Vacuum Pad

New

More shapes and sizes of pads. Applicable for various types of workpieces



Vacuum Pad Series ZP2/ZP

Pad Diameter List

●: Series ZP2 ○: Series ZP

Pad type Symbol Page of ZP2 0.8 1.1 2 3 3.5 4 5 6 7 8 9 10 11 13 13	44
Flat U	
Flat MU P.2	14
Flat EU P.5	_
AU P.8	_
Flat with rib C P. 1	_
Thin flat (pad) UT	_
Thin flat with rib	_
B P. 1	•
Bellows (pad) J P. 13 — — — — — — — — — — — — — — — — — —	_
Bellows (pad) MB P. 14 — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — —	_
MB P. 14 — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — <td>•</td>	•
Deep AN P.9 P.9 <td>_</td>	_
Nozzle pad	_
	_
Flat pad MT P. 11 — — — — — — — — — — — — — —	_
	_
W P. 17 — 3.5 x 7 4 x 20 5 x 20 6 x 20 4 x 30 5 x 30 6 x 30 — 8 x 30 — — — — — — — — — — — — — — — — — —	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
H P. 33	_
HT P. 33 — — — — — — — — — — — — — — — — — —	_
HB P. 35	_
HW P. 36	_
Mark-free pad U P. 27 — — — — — — — — — — — — — — — — — —	_
*Related pad	_
Sponge pad S P. 30 — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — —	_
Resin attachment K P. 29 — — — — — — — — — —	_
Pad with ball spline buffer U P. 24 — — — — — — — — — — — — — — — — — —	_
Heavy-duty	
ball joint pad HB P. 43 — — — — — — — — — — — —	_

* Cyclone pad (Non-contact pad) Made to Order -----P. 25

Note) The ZP2 series is blast type.

Products other than above

Vacuum pad for transferring disks



.....P. 59 Vacuum pad for fixing panelP. 60 Vacuum saving valve





Pad Diameter List

 \ast \bigcirc : Refer to SMC website or pages 1117 to 1235 in Best Pneumatics No. 4 for details of the ZP series.

SMC vacuum pad Search

Catalogue	Page of	Cumbal																eter	diame		
of ZP	ZP2	Symbol	340	300	250	150	125	100	80	63	50	46	40	32	30	25	20	18	16	15	
January Control	P. 1	U	_	_	_	_	_	_	_	_	0	_	0	0	_	0	0	_	0	_	
_	P. 2	MU	_	_	_	_		_	_	_	_	_	_		_	_	_	_	_	•	
_	P. 5	EU	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	•	
_	P. 8	AU	_	_	_	_	_	_		_	_	_	_	_	_	_	_	_	_	_	
	P. 1	С	_	_	_	_		_	_	_	0	_	0	0	_	0	0	_	0	_	
	P. 1 P. 10	UT	_	_	_	_	_	_	_	_	_	_	_	_	_	_	•		0	_	
O (m)		СТ	_					_		_	_	_	_		_			_	0	_	
	P. 1	В	_		_	_		_		_	0	_	0	0	_	0	0	_	0	_	
-	P. 13	J	_	_	_	_		_	_	_	_	_	-	-	•		_	_	•	•	
	P. 14	МВ	_	_	_	_		_	_	_	_	_	_	_	_	_	•	_	_	•	
_	P. 16	ZJ	_	_	_			_	_	_	_	•	•	_	_	_	_	_	_	_	
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	P. 9	AN	_	_	_	_		_			_	_		_	_		_	_		_	
_	P. 11	МТ	_		_			_		_	_	_	_					_	_		
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	P. 17	W	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	
_ <u></u>	_	U																			
0	P. 33	Н	•	•	_	_	0	0	0	0	0	_	0	•	_	_	_	_	_	_	
	P. 33	НТ	_	_	•			_	_	_	_	_	_		_	_	_	_	_	_	
	P. 35	НВ	_	_	_	•	0	0	0	0	0	_	0	•	_	_	_	_	_	_	
	P. 36	HW	_	_	_	_		_		_	_	_		_	30 x 50	_	_	_	_	_	
	P. 27	U	_	_	_	_	_	_	_	_	•	_	•	•	_	•	_	_	•	_	
	P. 28	Н	_	_	_	_	•	•		•	•	_	•	_	_	_	_	_	_	_	
	P. 30	S	_	_	_		_	_	_	_	_	_		_	_	_	_	_	_	•	
_	P. 29	K	_		_	_		_	_	_	_	_	_	•	_	•	•	_	•	_	
	P. 24	U	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	
	P. 37	Н	_	_	_	_		•			•	_	•	_	_	_	_	_	_	_	
	P. 43	НВ	_	_	_	_					•	_	•		_	_	_	_	_	_	

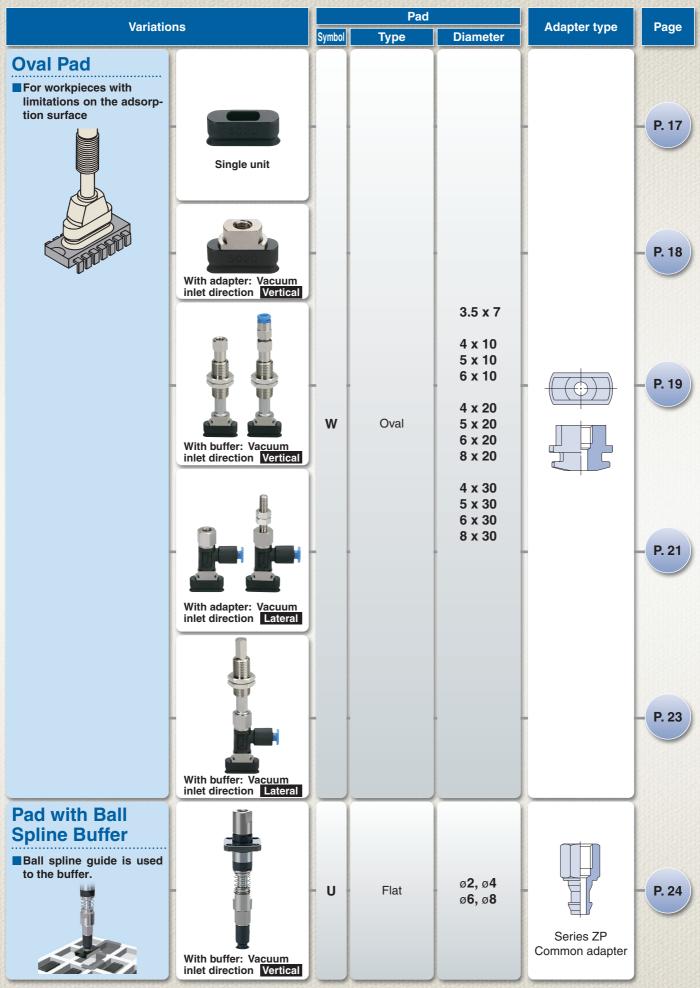
Series ZP2

Variation	18		Pad		Adapter type	Page	
variation	15	Symbol	Туре	Diameter	Adapter type	rage	
■Flat For adsorption of general workpieces For adsorption of workpieces with flat and not	Single unit	U	Flat	ø 3 , ø 4		P. 1	
deformed surface Flat with rib For a workpiece which is likely to deform or for releasing a workpiece certainly Thin flat	Single unit	- c	Flat with rib	ø 6 , ø 7 , ø 8		P. 1	
For a workpiece which is likely to deform Bellows For adsorption of workpieces with inclined surface	Single unit	- UT	Thin flat	ø 5 , ø 6	Series ZP Common adapter	- P. 1	
	Single unit	- в	Bellows	ø 6 , ø 8		- P. 1	
Space-saving in the height direction	Single unit With adapter	- MU -		ø2, ø3.5, ø4 ø5, ø6, ø8 ø10, ø15		P. 2	
	Single unit With adapter	- EU	Flat	ø2, ø4, ø6 ø8, ø15		P. 5	
	Single unit	- AU		ø2, ø3, ø4 ø6, ø8	_	P. 8	
Nozzle Pad For adsorption of small components such as IC chips	Single unit With adapter	- AN	Nozzle	ø 0.8 , ø1.1		P. 9	
Thin Flat Pad For adsorption of soft workpieces such as thin sheets or vinyl. Wrinkling or deformation during adsorption is reduced.	Single unit	- UT	Thin flat (Skirt)	ø5, ø6, ø11 ø14, ø18 ø20	Series ZP Common adapter	P. 10	

Variatio	ne.		Pad		Adapter type	Page
Variatio	uis .	Symbol	Туре	Diameter	Adapter type	raye
Flat Pad For adsorption of flexible sheets or film. Deformation of the flat surface during adsorption is reduced.	Single unit With adapter	- МТ	Thin flat (With groove)	ø10, ø15 ø20, ø25 ø30		P. 11
Bellows Pad						
For use where there is no space for the buffer (spring type). For adsorption of workpieces with inclined surface	Single unit	- J	Bellows (Multistage type)	ø6, ø9, ø10 ø14, ø15 ø16, ø25 ø30	Series ZP Common adapter	P. 13
	Single unit With adapter	- МВ	Bellows	Ø4, Ø6, Ø8 Ø10, Ø15 Ø20		P. 14
	Single unit	- ZJ		ø2, ø4, ø5 ø6, ø40, ø46	_	P. 16

Series ZP2

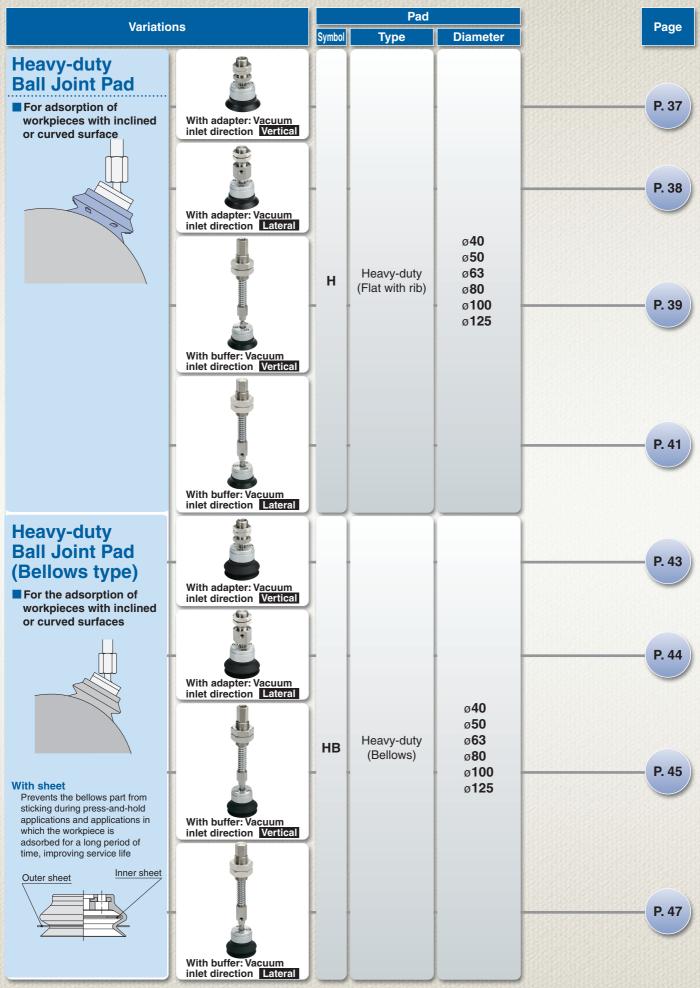
Series Variations	S					
Variatio	ons	Symbol	Pad Type	Diameter	Adapter type	Page
Blast-type Pad Blast treatment to create finely uneven surface. workpieces can be removed easily.	Single unit	U	Flat	ø4		- P. 1
	Single unit	c	Flat with rib	ø 6 , ø 8		- P. 1
	Single unit	- в	Bellows	ø 6 , ø 8		- P. 1
	Single unit	- J	Bellows (Multistage type)	ø10, ø15 ø25, ø30	Series ZP Common adapter	- P. 13
	Single unit With adapter	- MU	Flat	ø2, ø3.5, ø4 ø5, ø6, ø8 ø10, ø15		- P. 2
	Single unit With adapter	- EU	Flat	ø 2 , ø 4 , ø 6		- P. 5
	Single unit With adapter	- мт	Thin flat (With groove)	ø10, ø15 ø20, ø25 ø30		P. 11
	Single unit With adapter	МВ	Bellows	ø4, ø6, ø8 ø10, ø15 ø20		P. 14



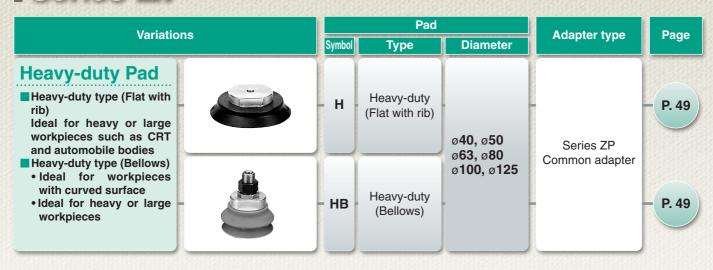
SMC

Series ZP2

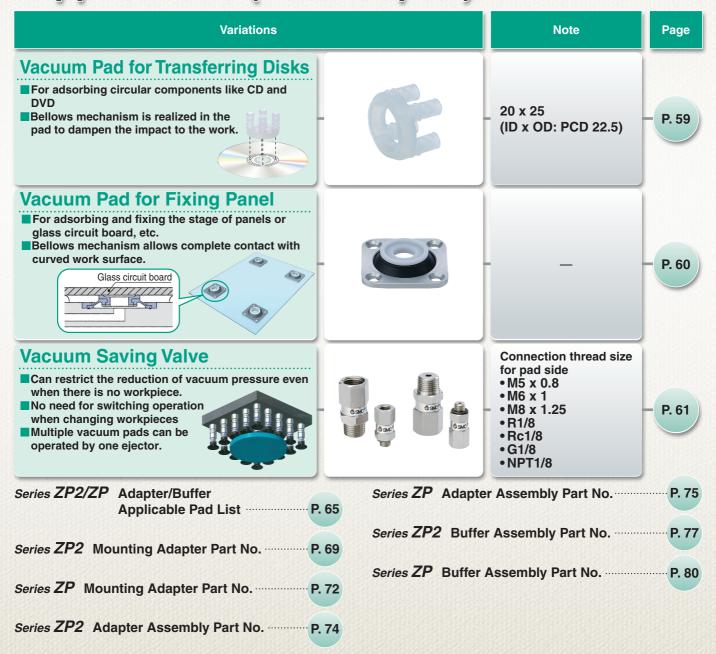
Variatio	ns		Pad		Adapter type	Page
variatio	113	Symbol	Туре	Diameter	Adapter type	1 age
Mark-free Pad For use where adsorption marks must not be left on workpieces. Standard pad Clear trace of the pad	Single unit	U	Flat	ø4, ø6, ø8 ø10, ø16 ø25, ø32 ø40, ø50	Series ZP Common adapter	P. 27
No trace on the object Mark-free NBR pad Stuck fluororesin pad Related Pad Made to Order Cyclone Pad (Non-contact	XTSS1-SA-R	- н	Heavy-duty (Flat with rib)	ø40, ø50 ø63, ø80 ø100, ø125	_	P. 28
Resin Attachment Mark-free. Prevents sticking of the rubber and the workpiece. Attachment	Single unit With pad		Bellows	ø6, ø8 ø10, ø13 ø16, ø20 ø25, ø32	Series ZP Common adapter	P. 29
For adsorption of workpieces with bumps	Single unit With adapter	s	Sponge	ø4, ø6 ø8, ø10 ø15		- P. 30
Heavy-duty Pad For heavy or large workpieces		Н	Heavy-duty (Flat with rib)	ø32, ø300 ø340		P. 33
		нт	Heavy-duty (Thin flat with rib)	ø150, ø250		P. 33
		- нв	Heavy-duty (Bellows)	ø32, ø150		- P. 35
		HW	Heavy-duty (Oval)	30 x 50		P. 36



Series ZP



Applications (Pad/Adapter)



Vacuum Equipment Model Selection

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Front matter 11

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 - B. Shear Force and Moment Applied to Vacuum Pad
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 - 1. Theoretical Lifting Force
- Vacuum Pad Type
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- Rubber Material and Properties
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- Buffer Attachment
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- Vacuum Pad Durability

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 - B. Suction Verification
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Transfer of Semiconductor Chips

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- Glossary of Terms
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- Non-conformance Examples
- Time of Replacement of Vacuum Pad



Features of 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 workpieces

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.

Vacuum Pad Selection

Vacuum Pad Selection Procedures

- 1) Fully taking into account the balance of a workpiece, identify the adsorption positioning, number of pads and applicable pad diameter (or pad area).
- 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.
- 3) Determine a pad diameter (or pad area) that is sufficient to ensure the lifting force is greater than the workpiece mass.
- 4) Determine the pad type and materials, and the necessity of buffer based on the operating environment, and the workpiece shape and materials.

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 adsorption 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 contact 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 quickly and cracked, which makes the pad service life shorter.
 - 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.

