø4 tubing *2	●	●	●
	U6	ø6 tubing *2	—	—	●
One-touch fitting	**02**	ø2 tubing	●	●	●
	04	ø4 tubing	●	●	●
	06	ø6 tubing	—	—	●

*1 Polyurethane tube piping
*2 Soft nylon/Polyurethane tube piping

Stroke (■)—Buffer specifications

Stroke	ø1.5 to ø3.5		ø4 to ø16		
	J	K	J	JB	K
3	●	●	●	—	●
6	●	●	●	—	●
10	—	—	●	—	●
15	—	—	—	●	●
20	—	—	—	●	●

*Refer to the "Specifications" below, for applicable stroke.

Buffer specifications (☆)

J	Rotating
JB	Rotating, With bushing
K	Non-rotating

Specifications

Pad diameter	Buffer specifications	Stroke (mm)	Tightening torque (N·m)	Mounting	Spring reactive force	
					At 0 stroke (N)	At full stroke (N)
ø1.5 to ø3.5	**J**	3, 6	1.5 to 1.8	M6 x 0.75	0.2	0.4
	K		2.0 to 2.5	M8 x 0.75		0.5
ø4 to ø16	**J**	3, 6, 10				
	JB	15, 20				
	K	3, 6, 10, 15, 20				

Replacement Part No.

Pad diameter: ø1.5 to ø3.5

Model	Pad unit part no.	Buffer assembly part no. Note 3)
ZP3-T(015/02/035)U□(J/K)3-◇	ZP3-(015/02/035)U□	ZP3B-T1(J/K)3-B3
ZP3-T(015/02/035)U□(J/K)6-◇		ZP3B-T1(J/K)6-B3

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-3AU-2, U4: M-3AU-4-X83
02: KJH02-M3, 04: KJH04-M3-X83

Pad diameter: ø4 to ø8

Model	Pad unit part no.	Buffer assembly part no. Note 3)
ZP3-T(04/06/08)UM□(J/K)3-◇	ZP3-(04/06/08)UM□	ZP3B-T2A(J/K)3-B5
ZP3-T(04/06/08)B□(J/K)3-◇	ZP3-(04/06/08)B□	
ZP3-T(04/06/08)UM□(J/K)6-◇	ZP3-(04/06/08)UM□	ZP3B-T2A(J/K)6-B5
ZP3-T(04/06/08)B□(J/K)6-◇	ZP3-(04/06/08)B□	
ZP3-T(04/06/08)UM□(J/K)10-◇	ZP3-(04/06/08)UM□	ZP3B-T2A(J/K)10-B5
ZP3-T(04/06/08)B□(J/K)10-◇	ZP3-(04/06/08)B□	
ZP3-T(04/06/08)UM□(JB/K)15-◇	ZP3-(04/06/08)UM□	ZP3B-T2A(JB/K)15-B5
ZP3-T(04/06/08)B□(JB/K)15-◇	ZP3-(04/06/08)B□	
ZP3-T(04/06/08)UM□(JB/K)20-◇	ZP3-(04/06/08)UM□	ZP3B-T2A(JB/K)20-B5
ZP3-T(04/06/08)B□(JB/K)20-◇	ZP3-(04/06/08)B□	

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-5AU-2, U4: M-5AU-4-X83
02: KJH02-M5, 04: KJH04-M5

Pad diameter: ø10 to ø16

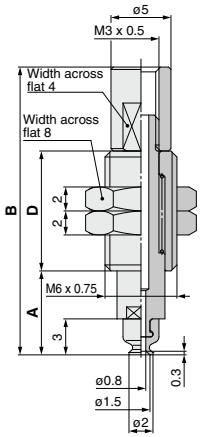
Model	Pad unit part no.	Buffer assembly part no. Note 3)
ZP3-T(10/13/16)UM□(J/K)3-◇	ZP3-(10/13/16)UM□	ZP3B-T2B(J/K)3-B5
ZP3-T(10/13/16)B□(J/K)3-◇	ZP3-(10/13/16)B□	
ZP3-T(10/13/16)UM□(J/K)6-◇	ZP3-(10/13/16)UM□	ZP3B-T2B(J/K)6-B5
ZP3-T(10/13/16)B□(J/K)6-◇	ZP3-(10/13/16)B□	
ZP3-T(10/13/16)UM□(J/K)10-◇	ZP3-(10/13/16)UM□	ZP3B-T2B(J/K)10-B5
ZP3-T(10/13/16)B□(J/K)10-◇	ZP3-(10/13/16)B□	
ZP3-T(10/13/16)UM□(JB/K)15-◇	ZP3-(10/13/16)UM□	ZP3B-T2B(JB/K)15-B5
ZP3-T(10/13/16)B□(JB/K)15-◇	ZP3-(10/13/16)B□	
ZP3-T(10/13/16)UM□(JB/K)20-◇	ZP3-(10/13/16)UM□	ZP3B-T2B(JB/K)20-B5
ZP3-T(10/13/16)B□(JB/K)20-◇	ZP3-(10/13/16)B□	

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-5AU-2, U4: M-5AU-4-X83
U6: M-5AU-6-X83, 02: KJH02-M5
04: KJH04-M5, 06: KJH06-M5

Pad diameter ø1.5 to ø3.5
Pad type Flat
Stroke 3, 6 mm

Dimensions/With Buffer: Vacuum Inlet Vertical

ZP3-T015U□J■-B3

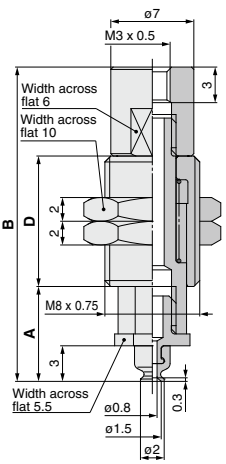


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-T015U□J3-B3	7	24	10	3.4
ZP3-T015U□J6-B3	10	31	14	4.4

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

ZP3-T015U□K■-B3

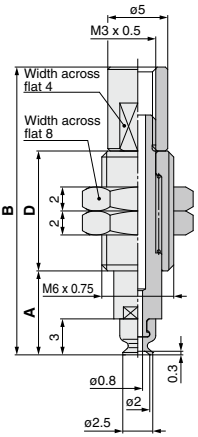


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-T015U□K3-B3	8	26.5	11	6.8
ZP3-T015U□K6-B3	11	33	14.5	8.2

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

ZP3-T02U□J■-B3

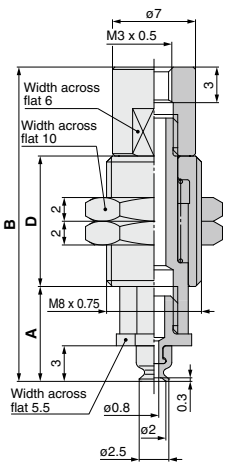


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-T02U□J3-B3	7	24	10	3.4
ZP3-T02U□J6-B3	10	31	14	4.4

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

ZP3-T02U□K■-B3

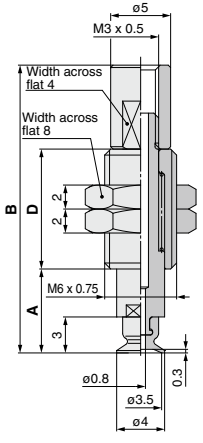


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-T02U□K3-B3	8	26.5	11	6.8
ZP3-T02U□K6-B3	11	33	14.5	8.2

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

ZP3-T035U□J■-B3

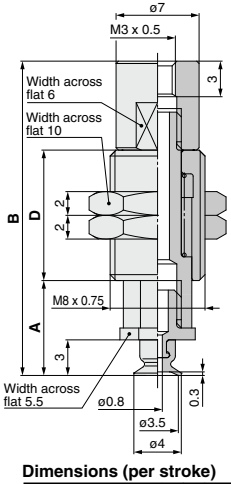


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-T035U□J3-B3	7	24	10	3.4
ZP3-T035U□J6-B3	10	31	14	4.4

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

ZP3-T035U□K■-B3



Dimensions (per stroke)

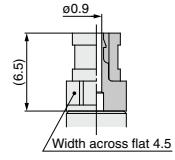
Model	A	B	D	Weight (g)
ZP3-T035U□K3-B3	8	26.5	11	6.8
ZP3-T035U□K6-B3	11	33	14.5	8.2

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

Vacuum Inlet Dimensions

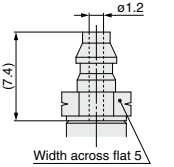
Barb fitting

ZP3-T015U□☆■-U2
ZP3-T02U□☆■-U2
ZP3-T035U□☆■-U2



M-3AU-2 [Weight: 0.7 g]*2

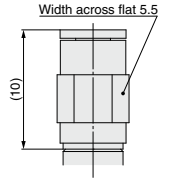
ZP3-T015U□☆■-U4
ZP3-T02U□☆■-U4
ZP3-T035U□☆■-U4



M-3AU-4-X83 [Weight: 0.7 g]*2

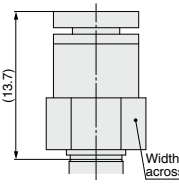
One-touch fitting

ZP3-T015U□☆■-02
ZP3-T02U□☆■-02
ZP3-T035U□☆■-02



KJH02-M3 [Weight: 1.1 g]*2

ZP3-T015U□☆■-04
ZP3-T02U□☆■-04
ZP3-T035U□☆■-04



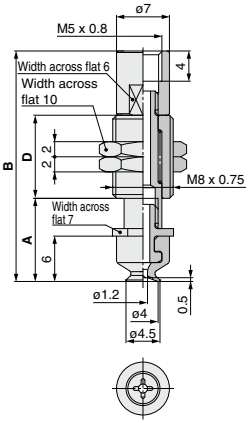
KJH04-M3-X83 [Weight: 1.9 g]*2

*1 Refer to "ZP3-T▲▲▲U□☆■-B3" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲▲U□☆■-B3".

Pad diameter: ø4 to ø8
Pad type: Flat with groove
Stroke: 3, 6, 10 mm

Dimensions/With Buffer: Vacuum Inlet **Vertical**

ZP3-T04UM□J■■-B5 / ZP3-T04UM□K■■-B5

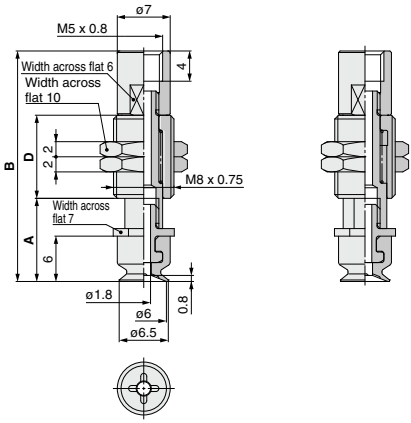


Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T04UM□☆3-B5	11	30.5	11	7.4	7.3
ZP3-T04UM□☆6-B5	14	37	14.5	8.6	8.6
ZP3-T04UM□☆10-B5	18	47	20.5	10.5	10.5

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-T06UM□J■■-B5 / ZP3-T06UM□K■■-B5

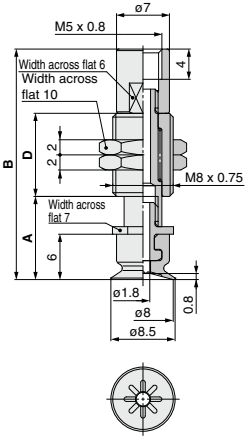


Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T06UM□☆3-B5	11	30.5	11	7.4	7.3
ZP3-T06UM□☆6-B5	14	37	14.5	8.6	8.6
ZP3-T06UM□☆10-B5	18	47	20.5	10.5	10.5

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-T08UM□J■■-B5 / ZP3-T08UM□K■■-B5

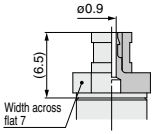
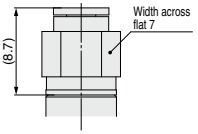
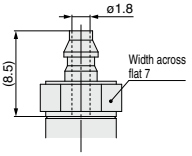
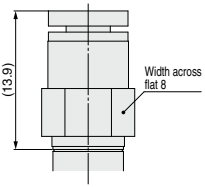


Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T08UM□☆3-B5	11	30.5	11	7.4	7.3
ZP3-T08UM□☆6-B5	14	37	14.5	8.6	8.6
ZP3-T08UM□☆10-B5	18	47	20.5	10.5	10.5

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

Vacuum Inlet Dimensions

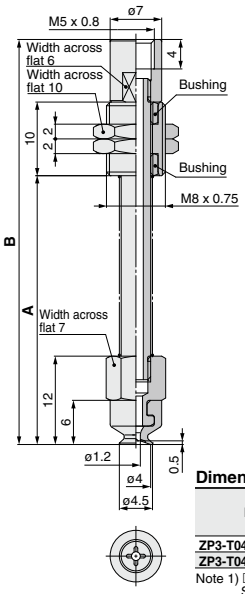
Barb fitting	One-touch fitting
ZP3-T04UM□☆■■-U2 **ZP3-T06UM□☆■■-U2** **ZP3-T08UM□☆■■-U2**	**ZP3-T04UM□☆■■-02** **ZP3-T06UM□☆■■-02** **ZP3-T08UM□☆■■-02**
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-T04UM□☆■■-U4 **ZP3-T06UM□☆■■-U4** **ZP3-T08UM□☆■■-U4**	**ZP3-T04UM□☆■■-04** **ZP3-T06UM□☆■■-04** **ZP3-T08UM□☆■■-04**
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2

*1 Refer to "ZP3-T▲▲UM□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲UM□☆■■-B5".

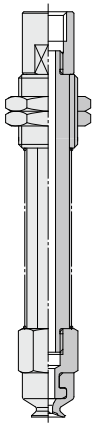
Pad diameter ø4 to ø8
Pad type Flat with groove
Stroke 15, 20 mm

Dimensions/With Buffer: Vacuum Inlet **Vertical**

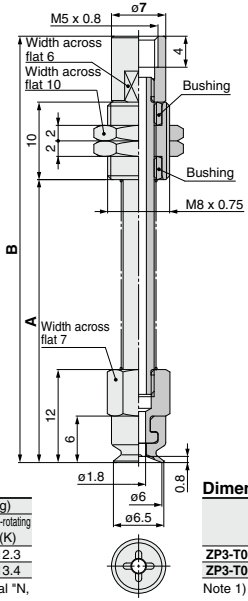
ZP3-T04UM□JB■■-B5



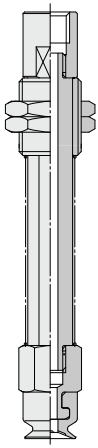
ZP3-T04UM□K■■-B5



ZP3-T06UM□JB■■-B5



ZP3-T06UM□K■■-B5



Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T04UM□☆15-B5	36.5	55	10.3	12.3
ZP3-T04UM□☆20-B5	44	62.5	10.9	13.4

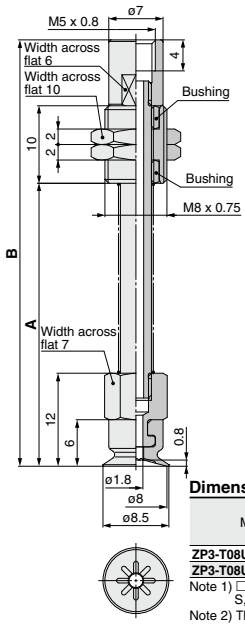
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Dimensions (per stroke)

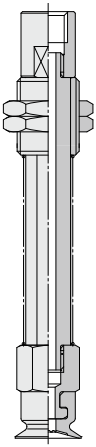
Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T06UM□☆15-B5	36.5	55	10.3	12.3
ZP3-T06UM□☆20-B5	44	62.5	10.9	13.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-T08UM□JB■■-B5



ZP3-T08UM□K■■-B5

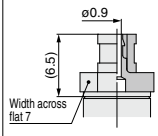
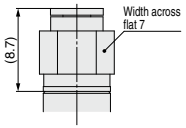
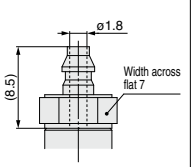
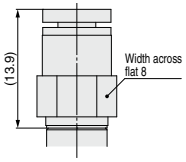


Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T08UM□☆15-B5	36.5	55	10.3	12.3
ZP3-T08UM□☆20-B5	44	62.5	10.9	13.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Vacuum Inlet Dimensions

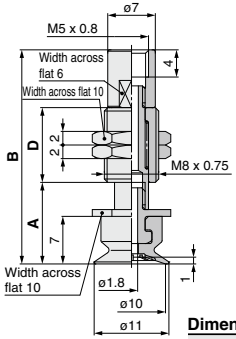
Barb fitting	One-touch fitting
ZP3-T04UM□☆■■-U2 **ZP3-T06UM□☆■■-U2** **ZP3-T08UM□☆■■-U2**	**ZP3-T04UM□☆■■-02** **ZP3-T06UM□☆■■-02** **ZP3-T08UM□☆■■-02**
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-T04UM□☆■■-U4 **ZP3-T06UM□☆■■-U4** **ZP3-T08UM□☆■■-U4**	**ZP3-T04UM□☆■■-04** **ZP3-T06UM□☆■■-04** **ZP3-T08UM□☆■■-04**
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2

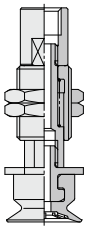
*1 Refer to "ZP3-T▲▲UM□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲UM□☆■■-B5".