2 times

Example) i neoretic	xample) Theoretical lifting force = Pressure x Area										
Pad diameter	Area (cm²)	Vacuum pressure [40-kPa]	Vacuum pressure [80-kPa]								
ø20	3.14	Theoretical lifting force 12.56 N	Theoretical lifting force 25.11 N								
ø40	12.56	Theoretical lifting force 50.23 N	Theoretical lifting force 100.45 N								

4 times



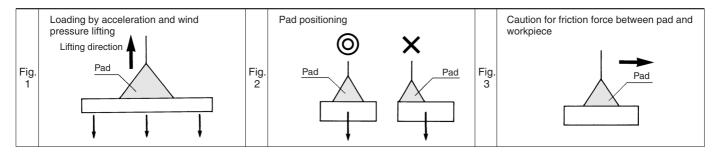
B. Shear Force and Moment Applied to Vacuum Pad

- · Vacuum pads are not resistant to shear force (parallel force with adsorption surface) and moment.
- Minimise the moment applied to the vacuum pad with the position of the workpiece centre 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

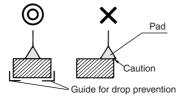
To lift a workpiece vertically, make sure to take into consideration the acceleration rate, wind pressure, impact, etc., in addition to the mass of the workpiece. (Refer to Fig. 1)

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 t. (Refer to Fig. 3)

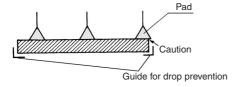


Balance of Pad and Work

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



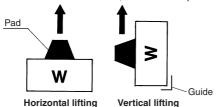
If multiple pads are used for transferring a flat object with a large surface area, properly allocate the pads to maintain balance. Also make sure that the pads are aligned properly to prevent them from becoming disengaged along the edges.



Provide an auxiliary device (example: a guide for preventing the workpieces from dropping) if 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 provide a guide to guarantee 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 -

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

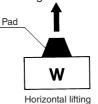
W: Lifting force (N)

P: Vacuum pressure (kPa)

S: Pad area (cm²)

t : Safety factor Horizontal lifting: 4 or more

Vertical lifting: 8 or more



1 >

Vertical lifting

(This type of application should basically be avoided.

/NI\

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)

(1) Theoretical Litting For	CE (Theoretical litting force = P x 5 x 0.1)
Pad Diameter (a2 to a50)	

Pau Diame	eler (ØZ lO	Ø SU)											(IN)
Pad diam	eter (mm)	ø 2	ø 4	ø 6	ø 8	ø 10	ø 13	ø 16	ø 20	ø 25	ø 32	ø 40	ø 50
Pad area	a S (cm²)	0.03	0.13	0.28	0.50	0.79	1.33	2.01	3.14	4.91	8.04	12.6	19.6
	-85	0.27	1.07	2.40	4.27	6.67	11.3	17.1	26.7	41.7	68.3	107	167
	-80	0.25	1.00	2.26	4.02	6.28	10.6	16.1	25.1	39.3	64.3	101	157
	-75	0.24	0.94	2.12	3.77	5.89	10.0	15.1	23.6	36.8	60.3	95	147
Vacuum	-70	0.22	0.88	1.98	3.52	5.50	9.3	14.1	22.0	34.3	56.3	88	137
pressure	-65	0.20	0.82	1.84	3.27	5.10	8.6	13.1	20.4	31.9	52.2	82	127
(kPa)	-60	0.19	0.75	1.70	3.01	4.71	8.0	12.1	18.8	29.4	48.2	76	118
(*** 3.)	-55	0.17	0.69	1.55	2.76	4.32	7.3	11.1	17.3	27.0	44.2	69	108
	-50	0.16	0.63	1.41	2.51	3.93	6.7	10.0	15.7	24.5	40.2	63	98
	-45	0.14	0.57	1.27	2.26	3.53	6.0	9.0	14.1	22.1	36.2	57	88
	-40	0.13	0.50	1.13	2.01	3.14	5.3	8.0	12.6	19.6	32.2	50	78

(NI)

Pad Diameter (ø63 to ø340)

rad Diameter (903 to 9340)											
Pad diam	eter (mm)	ø 63	ø 80	ø 100	ø 125	ø 150	ø 250	ø 300	ø 340		
Pad area	a S (cm²)	31.2	50.2	78.5	122.7	176.6	490.6	706.5	907.5		
	-85	265	427	667	1043	1501	4170	6005	7714		
	-80	250	402	628	982	1413	3925	5652	7260		
	-75	234	377	589	920	1325	3680	5299	6806		
Vacuum	-70	218	351	550	859	1236	3434	4946	6353		
pressure	-65	203	326	510	798	1148	3189	4592	5899		
(kPa)	-60	187	301	471	736	1060	2944	4239	5445		
()	-55	172	276	432	675	971	2698	3886	4991		
	-50	156	251	393	614	883	2453	3533	4538		
	-45	140	226	353	552	795	2208	3179	4084		
	-40	125	201	314	491	706	1962	2826	3630		

Oval Pad (2 x 4 to 8 x 30)

Oval Pad (A	2 X 4 10 0 .	x 30)												(IN)
Pad siz	e (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
Pad area	a 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
	-85	0.60	1.79	3.06	3.74	4.42	6.46	7.99	9.52	12.41	9.86	12.24	14.62	19.21
	-80	0.56	1.68	2.88	3.52	4.16	6.08	7.52	8.96	11.68	9.28	11.52	13.76	18.08
	-75	0.53	1.58	2.70	3.30	3.90	5.70	7.05	8.40	10.95	8.70	10.80	12.90	16.95
Vacuum	-70	0.49	1.47	2.52	3.08	3.64	5.32	6.58	7.84	10.22	8.12	10.08	12.04	15.82
pressure	-65	0.46	1.37	2.34	2.86	3.38	4.94	6.11	7.28	9.49	7.54	9.36	11.18	14.69
(kPa)	-60	0.42	1.26	2.16	2.64	3.12	4.56	5.64	6.72	8.76	6.96	8.64	10.32	13.56
(*** 3.7)	-55	0.39	1.16	1.98	2.42	2.86	4.18	5.17	6.16	8.03	6.38	7.92	9.46	12.43
	-50	0.35	1.05	1.80	2.20	2.60	3.80	4.70	5.60	7.30	5.80	7.20	8.60	11.30
	-45	0.32	0.95	1.62	1.98	2.34	3.42	4.23	5.04	6.57	5.22	6.48	7.74	10.17
	-40	0.28	0.84	1.44	1.76	2.08	3.04	3.76	4.48	5.84	4.64	5.76	6.88	9.04

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 catalogue.

Pad Type

Pad s	hape	Application
Flat	M	To be used when adsorption surface of workpiece is flat and not deformed.
Flat with rib	*	To be used when workpiece is likely to deform or in the case of releasing work certainly.
Deep	R	To be used when workpiece is curved shape.
Bellows		To be used when there is not enough space to install buffer or adsorption surface of workpiece is slanted.
Oval		To be used when workpiece 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 workpiece is not horizontal.
Long stroke buffer	To be used when workpiece height is not even or cushioning toward workpiece is required.
Large	To be used when workpiece 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 work transfer example for each material, select after confirming the characteristics (adaptability) of rubber.

Vacuum Pad/Example of Work Transfer

Material

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

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 (spe	gum property cific 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	0.4 g/cm ³	0.161 g/cm ³
	Impact resilience	0	0	0	Δ	0	0	0	0	Χ/Δ	X/A
Ę	Abrasion resistance	0	X/Δ	0	0	0	0	0	X/Δ	X	×
Physical properties of blended gum	Tear resistance	0	X/Δ	0	0	0	Δ	0	X/A	X	×
ende	Flex crack resistance	0	X/O	0	0	0	0	0	X/O	×	×
of bl	Maximum operation temperature °C	120	200	60	250	150	150	100	200	180	120
ties	Minimum operation temperature °C	0	-30	0	0	-40	-20	0	-10	-30	-20
ledo.	Volume resistivity (cm)	_	_	_	_	_	_	10 ⁴ or less	10 ⁴ or less	4.8 x 10 ⁴	3.8 x 10 ⁴
alpr	Heat aging	0	0	\triangle	0	0	0	0	0	Δ	Δ
Jysic	Weather resistance	0	0			0	0	0		Δ	Δ
<u>a</u>	Ozone resistance	Δ	0	0	0	0	0	Δ	0	Δ	Δ
	Gas permeability resistance	0	X/A	X/A	X/A	0	X/△	0	X/A	×	×
(D)	Gasoline/Gas oil	0	X/A	0	0	0	×	0	X/A	×	×
tanc	Benzene/Toluene	X/A	×	X/A	0	X/A	×	X/A	×	×	×
cal resistar resistance	Alcohol	0	0	Δ	\triangle/\bigcirc	0	0	0	0	Δ	Δ
ical r	Ether	X/A	X/A	×	X/A	X/A	0	X/A	X/A	×	×
Chemical resistance Oil resistance	Ketone (MEK)	×	0	×	×	Δ/Ο	0	X	0	×	×
Ō	Ethyl acetate	X/A	Δ	X/A	×	X/A	0	X/A	Δ	×	X
0	Water	0	0	Δ	0	0	0	0	0	0	0
ance	Organic acid	X/A	0	×	Δ/Ο	X/A	×	X/A	0	×	×
e resistano resistance	Organic acid of high concentration	Δ/Ο	Δ	×	0	0	0	Δ/Ο	Δ	×	×
ine r d res	Organic acid of low concentration	0	0	Δ	0	0	0	0	0	×	×
Alkaline resistance Acid resistance	Strong alkali	0	0	×	0	0	0	0	0	Δ	Δ
	Weak alkali	0	0	×	0	0	0	0	0	Δ	Δ

 $[\]bigcirc$ = Excellent --- Not affected at all, or almost no effect

Colour and Identification

General name	NBR (Nitrile rubber)	Silicone rubber	Urethane rubber	FKM (Fluoro rubber)	CR (Chloroprene rubber)	(Fthylene-	Conductive NBR (Nitrile rubber)	Conductive silicone rubber	Conductive	Conductive CR sponge (Chloroprene sponge)
Colour of rubber	Black	White	Brown	Black	Black	Black	Black	Black	Black	Black
Identification (Dot or stamp)	_	_	_	·Green 1 dot	· Red 1 dot	·E	·Silver 1 dot	· Silver 2 dots	_	_



O = Good --- Affected a little, but adequate resistance depending on conditions

 $[\]triangle$ = Better not to use if possible

 $[\]times$ = Unsuitable for usage. Severely affected.

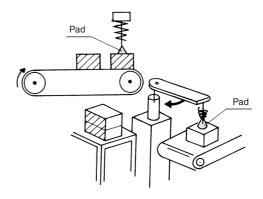
^{*} Properties, chemical resistance, and other values are not guaranteed. These values depend on the operating environment, so they cannot be guaranteed by SMC. Thorough research and confirmation are necessary before usage.

Buffer Attachment

• Use a buffer when there is a variation in the height of workpieces and fragile workpieces are adsorbed (cushioning is necessary). If it is necessary to further position the pad and the workpiece, use a non-rotating buffer.

Unsteady Distance between Pad and Work

If the pad and the workpiece cannot be positioned properly, such as when picking a workpiece having an uneven height, use a built-in spring type pad with a buffer. This type of pad acts as a cushion between the pad and the workpiece. If it is necessary to further position the pad and the workpiece, use a non-rotating buffer.

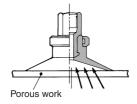


Pad Selection by Work Type

• Carefully select a pad for the following workpieces.

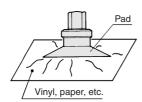
1. Porous Work

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.



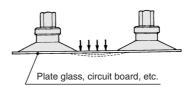
3. Soft Work

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.



2. Flat Plate Work

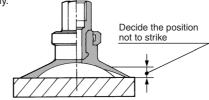
When a workpiece with a large surface area such as sheet glass or PCB is suspended, the workpiece could move in a wavelike motion if a large force is applied by wind pressure or by an impact. Therefore, it is necessary to ensure the proper allocation and size of pads.



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.



Vacuum Pad Durability

- Need to be careful of the vacuum pad (rubber) deterioration.
- The vacuum pad's adsorption surface will be worn out when it is used for a certain period of time, and the outer diameter gradually becomes smaller. The lifting force becomes weaker as the pad diameter becomes smaller, but absorption is still possible.
- Since the vacuum pad replacement period greatly varies depending on the operating environment, it is extremely difficult to estimate the replacement period. Specify the period taking into account the actual operating conditions.



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

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

Q: Average suction flow rate L/min (ANR)

V : Piping capacity (L)

 $T_2 = 3 \times T_1$

T₁: Arrival time to stable Pv 63% after adsorption (sec)

T₂: Arrival time to stable Pv 95% after adsorption (sec)

QL: Leakage volume during work 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

Conductance C =
$$\frac{Qmax}{5 \times 11.1} [dm^3/(s \cdot bar)]$$

* 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 1278 in Best Pneumatics No. 4).

Note 1) QL: 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 Work Adsorption." Note 2) Tube piping capacity can be found in "8. Data: Piping Capacity by Tube I.D. (Selection Graph (2))."

Leakage Volume during Work 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.





Rough work surface

Leakage Volume from Conductance of Work

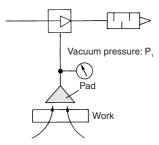
Leakage volume Q_L = 11.1 x 5 x C_L

QL: Leakage volume L/min (ANR)

CL: Conductance between work and pad, and work 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,, 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.

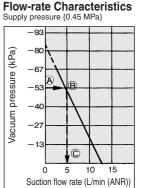
<Selection Procedure>

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). ($\triangle \rightarrow B \rightarrow C$)

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

ZH07BS, ZH07DS

Exhaust Characteristics 8 (L/min (ANR)) (ANR) -80 pressure (kPa) (L/min (-67 -53 rate consumption -40 flow Suction Ą 0.2 0.3 0.4 0.5 Supply pressure (MPa)



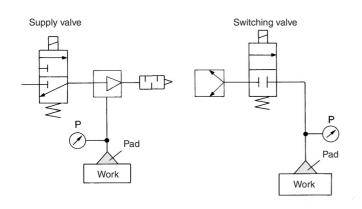
Adsorption Response Time

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.

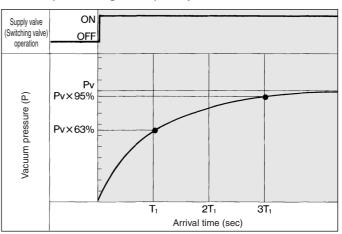
Relationship between Vacuum Pressure and Response Time after Supply Valve (Switching Valve) is Operated

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 $T_{3} = 3 \times T_{1}$

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

 $Q_1 = (1/2 \text{ to } 1/3) \text{ x Ejector max. suction flow rate L/min (ANR)}$

Vacuum pump

 $Q_1 = (1/2 \text{ to } 1/3) \text{ x } 11.1 \text{ x Conductance of vacuum pump } [dm^3/(s \cdot bar)]$

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

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

 \mathbf{Q} : Smaller one between the \mathbf{Q}_1 and \mathbf{Q}_2 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))."

Adsorption Response Time from the Selection Graph

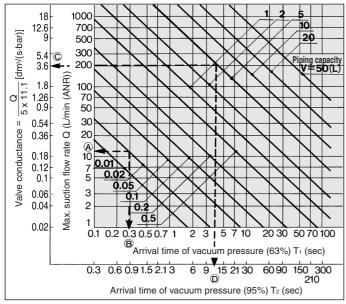
1. Tube Piping Capacity

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 \square 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), $\textcircled{A} \rightarrow \textcircled{B}$) T_1 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), $\bigcirc \rightarrow \bigcirc$) T_2 12 seconds.

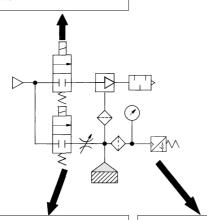
6 Precautions on Vacuum Equipment Selection and SMC's Proposal

Safety Measures

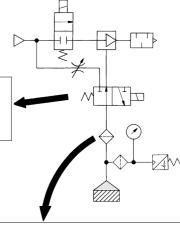
• Make sure to provide a safe design for a vacuum pressure drop due to a disruption of power supply, or a lack of supply air. Drop prevention measures must be taken in particular when dropping a workpiece presents some degree of danger.

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.

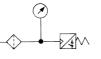


Select a vacuum switching valve that has a conductance that does not reduce the composite conductance consisting of the areas from the pad to the ejector.



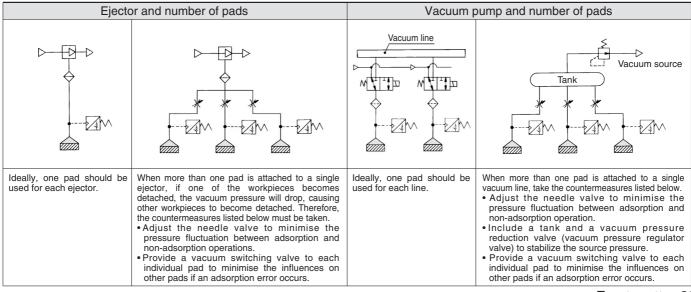
For the release valve, select a 2/3 port valve with a low vacuum specification. Also, use a needle valve to regulate the release flow rate.

- 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.
- The ZSP1 type is optimal for the adsorption and transfer of small parts using a suction nozzle with a small diameter.
- Install a filter (Series ZFA, ZFB, ZFC) before the pressure switch if the ambient air is of low quality.



Use a suction filter (Series ZFA, ZFB, ZFC) 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



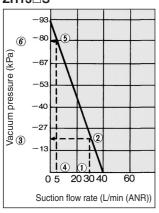
Vacuum Ejector Selection and Handling Precautions

Ejector Selection

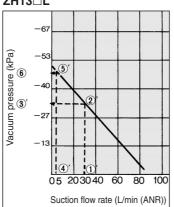
There are 2 types of ejector flow-rate characteristics: the high vacuum type (S type) and the high flow type (L type).

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

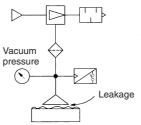


The vacuum pressure varies in accordance with the leakage volumes indicated in the above diagrams.

If the leakage volume is 30 L/min (ANR), the vacuum pressure of the S type is –20 kPa $\widehat{\ 1} \rightarrow \widehat{\ 2} \rightarrow \widehat{\ 3}$, and for the L type it is –33 kPa $\widehat{\ 1}' \rightarrow \widehat{\ 2}' \rightarrow \widehat{\ 3}'$. If the leakage volume is 5 L/min (ANR), the vacuum pressure of the S type is –80 kPa $\widehat{\ 4} \rightarrow \widehat{\ 5} \rightarrow \widehat{\ 6}$, and for the L type it is –47 kPa $\widehat{\ 4}' \rightarrow \widehat{\ 5}' \rightarrow \widehat{\ 6}'$. 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

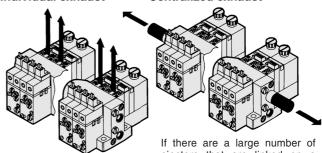


If a considerable amount of leakage occurs between the workpiece and the pad, resulting in incomplete adsorption, or to shorten the adsorption and transfer time, select an ejector nozzle with a larger diameter from the ZH, ZM, ZR, or ZL series.

Manifold Use

Individual exhaust

Centralized 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.

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 sure that the diameter of the piping is large enough that its 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

• 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 the excessive supply pressure causes a decline in the ejector performance, do not use it at a supply pressure exceeding the standard supply.

■ 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.

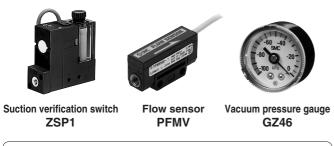
Vacuum Pressure Switch (Series ZS), Vacuum Pressure Gauge (Series GZ)

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.).

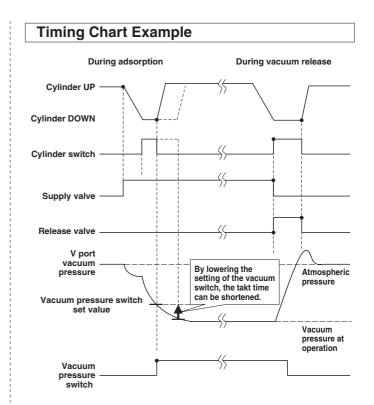
Approx. ø1 adsorption nozzle

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 will be necessary to use ZSP1 that can detect a small hysteresis or a flow switch.

- 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.



Refer to the Best Pneumatics No. 6 for details.





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, in the piping when necessary. In particular, equipment used to capture dust, such as a vacuum cleaner, require a special filter.
- (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 (Series ZFA, ZFB, ZFC)

- 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.)

 $C = \frac{Qmax}{5 \times 11.1}$ C: Co

C: Conductance [dm³/(s·bar)]

Qmax: 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, Weight: 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 the front matter 13, confirm the lifting force.

W = P x S x 0.1 x 1/tW = 1 g = 0.0098 N0.0098 = P x 0.13 x 0.1 x 1/4S =
$$\pi/4$$
 x (0.4)2 = 0.13 cm2P = 3.0 kPat = 4 (Horizontal lifting)

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

(3) Based on the work shape and type, select:

Pad type: Flat
Pad material: Silicone

(4) According to the results above, select a vacuum pad part number ZPT04US- \square . (Specify the vacuum entry port (\square) from the pad mounting status.)

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 (QL) during adsorption is 0, find the average suction flow rate to meet the adsorption response time using the formula on the front matter 17.

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

From the formula on the front matter 17, the maximum suction flow rate Qmax is

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. From the formula on the front matter 18, the average suction flow rate **Q**₁ is as follows:

```
Q_1 = (1/2 \text{ to } 1/3) \text{ x Ejector's max. suction flow rate}
= (1/2 to 1/3) x 5 = 2.5 to 1.7 L/min
```

(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 the front matter 18, the maximum flow rate is as follows:

$$Q_2 = 5 \times C \times 11.1 = 5 \times 0.22 \times 11.1 = 12.2 \text{ L/min}$$

(3) Since Q_2 is smaller than Q_1 , $Q = Q_1$.

Thus, from the formula on the front matter 18, the adsorption response time is as follows:

$$T = (V \times 60)/Q = (0.0031 \times 60)/1.7 = 0.109 \text{ second}$$

= 109 msec

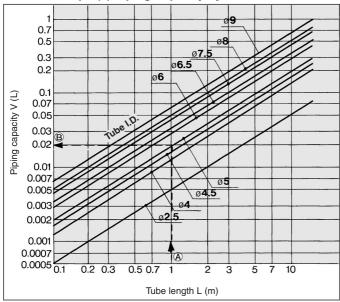
It is possible to confirm that the calculation result satisfies the required specification of 300 msec.



8 Data

Selection Graph

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



How to read the graph

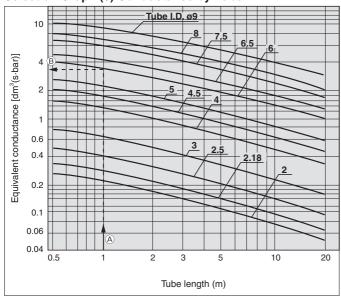
Example: For obtaining the capacity of tube I.D. ø5 and 1 meter length

<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. \emptyset 5, the piping capacity approximately equivalent to 0.02 L can be obtained on the vertical axis.

Piping capacity \approx 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. \emptyset 6, 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		
Suction verification switch	Switch, based on an air pressure bridge, for verifying the adsorption of a workpiece. It is used when the adsorption pad and the nozzle are extremely small.		
(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		
Release pressure	Pressure 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	Contributing factor	Countermeasure		
of improvement Initial adsorption problem (During trial operation)	Adsorption area is small. (Lifting force is lower than the workpiece mass.)	Reconfirm 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 shape of vacuum pad. Confirm 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.	Confirm 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 objects during piping)	Remove foreign objects.		
	Supply valve (switching valve) is not being activated.	Measure supply voltage at the solenoid valve with a tester. • Review 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.	Confirm 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 utilised 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.		

Condition & Description of improvement	Contributing factor	Countermeasure		
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 no. of an ejector with a check valve.)		
Adsorption problem over time	Clogging of suction filter	Replace filters. Improve installation environment.		
(Adsorption was normal during trial operation.)	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 objects. Add a filter to supply (compressed) air circuit. Install an additional suction filter.		
	Vacuum pad (rubber) deterioration, cracking, etc.	Replace vacuum pads. Confirm compatibility of vacuum pad material and workpiece.		
Workpiece is not released.	Inadequate release flow rate	Open release flow adjustment needle.		
	Viscosity increase due to vacuum pad (rubber) wear	Replace vacuum pads. Confirm compatibility of vacuum pad material and workpiece.		
	Vacuum pressure is too high.	Set vacuum pressure to minimum necessary value.		
	Effects due to static electricity	Use a conductive pad.		



Non-conformance Examples

■ No problem occurred during the test, but adsorption becomes unstable after starting operation.

[Possible causes]

- 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.

[Remedy]

- 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. Revise the vacuum ejector and the shape, diameter, and material of the vacuum pad.
 Revise the vacuum pad.

Adsorption becomes unstable after replacing the pad.

[Possible causes]

- 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.

[Remedy]

- 1) Revise the operating conditions including vacuum pressure, the set pressure of the vacuum switch, and the height of the pad.
- 2) Revise the engagement.

■ Identical pads are used to adsorb identical workpieces, but some of the pads cannot adsorb the workpieces.

[Possible causes]

- · 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.

[Remedy]

- 1) Revise the pad diameter, shape, material, vacuum ejector (suction flow rate), etc.
- 2) Revise the pneumatic circuit.
- 3) Revise the engagement.
 - * In principle, vacuum pads are molded using a die. Therefore, there is minimal variance in dimensions between products.

■ The workpiece cannot be separated from the pad. The workpiece sticks to the rubber part of the bellows.

[Possible causes]

- The adhesiveness of the rubber material is high. Adhesiveness increases due to the operating environment (wearing of the pad. etc.).
- Vacuum pressure is higher than necessary, so excessive force (adhesiveness of the rubber + vacuum pressure) is applied to the pad (rubber part).

[Remedy]

- 1) Revise the shape, material, and quantity of vacuum pads.
- 2) 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, or select pads with larger diameter.



■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.

General Purpose

	Product specification	ns	Nut tightening torque	
Pad diameter	Product part no.	Mounting thread size	Nut tigritering torque	
ø2 to ø16 2004 to 4010	ZP* (02 to 08) U, B* ZP* (10 to 16) UT, CT* 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	
ø 20 to ø 50	ZP* (40, 50) U, C, B, D* ZP* (20 to 50) F*	M14 x 1	6.5 to 7.5 N⋅m	

Heavy-duty Pad

noury waty raw					
		Nut tightoning torque			
Pad diameter	Product part no.		Mounting thread size	Buffer body material	Nut tightening torque
70(40/50) 11		J		Aluminum alloy	9.5 to 10.5 N·m
ø 40, ø 50	Ø 40 , Ø 50 ZP* (40/50) H* ZP* (40/50) HB*		M18 x 1.5	Brass	28 to 32 N·m
ZP* (40/50) HB*		JF		Steel	48 to 52 N·m
7D:: (CO/OO) 11::		J		Aluminum alloy	9.5 to 10.5 N⋅m
~62 ~9N	ZP* (63/80) H* ZP* (63/80) HB*	JB *	M18 x 1.5	Brass	28 to 32 N·m
ZP* (63/80) HB*		JF		Steel	48 to 52 N·m
	7D∜ (100/105) U∜	J		Aluminum alloy	9.5 to 10.5 N⋅m
ø100, ø125	ZP* (100/125) H* ZP* (100/125) HB*	JB *	M22 x 1.5	Brass	45 to 50 N⋅m
	21 . (100/123) 110	JF		Steel	75 to 80 N⋅m

Heavy-duty Ball Joint Pad

	ioury and Junious and					
	Product specifications					
Pad diameter	Product part no.		Mounting thread size	Buffer body material	Nut tightening torque	
ø 40 , ø 50	ZP2-*F (40/50) H* JB		M18 x 1.5	Brass	28 to 32 N·m	
Ø 40 , Ø 50	ZP2-*F (40/50) HB*	JF *	C.I X 01IVI	Steel	48 to 52 N⋅m	
ø 63. ø 80 ZP2-*F (63/80) H* JB		JB *	M00 v 1 F	Brass	45 to 50 N⋅m	
Ø03, Ø00	ZP2-*F (63/80) HB*			Steel	75 to 80 N·m	
ø 100, ø 125 ZP2-*F (100/125) H*		JB *	M22 x 1.5	Brass	45 to 50 N⋅m	
0100,0125	ZP2-*F (100/125) HB*	JF	IVI∠∠ X 1.5	Steel	75 to 80 N·m	

●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, operationg 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.).

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

or ricavy daty rad					
Р	Bolt tightening				
Pad diameter	Product part no.	Bolt	torque		
ø 40 , ø 50	ZP (40/50) H* ZP (40/50) HB*	M3 x 8	0.7 to 0.9 N·m		
ø 63 , ø 80	ZP (63/80) H* ZP (63/80) HB*	M4 x 8	0.9 to 1.1 N·m		
ø 100, ø 125	ZP (100/125) H* ZP (100/125) HB*	M5 x 10	2.3 to 2.7 N·m		

Assemble parts with recommended tightening torque.





Compact Pad

Pad diameter $\emptyset 3$, $\emptyset 4$, $\emptyset 5$, $\emptyset 6$, $\emptyset 7$, $\emptyset 8$

Symbol/Type

U: Flat

C: Flat with rib

UT: Thin flat B: Bellows

- ■7 types of Ø3 to Ø8 are added.
- ■Applicable for the ZP series adapter

How to Order



Pad unit

ZP2 – <u>03</u> <u>U</u> <u>N</u>

	Pad	diameter •
Symbol	Pad diameter	Blast type
03	ø3	_
B04	ø4	
05	ø5	_
06	ø6	_
B06	ø6	•
07	ø7	_
B08	ø8	

* Blast type: Workpieces can be removed easily.

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 diameter Pad type (Symbol)	03	B04	05	06	B06	07	B08
U (Flat)			_	_	_	_	_
C (Flat with rib)	_	_	_	_			•
UT (Thin flat)	_	_	•	•	_	_	_
B (Bellows)	_	I —	_	_		_	

Dimensions: Pad Unit

ZP2-03U□

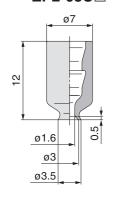
ZP2-B04U□

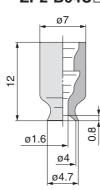
ZP2-05UT□

ZP2-06UT

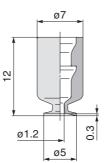
ZP2-B06B□

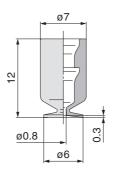
ZP2-B08B

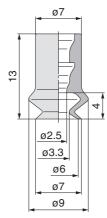


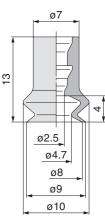


7









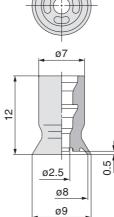
ZP2-B06C□

ZP2-07C□

ø2.5

ø7

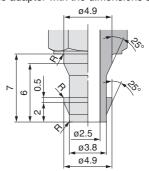
ø8



ZP2-B08C□

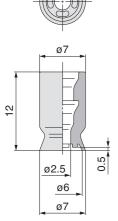
Adapter Mounting Dimensions

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



Note) R part has to be smooth with no corners.

* Refer to page 66 for adapter applicable to the ZP series.





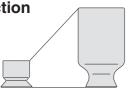
Short-type Pad

MU: Flat

Symbol/Type

Pad diameter Ø2, Ø3.5, Ø4, Ø5, Ø6, Ø8, Ø10, Ø15

■Space-saving in the height direction



How to Order



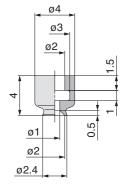
ZP2 – **B02 MU N** Pad unit

	rau	ulailletei •
Symbol	Pad diameter	Blast type
B02	ø2	
B035	ø3.5	
B04	ø4	
B05	ø5	
B06	ø6	
B08	ø8	
B10	ø10	
B15	ø15	

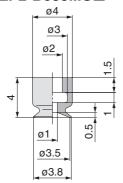
Pad material Symbol Material Pad type Ν NBR S Symbol MU Silicone rubber Urethane rubber FKM Conductive NBR GS Conductive silicone rubber

Dimensions: Pad Unit

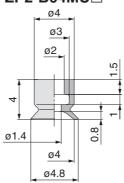
ZP2-B02MU□



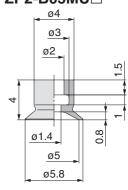
ZP2-B035MU□



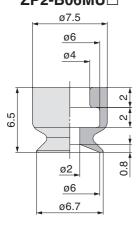
ZP2-B04MU□



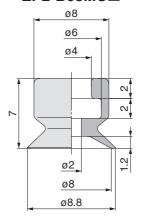
ZP2-B05MU□

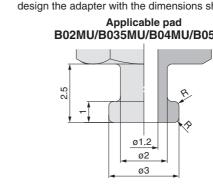


ZP2-B06MU□

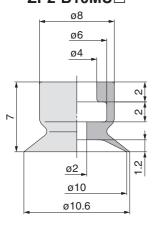


ZP2-B08MU□

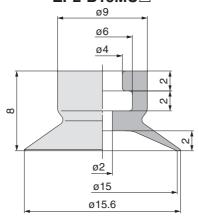




ZP2-B10MU□



ZP2-B15MU□

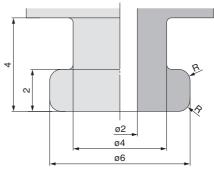


Adapter Mounting Dimensions

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

B02MU/B035MU/B04MU/B05MU

Applicable pad B06MU/B08MU/B10MU/B15MU

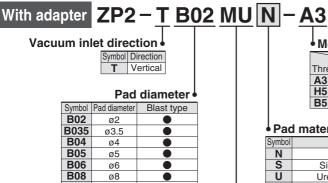


Note) R part has to be smooth with no corners. * Refer to page 69 for adapter applicable to the ZP2 series.

^{*} Blast type: workpieces can be removed easily.

How to Order





* Blast type: Workpieces can be removed easily.

> Pad type Symbol Type
> MU Flat

ø10

ø15

Mounting

mounting								
Pad diameter (Symbol)	B02	B035	B04	B05	B06	B08	B10	B15
A3 (M3 x 0.5 Male thread)					_	_	_	_
H5 (M5 x 0.8 Male thread)	_	_	_	_				
B5 (M5 x 0.8 Female thread)		_	_	_				

Pad material

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

Replacement Part No

neplacement rait No.				
Model	Pad unit part no.	Adapter part no.		
ZP2-TB02MU□-A3	ZP2-B02MU□			
ZP2-TB035MU□-A3	ZP2-B035MU□	ZP2A-M01P		
ZP2-TB04MU□-A3	ZP2-B04MU□	ZFZA-IVIUTF		
ZP2-TB05MU□-A3	ZP2-B05MU□			
ZP2-TB06MU□-H5	ZP2-B06MU□			
ZP2-TB08MU□-H5	ZP2-B08MU□	ZP2A-M02P		
ZP2-TB10MU□-H5	ZP2-B10MU□	ZFZA-IVIUZF		
ZP2-TB15MU□-H5	ZP2-B15MU□			
ZP2-TB06MU□-B5	ZP2-B06MU□			
ZP2-TB08MU□-B5	ZP2-B08MU□	ZP2A-M04		
ZP2-TB10MU□-B5	ZP2-B10MU□	ZFZA-IVIU4		
ZP2-TB15MU□-B5	ZP2-B15MU□			

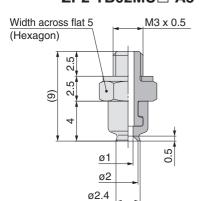
Note) \square in the table indicates the pad material.