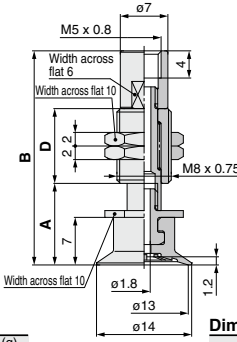
Pad diameter ø10 to ø16
Pad type Flat with groove
Stroke 3, 6, 10 mm

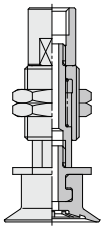
Dimensions/With Buffer: Vacuum Inlet **Vertical**

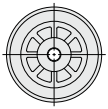
ZP3-T10UM□J■■-B5 ZP3-T10UM□K■■-B5 ZP3-T13UM□J■■-B5 ZP3-T13UM□K■■-B5











Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T10UM□☆3-B5	12	31.5	11	8.4	8.3
ZP3-T10UM□☆6-B5	15	38	14.5	9.6	9.6
ZP3-T10UM□☆10-B5	19	48	20.5	11.7	11.7

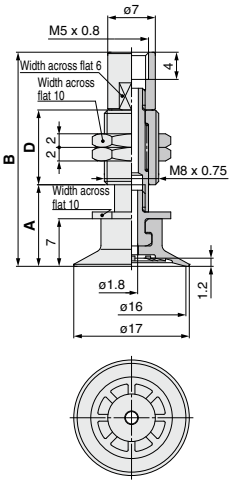
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

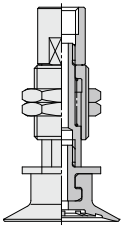
Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T13UM□☆3-B5	12	31.5	11	8.5	8.4
ZP3-T13UM□☆6-B5	15	38	14.5	9.7	9.7
ZP3-T13UM□☆10-B5	19	48	20.5	11.8	11.8

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-T16UM□J■■-B5 ZP3-T16UM□K■■-B5



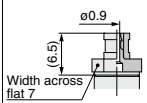
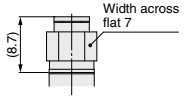
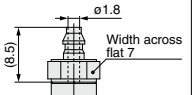
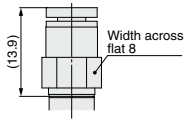
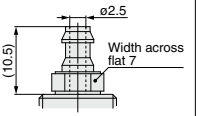
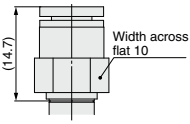


Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T16UM□☆3-B5	12	31.5	11	8.6	8.5
ZP3-T16UM□☆6-B5	15	38	14.5	9.8	9.8
ZP3-T16UM□☆10-B5	19	48	20.5	11.9	11.9

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

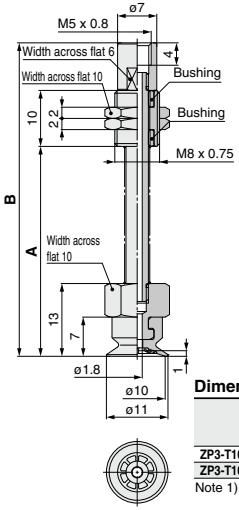
Vacuum Inlet Dimensions

Barb fitting	One-touch fitting
ZP3-T10UM□☆■■-U2 ZP3-T13UM□☆■■-U2 ZP3-T16UM□☆■■-U2	ZP3-T10UM□☆■■-02 ZP3-T13UM□☆■■-02 ZP3-T16UM□☆■■-02
 **M-5AU-2** [Weight: 1.5 g]*2	 **KJH02-M5** [Weight: 1.9 g]*2
ZP3-T10UM□☆■■-U4 ZP3-T13UM□☆■■-U4 ZP3-T16UM□☆■■-U4	ZP3-T10UM□☆■■-04 ZP3-T13UM□☆■■-04 ZP3-T16UM□☆■■-04
 **M-5AU-4-X83** [Weight: 1.6 g]*2	 **KJH04-M5** [Weight: 2.4 g]*2
ZP3-T10UM□☆■■-U6 ZP3-T13UM□☆■■-U6 ZP3-T16UM□☆■■-U6	ZP3-T10UM□☆■■-06 ZP3-T13UM□☆■■-06 ZP3-T16UM□☆■■-06
 **M-5AU-6-X83** [Weight: 1.8 g]*2	 **KJH06-M5** [Weight: 3.3 g]*2

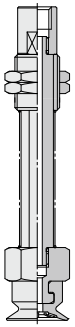
*1 Refer to "ZP3-T▲▲UM□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲UM□☆■■-B5".

Dimensions/With Buffer: Vacuum Inlet **Vertical**

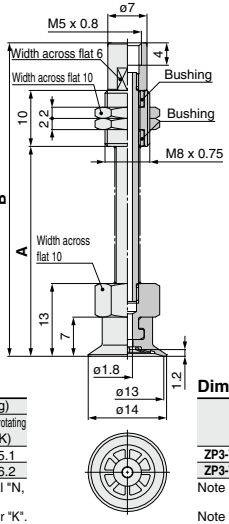
ZP3-T10UM□JB■■-B5



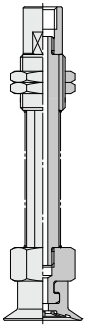
ZP3-T10UM□K■■-B5



ZP3-T13UM□JB■■-B5



ZP3-T13UM□K■■-B5



Dimensions (per stroke)

Model	A	B	Weight (g)	
			Rotating (J)	Non-rotating (K)
ZP3-T10UM□☆15-B5	37.5	56	13.1	15.1
ZP3-T10UM□☆20-B5	45	63.5	16.2	16.2

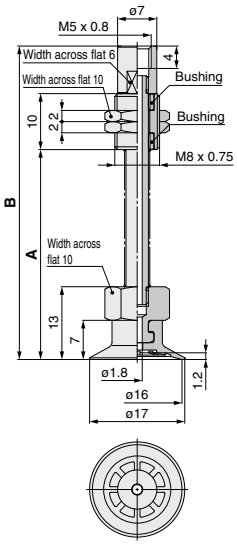
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Dimensions (per stroke)

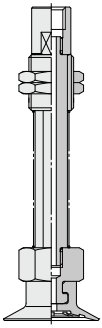
Model	A	B	Weight (g)	
			Rotating (J)	Non-rotating (K)
ZP3-T13UM□☆15-B5	37.5	56	13.2	15.2
ZP3-T13UM□☆20-B5	45	63.5	16.3	16.3

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-T16UM□JB■■-B5



ZP3-T16UM□K■■-B5

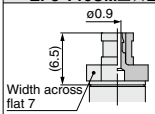
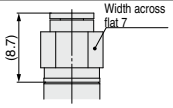
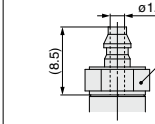
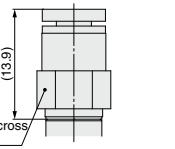
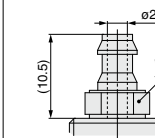
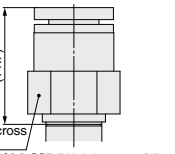


Dimensions (per stroke)

Model	A	B	Weight (g)	
			Rotating (J)	Non-rotating (K)
ZP3-T16UM□☆15-B5	37.5	56	13.3	15.3
ZP3-T16UM□☆20-B5	45	63.5	16.4	16.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Vacuum Inlet Dimensions

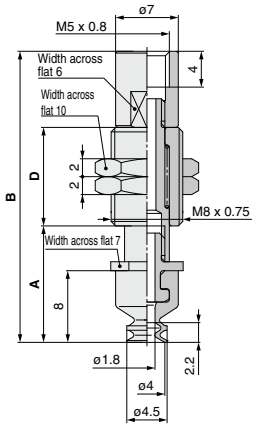
Barb fitting	One-touch fitting
ZP3-T10UM□☆■■-U2 ZP3-T13UM□☆■■-U2 ZP3-T16UM□☆■■-U2	ZP3-T10UM□☆■■-02 ZP3-T13UM□☆■■-02 ZP3-T16UM□☆■■-02
 **M-5AU-2** [Weight: 1.5 g]*2	 **KJH02-M5** [Weight: 1.9 g]*2
ZP3-T10UM□☆■■-U4 ZP3-T13UM□☆■■-U4 ZP3-T16UM□☆■■-U4	ZP3-T10UM□☆■■-04 ZP3-T13UM□☆■■-04 ZP3-T16UM□☆■■-04
 **M-5AU-4-X83** [Weight: 1.6 g]*2	 **KJH04-M5** [Weight: 2.4 g]*2
ZP3-T10UM□☆■■-U6 ZP3-T13UM□☆■■-U6 ZP3-T16UM□☆■■-U6	ZP3-T10UM□☆■■-06 ZP3-T13UM□☆■■-06 ZP3-T16UM□☆■■-06
 **M-5AU-6-X83** [Weight: 1.8 g]*2	 **KJH06-M5** [Weight: 3.3 g]*2

∗1 Refer to "ZP3-T▲▲UM□☆■■-B5" for dimensions.
∗2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲UM□☆■■-B5".

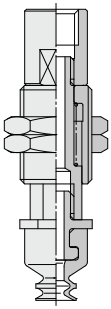
Pad diameter: ø4 to ø8
Pad type: Bellows
Stroke: 3, 6, 10 mm

Dimensions/With Buffer: Vacuum Inlet **Vertical**

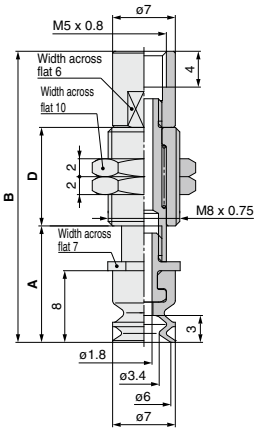
ZP3-T04B□J■■-B5



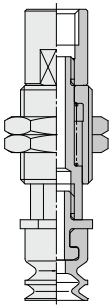
ZP3-T04B□K■■-B5



ZP3-T06B□J■■-B5



ZP3-T06B□K■■-B5



Dimensions (per stroke)

Model	A	B	D	Weight (g)	
				Rotating (J)	Non-rotating (K)
ZP3-T04B□☆3-B5	13	32.5	11	7.4	7.3
ZP3-T04B□☆6-B5	16	39	14.5	8.6	8.6
ZP3-T04B□☆10-B5	20	49	20.5	10.5	10.5

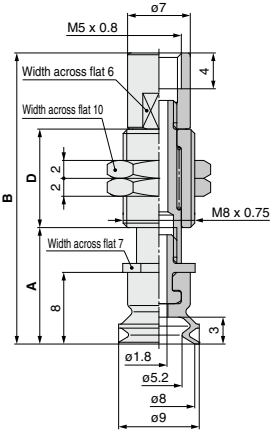
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

Dimensions (per stroke)

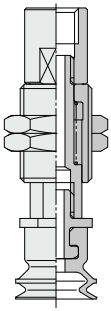
Model	A	B	D	Weight (g)	
				Rotating (J)	Non-rotating (K)
ZP3-T06B□☆3-B5	13	32.5	11	7.4	7.3
ZP3-T06B□☆6-B5	16	39	14.5	8.6	8.6
ZP3-T06B□☆10-B5	20	49	20.5	10.5	10.5

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-T08B□J■■-B5



ZP3-T08B□K■■-B5

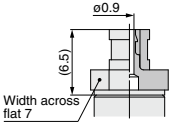
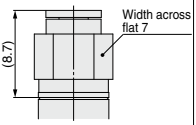
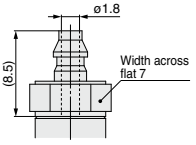
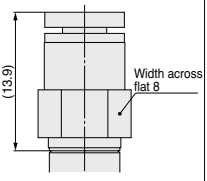


Dimensions (per stroke)

Model	A	B	D	Weight (g)	
				Rotating (J)	Non-rotating (K)
ZP3-T08B□☆3-B5	13	32.5	11	7.5	7.4
ZP3-T08B□☆6-B5	16	39	14.5	8.7	8.7
ZP3-T08B□☆10-B5	20	49	20.5	10.6	10.6

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

Vacuum Inlet Dimensions

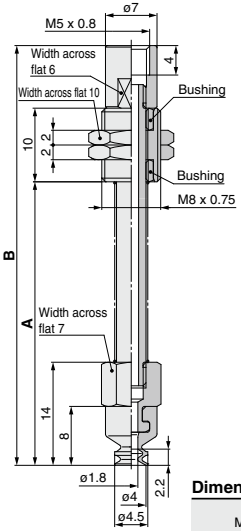
Barb fitting	One-touch fitting
ZP3-T04B□☆■■-U2 **ZP3-T06B□☆■■-U2** **ZP3-T08B□☆■■-U2**	**ZP3-T04B□☆■■-02** **ZP3-T06B□☆■■-02** **ZP3-T08B□☆■■-02**
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-T04B□☆■■-U4 **ZP3-T06B□☆■■-U4** **ZP3-T08B□☆■■-U4**	**ZP3-T04B□☆■■-04** **ZP3-T06B□☆■■-04** **ZP3-T08B□☆■■-04**
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2

*1 Refer to "ZP3-T▲▲B□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲B□☆■■-B5".

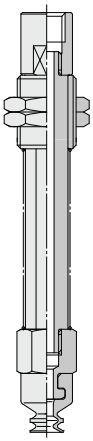
Pad diameter ø4 to ø8
Pad type Bellows
Stroke 15, 20 mm

Dimensions/With Buffer: Vacuum Inlet **Vertical**

ZP3-T04B□JB■■-B5



ZP3-T04B□K■■-B5

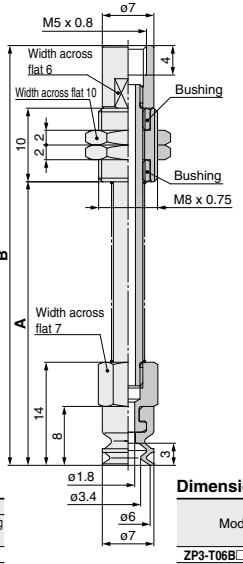


Dimensions (per stroke)

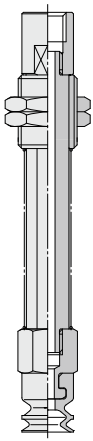
Model	A	B	Weight (g)	
			Rotating (J)	Non-rotating (K)
ZP3-T04B□☆15-B5	38.5	57	10.3	12.3
ZP3-T04B□☆20-B5	46	64.5	10.9	13.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-T06B□JB■■-B5



ZP3-T06B□K■■-B5

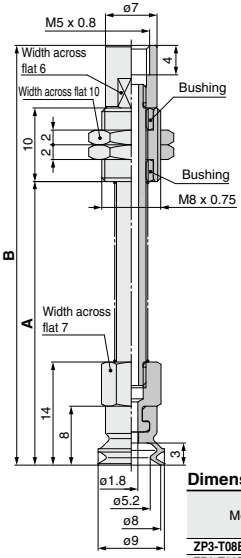


Dimensions (per stroke)

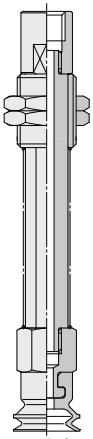
Model	A	B	Weight (g)	
			Rotating (J)	Non-rotating (K)
ZP3-T06B□☆15-B5	38.5	57	10.3	12.3
ZP3-T06B□☆20-B5	46	64.5	10.9	13.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-T08B□JB■■-B5



ZP3-T08B□K■■-B5

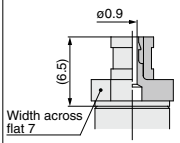
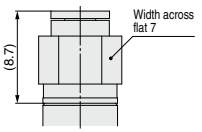
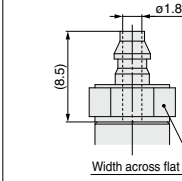
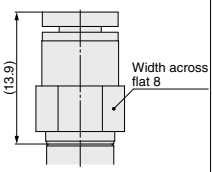


Dimensions (per stroke)

Model	A	B	Weight (g)	
			Rotating (J)	Non-rotating (K)
ZP3-T08B□☆15-B5	38.5	57	10.4	12.4
ZP3-T08B□☆20-B5	46	64.5	11.0	13.5

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Vacuum Inlet Dimensions

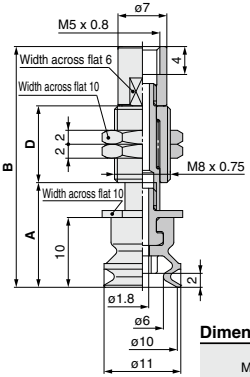
Barb fitting	One-touch fitting
ZP3-T04B□☆■■-U2 ZP3-T06B□☆■■-U2 ZP3-T08B□☆■■-U2	ZP3-T04B□☆■■-02 ZP3-T06B□☆■■-02 ZP3-T08B□☆■■-02
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-T04B□☆■■-U4 ZP3-T06B□☆■■-U4 ZP3-T08B□☆■■-U4	ZP3-T04B□☆■■-04 ZP3-T06B□☆■■-04 ZP3-T08B□☆■■-04
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2

*1 Refer to "ZP3-T▲▲B□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲B□☆■■-B5".