Dimensions: With Adapter

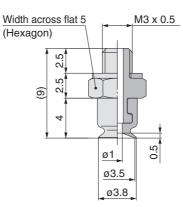
B10

B15

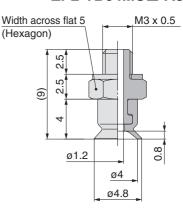
ZP2-TB02MU□-A3



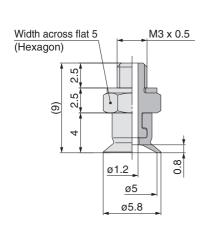
ZP2-TB035MU□-A3



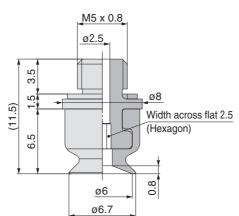
ZP2-TB04MU□-A3



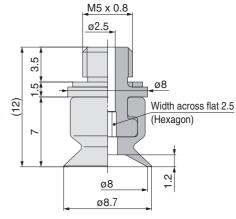
ZP2-TB05MU□-A3



ZP2-TB06MU□-H5

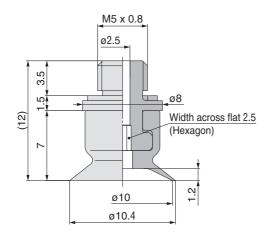


ZP2-TB08MU□-H5

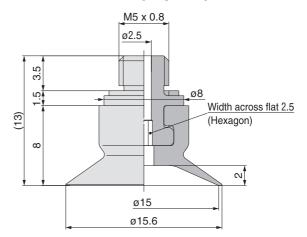


Dimensions: With Adapter

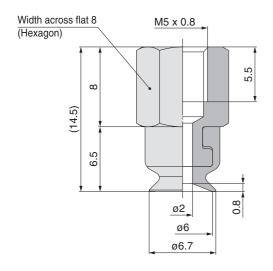
ZP2-TB10MU□-H5



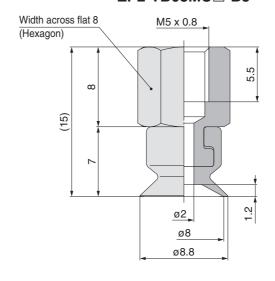
ZP2-TB15MU□-H5



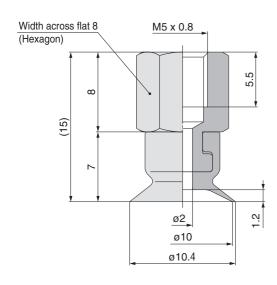
ZP2-TB06MU□-B5



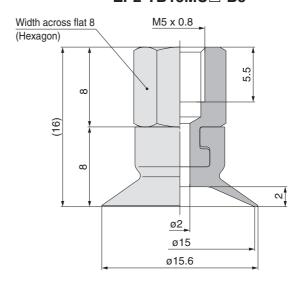
ZP2-TB08MU□-B5



ZP2-TB10MU□-B5



ZP2-TB15MU□-B5



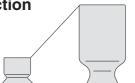


Short-type Pad

Pad diameter $\emptyset 2$, $\emptyset 4$, $\emptyset 6$, $\emptyset 8$, $\emptyset 15$

EU: Flat

■Space-saving in the height direction



How to Order



Pad unit

ZP2-B02 EU N

	Pad	diameter •
	Pad diameter	Blast type
B02	ø2	
B04	ø4	
B06	ø6	
08	ø8	_
15	α15	

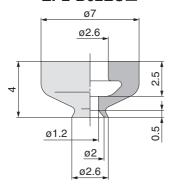
* Blast type: Workpieces can be removed easily.

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

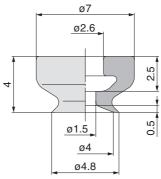
Pad type

Dimensions: Pad Unit

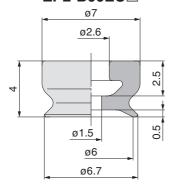
ZP2-B02EU□

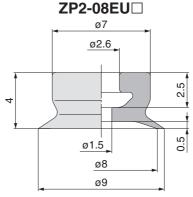


ZP2-B04EU□

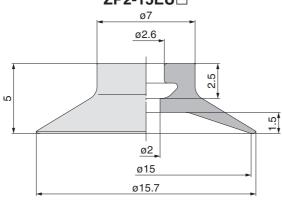


ZP2-B06EU□



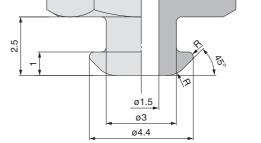


ZP2-15EU□



Adapter Mounting Dimensions

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

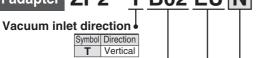


Note) R part has to be smooth with no corners.

* Refer to page 70 for adapter applicable to the ZP2 series.

How to Order





Pad diameter

Symbol	Pad diameter	Blast type
B02	ø2	•
B04	ø4	•
B06	ø6	•
08	ø8	_
15	ø15	_

* Blast type: Workpieces can be removed easily.

Pad type Symbol Type EU Flat

Mounting

Symbol	Thread size	Adapter type
A5	M5 x 0.8	Hexagon O.D.
H5	M5 x 0.8	Hexagon socket head

Pad material

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

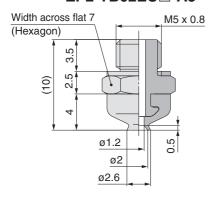
Replacement Part No

neplacement rait No.					
Model	Pad unit part no.	Adapter part no.			
ZP2-TB02EU□-A5	ZP2-B02EU□				
ZP2-TB04EU□-A5	ZP2-B04EU□				
ZP2-TB06EU□-A5	ZP2-B06EU□	ZP2A-Z01P			
ZP2-T08EU□-A5	ZP2-08EU□				
ZP2-T15EU□-A5	ZP2-15EU□				
ZP2-TB02EU□-H5	ZP2-B02EU□				
ZP2-TB04EU□-H5	ZP2-B04EU□				
ZP2-TB06EU□-H5	ZP2-B06EU□	ZP2A-Z02P			
ZP2-T08EU□-H5	ZP2-08EU□				
ZP2-T15EU□-H5	ZP2-15EU□				

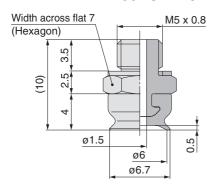
Note) \square in the table indicates the pad material.

Dimensions: With Adapter

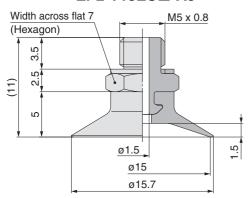
ZP2-TB02EU□-A5



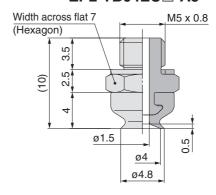
ZP2-TB06EU□-A5



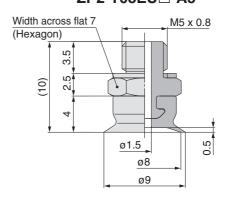
ZP2-T15EU□-A5



ZP2-TB04EU□-A5



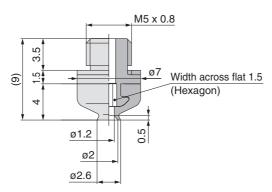
ZP2-T08EU□-A5



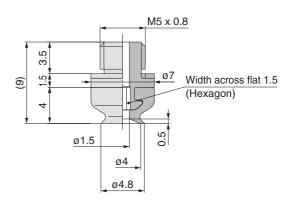
Series ZP2

Dimensions: With Adapter

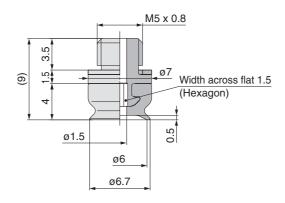
ZP2-TB02EU□-H5



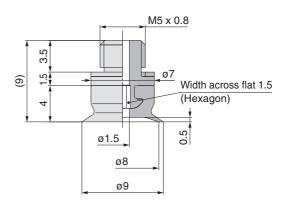
ZP2-TB04EU□-H5



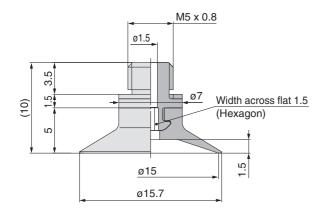
ZP2-TB06EU□-H5



ZP2-T08EU□-H5



ZP2-T15EU□-H5



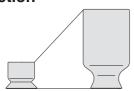


Short-type Pad

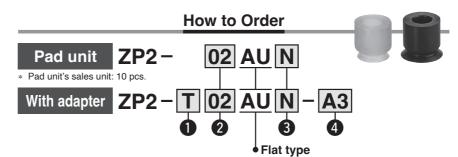
Pad diameter $\emptyset 2$, $\emptyset 3$, $\emptyset 4$, $\emptyset 6$, $\emptyset 8$

AU: Flat type

■Space saving in the height direction



* The mounting adapter is available as a special order.



1 Vacuum inlet direction

Symbol	Vacuum inlet direction
_	Pad unit
Т	Vertical

2 Pad diameter
Symbol Pad diameter

Pad diameter
ø2
ø3
ø4
ø6
ø8

3 Pad material

_	
Symbol	Material
N	NBR
S	Silicone rubber*1, *2
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

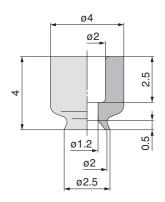
4 Connection thread

Symbol	Size	Pad diameter					
Symbol	Size	ø2	ø3	ø4	ø6	ø8	
А3	M3 x 0.5						
AJ	Male thread				_		
A5	M5 x 0.8						
AS	Male thread	_	_				

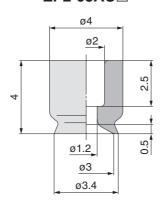
- *1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles intended for repeated use"
- *2 Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D3) (Partial revision: Japanese Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Japan Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Japanese Ministry of Health and Welfare Notification No. 370, 1959)

Dimensions: Pad Unit

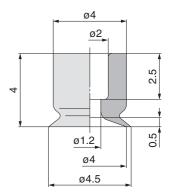
ZP2-02AU□



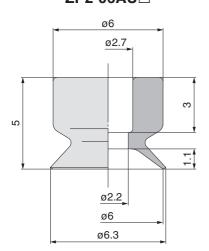
ZP2-03AU□



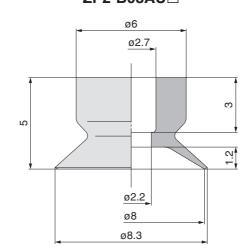
ZP2-04AU□



ZP2-06AU□



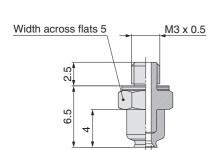
ZP2-B08AU□



Series **ZP**

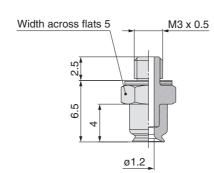
Dimensions: With Adapter

ZP2-T02AU□-A3

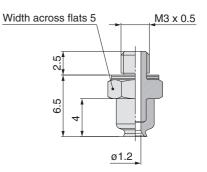


ø1.2

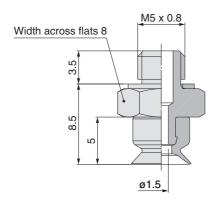
ZP2-T03AU□-A3



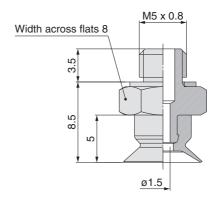
ZP2-T04AU□-A3



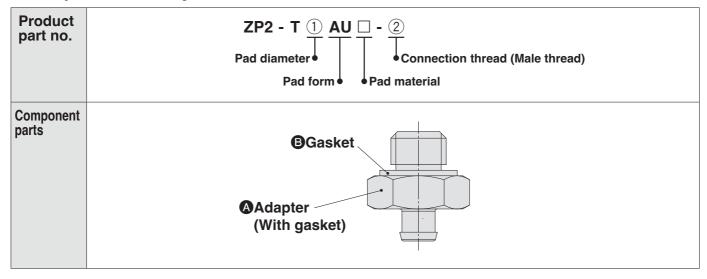
ZP2-T06AU□-A5



ZP2-TB08AU□-A5



■ Adapter Assembly



		Symbol	● Pad diameter symbol					
		Symbol	02	03	04	06	B08	
Adapter onnection thread	M3 x 0.5	А3		ZP2A-T1AU-A3		ZP2A-T1AU-A3 —		_
AAd Sconrathree	M5 x 0.8	A 5		_		ZP2A-T2AU-A5		
	For M3 x 0.5	1 0 pcs.*1		M-3G2		-	_	
B Gasket (Single unit)	For M5 x 0.8	1 0 pcs.*1		_		ZP-	5G2	
	FUI IVIO X U.O	1 00 pcs.*1		_		M-5	5G2	

^{*} The gasket (single unit) sales unit is shown.

Nozzle Pad

Pad diameter Ø0.8, Ø1.1

Symbol/Type

AN: Nozzle

■For adsorption of small pieces (such as IC chips)



How to Order

ZP2-08 AN N Pad unit



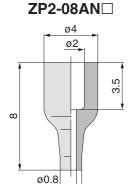
au ulailletei •					
Symbol	Pad diameter				
08	ø0.8				
11	ø1.1				

Pad type Type Nozzle

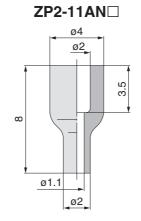
Pad material

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

Dimensions: Pad Unit



ø1.6



Adapter Mounting Dimensions If an adapter is made by the customer, design the adapter with the dimensions shown below. **√** က ø1.1 ø2.2 Note) R part has to be smooth with no corners. * Refer to page 70 for adapter applicable to the ZP2 series.

How to Order



Pad diameter Symbol Pad diameter 08 ø0.8 ø1.1

Dimensions: With Adapter

Pad type Symbol Type AN Nozzle

Pad material Material

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

Mounting

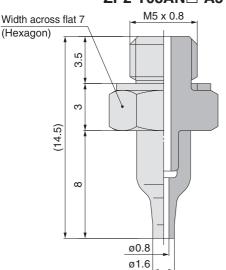
Symbol	Thread size	
A5	M5 x 0.8	

Replacement Part No.

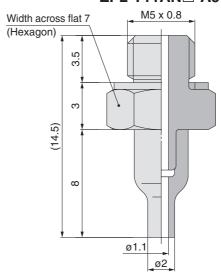
Model	Pad unit part no.	Adapter part no.
ZP2-T08AN□-A5	ZP2-08AN□	ZP2A-Z21P
ZP2-T11AN□-A5	ZP2-11AN□	ZP2A-Z21P

Note) \square Indicates the pad material.

ZP2-T08AN□-A5



ZP2-T11AN□-A5





Thin Flat Pad

Pad diameter Ø5, Ø6, Ø11, Ø14, Ø18, Ø20

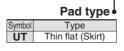
UT: Thin flat (Skirt)

- **■**For adsorption of soft workpieces such thin sheets or vinyl. Wrinkling or deformation during adsorption is reduced.
- ■Applicable for the ZP series adapter

How to Order

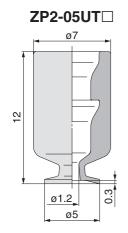
ZP2 – 11 UT N Pad unit

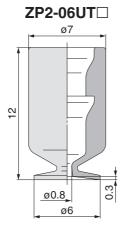


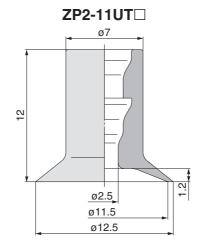


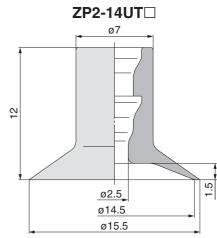
Pad material			
Symbol	Material		
N	NBR		
S	Silicone rubber		
U	Urethane rubber		
F	FKM		
GN	Conductive NBR		
GS	Conductive silicone rubber		

Dimensions: Pad Unit

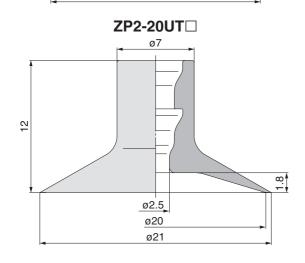


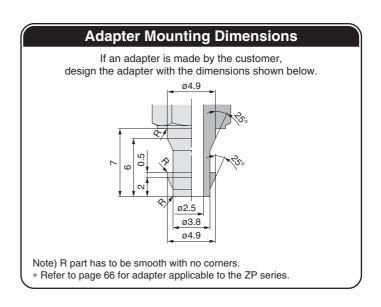






ZP2-18UT 7 1.5 ø2.5 ø18 ø19







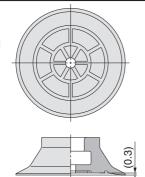
Flat Pad

Pad diameter Ø10, Ø15, Ø20, Ø25, Ø30

MT: Thin flat (with groove)

■ Adsorption surface with groove





How to Order

ZP2-B10 MT N Pad unit

Pad diameter

Symbol	Pad diameter	Blast type
B10	ø10	
B15	ø15	
B20	ø20	
B25	ø25	
B30	ø30	

* Blast type: Workpieces can be removed easily.

Pad material

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

Pad type

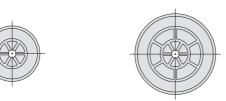
Symbol	Туре	
MT	Thin flat (With groove)	

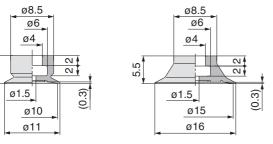
■ For adsorption of thin sheets or film Deformation of the flat surface during adsorption is reduced.

Note 1) Not suitable for transferring workpieces which apply a load. Note 2) Wrinkling may be generated depending on the sheet thickness. Confirm the thickness before use.

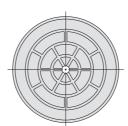
Dimensions: Pad Unit

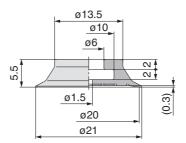
ZP2-B10MT□ ZP2-B15MT□



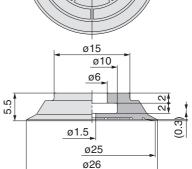


ZP2-B20MT□

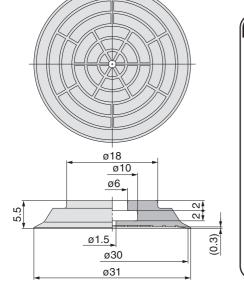




ZP2-B25MT□

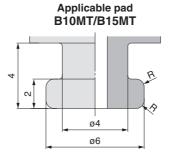


ZP2-B30MT□



Adapter Mounting Dimensions

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



Applicable pad B20MT/B25MT/B30MT ø6

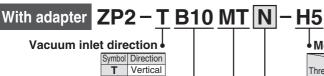
ø10

Note) R part has to be smooth with no corners.

* Refer to page 69 for adapter applicable to the ZP2 series.







Vertical

Pad diameter • Symbol Pad diameter Blast type Pad type B10 ø10 Symbol Type
MT Thin flat (With groove) B15 ø15 B20 ø20 ø25 ø30

* Blast type: Workpieces can be removed easily.

Mounting

Pad diameter (Symbol)	B10	B15	B20	B25	B30
H5 (M5 x 0.8 Male thread)					
B5 (M5 x 0.8 Female thread)				_	_

Pad material

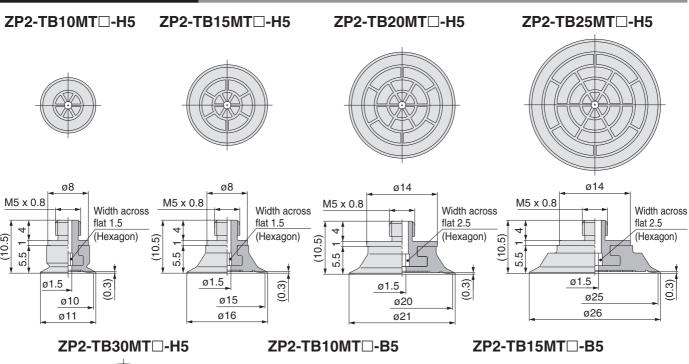
Symbol	Material		
N	NBR		
S	Silicone rubber		
F	FKM		
GN	Conductive NBR		
GS	Conductive silicone rubber		

Replacement Part No.

Model	Pad unit part no.	Adapter part no.
ZP2-TB10MT□-H5	ZP2-B10MT□	ZP2A-M02
ZP2-TB15MT□-H5	ZP2-B15MT□	ZPZA-IVIUZ
ZP2-TB20MT□-H5	ZP2-B20MT□	
ZP2-TB25MT□-H5	ZP2-B25MT□	ZP2A-M03
ZP2-TB30MT□-H5	ZP2-B30MT□	
ZP2-TB10MT□-B5	ZP2-B10MT□	ZP2A-M04
ZP2-TB15MT□-B5	ZP2-B15MT□	ZPZA-IVIU4

Note) \square in the table indicates the pad material.

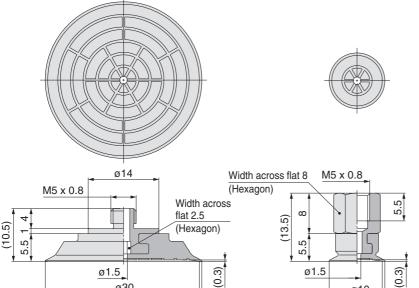
Dimensions: With Adapter



ø10

ø11

SMC



ø30

ø31

Bellows Pad

Pad diameter Ø6, Ø9, Ø10, Ø14, Ø15, Ø16, Ø25, Ø30

Symbol/Type

J: Bellows (Multistage type)

■For use where there is no space for the buffer (spring type)

■Workpieces with inclined adsorption surface

■Applicable for the **ZP** series adapter

How to Order

ZP2-06 J N-X19 Pad unit

Pad diameter

Syllibol	rau ulametei	biasi type
06	ø6	_
09	ø9	_
B10	ø10	
14	ø14	_
B15	ø15	
16	ø16	_
B25	ø25	
B30	ø30	

* Blast type: Workpieces can be removed easily.

Pad material Material Symbol



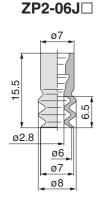
Pad type Symbol Type J Bellows (Multistage type)

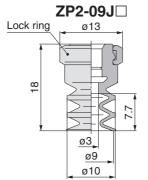


With/Without lock ring With lock ring

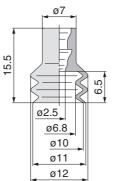
X19 Without lock ring Note) Note) ø6, ø10, ø15 are not available.

Dimensions: Pad Unit

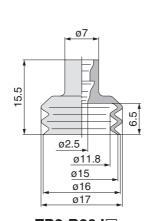




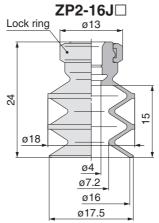
ZP2-B10J□



ZP2-14J□ Lock ring ø13 24 2 ø3 ø14 ø15



ZP2-B15J□



ø4.9 Applicable pad 09J/14J/16J

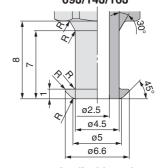
ø2.5

ø3.8

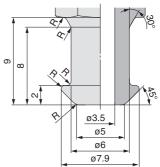
Adapter Mounting Dimensions

If an adapter is made by the customer, design the adapter with the dimensions shown below. Applicable pad 06J/B10J/B15J

ø4.9

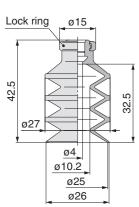


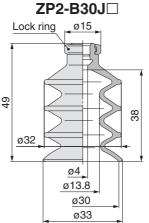
Applicable pad B25J/B30J



Note) R part has to be smooth with no corners. Refer to page 66 for adapter applicable to the ZP2 series

ZP2-B25J□









Bellows Pad

Pad diameter Ø4, Ø6, Ø8, Ø10, Ø15, Ø20

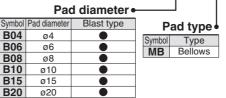
Symbol/Type
MB: Bellows

■For use where there is no space for the buffer (spring type)

■Workpieces with inclined adsorption surface

How to Order

Pad unit ZP2 – B04 MB N



Pad material

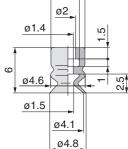
Symbol	Material	
N	NBR	
S	Silicone rubber*1	
U	Urethane rubber	
F	FKM	
GN	Conductive NBR	
GS	Conductive silicone rubber	

*1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles intended for repeated use"

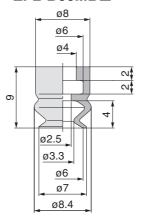
Dimensions: Pad Unit

ZP2-B04MB□

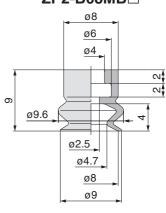
Ø4.5 Ø3 Ø2



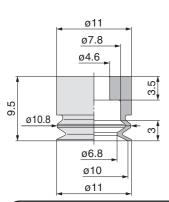
ZP2-B06MB□



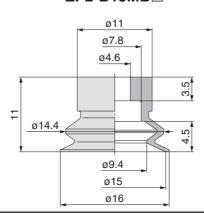
ZP2-B08MB□



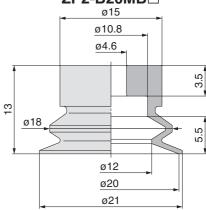
ZP2-B10MB□



ZP2-B15MB□



ZP2-B20MB□



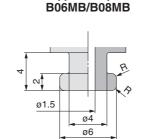
Adapter Mounting Dimensions

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

Ø1.2 Ø2

Applicable pad

B04MB

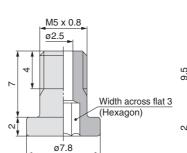


Applicable pad

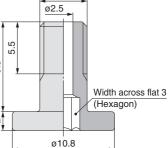
Note) R part has to be smooth with no corners.

* Refer to pages 69 and 70 for adapter applicable to the ZP2 series.

Applicable pad B10MB/B15MB



Applicable pad B20MB





How to Order

With adapter ZP2 - T B04 MB N - A3

Vacuum inlet direction

| Symbol Direction | T Vertical |

Pad diameter

Symbol	Pad diameter	Blast type
B04	ø4	
B06	ø6	•
B08	ø8	
B10	ø10	
B15	ø15	
B20	ø20	

* Blast type: Workpieces can be removed easily.

Mounting

Pad diameter (Symbol)	B04	B06	B08	B10	B15	B20
A3 (M3 x 0.5 Male thread)		_	_	_	_	<u> </u>
H5 (M5 x 0.8 Male thread)	_					
B5 (M5 x 0.8 Female thread)	_			_	_	

Pad material

Symbol	Material
N	NBR
S	Silicone rubber*1
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

*1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles intended for repeated use"

Replacement Part No.

Model	Pad unit part no.	Adapter part no.
ZP2-TB04MB□-A3	ZP2-B04MB□	ZP2A-M01P
ZP2-TB06MB□-H5	ZP2-B06MB□	ZP2A-M02P
ZP2-TB08MB□-H5	ZP2-B08MB□	ZPZA-IVIUZP
ZP2-TB10MB□-H5	ZP2-B10MB□	ZP2A-M05
ZP2-TB15MB□-H5	ZP2-B15MB□	ZPZA-IVIUS
ZP2-TB20MB□-H5	ZP2-B20MB□	ZP2A-M06
ZP2-TB06MB□-B5	ZP2-B06MB□	ZP2A-M04
ZP2-TB08MB□-B5	ZP2-B08MB□	ZPZA-10104

Note) \square Indicates the pad material.

Pad type

Symbol	Type
MB	Bellows

Dimensions: With Adapter

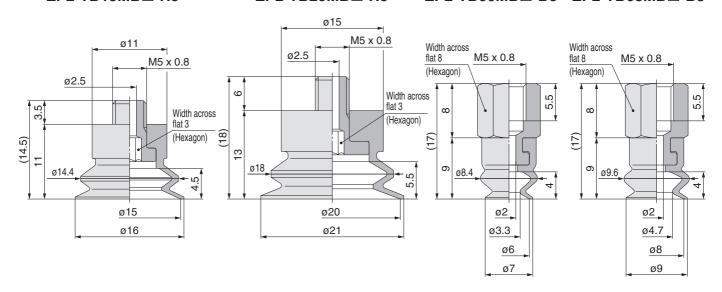
ZP2-TB04MB□□-A3 ZP2-TB08MB□-H5 ZP2-TB10MB□-H5 ZP2-TB06MB□-H5 ø11 M5 x 0.8 M5 x 0.8 M5 x 0.8 Width across flat 5 ø2.5 ø2.5 ø2.5 M3 x 0.5 (Hexagon) က် က Width across ø8 Width across flat Width across flat flat 3 (Hexagon) (14) 3 ι. 1.5 (Hexagon) 6 0 ø8.4 ø9.6 9 ø4.6 ø10.8 က ø1.2 ø3.3 ø4.7 ø10 ø11 ø6 ø8 ø4.1 ø7 ø9

<u>| ø4.8</u> | ZP2-TB15MB□-H5

15

ZP2-TB20MB□-H5

ZP2-TB06MB□-B5 ZP2-TB08MB□-B5





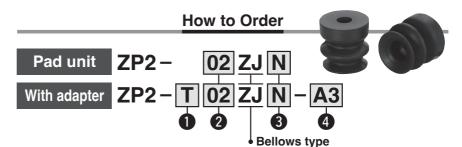
Bellows Pad

Pad diameter $\emptyset 2$, $\emptyset 4$, $\emptyset 5$, $\emptyset 6$

ZJ: Bellows type

■For use where there is no space for a buffer (spring type)

■For the adsorption of workpieces with inclined surfaces



4 Connection thread

Vacuum inlet direction

Symbol	Vacuum inlet direction
_	Pad unit
Т	Vertical

2 Pad diameter

<u> </u>	a didiliotoi
Symbol	Pad diameter
02	ø2
04	ø4
05	ø5
06	ø6

3 Pad material

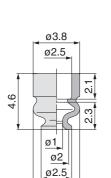
Symbol	Pad material	Symbol	Pad material
N	NBR	F	FKM
S	Silicone rubber*1, *2	GN	Conductive NBR
U	Urethane rubber	GS	Conductive silicone rubber

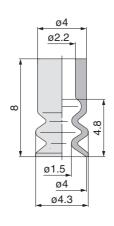
- *1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles intended for repeated use"
- *2 Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959)

Symbol Size			Pad dia	ametei	
Symbol	Size	ø2	ø4	ø5	ø6
A3	M3 x 0.5 Male thread		•	_	_
A5	M5 x 0.8 Male thread	_	_	•	•

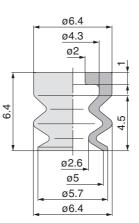
Dimensions: Pad Unit

ZP2-02ZJ [0.1 g]

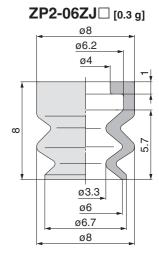




ZP2-04ZJ [0.1 g]

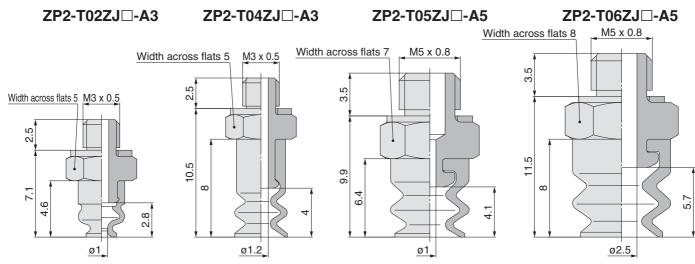


ZP2-05ZJ [0.2 g]



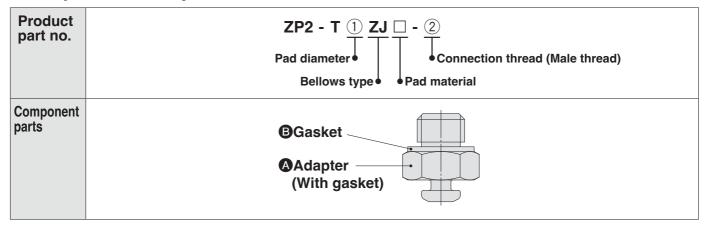
* Due to the small diameter of the ZP2-02ZJ, the pad portion may shrink before adsorption depending on the suction flow rate. For this reason, operate with the suction flow rate set to 2 [I/min (ANR)] or lower,

Dimensions: With Adapter



Bellows Pad Series ZP2 Mounting Bracket Assembly

■ Adapter Assembly



		Cumbal	1 Pad diameter symbol				
		Symbol	02 04		05	06	
Adapter onnection thread	M3 x 0.5	А3	ZP2A-T02ZJ-A3	ZP2A-T04ZJ-A3	_	_	
AAd Constitution three	M5 x 0.8	A 5	_	_	ZP2A-T05ZJ-A5	ZP2A-T06ZJ-A5	
	For M3 x 0.5	1 0 pcs.*1	M-3	M-3G2		_	
Gasket (Single unit)	For M5 x 0.8	1 0 pcs.*1	-	_		5G2	
(=g.o a)	FUI IVID X U.8	1 00 pcs.*1	_	_	M-5	5G2	

^{*1} The gasket (single unit) sales unit is shown.



Oval Pad

Pad size

3.5 x 7 to 8 x 30

W: Oval

■For workpieces with limitations on the adsorption surface





Pad unit

ZP2-3507 W N

Pad size

Symbol	Size	Symbol	Size
3507	3.5 x 7	6020	6 x 20
4010	4 x 10	8020	8 x 20
5010	5 x 10	4030	4 x 30
6010	6 x 10	5030	5 x 30
4020	4 x 20	6030	6 x 30
5020	5 x 20	8030	8 x 30

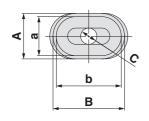
Pad material

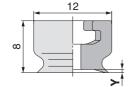
Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

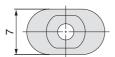
Pad type Symbol Type Oval

Dimensions: Pad Unit









a A b

7 8

10 6

11

2 x 1.5

2.5

0.5

Dimensions

Model

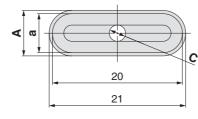
ZP2-4010W□

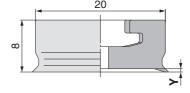
ZP2-5010W□ 5

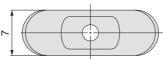
ZP2-6010W□ 6

ZP2-3507W□ 3.5 4.5

ZP2- 20 W □



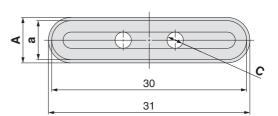


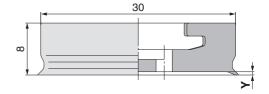


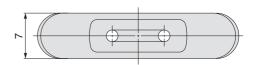
Dimensions

Model	а	Α	С	Υ
ZP2-4020W □	V □ 4 5 2 x 1.8			
ZP2-5020W □	5	6	2 x 2	0.5
ZP2-6020W	6	7	2.5	
7P2-8020W□	Я	q	3	0.8

ZP2- 30 W □







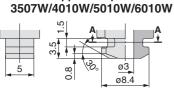
Dimensions

Model	а	Α	С	Υ
ZP2-4030W□	4	5	2 x 1.8	
ZP2-5030W □	5	6		0.5
ZP2-6030W□	6	7	2 x 2.5	
ZP2-8030W □	8	9		0.8

Applicable pad

Adapter Mounting Dimensions

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

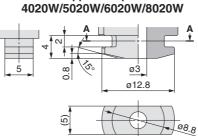


Applicable pad

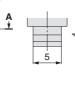


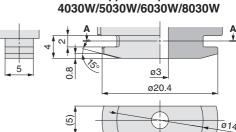
A-A





Applicable pad



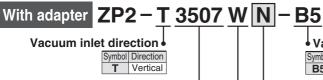


014.8 A-A

Note) R part has to be smooth with no corners. * Refer to page 69 for adapter applicable to the ZP2 series.

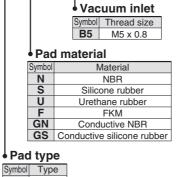






Pad size

		P	ad size •
Symbol	Size	Symbol	Size
3507	3.5 x 7	6020	6 x 20
4010	4 x 10	8020	8 x 20
5010	5 x 10	4030	4 x 30
6010	6 x 10	5030	5 x 30
4020	4 x 20	6030	6 x 30
5020	5 x 20	8030	8 x 30



W Oval

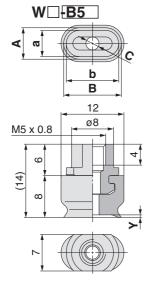
Replacement Part No.