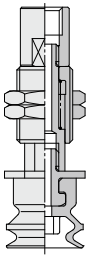
Pad diameter ø10 to ø16
Pad type Bellows
Stroke 3, 6, 10 mm

Dimensions/With Buffer: Vacuum Inlet **Vertical**

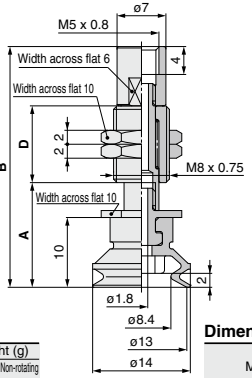
ZP3-T10B□J■■-B5



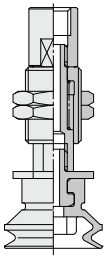
ZP3-T10B□K■■-B5



ZP3-T13B□J■■-B5



ZP3-T13B□K■■-B5



Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T10B□☆3-B5	15	34.5	11	8.6	8.5
ZP3-T10B□☆6-B5	18	41	14.5	9.7	9.7
ZP3-T10B□☆10-B5	22	51	20.5	11.7	11.7

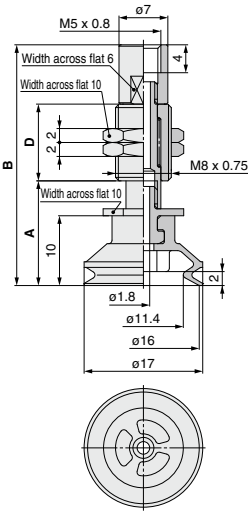
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

Dimensions (per stroke)

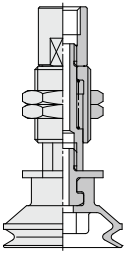
Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T13B□☆3-B5	15	34.5	11	8.7	8.6
ZP3-T13B□☆6-B5	18	41	14.5	9.8	9.8
ZP3-T13B□☆10-B5	22	51	20.5	11.8	11.8

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-T16B□J■■-B5



ZP3-T16B□K■■-B5

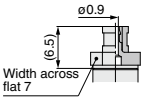
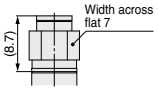
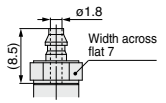
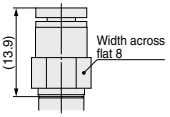
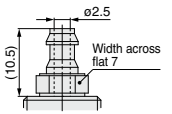
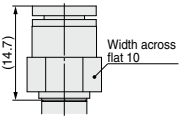


Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T16B□☆3-B5	15	34.5	11	8.8	8.7
ZP3-T16B□☆6-B5	18	41	14.5	9.9	9.9
ZP3-T16B□☆10-B5	22	51	20.5	11.9	11.9

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."*
Note 2) The symbol "☆" indicates buffer type "J" or "K".

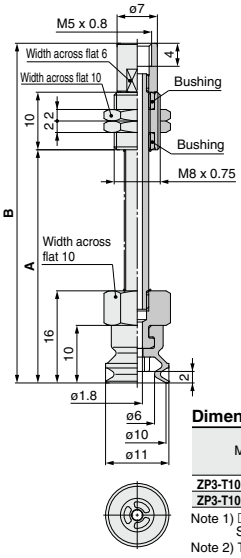
Vacuum Inlet Dimensions

Barb fitting	One-touch fitting
ZP3-T10B□☆■■-U2 **ZP3-T13B□☆■■-U2** **ZP3-T16B□☆■■-U2**	**ZP3-T10B□☆■■-02** **ZP3-T13B□☆■■-02** **ZP3-T16B□☆■■-02**
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-T10B□☆■■-U4 **ZP3-T13B□☆■■-U4** **ZP3-T16B□☆■■-U4**	**ZP3-T10B□☆■■-04** **ZP3-T13B□☆■■-04** **ZP3-T16B□☆■■-04**
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2
ZP3-T10B□☆■■-U6 **ZP3-T13B□☆■■-U6** **ZP3-T16B□☆■■-U6**	**ZP3-T10B□☆■■-06** **ZP3-T13B□☆■■-06** **ZP3-T16B□☆■■-06**
	
M-5AU-6-X83 [Weight: 1.8 g]*2	**KJH06-M5** [Weight: 3.3 g]*2

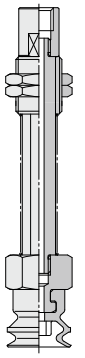
*1 Refer to "ZP3-T▲▲B□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲B□☆■■-B5".

Dimensions/With Buffer: Vacuum Inlet Vertical

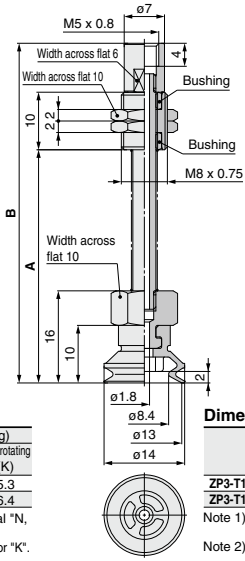
ZP3-T10B□JB■■-B5



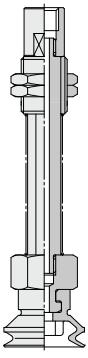
ZP3-T10B□K■■-B5



ZP3-T13B□JB■■-B5



ZP3-T13B□K■■-B5



Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T10B□☆15-B5	40.5	59	13.3	15.3
ZP3-T10B□☆20-B5	48	66.5	16.4	16.4

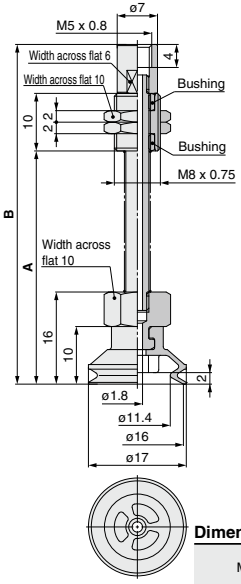
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Dimensions (per stroke)

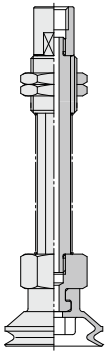
Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T13B□☆15-B5	40.5	59	13.5	15.5
ZP3-T13B□☆20-B5	48	66.5	16.6	16.6

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-T16B□JB■■-B5



ZP3-T16B□K■■-B5

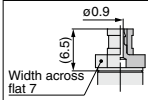
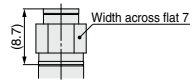
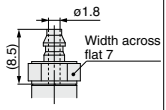
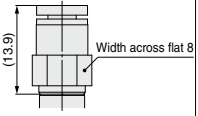
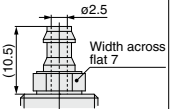
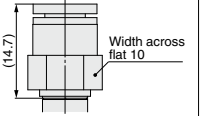


Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-T16B□☆15-B5	40.5	59	13.6	15.6
ZP3-T16B□☆20-B5	48	66.5	16.7	16.7

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Vacuum Inlet Dimensions

Barb fitting	One-touch fitting
ZP3-T10B□☆■■-U2 **ZP3-T13B□☆■■-U2** **ZP3-T16B□☆■■-U2**	**ZP3-T10B□☆■■-02** **ZP3-T13B□☆■■-02** **ZP3-T16B□☆■■-02**
 **M-5AU-2** [Weight: 1.5 g]*2	 **KJH02-M5** [Weight: 1.9 g]*2
ZP3-T10B□☆■■-U4 **ZP3-T13B□☆■■-U4** **ZP3-T16B□☆■■-U4**	**ZP3-T10B□☆■■-04** **ZP3-T13B□☆■■-04** **ZP3-T16B□☆■■-04**
 **M-5AU-4-X83** [Weight: 1.6 g]*2	 **KJH04-M5** [Weight: 2.4 g]*2
ZP3-T10B□☆■■-U6 **ZP3-T13B□☆■■-U6** **ZP3-T16B□☆■■-U6**	**ZP3-T10B□☆■■-06** **ZP3-T13B□☆■■-06** **ZP3-T16B□☆■■-06**
 **M-5AU-6-X83** [Weight: 1.8 g]*2	 **KJH06-M5** [Weight: 3.3 g]*2

*1 Refer to "ZP3-T▲▲B□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-T▲▲B□☆■■-B5".

How to Order

Lateral vacuum inlet/ With adapter

ZP3 – Y 015 U N – B3 – B3

Vacuum inlet direction

Symbol	Direction
Y	Lateral

Pad diameter

Symbol	Pad diameter
015	ø1.5
02	ø2
035	ø3.5
04	ø4
06	ø6
08	ø8
10	ø10
13	ø13
16	ø16

Vacuum inlet (◇)

	Symbol	Connection	ø1.5 to ø3.5	ø4 to ø8	ø10 to ø16
Female thread	**B3**	M3 x 0.5	●	—	—
	B5	M5 x 0.8	—	●	●
Barb fitting	**U2**	ø2 tubing *1	●	●	●
	U4	ø4 tubing *2	●	●	●
	U6	ø6 tubing *2	—	—	●
One-touch fitting	**02**	ø2	●	●	●
	04	ø4	●	●	●
	06	ø6	—	—	●

∗1 Polyurethane tube piping
∗2 Soft nylon/Polyurethane tube piping

Mounting thread size

	Symbol	Thread size	ø1.5 to ø3.5	ø4 to ø16
Female thread	**B3**	M3 x 0.5	●	—
	B5	M5 x 0.8	—	●

Pad material (□)

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

Pad type—Pad diameter

Pad type \ Pad diameter (Symbol)	015	02	035	04	06	08	10	13	16
U (Flat)	●	●	●	—	—	—	—	—	—
UM (Flat with groove)	—	—	—	●	●	●	●	●	●
B (Bellows)	—	—	—	●	●	●	●	●	●

Specifications

Pad diameter: ø1.5 to ø3.5

Model	Pad unit part no.	Adapter part no.
ZP3-Y(015/02/035)U□-B3-◇	ZP3-(015/02/035)U□	ZP3A-Y1-B3

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-3AU-2, U4: M-3AU-4-X83
02: KJH02-M3, 04: KJH04-M3-X83

Pad diameter: ø4 to ø8

Model	Pad unit part no.	Adapter part no.
ZP3-Y(04/06/08)UM□-B5-◇	ZP3-(04/06/08)UM□	ZP3A-Y2-B5
ZP3-Y(04/06/08)B□-B5-◇	ZP3-(04/06/08)B□	

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-5AU-2, U4: M-5AU-4-X83
02: KJH02-M5, 04: KJH04-M5

Pad diameter: ø10 to ø16

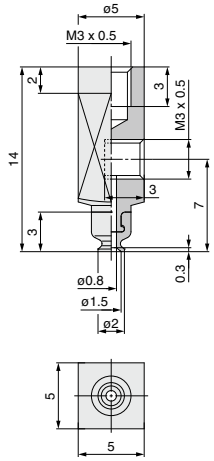
Model	Pad unit part no.	Adapter part no.
ZP3-Y (10/13/16)UM□-B5-◇	ZP3-(10/13/16)UM□	ZP3A-Y3-B5
ZP3-Y (10/13/16)B□-B5-◇	ZP3-(10/13/16)B□	

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-5AU-2, U4: M-5AU-4-X83
U6: M-5AU-6-X83, 02: KJH02-M5
04: KJH04-M5, 06: KJH06-M5

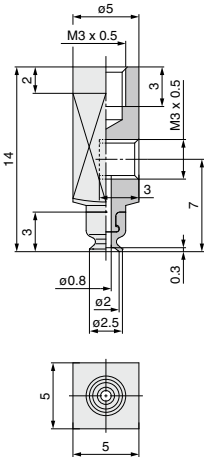
Dimensions/With Adapter: Vacuum Inlet Lateral

Pad diameter ø1.5 to ø3.5
Pad type Flat

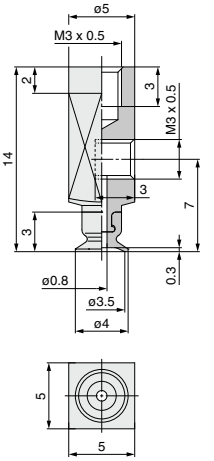
ZP3-Y015U□-B3-B3
[Weight: 1.9 g]



ZP3-Y02U□-B3-B3
[Weight: 1.9 g]

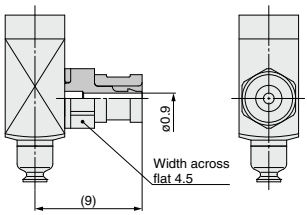
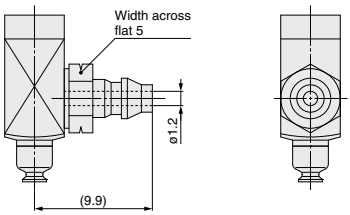


ZP3-Y035U□-B3-B3
[Weight: 1.9 g]

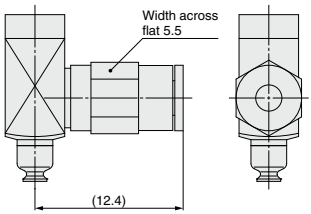
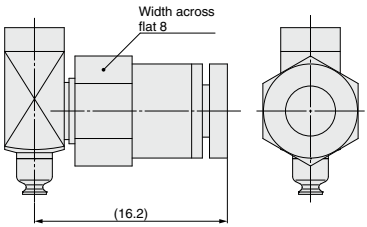


Vacuum Inlet Dimensions

Barb fitting

ZP3-Y015U□-B3-U2 ZP3-Y02U□-B3-U2 ZP3-Y035U□-B3-U2	ZP3-Y015U□-B3-U4 ZP3-Y02U□-B3-U4 ZP3-Y035U□-B3-U4
	
M-3AU-2 [Weight: 0.7 g]*2	**M-3AU-4-X83** [Weight: 0.7 g]*2

One-touch fitting

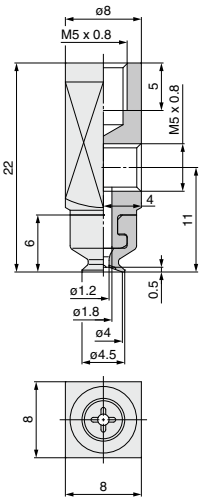
ZP3-Y015U□-B3-02 ZP3-Y02U□-B3-02 ZP3-Y035U□-B3-02	ZP3-Y015U□-B3-04 ZP3-Y02U□-B3-04 ZP3-Y035U□-B3-04
	
KJH02-M3 [Weight: 1.1 g]*2	**KJH04-M3-X83** [Weight: 1.9 g]*2

*1 Refer to "ZP3-Y▲▲▲U□-B3-B3" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲▲U□-B3-B3".