Model	Pad unit part no.	Adapter part no.
ZP2-T3507W□-B5	ZP2-3507W□	
ZP2-T4010W□-B5	ZP2-4010W□	ZP2A-001
ZP2-T5010W□-B5	ZP2-5010W□	ZFZA-001
ZP2-T6010W□-B5	ZP2-6010W□	
ZP2-T4020W□-B5	ZP2-4020W□	
ZP2-T5020W□-B5	ZP2-5020W□	ZP2A-002
ZP2-T6020W□-B5	ZP2-6020W□	ZFZA-00Z
ZP2-T8020W□-B5	ZP2-8020W□	
ZP2-T4030W□-B5	ZP2-4030W□	
ZP2-T5030W□-B5	ZP2-5030W□	ZP2A-003
ZP2-T6030W□-B5	ZP2-6030W□	ZFZA-003
ZP2-T8030W□-B5	ZP2-8030W□	

Note) ☐ Indicates the pad material.

Dimensions: With Adapter

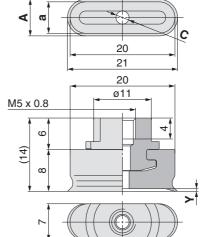
ZP2-T



Dimensions

Model	а	Α	b	В	С	Υ
ZP2-T3507W□-B5	3.5	4.5	7	8	2 x 1.5	
ZP2-T4010W□-B5	4	5			2 X 1.5	0.5
ZP2-T5010W□-B5	5	6	10	11	0.5	0.5
ZP2-T6010W□-B5	6	7			2.5	

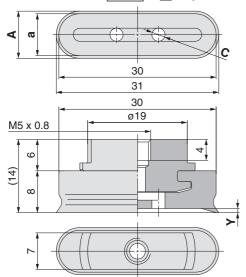
ZP2-T 20W -B5



Dimensions

Model	а	Α	С	Υ
ZP2-T4020W□-B5	4	5	2 x 1.8	
ZP2-T5020W□-B5	5	6	2 x 2	0.5
ZP2-T6020W□-B5	6	7	2.5	
ZP2-T8020W□-B5	8	9	3	0.8

ZP2-T 30 W □-B5



Dimensions

Model	а	Α	С	Υ
ZP2-T4030W□-B5	4	5	2 x 1.8	
ZP2-T5030W□-B5	5	6		0.5
ZP2-T6030W□-B5	6	7	2 x 2.5	
ZP2-T8030W□-B5	8	9		0.8



How to Order

Symbol

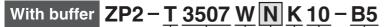
10

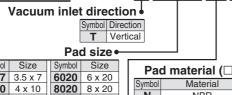
20

30

40

50





 Symbol
 Size
 Symbol
 Size

 3507
 3.5 x 7
 6020
 6 x 20

 4010
 4 x 10
 8020
 8 x 20

 5010
 5 x 10
 4030
 4 x 30

 6010
 6 x 10
 5030
 5 x 30

 4020
 4 x 20
 6030
 6 x 30

 5020
 5 x 20
 8030
 8 x 30

Pad type GS Conductive silicone rubber

Symbol Type

W Oyal

Buffer specificat

Pad material () • Symbol Material N NBR S Silicone rubber U Urethane rubber F FKM GN Conductive NBR

Buffer specification
Symbol Specification
K Non-rotating

Replacement Part No.

Buffer stroke (★)

Stroke

10 mm

20 mm

30 mm

40 mm

50 mm

ricpiacement i art i	10.				
Model	Pad unit part no.	Adapter part no.	Buffer asse	embly pa	art no.
ZP2-T3507W□K★-■	ZP2-3507W□				
ZP2-T4010W□K★-■	ZP2-4010W□	ZP2A-001	ZPB2K★	-	
ZP2-T5010W□K★-■	ZP2-5010W□	ZFZA-001	T	Τ.,	
ZP2-T6010W□K★-■	ZP2-6010W□			• vac	uum inlet
ZP2-T4020W□K★-■	ZP2-4020W□		Buffer stroke	Symbol	Applicable
ZP2-T5020W□K★-■	ZP2-5020W□	ZP2A-002	Symbol Stroke	,	tube O.D.
ZP2-T6020W□K★-■	ZP2-6020W□	ZPZA-002	10 10 mm	B5	M5 x 0.8
ZP2-T8020W□K★-■	ZP2-8020W□		20 20 mm	04	ø4 one-
ZP2-T4030W□K★-■	ZP2-4030W□		30 30 mm	04	touch fitting
ZP2-T5030W□K★-■	ZP2-5030W□	7004 000	40 40 mm	06	ø6 one-
ZP2-T6030W□K★-■	ZP2-6030W□	ZP2A-003	50 50 mm	00	touch fitting
ZP2-T8030W□K★-■	ZP2-8030W□				

◆ Vacuum inlet (■)

Symbol Applicable tube O.D

M5 x 0.8

ø4 one-touch fitting

ø6 one-touch fitting

B5

04

Note 1) ☐ Indicates the pad material. Note 2) ★ Indicates the buffer stroke.

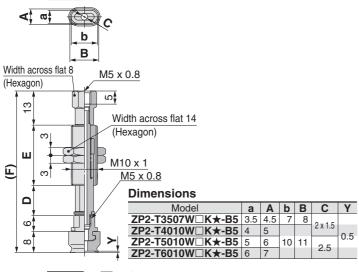
Note 3) ■ Indicates the vacuum inlet.

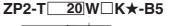
Buffer Specifications

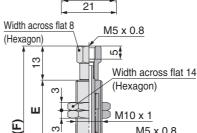
Stroke (mm)		10, 20, 30, 40, 50
Spring reactive	At 0 stroke (N)	1.0
force	At buffer stroke (N)	3.0
Tightening torqu	ue	3.0 N·m 5%

Dimensions: With Buffer





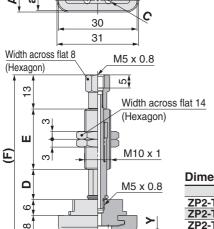




M10 x 1 M5 x 0.8 Dimensions Model ZP2-T4020W□K★

ZP2-T4020W□K★-B5 4 ZP2-T5020W□K★-B5 5	5	2 x 1.8	
7P2-T5020W□K+-B5 5	6	0 0	
	О	2 x 2	0.5
ZP2-T6020W □K★-B5 6	7	2.5	
ZP2-T8020W □K★-B5 8	9	3	0.8

ZP2-T 30 W □ K★-B5



Dimensions common for all three drawings Dimensions (per buffer stroke)

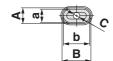
Stroke (★) D 11.5 23 61.5 20 21.5 99.5 51 30 31.5 109.5 40 41.5 145.5 77 51.5 155.5

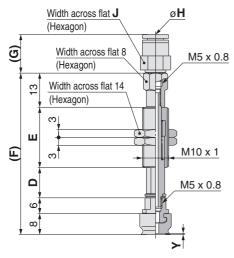
Dimensions

Model	а	Α	С	Υ
ZP2-T4030W□K★-B5	4	5	2 x 1.8	
ZP2-T5030W□K★-B5	5	6		0.5
ZP2-T6030W□K★-B5	6	7	2 x 2.5	
ZP2-T8030W □ K ★- B 5	8	9		0.8

Dimensions: With Buffer

ZP2-T W K★-04

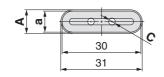


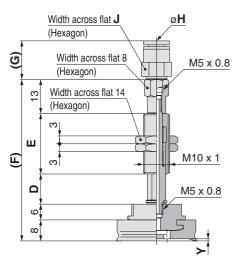


Dimensions

Model	а	Α	b	В	С	Υ
ZP2-T3507W□K★-04	3.5	4.5	7	8	2 x 1.5	
ZP2-T4010W□K★-04	4	5			2 X 1.5	0.5
ZP2-T5010W□K★-04	5	6	10	11	2.5	0.5
ZP2-T6010W□K★-04	6	7			2.5	

ZP2-T 30 W K ★-04

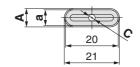


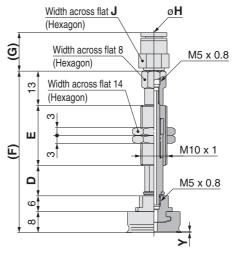


Dimensions

Model	а	Α	С	Υ
ZP2-T4030W□K★-04	4	5	2 x 1.8	
ZP2-T5030W □ K ★- ⁰⁴ ⁄ ₀₆	5	6		0.5
ZP2-T6030W□K★-04	6	7	2 x 2.5	
ZP2-T8030W □ K ★- ⁰⁴ ⁄ ₀₆	8	9		0.8

ZP2-T 20 W K ★ -04





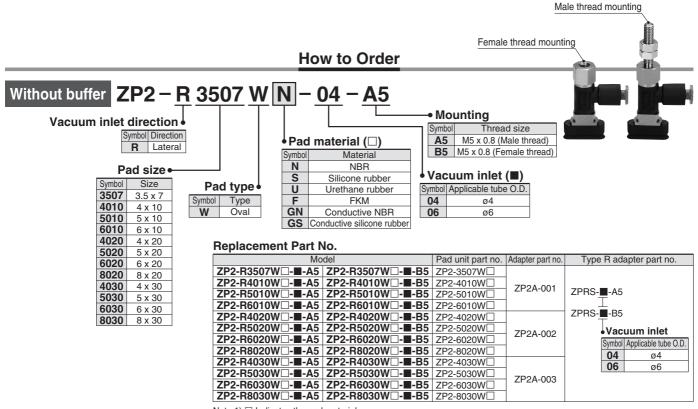
Dimensions

Model	а	Α	С	Υ
ZP2-T4020W□K★-04	4	5	2 x 1.8	
ZP2-T5020W□K★-04	5	6	2 x 2	0.5
ZP2-T6020W□K★-04	6	7	2.5	
ZP2-T8020W □ K ★- ⁰⁴ ⁄ ₀₆	8	9	3	0.8

Dimensions common for all three drawings Dimensions (per buffer stroke)

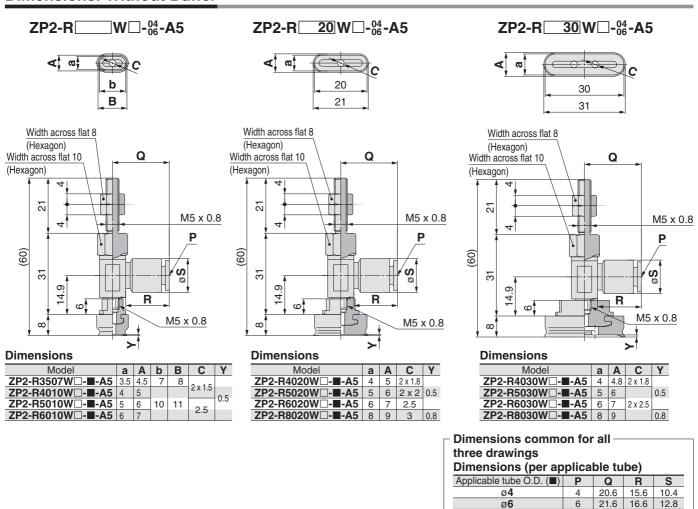
Ctroko (+)		Е	F	H:	ø 4	H: ø6	
Stroke (★)	D		r	G	J	G	J
10	11.5	23	61.5			14.7	
20	21.5	51	99.5	13.9	8		10
30	31.5	51	109.5				
40	41.5	77	145.5				
50	51.5	77	155.5				

Series ZP2



Note 1) ☐ Indicates the pad material. Note 2) ■ Indicates the vacuum inlet.

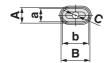
Dimensions: Without Buffer

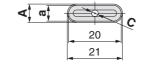


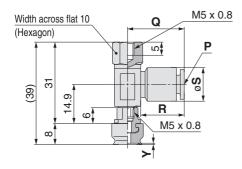
Dimensions: Without Buffer

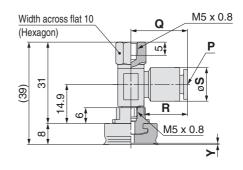
ZP2-R W - 04 - B5

ZP2-R 20 W -04-B5









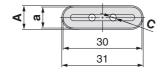
Dimensions

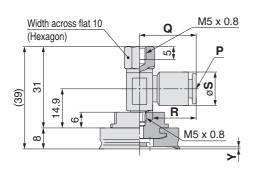
Model	а	Α	b	В	С	Υ
ZP2-R3507W□- ■ -B5	3.5	4.5	7	8	2 x 1.5	
ZP2-R4010W□- ■ -B5	4	5			2 X 1.5	0.5
ZP2-R5010W□- ■ -B5	5	6	10	11	2.5	0.5
ZP2-R6010W□-■-B5	6	7			2.5	

Dimensions

Model	а	Α	С	Υ
ZP2-R4020W□- ■ -B5	4	5	2 x 1.8	
ZP2-R5020W□- ■ -B5	5	6	2 x 2	0.5
ZP2-R6020W□- ■ -B5	6	7	2.5	
ZP2-R8020W□- ■ -B5	8	9	3	0.8

ZP2-R 30 W - 06 - B5





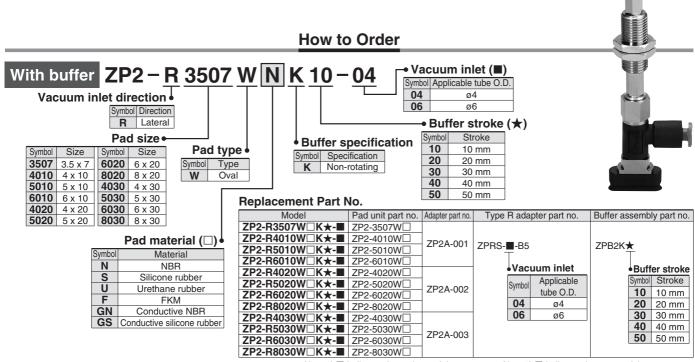
Dimensions

Model	а	Α	С	Υ
ZP2-R4030W□- ■ -B5	4	5	2 x 1.8	
ZP2-R5030W□- ■ -B5	5	6		0.5
ZP2-R6030W□-■-B5	6	7	2 x 2.5	
ZP2-R8030W□- ■ -B5	8	9		0.8

Dimensions common for all three drawings Dimensions (per applicable tube)

Applicable tube O.D. (■)	Р	Q	R	S
ø 4	4	20.6	15.6	10.4
ø 6	6	21.6	16.6	12.8





Note 1) ☐ Indicates the pad material.

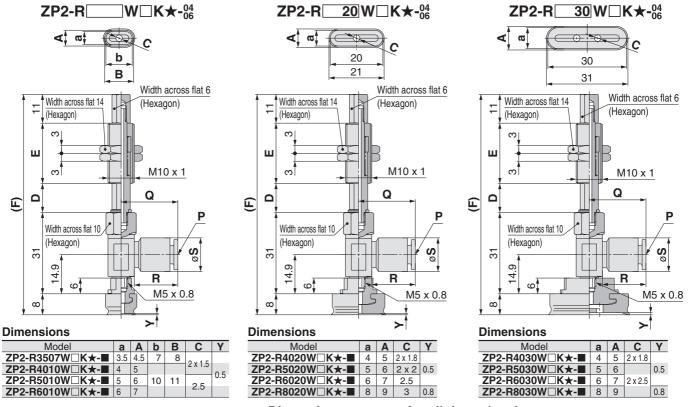
Note 2) ★ Indicates the buffer stroke.

Note 3) ■ Indicates the vacuum inlet.

Buffer Specifications (Non-rotating)

Stroke (mm)		10, 20, 30, 40, 50		
Spring reactive	At 0 stroke (N)	1.0		
force	At buffer stroke (N)	3.0		
Tightening torqu	Tightening torque			

Dimensions: With Buffer



——————————————————————————————————————												
Dimensions (per stroke) Dimensions (per applicable tube)												
Stroke (★)	D	Е	F	Stroke (★)	D	Е	F	Applicable tube O.D. (■)	Р	Q	R	S
10	11	23	84	30	31	51	132	ø 4	4	20.6	15.6	10.4
20	21	51	122	40	41	77	168	ø 6	6	21.6	16.6	12.8
				50	51	77	178					

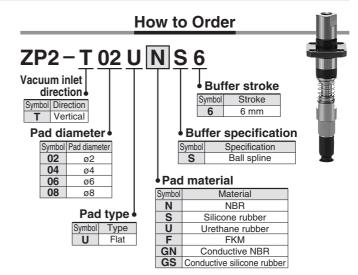
Pad with Ball Spline Buffer

Symbol/Type

U: Flat

Pad diameter $\emptyset 2, \emptyset 4, \emptyset 6, \emptyset 8$

■Ball spline guide is used to the buffer.



Buffer Specifications

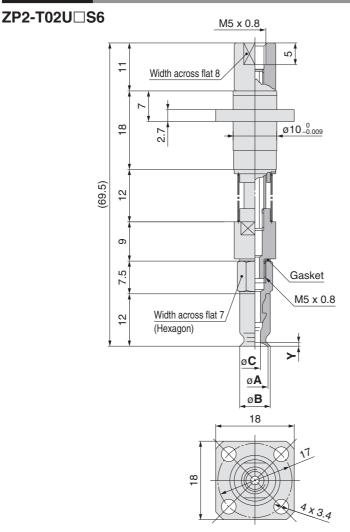
9	Ball spline			
Stroke (mm)	Stroke (mm)			
Spring reactive	At 0 stroke (N)	0.8		
force	At buffer stroke (N)	1.1		

Replacement Part No.