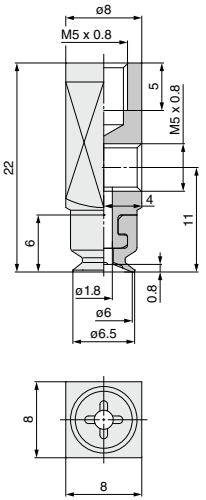
Pad diameter ø4 to ø8
Pad type Flat with groove

Dimensions/With Adapter: Vacuum Inlet Lateral

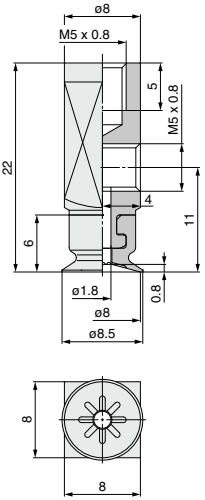
ZP3-Y04UM□-B5-B5
[Weight: 7.0 g]



ZP3-Y06UM□-B5-B5
[Weight: 7.0 g]

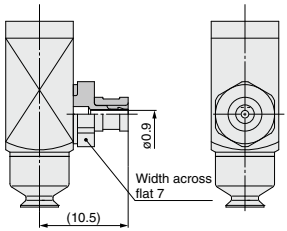
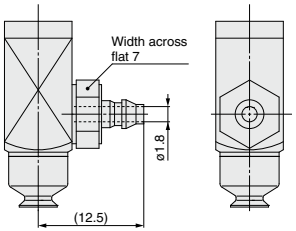


ZP3-Y08UM□-B5-B5
[Weight: 7.0 g]

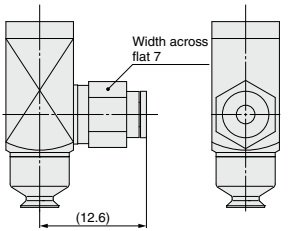
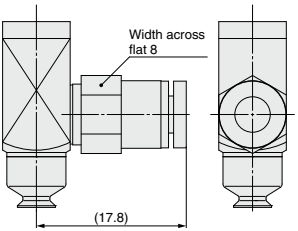


Vacuum Inlet Dimensions

Barb fitting

ZP3-Y04UM□-B5-U2 ZP3-Y06UM□-B5-U2 ZP3-Y08UM□-B5-U2	ZP3-Y04UM□-B5-U4 ZP3-Y06UM□-B5-U4 ZP3-Y08UM□-B5-U4
	
M-5AU-2 [Weight: 1.5 g]*2	**M-5AU-4-X83** [Weight: 1.6 g]*2

One-touch fitting

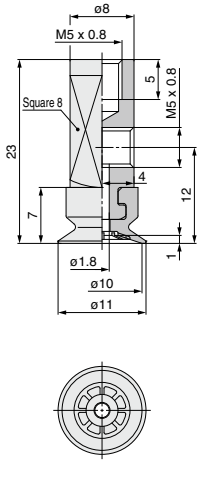
ZP3-Y04UM□-B5-02 ZP3-Y06UM□-B5-02 ZP3-Y08UM□-B5-02	ZP3-Y04UM□-B5-04 ZP3-Y06UM□-B5-04 ZP3-Y08UM□-B5-04
	
KJH02-M5 [Weight: 1.9 g]*2	**KJH04-M5** [Weight: 2.4 g]*2

*1 Refer to "ZP3-Y▲▲UM□-B5-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲UM□-B5-B5".

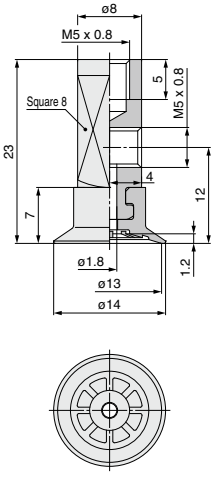
Pad diameter ø10 to ø16
Pad type Flat with groove

Dimensions/With Adapter: Vacuum Inlet Lateral

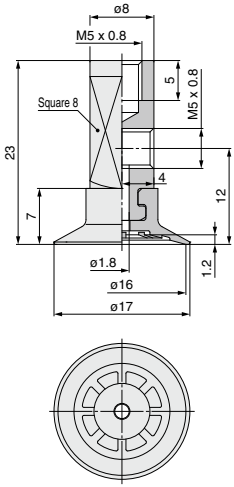
ZP3-Y10UM□-B5-B5
[Weight: 7.7 g]



ZP3-Y13UM□-B5-B5
[Weight: 7.8 g]

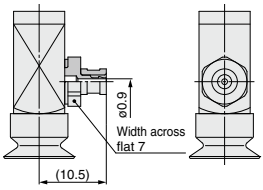
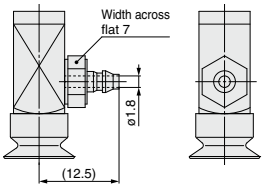
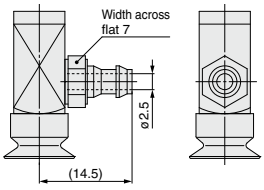


ZP3-Y16UM□-B5-B5
[Weight: 7.9 g]

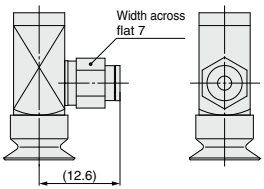
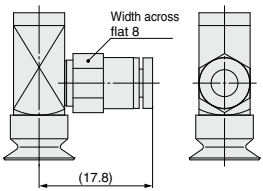
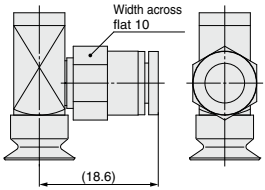


Vacuum Inlet Dimensions

Barb fitting

ZP3-Y10UM□-B5-U2 ZP3-Y13UM□-B5-U2 ZP3-Y16UM□-B5-U2	ZP3-Y10UM□-B3-U4 ZP3-Y13UM□-B3-U4 ZP3-Y16UM□-B3-U4	ZP3-Y10UM□-B5-U6 ZP3-Y13UM□-B5-U6 ZP3-Y16UM□-B5-U6
		
M-5AU-2 [Weight: 1.5 g]*2	**M-5AU-4-X83** [Weight: 1.6 g]*2	**M-5AU-6-X83** [Weight: 1.8 g]*2

One-touch fitting

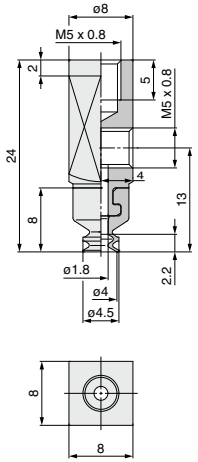
ZP3-Y10UM□-B5-02 ZP3-Y13UM□-B5-02 ZP3-Y16UM□-B5-02	ZP3-Y10UM□-B3-04 ZP3-Y13UM□-B3-04 ZP3-Y16UM□-B3-04	ZP3-Y10UM□-B5-06 ZP3-Y13UM□-B5-06 ZP3-Y16UM□-B5-06
		
KJH02-M5 [Weight: 1.9 g]*2	**KJH04-M5** [Weight: 2.4 g]*2	**KJH06-M5** [Weight: 3.3 g]*2

*1 Refer to "ZP3-Y▲▲UM□-B5-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲UM□-B5-B5".

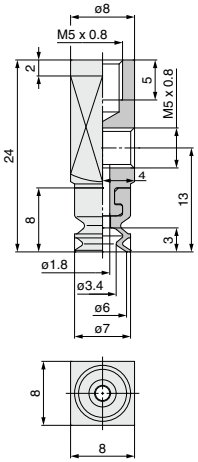
Pad diameter ø4 to ø8
Pad type Bellows

Dimensions/With Adapter: Vacuum Inlet Lateral

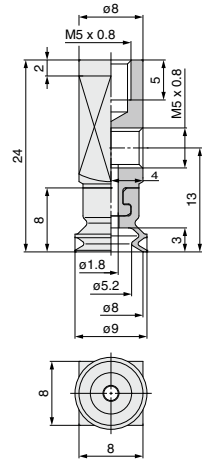
ZP3-Y04B□-B5-B5
[Weight: 7.0 g]



ZP3-Y06B□-B5-B5
[Weight: 7.0 g]

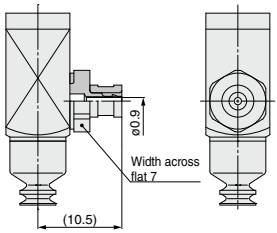
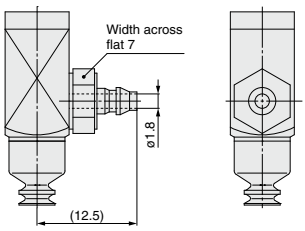


ZP3-Y08B□-B5-B5
[Weight: 7.1 g]

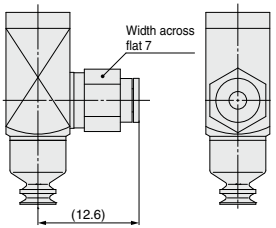
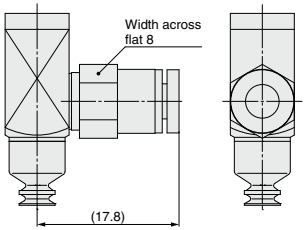


Vacuum Inlet Dimensions

Barb fitting

ZP3-Y04B□-B5-U2 ZP3-Y06B□-B5-U2 ZP3-Y08B□-B5-U2	ZP3-Y04B□-B5-U4 ZP3-Y06B□-B5-U4 ZP3-Y08B□-B5-U4
	
M-5AU-2 [Weight: 0.7 g]*2	**M-5AU-4-X83** [Weight: 0.7 g]*2

One-touch fitting

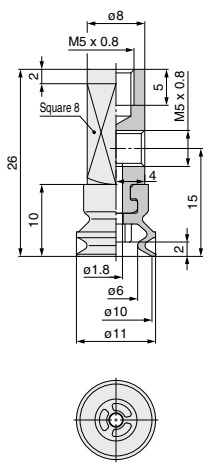
ZP3-Y04B□-B5-02 ZP3-Y06B□-B5-02 ZP3-Y08B□-B5-02	ZP3-Y04B□-B5-04 ZP3-Y06B□-B5-04 ZP3-Y08B□-B5-04
	
KJH02-M5 [Weight: 1.1 g]*2	**KJH04-M5** [Weight: 1.9 g]*2

*1 Refer to "ZP3-Y▲▲B□-B5-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲B□-B5-B5".

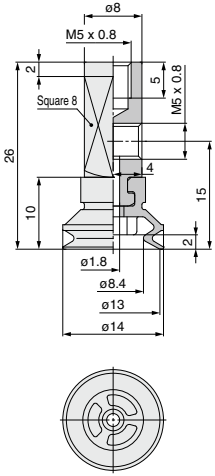
Pad diameter ø10 to ø16
Pad type Bellows

Dimensions/With Adapter: Vacuum Inlet Lateral

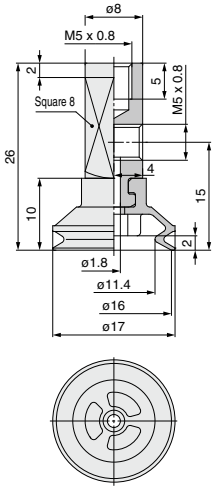
ZP3-Y10B□-B5-B5
[Weight: 7.9 g]



ZP3-Y13B□-B5-B5
[Weight: 8.1 g]

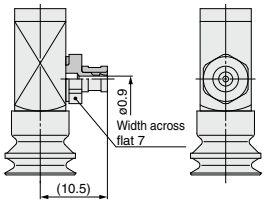
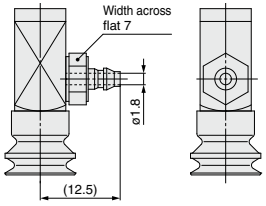
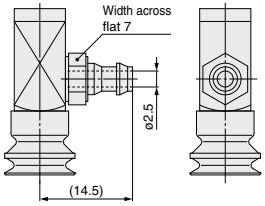


ZP3-Y16B□-B5-B5
[Weight: 8.2 g]

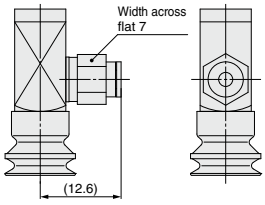
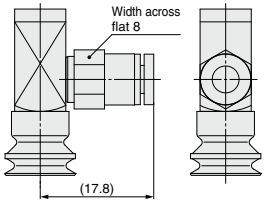
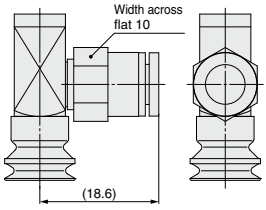


Vacuum Inlet Dimensions

Barb fitting

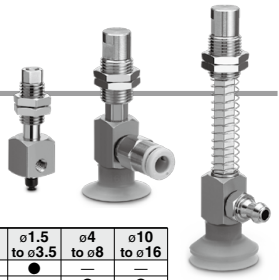
ZP3-Y10B□-B5-U2 ZP3-Y13B□-B5-U2 ZP3-Y16B□-B5-U2	ZP3-Y10B□-B5-U4 ZP3-Y13B□-B5-U4 ZP3-Y16B□-B5-U4	ZP3-Y10B□-B5-U6 ZP3-Y13B□-B5-U6 ZP3-Y16B□-B5-U6
		
M-5AU-2 [Weight: 1.5 g]*2	**M-5AU-4-X83** [Weight: 1.6 g]*2	**M-5AU-6-X83** [Weight: 1.8 g]*2

One-touch fitting

ZP3-Y10B□-B5-02 ZP3-Y13B□-B5-02 ZP3-Y16B□-B5-02	ZP3-Y10B□-B5-04 ZP3-Y13B□-B5-04 ZP3-Y16B□-B5-04	ZP3-Y10B□-B5-06 ZP3-Y13B□-B5-06 ZP3-Y16B□-B5-06
		
KJH02-M5 [Weight: 1.9 g]*2	**KJH04-M5** [Weight: 2.4 g]*2	**KJH06-M5** [Weight: 3.3 g]*2

*1 Refer to "ZP3-Y▲▲B□-B5-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲B□-B5-B5".

How to Order



Lateral vacuum inlet/ With buffer

ZP3 − Y 015 U N J 3 − B3

Vacuum inlet direction

Symbol	Direction
Y	Lateral

Pad diameter

Symbol	Pad diameter
015	ø1.5
02	ø2
035	ø3.5
04	ø4
06	ø6
08	ø8
10	ø10
13	ø13
16	ø16

Pad type—Pad diameter

Pad type \ Pad diameter (Symbol)	015	02	035	04	06
U (Flat)	●	●	●	—	—
UM (Flat with groove)	—	—	—	●	●
B (Bellows)	—	—	—	●	●

Pad type \ Pad diameter (Symbol)	08	10	13	16
U (Flat)	—	—	—	—
UM (Flat with groove)	●	●	●	●
B (Bellows)	●	●	●	●

Vacuum inlet (◇)

	Symbol	Connection	ø1.5 to ø3.5	ø4 to ø8	ø10 to ø16
Female thread	**B3**	M3 x 0.5	●	—	—
	B5	M5 x 0.8	—	●	●
Barb fitting	**U2**	ø2 tubing *1	●	●	●
	U4	ø4 tubing *2	●	●	●
	U6	ø6 tubing *2	—	—	●
One-touch fitting	**02**	ø2 tubing	●	●	●
	04	ø4 tubing	●	●	●
	06	ø6 tubing	—	—	●

*1 Polyurethane tube piping
*2 Soft nylon/Polyurethane tube piping

Stroke (■)—Buffer specifications

Stroke	ø1.5 to ø3.5		ø4 to ø16		
	J	K	J	JB	K
3	●	●	●	—	●
6	●	●	●	—	●
10	—	—	●	—	●
15	—	—	—	●	●
20	—	—	—	●	●

Buffer specifications (☆)

J	Rotating
JB	Rotating, With bushing
K	Non-rotating

Pad material (□)

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

Specifications

Pad diameter	Buffer specifications	Stroke (mm)	Tightening torque (N·m)	Mounting	Spring reactive force	
					At 0 stroke (N)	At full stroke (N)
ø1.5 to ø3.5	**J**	3, 6	1.5 to 1.8	M6 x 0.75	0.2	0.4
	K		2.0 to 2.5	M8 x 0.75		0.5
ø4 to ø16	**J**	3, 6, 10	2.0 to 2.5	M8 x 0.75	0.2	0.5
	JB	15, 20				
	K	3, 6, 10, 15, 20				

Replacement Part No.

Pad diameter: ø1.5 to ø3.5

Model	Pad unit part no.	Buffer assembly part no. Note 3)
ZP3-Y(015/02/035)U□(J/K)3-◇	ZP3-(015/02/035)U□	ZP3B-Y1(J/K)3-B3
ZP3-Y(015/02/035)U□(J/K)6-◇		ZP3B-Y1(J/K)6-B3

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-3AU-2, U4: M-3AU-4-X83
02: KJH02-M3, 04: KJH04-M3-X83

Pad diameter: ø4 to ø8

Model	Pad unit part no.	Buffer assembly part no. Note 3)
ZP3-Y(04/06/08)UM□(J/K)3-◇	ZP3-(04/06/08)UM□	ZP3B-Y2A(J/K)3-B5
ZP3-Y(04/06/08)B□(J/K)3-◇	ZP3-(04/06/08)B□	
ZP3-Y(04/06/08)UM□(J/K)6-◇	ZP3-(04/06/08)UM□	ZP3B-Y2A(J/K)6-B5
ZP3-Y(04/06/08)B□(J/K)6-◇	ZP3-(04/06/08)B□	
ZP3-Y(04/06/08)UM□(J/K)10-◇	ZP3-(04/06/08)UM□	ZP3B-Y2A(J/K)10-B5
ZP3-Y(04/06/08)B□(J/K)10-◇	ZP3-(04/06/08)B□	
ZP3-Y(04/06/08)UM□(JB/K)15-◇	ZP3-(04/06/08)UM□	ZP3B-Y2A(JB/K)15-B5
ZP3-Y(04/06/08)B□(JB/K)15-◇	ZP3-(04/06/08)B□	
ZP3-Y(04/06/08)UM□(JB/K)20-◇	ZP3-(04/06/08)UM□	ZP3B-Y2A(JB/K)20-B5
ZP3-Y(04/06/08)B□(JB/K)20-◇	ZP3-(04/06/08)B□	

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-5AU-2, U4: M-5AU-4-X83
02: KJH02-M5, 04: KJH04-M5

Pad diameter: ø10 to ø16

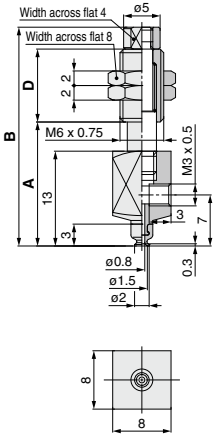
Model	Pad unit part no.	Buffer assembly part no. Note 3)
ZP3-Y(10/13/16)UM□(J/K)3-◇	ZP3-(10/13/16)UM□	ZP3B-Y2B(J/K)3-B5
ZP3-Y(10/13/16)B□(J/K)3-◇	ZP3-(10/13/16)B□	
ZP3-Y(10/13/16)UM□(J/K)6-◇	ZP3-(10/13/16)UM□	ZP3B-Y2B(J/K)6-B5
ZP3-Y(10/13/16)B□(J/K)6-◇	ZP3-(10/13/16)B□	
ZP3-Y(10/13/16)UM□(J/K)10-◇	ZP3-(10/13/16)UM□	ZP3B-Y2B(J/K)10-B5
ZP3-Y(10/13/16)B□(J/K)10-◇	ZP3-(10/13/16)B□	
ZP3-Y(10/13/16)UM□(JB/K)15-◇	ZP3-(10/13/16)UM□	ZP3B-Y2B(JB/K)15-B5
ZP3-Y(10/13/16)B□(JB/K)15-◇	ZP3-(10/13/16)B□	
ZP3-Y(10/13/16)UM□(JB/K)20-◇	ZP3-(10/13/16)UM□	ZP3B-Y2B(JB/K)20-B5
ZP3-Y(10/13/16)B□(JB/K)20-◇	ZP3-(10/13/16)B□	

Note 1) □ in the table indicates the pad material.
Note 2) ◇ in the table indicates the vacuum inlet.
Note 3) Fitting is ordered separately.
Suffix of how to order (◇) U2: M-5AU-2, U4: M-5AU-4-X83
U6: M-5AU-6-X83, 02: KJH02-M5
04: KJH04-M5, 06: KJH06-M5

Pad diameter ø1.5 to ø3.5
Pad type Flat
Stroke 3, 6 mm

Dimensions/With Buffer: Vacuum Inlet Lateral

ZP3-Y015U□J■-B3

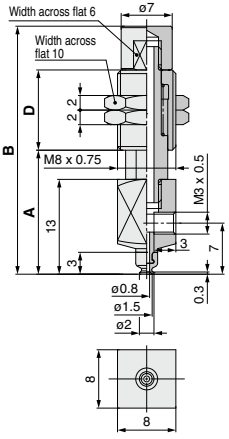


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-Y015U□J3-B3	17	30	10	7.7
ZP3-Y015U□J6-B3	20	37	14	8.6

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

ZP3-Y015U□K■-B3

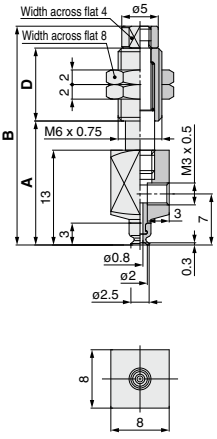


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-Y015U□K3-B3	17	34	11	11.0
ZP3-Y015U□K6-B3	20	40.5	14.5	12.2

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

ZP3-Y02U□J■-B3

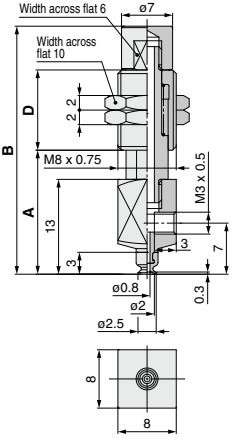


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-Y02U□J3-B3	17	30	10	7.7
ZP3-Y02U□J6-B3	20	37	14	8.6

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

ZP3-Y02U□K■-B3

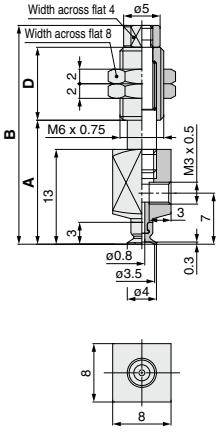


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-Y02U□K3-B3	17	34	11	11.0
ZP3-Y02U□K6-B3	20	40.5	14.5	12.2

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

ZP3-Y035U□J■-B3

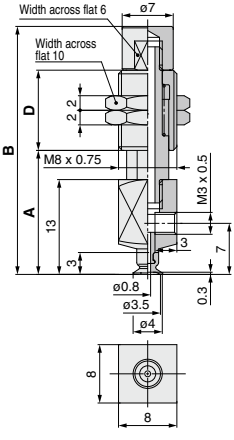


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-Y035U□J3-B3	17	30	10	7.7
ZP3-Y035U□J6-B3	20	37	14	8.6

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

ZP3-Y035U□K■-B3

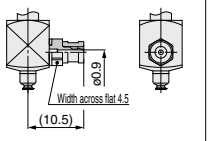
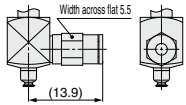
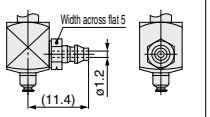
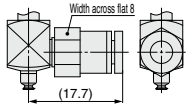


Dimensions (per stroke)

Model	A	B	D	Weight (g)
ZP3-Y035U□K3-B3	17	34	11	11.0
ZP3-Y035U□K6-B3	20	40.5	14.5	12.2

Note) □ in the table indicates the pad material "N, S, U, F, GN, GS."

Vacuum Inlet Dimensions

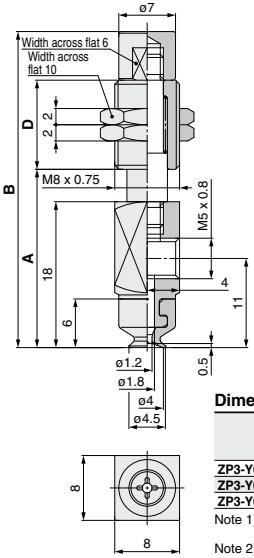
Barb fitting	One-touch fitting
ZP3-Y015U□J■-U2 ZP3-Y02U□J■-U2 ZP3-Y035U□J■-U2	ZP3-Y015U□J■-02 ZP3-Y02U□J■-02 ZP3-Y035U□J■-02
	
M-3AU-2 [Weight: 0.7 g]*2	**KJH02-M3** [Weight: 1.1 g]*2
ZP3-Y015U□J■-U4 ZP3-Y02U□J■-U4 ZP3-Y035U□J■-U4	ZP3-Y015U□J■-04 ZP3-Y02U□J■-04 ZP3-Y035U□J■-04
	
M-3AU-4-X83 [Weight: 0.7 g]*2	**KJH04-M3-X83** [Weight: 1.9 g]*2

*1 Refer to "ZP3-Y▲▲▲U□☆■-B3" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲▲U□☆■-B3".

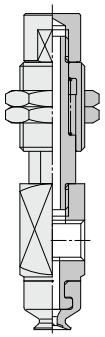
Pad diameter: ø4 to ø8
Pad type: Flat with groove
Stroke: 3, 6, 10 mm

Dimensions/With Buffer: Vacuum Inlet Lateral

ZP3-Y04UM□J■■-B5



ZP3-Y04UM□K■■-B5

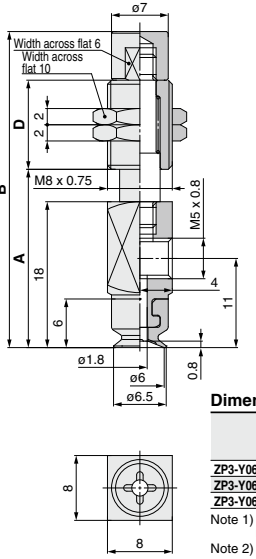


Dimensions (per stroke)

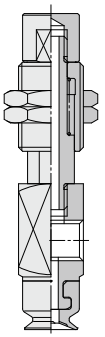
Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y04UM□☆3-B5	22.5	40	11	12.8	12.2
ZP3-Y04UM□☆6-B5	25	46	14.5	14.2	13.4
ZP3-Y04UM□☆10-B5	29	56	20.5	16.6	15.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-Y06UM□J■■-B5



ZP3-Y06UM□K■■-B5

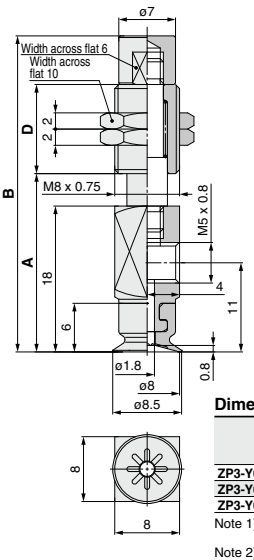


Dimensions (per stroke)

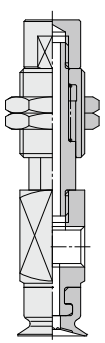
Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y06UM□☆3-B5	22.5	40	11	12.8	12.2
ZP3-Y06UM□☆6-B5	25	46	14.5	14.2	13.4
ZP3-Y06UM□☆10-B5	29	56	20.5	16.6	15.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-Y08UM□J■■-B5



ZP3-Y08UM□K■■-B5

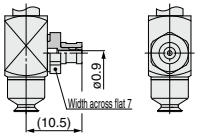
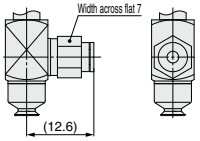
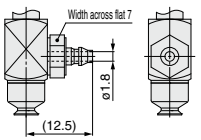
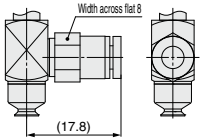


Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y08UM□☆3-B5	22.5	40	11	12.8	12.2
ZP3-Y08UM□☆6-B5	25	46	14.5	14.2	13.4
ZP3-Y08UM□☆10-B5	29	56	20.5	16.6	15.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

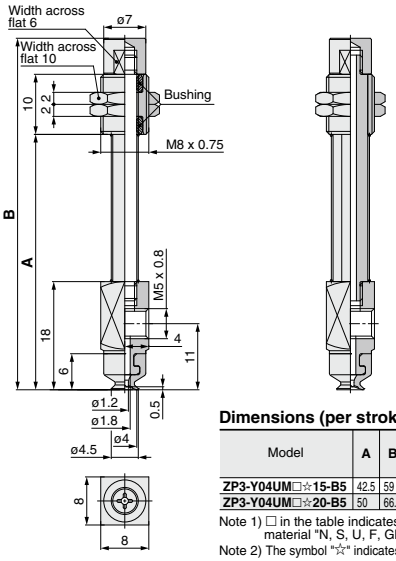
Vacuum Inlet Dimensions

Barb fitting	One-touch fitting
ZP3-Y04UM□☆■■-U2 ZP3-Y06UM□☆■■-U2 ZP3-Y08UM□☆■■-U2	ZP3-Y04UM□☆■■-02 ZP3-Y06UM□☆■■-02 ZP3-Y08UM□☆■■-02
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-Y04UM□☆■■-U4 ZP3-Y06UM□☆■■-U4 ZP3-Y08UM□☆■■-U4	ZP3-Y04UM□☆■■-04 ZP3-Y06UM□☆■■-04 ZP3-Y08UM□☆■■-04
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2

*1 Refer to "ZP3-Y▲▲UM□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲UM□☆■■-B5".

Dimensions/With Buffer: Vacuum Inlet Lateral

ZP3-Y04UM□JB■■-B5 ZP3-Y04UM□K■■-B5

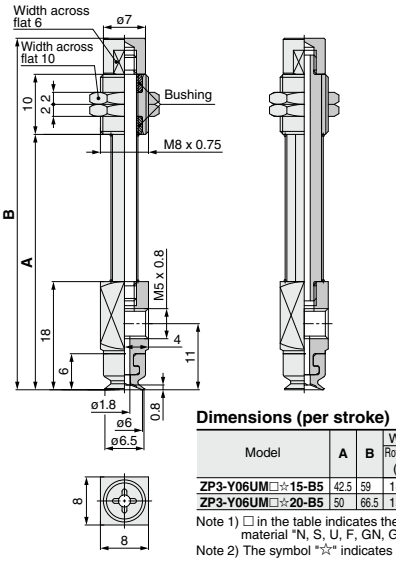


Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y04UM□☆15-B5	42.5	59	14.3	15.5
ZP3-Y04UM□☆20-B5	50	66.5	15.1	16.6

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-Y06UM□JB■■-B5 ZP3-Y06UM□K■■-B5

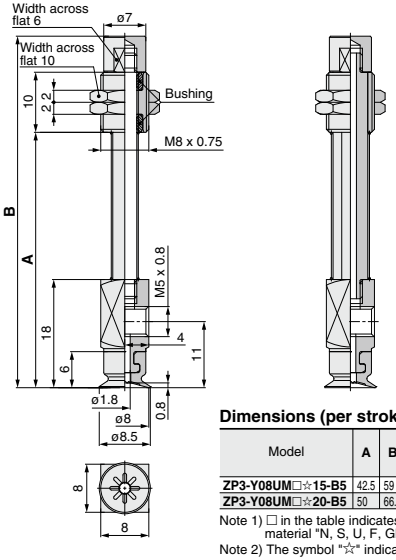


Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y06UM□☆15-B5	42.5	59	14.3	15.5
ZP3-Y06UM□☆20-B5	50	66.5	15.1	16.6

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-Y08UM□JB■■-B5 ZP3-Y08UM□K■■-B5

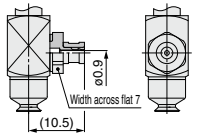
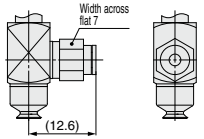
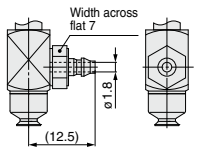
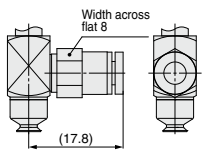


Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y08UM□☆15-B5	42.5	59	14.3	15.5
ZP3-Y08UM□☆20-B5	50	66.5	15.1	16.6

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Vacuum Inlet Dimensions

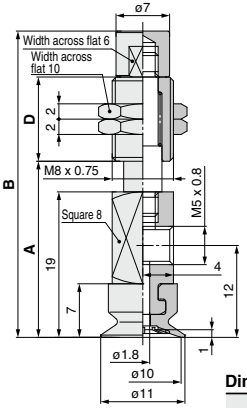
Barb fitting	One-touch fitting
ZP3-Y04UM□☆■■-U2 **ZP3-Y06UM□☆■■-U2** **ZP3-Y08UM□☆■■-U2**	**ZP3-Y04UM□☆■■-02** **ZP3-Y06UM□☆■■-02** **ZP3-Y08UM□☆■■-02**
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-Y04UM□☆■■-U4 **ZP3-Y06UM□☆■■-U4** **ZP3-Y08UM□☆■■-U4**	**ZP3-Y04UM□☆■■-04** **ZP3-Y06UM□☆■■-04** **ZP3-Y08UM□☆■■-04**
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2

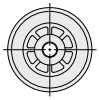
*1 Refer to "ZP3-Y▲▲UM□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲UM□☆■■-B5".