1	Model	Pad unit part no.	Adapter part no.	Buffer assembly part no.
	ZP2-T02U□S6	ZP02U□		
	ZP2-T04U□S6	ZP04U□	ZPT1-B5	ZP2B-T3S6
	ZP2-T06U□S6	ZP06U□	ZPTT-B5	ZPZB-1350
	ZP2-T08U□S6	ZP08U□		

Note) \square Indicates the pad material.

Dimensions



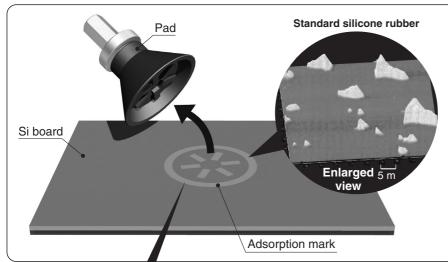
Dimensions

Model	Α	В	С	Υ
ZP2-T02U□S6	2	2.6	1.2	0.5
ZP2-T04U□S6	4	4.8	1.6	0.8
ZP2-T06U□S6	6	7	2.5	0.6
ZP2-T08U□S6	8	9	2.5	1



Mark-free Pad Series

Minimises the transfer of rubber constituents to the workpiece.



Analysis equipment:

Scanning probe microscope

Measurement conditions:

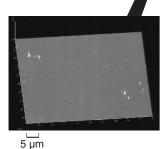
Measurement mode
Atomic force microscope DFM mode

Sample conditions:

Press the vacuum pad to the Si board for 1 hour.

Monitoring location:

Monitored at a randomly selected location where adsorption marks were likely due to contact between the vacuum pad and Si board.



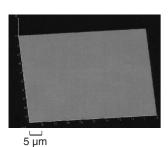
1 Mark-free NBR Pad

Minimises the transfer of rubber constituents which is supposed to be the cause of adsorption.

Pad diameter: ø4 to ø125



Heavy-duty type



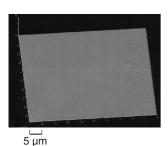


2 Stuck Fluororesin Pad

Fluororesin sheet is baked into the pad adsorption surface. Prevents the transfer of rubber constituents.

Pad diameter: ø40 to ø125



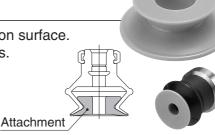




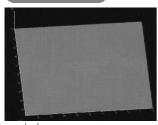
3 Resin Attachment

PEEK material is used for the pad adsorption surface. Prevents the transfer of rubber constituents.

Pad diameter: ø6 to ø32



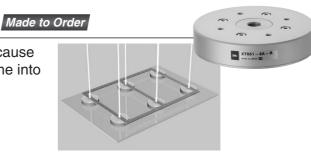




___ 5 µm



No adsorption mark is left because the vacuum pad does not come into



The above adsorption marks show sample data. Actual results will depend on the conditions.



		Material of the adsorption part		\dsorption r		Static *5
	Pad type	(Part in contact with the workpiece)	Condition *2 (Initial value) Visual checking Vapour method *3		Operating temperature	friction ratio
	Mark-free NBR pad	Mark-free NBR (Specially treated *4)	Visual checking	vapour method *3	range (C) 5 to 40	0.6
Mark-free Pad Series	Stuck fluororesin pad	NBR + Stuck fluororesin	•	•	5 to 60	0.2
		Fluororubber + Stuck fluororesin	•	•	5 to 100	0.2
	Resin attachment	PEEK	•	•	5 to 40	0.2
Ž		Conductive PEEK (Volume resistivity: 1 x 10 ⁶ cm)	•	•	3 10 40	
	Cyclone pad Made to Order	_	•	•	Standard: -5 to 60 (No freezing)	_
Standard	Series ZP (Standard material)	NBR Fluororubber Conductive NBR/Silicone rubber	×	×		
		Silicone rubber Urethane rubber		×	_	_

* The above table is for reference when selecting the pad.

Values and evaluation are reference data only. Preparatory testing under actual operating conditions is recommended.

*1 Adsorption mark — Indicates the transfer of rubber constituents from the pad.

*2 Condition — Visual evaluation of the adsorption mark

*3 Vapour method Method of applying vapour to the workpiece to visually check for adsorption marks

*4 Specially treated — NBR is specially treated to modify and reduce the transfer of rubber constituents.

*5 **Static friction ratio** ——Static friction ratio when the workpiece (glass) is adsorbed by the pad. (NBR = 1 as a benchmark) When the cyclone pad is used, the pad does not come into contact with the workpiece (glass).

The customer needs to install a guide for holding.

Cleaning method [Mark-free NBR pad/Stuck fluororesin pad/Resin attachment]

- Always clean the product before operation and when carrying out regular maintenance.
- 1) Hold the part other than the adsorption surface.
 - \ast Non particle-generating vinyl gloves are recommended.
- 2) Soak a non particle-generating cloth in 2-propanol (isopropyl alcohol) (purity > 99.5%).
 - * This solution is a recommendation. If not available, use a solution with high purity which does not affect the material properties.
- 3) Wipe the adsorption surface (pad/resin attachment) and the part that comes into contact with the workpiece.
- 4) Dry them with clean air blow. (Or, wipe again with a dry non particle-generating cloth.)



Mark-free Pad

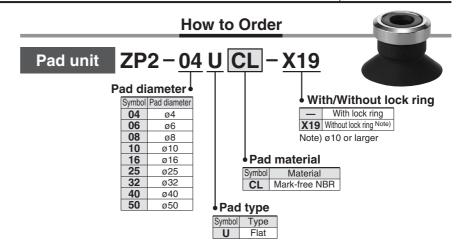
Pad diameter

Ø4, Ø6, Ø8, Ø10, Ø16, Ø25, Ø32, Ø40, Ø50

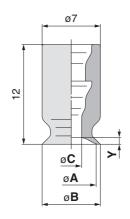
U: Flat

- Pad which reduces the adsorption marks left on the workpiece by rubber.
- The pad is made from mark-free NBR, and the NBR is then specially treated to minimise the transfer of rubber constituents to the workpiece.
- Applicable for the ZP series adapter

Dimensions: Pad Unit



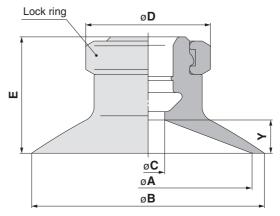
ZP2-04 to 08UCL



Dimensions

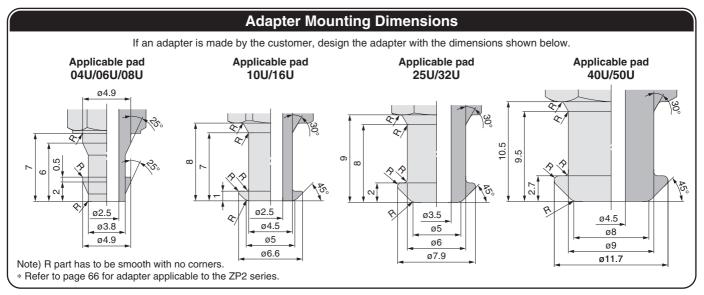
Model	Α	В	С	Υ
ZP2-04UCL	4	4.8	1.6	0.8
ZP2-06UCL	6	7	2.5	0.8
ZP2-08UCL	8	9	2.5	1

ZP2-10 to 50UCL



Dimensions

Model	Α	В	С	D	Е	Υ
ZP2-10UCL	10	12	4	13	12	3
ZP2-16UCL	16	18		13	12.5	3.5
ZP2-25UCL	25	28		15	14	4
ZP2-32UCL	32	35			14.5	4.5
ZP2-40UCL	40	43	7	18	18.5	6.5
ZP2-50UCL	50	53		18	19.5	7.5



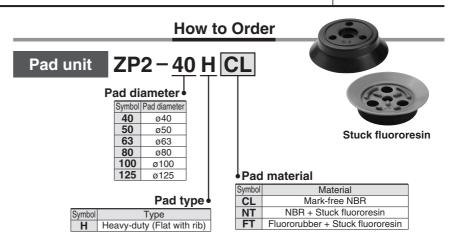
Symbol/Type

H: Heavy-duty (Flat with rib)

Pad diameter

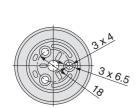
ø40, ø50, ø63, ø80, ø100, ø125

- Pad which reduces the adsorption marks left on the workpiece by rubber.
- The pad is made from mark-free NBR, and the NBR is then specially treated to minimise the transfer of rubber constituents to the workpiece.
- Prevents rubber constituents of the pad from transferring by baking the fluororesin sheet to the adsorption surface.

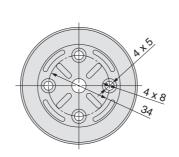


Dimensions: Pad Unit

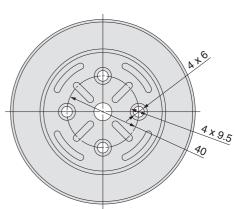


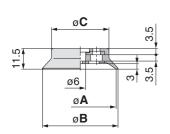


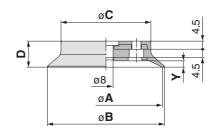
ZP2-⁶³₈₀H□

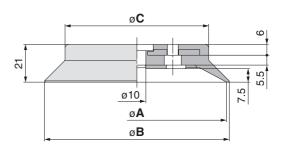


ZP2-¹⁰⁰₁₂₅H□









Dimensions

Model	Α	В	С
ZP2-40H□	40	43	32
7P2-50H□	50	53	42

Dimensions

Model	Α	В	С	D	Υ
ZP2-63H□	63	65	50	14.5	3.5
ZP2-80H □	80	82	61	16.5	4.5

Dimensions

Model	Α	В	С
ZP2-100H□	100	103	80
7P2-125H□	125	128	104



Resin Attachment

Pad diameter Ø6, Ø8, Ø10, Ø13, Ø16, Ø20, Ø25, Ø32

■ No adsorption marks (rubber constituents) are left on the workpiece.

Avoids direct contact between the workpiece and the rubber by installing a PEEK attachment to the bellows pad to prevent the transfer of rubber constituents.

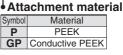
- Prevents sticking of the pad (rubber) and the workpiece.
- Ideal for the ZP series bellows pad (ø6 to ø32)



How to Order

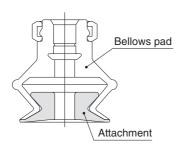
ZP2-06KP

ulailletei •
Pad diameter
ZP06B□
ZP08B□
ZP10B□
ZP13B□
ZP16B□
ZP20B□
ZP25B□
ZP32B□





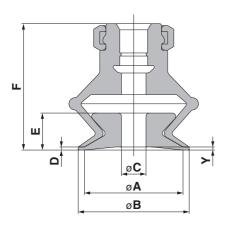
How to Order (When ordering with a pad)



- When ordering with a pad, put "*", below the part number of the pad as shown below. Note that the pad is not delivered with the attachment assembled.
- This attachment can only be assembled onto SMC's standard bellows pad.
- When the attachment is made of conductive PEEK, use conductive material for the pad.

Ordering ZPT06BNJ10-B5-A8 Bellows pad part no. example * ZP2-06KP Resin attachment part no.

Dimensions



Dimensions

Model	Applicable pad	Α	В	С	D	E	F	Υ
ZP2-06K■	ZP06B□	6	7	1.6		0	10.5	
ZP2-08K■	ZP08B□	8	9	3		3	13.5	
ZP2-10K■	ZP10B□	10	12	3.5	0.5	3.5	16.5	0.5
ZP2-13K■	ZP13B□	13	15	4		5.5	19	
ZP2-16K■	ZP16B□	16	18	4		6	20.5	
ZP2-20K■	ZP20B□	20	22	8		8.5	24.5	
ZP2-25K■	ZP25B□	25	27	10	1	0.5	25	1
ZP2-32K■	ZP32B□	32	34	10		11.5	30	

Note 1) Indicates the attachment material.

Note 2) Indicates the pad material.

«Precautions»

Clean the product before using the attachment.

This product is not cleaned after machining. If the product is used in the condition in which it is shipped, residual material may be left on the workpieces. Clean before usage. If you have any questions, please contact SMC.

- If contact with hard material is a problem, do not use this product.
- PEEK material and cut parts fall under the security trade control.



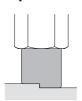
Sponge Pad

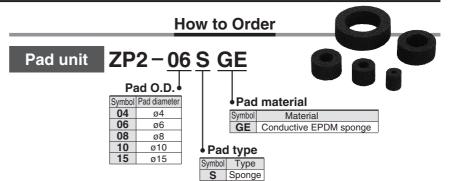
Symbol/Type

Pad diameter $\emptyset 4$, $\emptyset 6$, $\emptyset 8$, $\emptyset 10$, $\emptyset 15$

S: Sponge

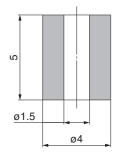
■ For adsorption of workpieces with bumps



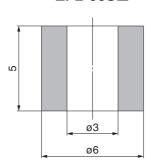


Dimensions: Pad Unit

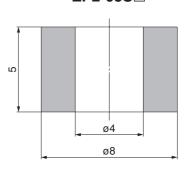
ZP2-04S□



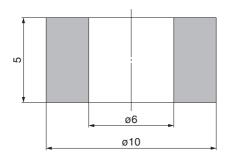




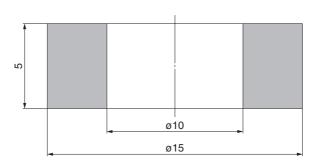
ZP2-08S□



ZP2-10S□

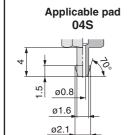


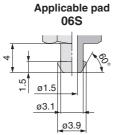
ZP2-15S

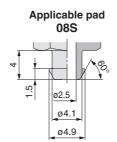


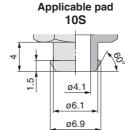
Adapter Mounting Dimensions

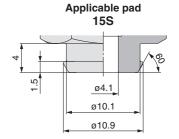
If an adapter is made by the customer, design the adapter with the dimensions shown below.



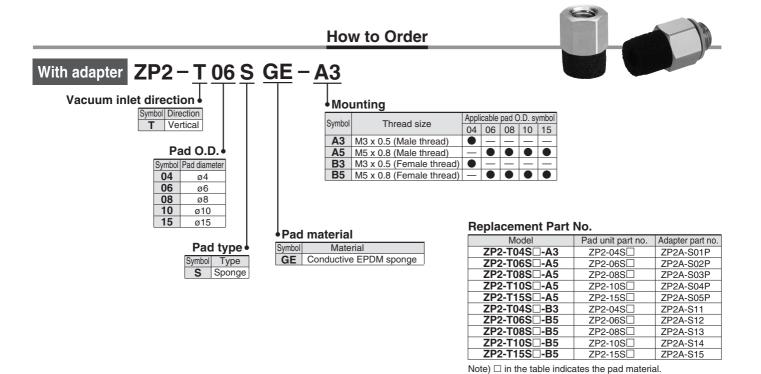




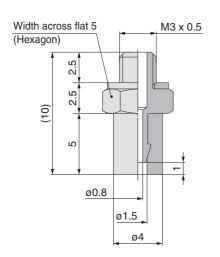


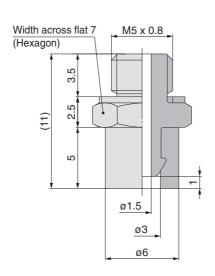


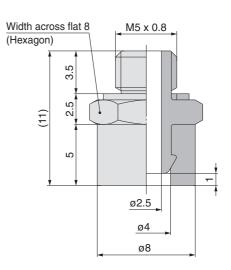
* Refer to pages 70 and 71 for adapter applicable to the ZP2 series.



Dimensions: With Adapter





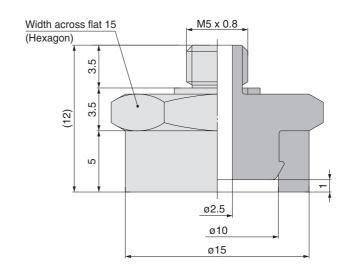


Dimensions: With Adapter

ZP2-T10S□-A5

Width across flat 10 (Hexagon) (Response of the control of the co

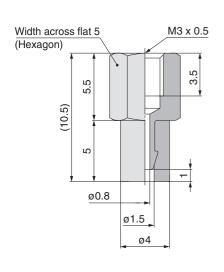
ZP2-T15S□-A5

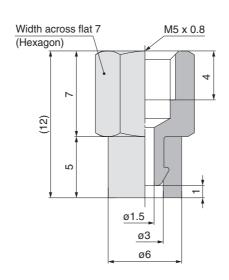


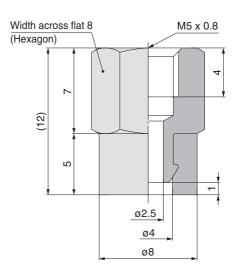
ZP2-T04S□-B3

ZP2-T06S□-B5

ZP2-T08S□-B5

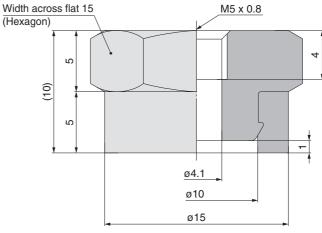






ZP2-T10S□-B5

ZP2-T15S□-B5





Heavy-duty Pad

Pad diameter Ø32, Ø150, Ø250, Ø300, Ø340

Symbol/Type

H: Heavy-duty (Flat with rib)

HT: Heavy-duty (Thin flat with rib)

■Reinforced pad to prevent deformation when transferring heavy or large workpieces



32 150 ø150 250 ø250 300 340 ø300 ø340

Silicone rubber FKM CR

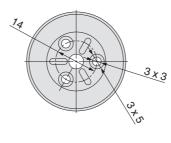
Note) Silicone rubber is only applicable to the ø32 pad.