Pad diameter ø10 to ø16
Pad type Flat with groove
Stroke 3, 6, 10 mm

Dimensions/With Buffer: Vacuum Inlet **Lateral**

ZP3-Y10UM□J■■-B5



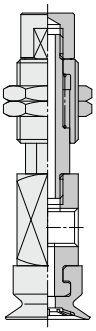


Dimensions (per stroke)

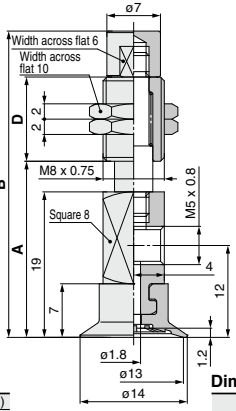
Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y10UM□☆3-B5	23.5	41	11	13.6	13.0
ZP3-Y10UM□☆6-B5	26	47	14.5	14.9	14.2
ZP3-Y10UM□☆10-B5	30	57	20.5	17.3	16.1

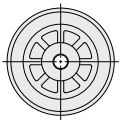
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-Y10UM□K■■-B5



ZP3-Y13UM□J■■-B5



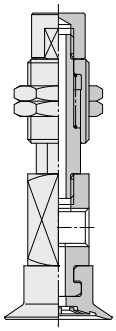


Dimensions (per stroke)

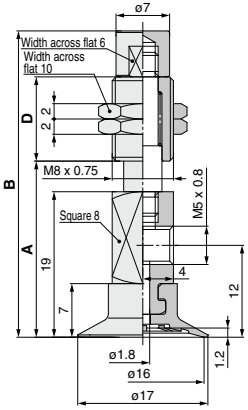
Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y13UM□☆3-B5	23.5	41	11	13.7	13.1
ZP3-Y13UM□☆6-B5	26	47	14.5	15.0	14.3
ZP3-Y13UM□☆10 -B5	30	57	20.5	17.4	16.2

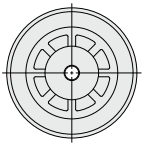
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-Y13UM□K■■-B5



ZP3-Y16UM□J■■-B5



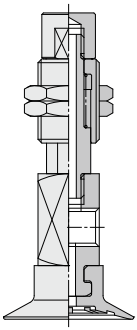


Dimensions (per stroke)

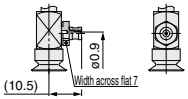
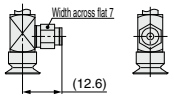
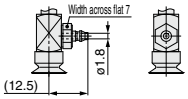
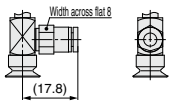
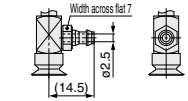
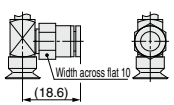
Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y16UM□☆3-B5	23.5	41	11	13.8	13.2
ZP3-Y16UM□☆6 -B5	26	47	14.5	15.1	14.4
ZP3-Y16UM□☆10-B5	30	57	20.5	17.5	16.3

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-Y16UM□K■■-B5



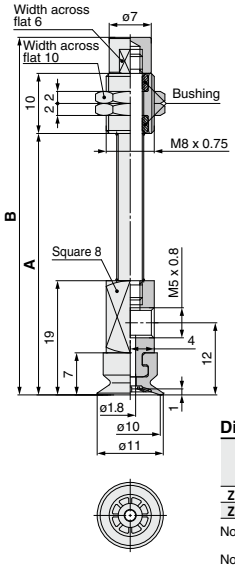
Vacuum Inlet Dimensions

Barb fitting	One-touch fitting
ZP3-Y10UM□☆■■-U2 ZP3-Y13UM□☆■■-U2 ZP3-Y16UM□☆■■-U2	ZP3-Y10UM□☆■■-02 ZP3-Y13UM□☆■■-02 ZP3-Y16UM□☆■■-02
 **M-5AU-2** [Weight: 1.5 g]*2	 **KJH02-M5** [Weight: 1.9 g]*2
ZP3-Y10UM□☆■■-U4 ZP3-Y13UM□☆■■-U4 ZP3-Y16UM□☆■■-U4	ZP3-Y10UM□☆■■-04 ZP3-Y13UM□☆■■-04 ZP3-Y16UM□☆■■-04
 **M-5AU-4-X83** [Weight: 1.6 g]*2	 **KJH04-M5** [Weight: 2.4 g]*2
ZP3-Y10UM□☆■■-U6 ZP3-Y13UM□☆■■-U6 ZP3-Y16UM□☆■■-U6	ZP3-Y10UM□☆■■-06 ZP3-Y13UM□☆■■-06 ZP3-Y16UM□☆■■-06
 **M-5AU-6-X83** [Weight: 1.8 g]*2	 **KJH06-M5** [Weight: 3.3 g]*2

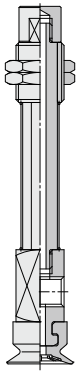
*1 Refer to "ZP3-Y▲▲UM□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲UM□☆■■-B5".

Dimensions/With Buffer: Vacuum Inlet Lateral

ZP3-Y10UM□JB■■-B5



ZP3-Y10UM□K■■-B5

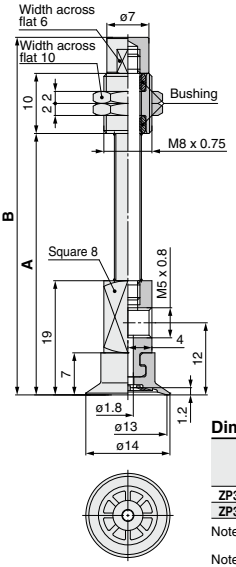


Dimensions (per stroke)

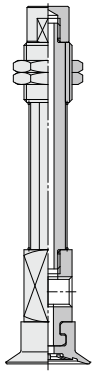
Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y10UM□☆15-B5	43.5	60	15.0	16.2
ZP3-Y10UM□☆20-B5	51	67.5	15.8	17.3

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-Y13UM□JB■■-B5



ZP3-Y13UM□K■■-B5

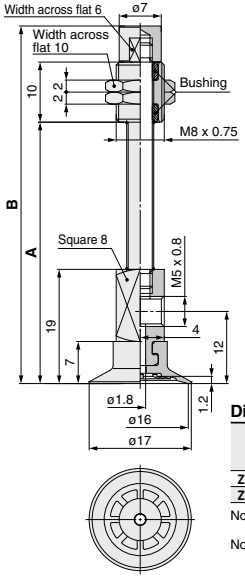


Dimensions (per stroke)

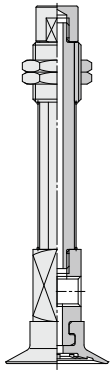
Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y13UM□☆15-B5	43.5	60	15.1	16.3
ZP3-Y13UM□☆20-B5	51	67.5	15.9	17.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-Y16UM□JB■■-B5



ZP3-Y16UM□K■■-B5

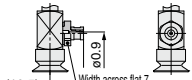
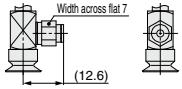
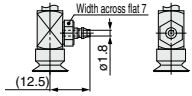
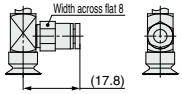
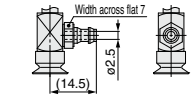
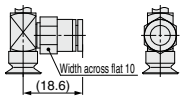


Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y16UM□☆15-B5	43.5	60	15.2	16.4
ZP3-Y16UM□☆20-B5	51	67.5	16.0	17.5

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Vacuum Inlet Dimensions

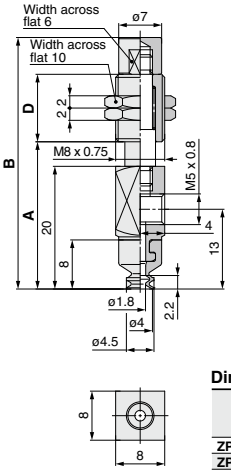
Barb fitting	One-touch fitting
ZP3-Y10UM□☆■■-U2 ZP3-Y13UM□☆■■-U2 ZP3-Y16UM□☆■■-U2	ZP3-Y10UM□☆■■-02 ZP3-Y13UM□☆■■-02 ZP3-Y16UM□☆■■-02
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-Y10UM□☆■■-U4 ZP3-Y13UM□☆■■-U4 ZP3-Y16UM□☆■■-U4	ZP3-Y10UM□☆■■-04 ZP3-Y13UM□☆■■-04 ZP3-Y16UM□☆■■-04
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2
ZP3-Y10UM□☆■■-U6 ZP3-Y13UM□☆■■-U6 ZP3-Y16UM□☆■■-U6	ZP3-Y10UM□☆■■-06 ZP3-Y13UM□☆■■-06 ZP3-Y16UM□☆■■-06
	
M-5AU-6-X83 [Weight: 1.8 g]*2	**KJH06-M5** [Weight: 3.3 g]*2

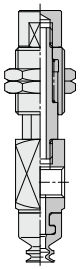
*1 Refer to "ZP3-Y▲▲UM□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲UM□☆■■ -B5".

Pad diameter: ø4 to ø8
Pad type: Bellows
Stroke: 3, 6, 10 mm

Dimensions/With Buffer: Vacuum Inlet Lateral

ZP3-Y04B□J■■-B5 / ZP3-Y04B□K■■-B5



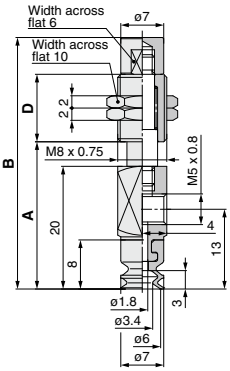


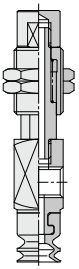
Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y04B□☆3-B5	24.5	42	11	12.8	12.2
ZP3-Y04B□☆6-B5	27	48	14.5	14.2	13.4
ZP3-Y04B□☆10-B5	31	58	20.5	16.6	15.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-Y06B□J■■-B5 / ZP3-Y06B□K■■-B5



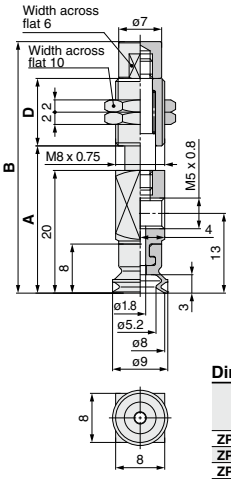


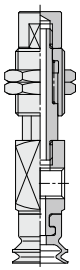
Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y06B□☆3-B5	24.5	42	11	12.8	12.2
ZP3-Y06B□☆6-B5	27	48	14.5	14.2	13.4
ZP3-Y06B□☆10-B5	31	58	20.5	16.6	15.4

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-Y08B□J■■-B5 / ZP3-Y08B□K■■-B5



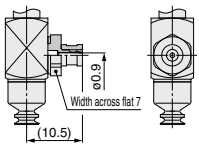
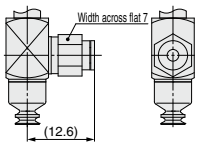
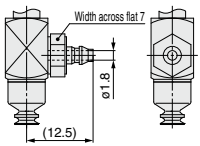
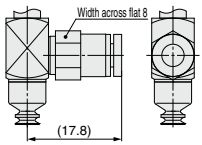


Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y08B□☆3-B5	24.5	42	11	12.9	12.3
ZP3-Y08B□☆6-B5	27	48	14.5	14.3	13.5
ZP3-Y08B□☆10-B5	31	58	20.5	16.7	15.5

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

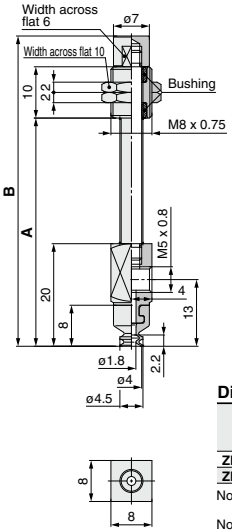
Vacuum Inlet Dimensions

Barb fitting	One-touch fitting
ZP3-Y04B□☆■■-U2 **ZP3-Y06B□☆■■-U2** **ZP3-Y08B□☆■■-U2**	**ZP3-Y04B□☆■■-02** **ZP3-Y06B□☆■■-02** **ZP3-Y08B□☆■■-02**
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-Y04B□☆■■-U4 **ZP3-Y06B□☆■■-U4** **ZP3-Y08B□☆■■-U4**	**ZP3-Y04B□☆■■-04** **ZP3-Y06B□☆■■-04** **ZP3-Y08B□☆■■-04**
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2

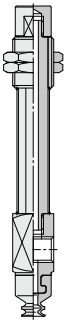
*1 Refer to "ZP3-Y▲▲B□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲B□☆■■-B5".

Dimensions/With Buffer: Vacuum Inlet Lateral

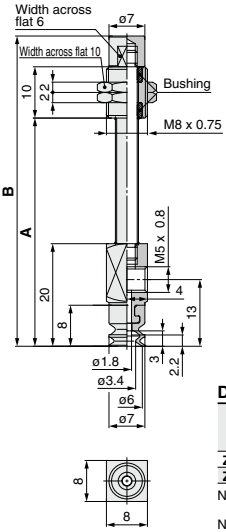
ZP3-Y04B□JB■■-B5



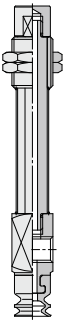
ZP3-Y04B□K■■-B5



ZP3-Y06B□JB■■-B5



ZP3-Y06B□K■■-B5



Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y04B□☆15-B5	44.5	61	14.3	15.5
ZP3-Y04B□☆20-B5	52	68.5	15.1	16.6

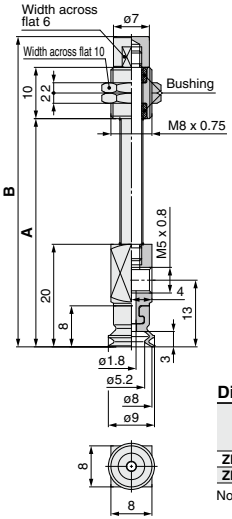
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Dimensions (per stroke)

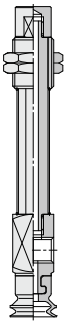
Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y06B□☆15-B5	44.5	61	14.3	15.5
ZP3-Y06B□☆20-B5	52	68.5	15.1	16 .6

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-Y08B□JB■■-B5



ZP3-Y08B□K■■-B5

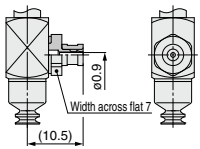
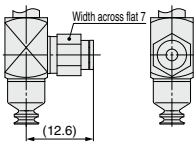
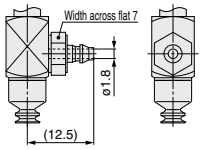
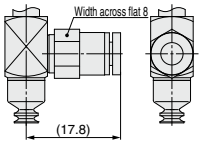


Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y08B□☆15-B5	44.5	61	14.4	15.6
ZP3-Y08B□☆20-B5	52	68.5	15.2	16.7

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Vacuum Inlet Dimensions

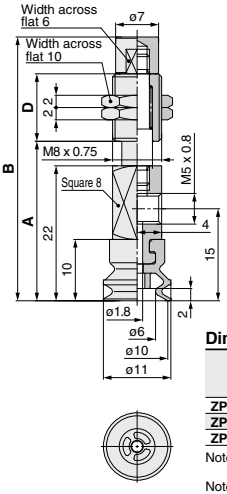
Barb fitting	One-touch fitting
ZP3-Y04B□☆■■-U2 ZP3-Y06B□☆■■-U2 ZP3-Y08B□☆■■-U2	ZP3-Y04B□☆■■-02 ZP3-Y06B□☆■■-02 ZP3-Y08B□☆■■-02
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-Y04B□☆■■-U4 ZP3-Y06B□☆■■-U4 ZP3-Y08B□☆■■-U4	ZP3-Y04B□☆■■-04 ZP3-Y06B□☆■■-04 ZP3-Y08B□☆■■-04
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2

*1 Refer to "ZP3-Y▲▲B□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲B□☆■■-B5".

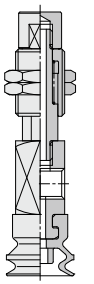
Pad diameter ø10 to ø16
Pad type Bellows
Stroke 3, 6, 10 mm

Dimensions/With Buffer: Vacuum Inlet Lateral

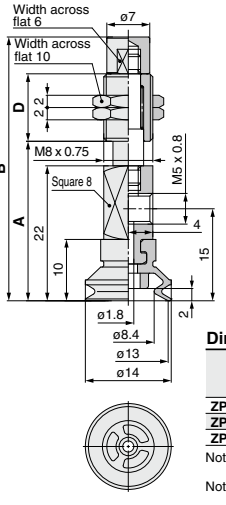
ZP3-Y10B□J■■-B5



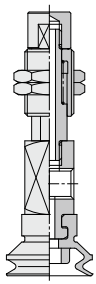
ZP3-Y10B□K■■-B5



ZP3-Y13B□J■■-B5



ZP3-Y13B□K■■-B5



Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y10B□☆3-B5	26.5	44	11	13.8	13.2
ZP3-Y10B□☆6-B5	29	50	14.5	15.1	14.2
ZP3-Y10B□☆10-B5	33	60	20.5	17.5	16.3

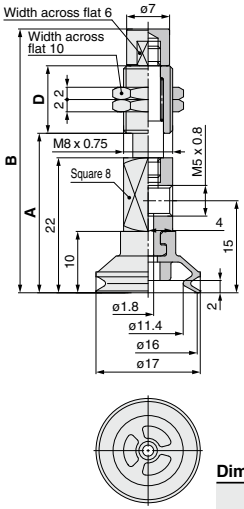
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

Dimensions (per stroke)

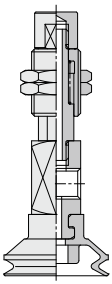
Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y13B□☆3-B5	26.5	44	11	14.0	13.4
ZP3-Y13B□☆6-B5	29	50	14.5	15.3	14.4
ZP3-Y13B□☆10-B5	33	60	20.5	17.7	16.5

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

ZP3-Y16B□J■■-B5



ZP3-Y16B□K■■-B5

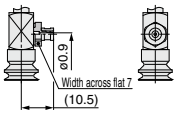
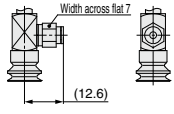
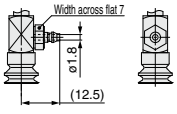
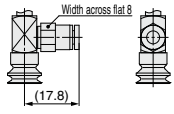
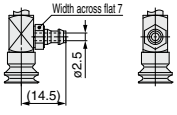
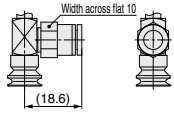


Dimensions (per stroke)

Model	A	B	D	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y16B□☆3-B5	26.5	44	11	14.1	13.5
ZP3-Y16B□☆6-B5	29	50	14.5	15.4	14.5
ZP3-Y16B□☆10-B5	33	60	20.5	17.8	16.6

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "J" or "K".

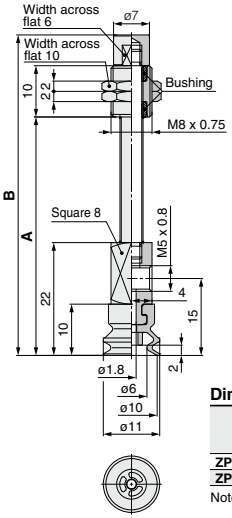
Vacuum Inlet Dimensions

Barb fitting	One-touch fitting
ZP3-Y10B□☆■■-U2 ZP3-Y13B□☆■■-U2 ZP3-Y16B□☆■■-U2	ZP3-Y10B□☆■■-02 ZP3-Y13B□☆■■-02 ZP3-Y16B□☆■■-02
	
M-5AU-2 [Weight: 1.5 g]*2	**KJH02-M5** [Weight: 1.9 g]*2
ZP3-Y10B□☆■■-U4 ZP3-Y13B□☆■■-U4 ZP3-Y16B□☆■■-U4	ZP3-Y10B□☆■■-04 ZP3-Y13B□☆■■-04 ZP3-Y16B□☆■■-04
	
M-5AU-4-X83 [Weight: 1.6 g]*2	**KJH04-M5** [Weight: 2.4 g]*2
ZP3-Y10B□☆■■-U6 ZP3-Y13B□☆■■-U6 ZP3-Y16B□☆■■-U6	ZP3-Y10B□☆■■-06 ZP3-Y13B□☆■■-06 ZP3-Y16B□☆■■-06
	
M-5AU-6-X83 [Weight: 1.8 g]*2	**KJH06-M5** [Weight: 3.3 g]*2

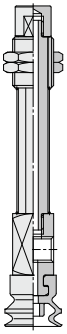
*1 Refer to "ZP3-Y▲▲B□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲B□☆■■-B5".

Dimensions/With Buffer: Vacuum Inlet Lateral

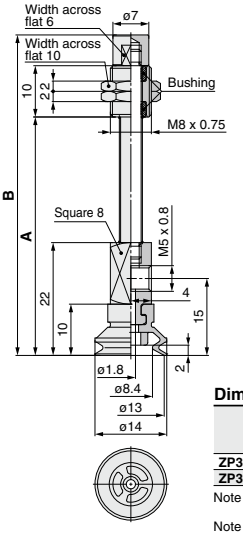
ZP3-Y10B□JB■■-B5



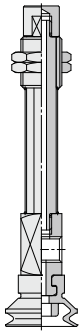
ZP3-Y10B□K■■-B5



ZP3-Y13B□JB■■-B5



ZP3-Y13B□K■■-B5



Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y10B□☆15-B5	46.5	63	15.2	16.4
ZP3-Y10B□☆20-B5	54	70.5	16.0	17.5

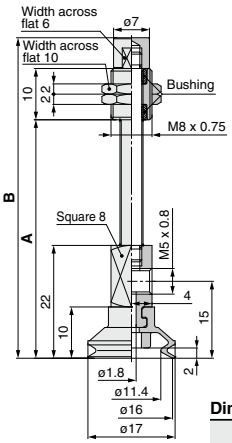
Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Dimensions (per stroke)

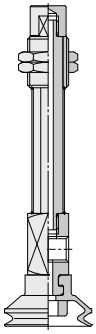
Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y13B□☆15-B5	46.5	63	15.4	16.6
ZP3-Y13B□☆20-B5	54	70.5	16.2	17.7

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

ZP3-Y16B□JB■■-B5



ZP3-Y16B□K■■-B5

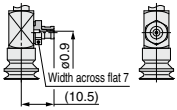
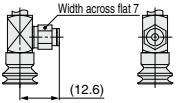
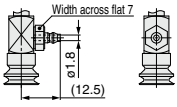
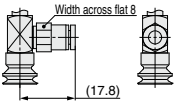
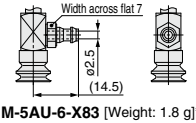
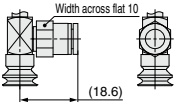


Dimensions (per stroke)

Model	A	B	Weight (g) Rotating (J)	Weight (g) Non-rotating (K)
ZP3-Y16B□☆15-B5	46.5	63	15.5	16.7
ZP3-Y16B□☆20-B5	54	70.5	16.3	17.8

Note 1) □ in the table indicates the pad material "N, S, U, F, GN, GS."
Note 2) The symbol "☆" indicates buffer type "JB" or "K".

Vacuum Inlet Dimensions

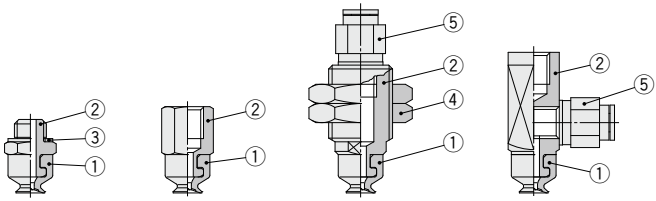
Barb fitting	One-touch fitting
ZP3-Y10B□☆■■-U2 **ZP3-Y13B□☆■■-U2** **ZP3-Y16B□☆■■-U2**	**ZP3-Y10B□☆■■-02** **ZP3-Y13B□☆■■-02** **ZP3-Y16B□☆■■-02**
 **M-5AU-2** [Weight: 1.5 g]*2	 **KJH02-M5** [Weight: 1.9 g]*2
ZP3-Y10B□☆■■-U4 **ZP3-Y13B□☆■■-U4** **ZP3-Y16B□☆■■-U4**	**ZP3-Y10B□☆■■-04** **ZP3-Y13B□☆■■-04** **ZP3-Y16B□☆■■-04**
 **M-5AU-4-X83** [Weight: 1.6 g]*2	 **KJH04-M5** [Weight: 2.4 g]*2
ZP3-Y10B□☆■■-U6 **ZP3-Y13B□☆■■-U6** **ZP3-Y16B□☆■■-U6**	**ZP3-Y10B□☆■■-06** **ZP3-Y13B□☆■■-06** **ZP3-Y16B□☆■■-06**
 **M-5AU-6-X83** [Weight: 1.8 g]*2	 **KJH06-M5** [Weight: 3.3 g]*2

*1 Refer to "ZP3-Y▲▲B□☆■■-B5" for dimensions.
*2 When calculating the weight, add the weight of the fitting to "ZP3-Y▲▲B□☆■■-B5".

Construction

Component Parts List

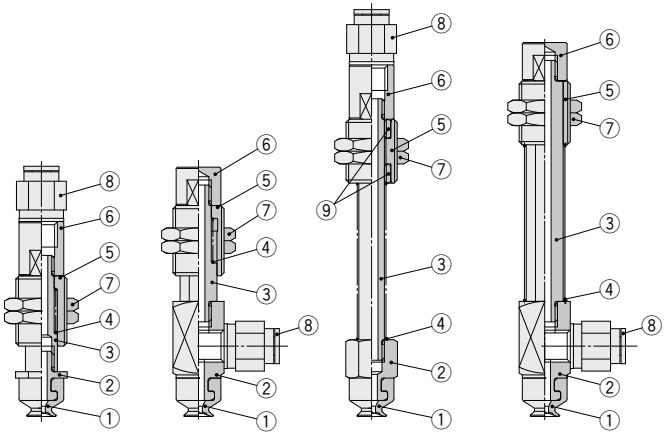
Pad with adapter



Component Parts

No.	Description	Material (Surface treatment)	Note
1	**Pad**	NBR/Silicone rubber Urethane rubber/FKM Conductive NBR/Conductive silicone rubber	
2	**Adapter**	Brass(Electroless nickel plated)	
3	**Gasket**	Stainless steel 304/NBR	
4	**Nut**	Structural steel(Trivalent chromated)	M6 x 0.75 M8 x 0.75 M12 x 1
		Brass(Nickel plated)	M10 x 1
5	**Fitting**	—	

Pad with buffer



Component Parts

No.	Description	Material (Surface treatment)	Note
1	**Pad**	NBR/Silicone rubber Urethane rubber/FKM Conductive NBR/Conductive silicone rubber	
2	**Adapter**	Brass(Electroless nickel plated)	
3	**Piston rod**	Stainless steel	
4	**Return spring**	Stainless steel	
5	**Buffer body**	Brass(Electroless nickel plated)	
6	**Buffer adapter**	Brass(Electroless nickel plated)	
7	**Nut**	Structural steel(Trivalent chromated)	
8	**Fitting**	—	
9	**Bushing**	—	

Adapter Applicable Pad List

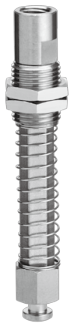
ZP3 Series Mounting Adapter Part No.

Adapter part no.		Applicable pad part no. ZP3 Series	Page
ZP3A-T1-A3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.370
ZP3A-T1-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.370
ZP3A-T1-A6-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.370
ZP3A-T2-A5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.370
ZP3A-T2-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.370
ZP3A-T2-A10-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.370
ZP3A-T2-A10-04		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.370
ZP3A-T3-A5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.370
ZP3A-T3-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.371
ZP3A-T3-A12-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.371
ZP3A-T3-A12-04		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.371
ZP3A-T3-A12-06		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.371
ZP3A-Y1-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.371
ZP3A-Y2-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.371
ZP3A-Y3-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.371

ZP3 Series
Buffer Applicable Pad List

Buffer Assembly Part No.

Buffer assembly part no.		Applicable pad part no. ZP3 Series	Page
ZP3B-T1J3-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.372
ZP3B-T1J6-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.372
ZP3B-T1K3-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.372
ZP3B-T1K6-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.372
ZP3B-T2AJ3-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.372
ZP3B-T2AJ6-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.372
ZP3B-T2AJ10-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.372

Buffer assembly part no.		Applicable pad part no. ZP3 Series	Page
ZP3B-T2AK3-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.372
ZP3B-T2AK6-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.372
ZP3B-T2AK10-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.372
ZP3B-T2AJB15-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.372
ZP3B-T2AJB20-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.372
ZP3B-T2AK15-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.372
ZP3B-T2AK20-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.372

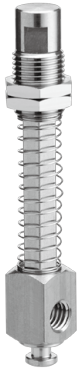
Buffer Assembly Part No.

Buffer assembly part no.		Applicable pad part no. ZP3 Series	Page
ZP3B-T2BJ3-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.373
ZP3B-T2BJ6-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.373
ZP3B-T2BJ10-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.373
ZP3B-T2BK3-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.373
ZP3B-T2BK6-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.373
ZP3B-T2BK10-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.373
ZP3B-T2BJB15-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.373
ZP3B-T2BJB20-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.373

Buffer assembly part no.		Applicable pad part no. ZP3 Series	Page
ZP3B-T2BK15-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.373
ZP3B-T2BK20-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.373
ZP3B-Y1J3-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.374
ZP3B-Y1J6-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.374
ZP3B-Y1K3-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.374
ZP3B-Y1K6-B3		ZP3-015U□ ZP3-02U□ ZP3-035U□	P.374

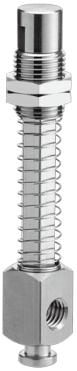
Buffer Assembly Part No.

Buffer assembly part no.		Applicable pad part no. ZP3 Series	Page
ZP3B-Y2AJ3-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.374
ZP3B-Y2AJ6-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.374
ZP3B-Y2AJ10-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.374
ZP3B-Y2AK3-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.374
ZP3B-Y2AK6-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.374
ZP3B-Y2AK10-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.374

Buffer assembly part no.		Applicable pad part no. ZP3 Series	Page
ZP3B-Y2AJB15-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.374
ZP3B-Y2AJB20-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.374
ZP3B-Y2AK15-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.374
ZP3B-Y2AK20-B5		ZP3-04UM□ ZP3-06UM□ ZP3-08UM□ ZP3-04B□ ZP3-06B□ ZP3-08B□	P.374

Buffer Assembly Part No.

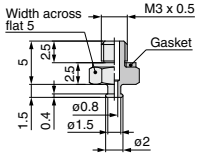
Buffer assembly part no.		Applicable pad part no. ZP3 Series	Page
ZP3B-Y2BJ3-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.375
ZP3B-Y2BJ6-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.375
ZP3B-Y2BJ10-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.375
ZP3B-Y2BK3-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.375
ZP3B-Y2BK6-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.375
ZP3B-Y2BK10-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.375

Buffer assembly part no.		Applicable pad part no. ZP3 Series	Page
ZP3B-Y2BJB15-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.375
ZP3B-Y2BJB20-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.375
ZP3B-Y2BK15-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.375
ZP3B-Y2BK20-B5		ZP3-10UM□ ZP3-13UM□ ZP3-16UM□ ZP3-10B□ ZP3-13B□ ZP3-16B□	P.375

Mounting Adapter Part No.

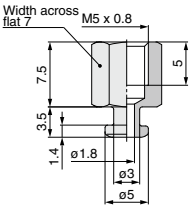
Vacuum Inlet Direction **Vertical**

Adapter part no.	**ZP3A-T1-A3** [Weight: 0.5 g]



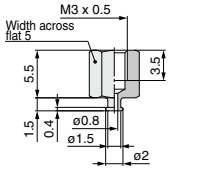
Applicable pad part no.
ZP3-015U
ZP3-02U
ZP3-035U

Adapter part no.	**ZP3A-T2-B5** [Weight: 2.0 g]



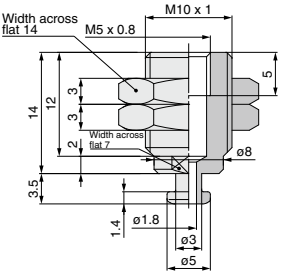
Applicable pad part no.
ZP3-04UM
ZP3-06UM
ZP3-08UM
ZP3-04B
ZP3-06B
ZP3-08B

Adapter part no.	**ZP3A-T1-B3** [Weight: 0.8 g]



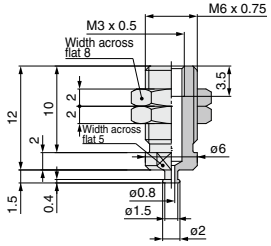
Applicable pad part no.
ZP3-015U
ZP3-02U
ZP3-035U

Adapter part no.	**ZP3A-T2-A10-B5** [Weight: 10.7 g]



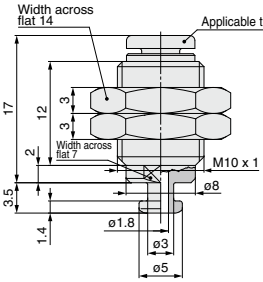
Applicable pad part no.
ZP3-04UM
ZP3-06UM
ZP3-08UM
ZP3-04B
ZP3-06B
ZP3-08B

Adapter part no.	**ZP3A-T1-A6-B3** [Weight: 2.7 g]



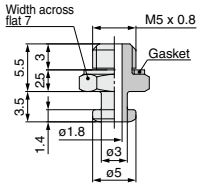
Applicable pad part no.
ZP3-015U
ZP3-02U
ZP3-035U

Adapter part no.	**ZP3A-T2-A10-04** [Weight: 9.9 g]



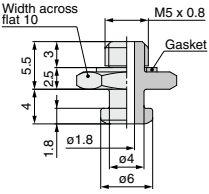
Applicable pad part no.
ZP3-04UM
ZP3-06UM
ZP3-08UM
ZP3-04B
ZP3-06B
ZP3-08B

Adapter part no.	**ZP3A-T2-A5** [Weight: 1.4 g]



Applicable pad part no.
ZP3-04UM
ZP3-06UM
ZP3-08UM
ZP3-04B
ZP3-06B
ZP3-08B

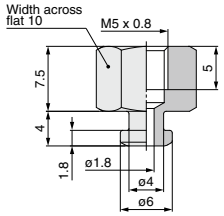
Adapter part no.	**ZP3A-T3-A5** [Weight: 2.4 g]



Applicable pad part no.
ZP3-10UM
ZP3-13UM
ZP3-16UM
ZP3-10B
ZP3-13B
ZP3-16B

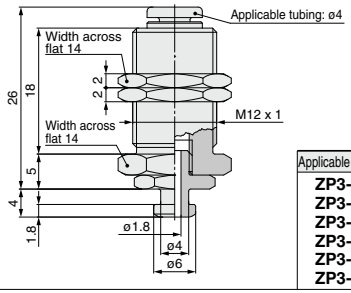
Vacuum Inlet Direction **Vertical**

Adapter part no.	**ZP3A-T3-B5** [Weight: 5.1 g]



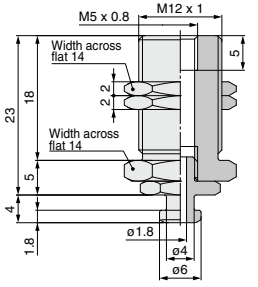
Applicable pad part no.
ZP3-10UM
ZP3-13UM
ZP3-16UM
ZP3-10B
ZP3-13B
ZP3-16B

Adapter part no.	**ZP3A-T3-A12-04** [Weight: 19.6 g]



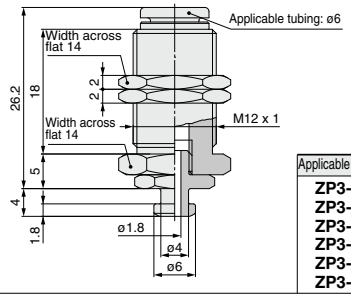
Applicable pad part no.
ZP3-10UM
ZP3-13UM
ZP3-16UM
ZP3-10B
ZP3-13B
ZP3-16B

Adapter part no.	**ZP3A-T3-A12-B5** [Weight: 18.2 g]



Applicable pad part no.
ZP3-10UM
ZP3-13UM
ZP3-16UM
ZP3-10B
ZP3-13B
ZP3-16B

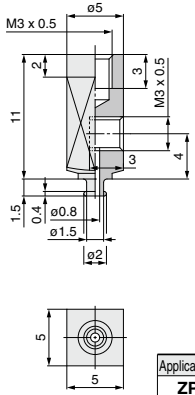
Adapter part no.	**ZP3A-T3-A12-06** [Weight: 17.5 g]



Applicable pad part no.
ZP3-10UM
ZP3-13UM
ZP3-16UM
ZP3-10B
ZP3-13B
ZP3-16B

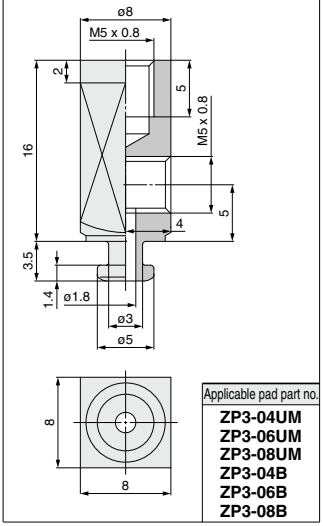
Vacuum Inlet Direction **Lateral**

Adapter part no.	**ZP3A-Y1-B3** [Weight: 1.8 g]



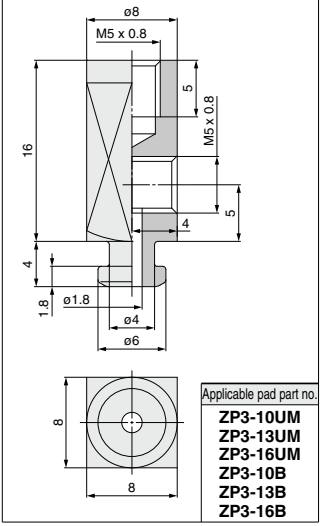
Applicable pad part no.
ZP3-015U
ZP3-02U
ZP3-035U

Adapter part no.	**ZP3A-Y2-B5** [Weight: 6.7 g]



Applicable pad part no.
ZP3-04UM
ZP3-06UM
ZP3-08UM
ZP3-04B
ZP3-06B
ZP3-08B

Adapter part no.	**ZP3A-Y3-B5** [Weight: 7.1 g]



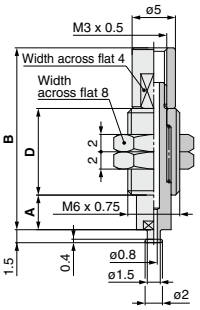
Applicable pad part no.
ZP3-10UM
ZP3-13UM
ZP3-16UM
ZP3-10B
ZP3-13B
ZP3-16B

Buffer Assembly Part No.

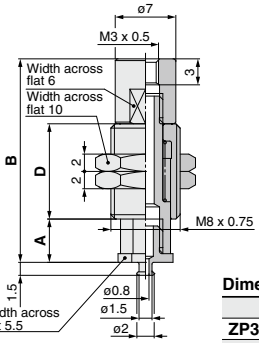
Vacuum Inlet Direction **Vertical**

Buffer assembly part no.	Weight(g)
ZP3B-T1J3-B3	3.5
ZP3B-T1J6-B3	4.3
ZP3B-T1K3-B3	6.7
ZP3B-T1K6-B3	8.1

ZP3B-T1J■-B3



ZP3B-T1K■-B3



Applicable pad part no.
ZP3-015U
ZP3-02U
ZP3-035U

Dimensions (per stroke)

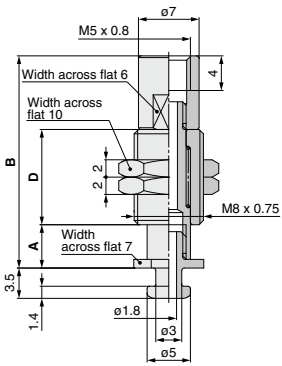
Model	A	B	D
ZP3B-T1J3-B3	4	21	10
ZP3B-T1J6-B3	7	28	14

Dimensions (per stroke)

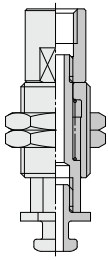
Model	A	B	D
ZP3B-T1K3-B3	5	23.5	11
ZP3B-T1K6-B3	8	30	14.5

Buffer assembly part no.	Weight(g)
ZP3B-T2AJ3-B5	7.1
ZP3B-T2AJ6-B5	8.3
ZP3B-T2AJ10-B5	10.2
ZP3B-T2AK3-B5	7.0
ZP3B-T2AK6-B5	8.3
ZP3B-T2AK10-B5	10.2

ZP3B-T2AJ■-B5



ZP3B-T2AK■-B5



Applicable pad part no.
ZP3-04UM
ZP3-06UM
ZP3-08UM
ZP3-04B
ZP3-06B
ZP3-08B

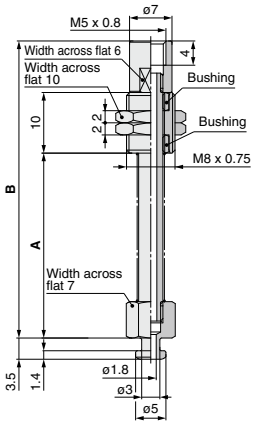
Dimensions (per stroke)

Model	A	B	D
ZP3B-T2A☆3-B5	5	24.5	11
ZP3B-T2A☆6-B5	8	31	14.5
ZP3B-T2A☆10-B5	12	41	20.5

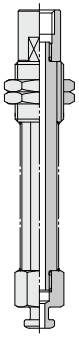
Note) The symbol "☆" indicates buffer type "J" or "K".

Buffer assembly part no.	Weight(g)
ZP3B-T2AJB15-B5	10.0
ZP3B-T2AJB20-B5	10.6
ZP3B-T2AK15-B5	12.0
ZP3B-T2AK20-B5	13.1

ZP3B-T2AJB■■-B5



ZP3B-T2AK■■-B5



Applicable pad part no.
ZP3-04UM
ZP3-06UM
ZP3-08UM
ZP3-04B
ZP3-06B
ZP3-08B

Dimensions (per stroke)

Model	A	B
ZP3B-T2A☆15-B5	30.5	49
ZP3B-T2A☆20-B5	38	56.5

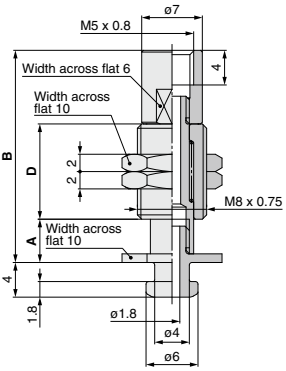
Note) The symbol "☆" indicates buffer type "JB" or "K".

* Refer to the 322 for nut tightening torque.

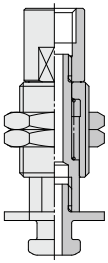
Vacuum Inlet Direction **Vertical**

Buffer assembly part no.	Weight(g)
ZP3B-T2BJ3-B5	7.8
ZP3B-T2BJ6-B5	8.9
ZP3B-T2BJ10-B5	10.9
ZP3B-T2BK3-B5	7.7
ZP3B-T2BK6-B5	8.9
ZP3B-T2BK10-B5	10.9

ZP3B-T2BJ■■-B5



ZP3B-T2BK■■-B5



Applicable pad part no.
- **ZP3-10UM**
- **ZP3-13UM**
- **ZP3-16UM**
- **ZP3-10B**
- **ZP3-13B**
- **ZP3-16B**

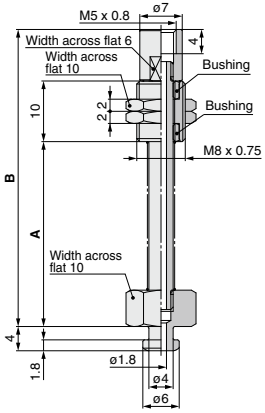
Dimensions (per stroke)

Model	A	B	D
ZP3B-T2B☆3-B5	5	24.5	11
ZP3B-T2B☆6-B5	8	31	14.5
ZP3B-T2B☆10-B5	12	41	20.5

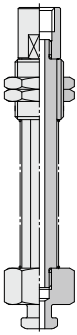
Note) The symbol "☆" indicates buffer type "J" or "K".

Buffer assembly part no.	Weight(g)
ZP3B-T2BJB15-B5	12.5
ZP3B-T2BJB20-B5	15.6
ZP3B-T2BK15-B5	14.5
ZP3B-T2BK20-B5	15.6

ZP3B-T2BJB■■-B5



ZP3B-T2BK■■-B5



Applicable pad part no.
- **ZP3-10UM**
- **ZP3-13UM**
- **ZP3-16UM**
- **ZP3-10B**
- **ZP3-13B**
- **ZP3-16B**

Dimensions (per stroke)

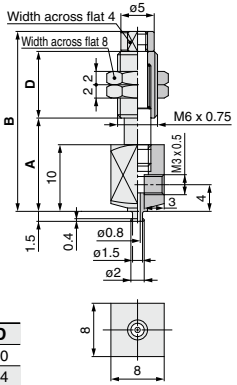
Model	A	B
ZP3B-T2B☆15-B5	30.5	49
ZP3B-T2B☆20-B5	38	56.5

Note) The symbol "☆" indicates buffer type "JB" or "K".

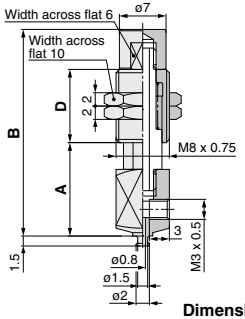
Vacuum Inlet Direction Lateral

Buffer assembly part no.	Weight(g)
ZP3B-Y1J3-B3	7.6
ZP3B-Y1J6-B3	8.5
ZP3B-Y1K3-B3	10.9
ZP3B-Y1K6-B3	12.1

ZP3B-Y1J■-B3



ZP3B-Y1K■-B3



Applicable pad part no.
ZP3-015U
ZP3-02U
ZP3-035U

Dimensions (per stroke)

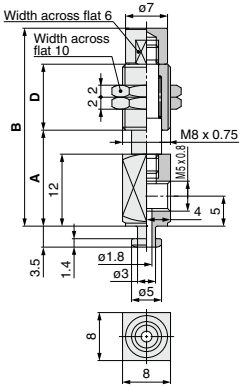
Model	A	B	D
ZP3B-Y1J3-B3	14	27	10
ZP3B-Y1J6-B3	17	34	14

Dimensions (per stroke)

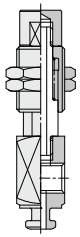
Model	A	B	D
ZP3B-Y1K3-B3	14	31	11
ZP3B-Y1K6-B3	17	37.5	14.5

Buffer assembly part no.	Weight(g)
ZP3B-Y2AJ3-B5	12.5
ZP3B-Y2AJ6-B5	13.9
ZP3B-Y2AJ10-B5	16.3
ZP3B-Y2AK3-B5	11.9
ZP3B-Y2AK6-B5	13.1
ZP3B-Y2AK10-B5	15.1

ZP3B-Y2AJ■■-B5



ZP3B-Y2AK■■-B5



Applicable pad part no.
ZP3-04UM
ZP3-06UM
ZP3-08UM
ZP3-04B
ZP3-06B
ZP3-08B

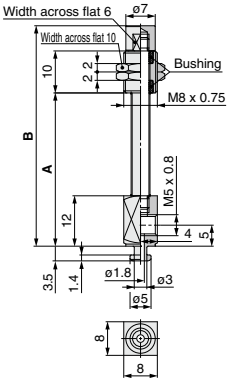
Dimensions (per stroke)

Model	A	B	D
ZP3B-Y2A☆3-B5	16.5	34	11
ZP3B-Y2A☆6-B5	19	40	14.5
ZP3B-Y2A☆10-B5	23	50	20.5

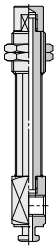
Note) The symbol "☆" indicates buffer type "J" or "K".

Buffer assembly part no.	Weight(g)
ZP3B-Y2AJB15-B5	14.0
ZP3B-Y2AJB20-B5	14.8
ZP3B-Y2AK15-B5	15.2
ZP3B-Y2AK20-B5	16.3

ZP3B-Y2AJB■■-B5



ZP3B-Y2AK■■-B5



Applicable pad part no.
ZP3-04UM
ZP3-06UM
ZP3-08UM
ZP3-04B
ZP3-06B
ZP3-08B

Dimensions (per stroke)

Model	A	B
ZP3B-Y2A☆15-B5	36.5	53
ZP3B-Y2A☆20-B5	44	60.5

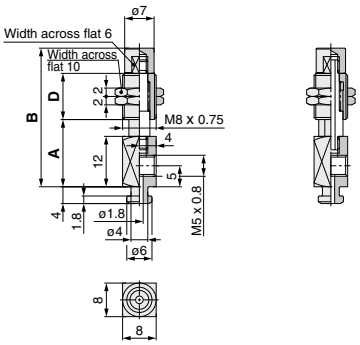
Note) The symbol "☆" indicates buffer type "JB" or "K".

∗ **Refer to the 322 for nut tightening torque.**

Vacuum Inlet Direction **Lateral**

Buffer assembly part no.	Weight(g)
ZP3B-Y2BJ3-B5	13.0
ZP3B-Y2BJ6-B5	14.3
ZP3B-Y2BJ10-B5	16.7
ZP3B-Y2BK3-B5	12.4
ZP3B-Y2BK6-B5	13.6
ZP3B-Y2BK10-B5	15.5

ZP3B-Y2BJ■■-B5 **ZP3B-Y2BK■■-B5**



Applicable pad part no.
ZP3-10UM
ZP3-13UM
ZP3-16UM
ZP3-10B
ZP3-13B
ZP3-16B

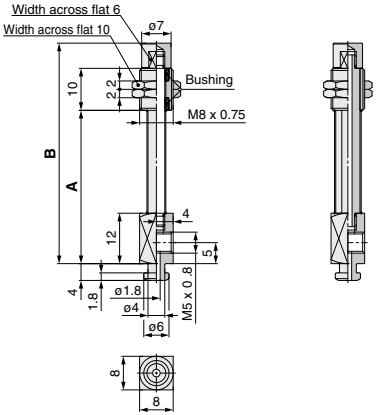
Dimensions (per stroke)

Model	A	B	D
ZP3B-Y2B☆3-B5	16.5	34	11
ZP3B-Y2B☆6-B5	19	40	14.5
ZP3B-Y2B☆10-B5	23	50	20.5

Note) The symbol "☆" indicates buffer type "J" or "K".

Buffer assembly part no.	Weight(g)
ZP3B-Y2BJB15-B5	14.4
ZP3B-Y2BJB20-B5	15.2
ZP3B-Y2BK15-B5	15.6
ZP3B-Y2BK20-B5	16.7

ZP3B-Y2BJB■■-B5 **ZP3B-Y2BK■■-B5**



Applicable pad part no.
ZP3-10UM
ZP3-13UM
ZP3-16UM
ZP3-10B
ZP3-13B
ZP3-16B

Dimensions (per stroke)

Model	A	B
ZP3B-Y2B☆15-B5	36.5	53
ZP3B-Y2B☆20-B5	44	60.5

Note) The symbol "☆" indicates buffer type "JB" or "K".