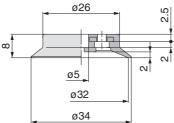
◆ Pad type—Pad diameter

Pad diameter (Symbol)	32	150	250	300	340
H (Flat with rib)	•	_	_	•	
HT (Thin flat with rib)		•	•		

Dimensions: Pad Unit

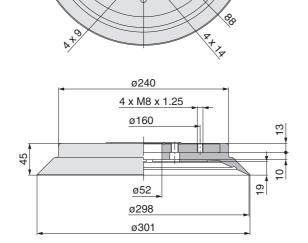
ZP2-32H□

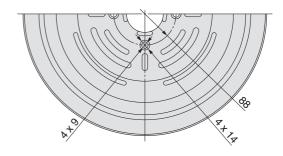


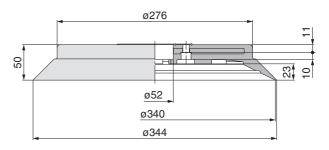


ZP2-300H□

ZP2-340H□

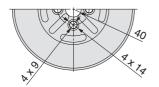


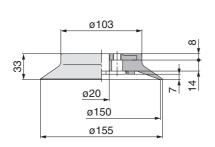




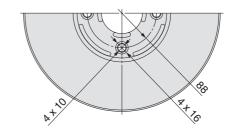
Dimensions

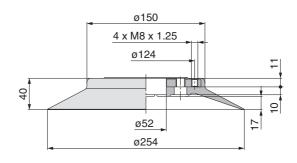
ZP2-150HT□





ZP2-250HT

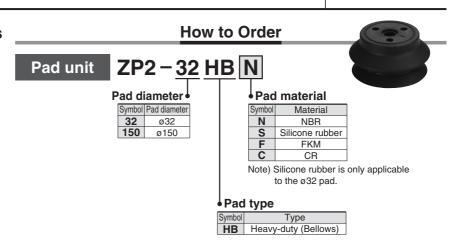




Symbol/Type

HB: Heavy-duty (Bellows)

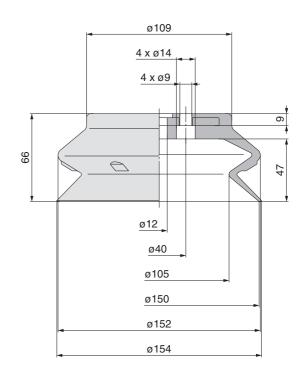
■For heavy or large workpieces



Dimensions: Pad Unit

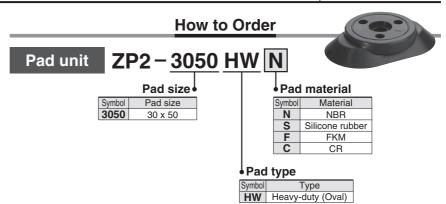
ZP2-32HB□

ZP2-150HB□



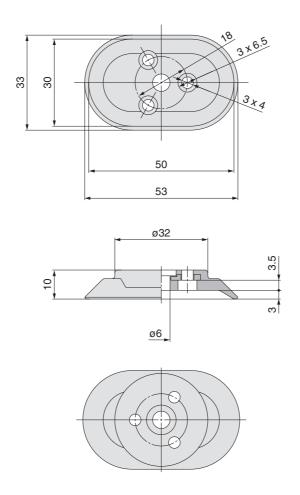


■For heavy or large workpieces



Dimensions: Pad Unit

ZP2-3050HW□



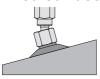
Heavy-duty Ball Joint Pad

Pad diameter Ø40, Ø50, Ø63, Ø80, Ø100, Ø125

Symbol/Type

H: Heavy-duty (Flat with rib)

■ For adsorption of workpieces with inclined surface

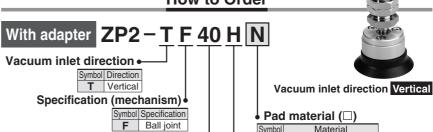


Replacement Part No.

- iopiacomonici antino						
Model	Pad unit part no.	Adapter assembly part no				
ZP2-TF40H□	ZP40H□	ZP2A-TF1	With three			
ZP2-TF50H□	ZP50H□	ZPZA-IFI	M3 bolts			
ZP2-TF63H□	ZP63H□	ZP2A-TF2	With four			
ZP2-TF80H□	ZP80H□	ZP2A-TF2	M4 bolts			
ZP2-TF100H□	ZP100H□	ZP2A-TF3	With four			
ZP2-TF125H□	ZP125H□	ZP2A-1F3	M5 bolts			

Note) \square Indicates the pad material.

How to Order



Pad diameter

Symbol	Pad diameter	
40	ø40	
50	ø50	Symbol
63	ø63	н
80	ø80	- 11
100	ø100	
125	ø125	

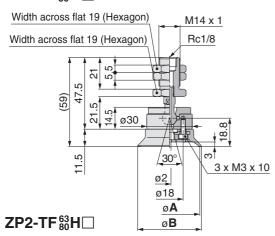
N Silicone rubber*1*2 <u>S</u> Pad type Urethane rubber FKM Туре **EPDM** Heavy-duty (Flat with rib)

Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles intended for repeated use" Compliant with the standards for "Rubber appa-

ratus (excluding baby drinking apparatus) and containers/packaging" (D3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).

Dimensions: With Adapter

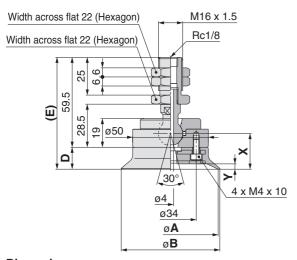
ZP2-TF⁴⁰₅₀H□



Dimensions

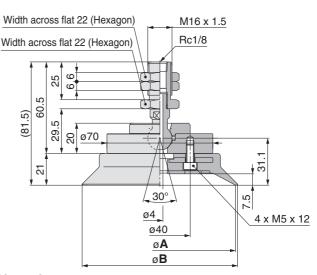
Model	Α	В	l
ZP2-TF40H□	40	42	
ZP2-TF50H□	50	52	l

ZP2-TF¹⁰⁰₁₂₅H□



Dimensions

Model	Α	В	D	Е	Х	Υ
ZP2-TF63H□	63	65	14.5	74	23.6	3.5
7P2-TF80H□	80	82	16.5	76	25.6	4.5

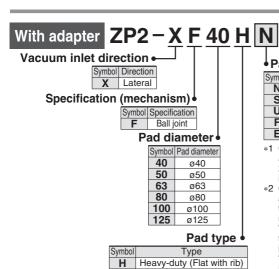


Dimensions

Model	Α	В	
ZP2-TF100H□	100	103	
ZP2-TF125H□	125	128	



How to Order



Pad material (□)

Symbol	Material				
N	NBR				
S	Silicone rubber*1*2				
U	Urethane rubber				
F	FKM				
Е	EPDM				

- *1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles
- intended for repeated use"

 *2 Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).



Vacuum inlet direction Lateral

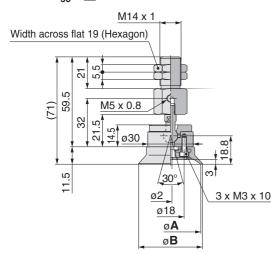
Replacement Part No.

Model	Pad unit part no.	Adapter assembly part no		
ZP2-XF40H□	ZP40H□	ZP2A-XF1	With three	
ZP2-XF50H□	ZP50H□	ZPZA-XFI	M3 bolts	
ZP2-XF63H□	ZP63H□	ZP2A-XF2	With four	
ZP2-XF80H□	ZP80H□	ZP2A-XF2	M4 bolts	
ZP2-XF100H□	ZP100H□	ZP2A-XF3	With four	
ZP2-XF125H□	ZP125H□	ZFZM-XF3	M5 bolts	

Note) \square Indicates the pad material.

Dimensions: With Adapter

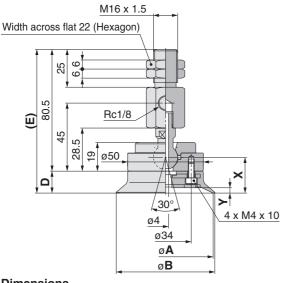
ZP2-XF⁴⁰₅₀H□



Dimensions

Difficitions		
Model	Α	В
ZP2-XF40H□	40	42
ZP2-XF50H□	50	52

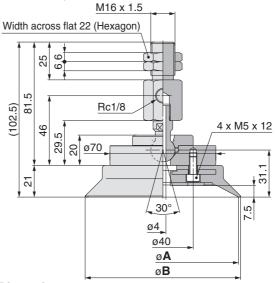
ZP2-XF⁶³₈₀H□



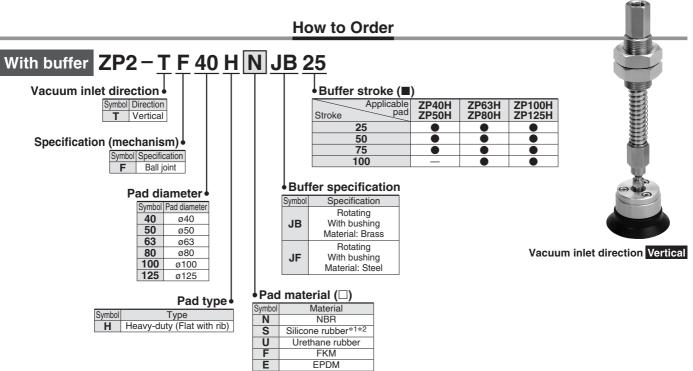
Dimensions

Model	Α	В	D	Е	Х	Υ
ZP2-XF63H□	63	65	14.5	95	23.6	3.5
ZP2-XF80H□	80	82	16.5	97	25.6	4.5

ZP2-XF¹⁰⁰₁₂₅H□



Model	Α	В
ZP2-XF100H□	100	103
ZP2-XF125H□	125	128



- *1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Pubbor articles intended for repeated use"
- for "Rubber articles intended for repeated use"

 *2 Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).

Replacement Part No.

Model	Pad unit part no.	Buffer assembly part	no.
ZP2-TF40H□(JB/JF)25		ZP2B-TF1(JB/JF)25	
ZP2-TF40H□(JB/JF)50	ZP40H□	ZP2B-TF1(JB/JF)50	
ZP2-TF40H□(JB/JF)75		ZP2B-TF1(JB/JF)75	With three
ZP2-TF50H□(JB/JF)25		ZP2B-TF1(JB/JF)25	M3 bolts
ZP2-TF50H□(JB/JF)50	ZP50H□	ZP2B-TF1(JB/JF)50	
ZP2-TF50H□(JB/JF)75		ZP2B-TF1(JB/JF)75	
ZP2-TF63H□(JB/JF)25		ZP2B-TF2(JB/JF)25	
ZP2-TF63H□(JB/JF)50	ZP63H□	ZP2B-TF2(JB/JF)50	
ZP2-TF63H□(JB/JF)75	21 0011	ZP2B-TF2(JB/JF)75	
ZP2-TF63H□(JB/JF)100		ZP2B-TF2(JB/JF)100	With four
ZP2-TF80H□(JB/JF)25		ZP2B-TF2(JB/JF)25	M4 bolts
ZP2-TF80H□(JB/JF)50	ZP80H□	ZP2B-TF2(JB/JF)50	
ZP2-TF80H□(JB/JF)75	20011	ZP2B-TF2(JB/JF)75	
ZP2-TF80H□(JB/JF)100		ZP2B-TF2(JB/JF)100	
ZP2-TF100H□(JB/JF)25		ZP2B-TF3(JB/JF)25	
ZP2-TF100H□(JB/JF)50	ZP100H□	ZP2B-TF3(JB/JF)50	
ZP2-TF100H□(JB/JF)75	ZF 100HL	ZP2B-TF3(JB/JF)75	
ZP2-TF100H□(JB/JF)100		ZP2B-TF3(JB/JF)100	With four
ZP2-TF125H□(JB/JF)25		ZP2B-TF3(JB/JF)25	M5 bolts
ZP2-TF125H□(JB/JF)50	ZP125H□	ZP2B-TF3(JB/JF)50	
ZP2-TF125H□(JB/JF)75	ZF 123ПЦ	ZP2B-TF3(JB/JF)75	
ZP2-TF125H□(JB/JF)100		ZP2B-TF3(JB/JF)100	

Note) \square Indicates the pad material.

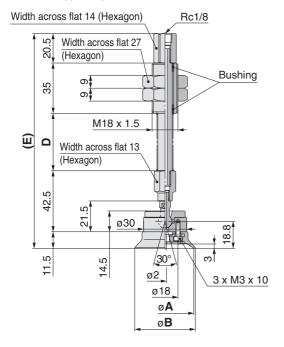
Buffer Specifications

Pad dia	Pad diameter		ø63, ø80, ø100, ø125		
Stroke (mm)		25, 50, 75 25, 50, 75, 100			
Spring reactive force	At 0 stroke (N)	6.9	10		
Spring reactive force	At buffer stroke (N)	11.8	15		
JB		Rotating With bushing Buffer body material: Brass			
Buffer specifications		Tightening torque: 30 N⋅m ±5%	Tightening torque: 45 N⋅m ±5%		
JF		Rotating With bushing Buffer body material: Steel			
			Tightening torque: 70 N·m ±5%		



Dimensions: With Buffer

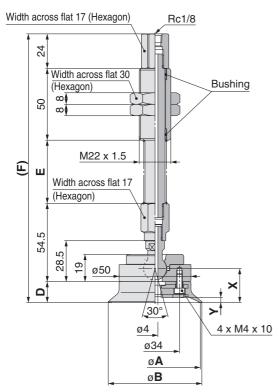
ZP2-TF⁴⁰H□JB■



Dimensions

Model	Α	В	D	E
ZP2-TF40H□(JB/JF)25			40	149.5
ZP2-TF40H□(JB/JF)50	40	42	75	184.5
ZP2-TF40H□(JB/JF)75			111	220.5
ZP2-TF50H□(JB/JF)25			40	149.5
ZP2-TF50H□(JB/JF)50	50	52	75	184.5
ZP2-TF50H□(JB/JF)75			111	220.5

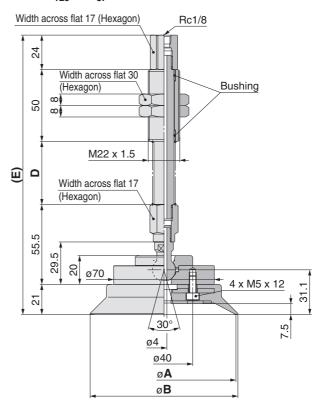
ZP2-TF⁶³H□J^B■



Dimensions

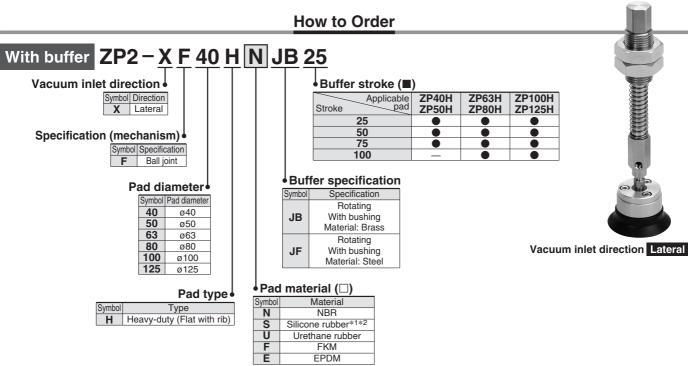
Model	Α	В	D	Е	F	Х	Υ	
ZP2-TF63H□(JB/JF)25				44	187			
ZP2-TF63H□(JB/JF)50	60	65	14.5	80	223	23.6	3.5	
ZP2-TF63H□(JB/JF)75	63	65	14.5	120	263	23.6	3.5	
ZP2-TF63H□(JB/JF)100				155	298			
ZP2-TF80H□(JB/JF)25				44	189			
ZP2-TF80H□(JB/JF)50	00	00	10.5	80	225	05.6	4.5	
ZP2-TF80H□(JB/JF)75	80	82	82 10.5	16.5	120	265	25.6	4.5
ZP2-TF80H□(JB/JF)100				155	300			

ZP2-TF¹⁰⁰₁₂₅**H**□ J^B_J■



Model	Α	В	D	E		
ZP2-TF100H□(JB/JF)25			44	194.5		
ZP2-TF100H□(JB/JF)50	100	103	80	230.5		
ZP2-TF100H□(JB/JF)75	100	100	100 103	103	120	270.5
ZP2-TF100H□(JB/JF)100			155	305.5		
ZP2-TF125H□(JB/JF)25			44	194.5		
ZP2-TF125H□(JB/JF)50	125	128	80	230.5		
ZP2-TF125H□(JB/JF)75	125	125 126	128	120	270.5	
ZP2-TF125H □(JB/JF)100			155	305.5		





- *1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600
- for "Rubber articles intended for repeated use"

 *2 Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).

Replacement Part No.

riepiacement i art ivo.			
Model	Pad unit part no.	Buffer assembly par	no.
ZP2-XF40H□(JB/JF)25		ZP2B-XF1(JB/JF)25	
ZP2-XF40H□(JB/JF)50	ZP40H□	ZP2B-XF1(JB/JF)50	
ZP2-XF40H□(JB/JF)75		ZP2B-XF1(JB/JF)75	With three
ZP2-XF50H□(JB/JF)25		ZP2B-XF1(JB/JF)25	M3 bolts
ZP2-XF50H□(JB/JF)50	ZP50H□	ZP2B-XF1(JB/JF)50	
ZP2-XF50H□(JB/JF)75		ZP2B-XF1(JB/JF)75	
ZP2-XF63H□(JB/JF)25		ZP2B-XF2(JB/JF)25	
ZP2-XF63H□(JB/JF)50	ZP63H□	ZP2B-XF2(JB/JF)50	
ZP2-XF63H□(JB/JF)75	2 ₽ 0 3 П 🗆	ZP2B-XF2(JB/JF)75	1
ZP2-XF63H□(JB/JF)100		ZP2B-XF2(JB/JF)100	With four
ZP2-XF80H□(JB/JF)25		ZP2B-XF2(JB/JF)25	M4 bolts
ZP2-XF80H□(JB/JF)50	ZP80H□	ZP2B-XF2(JB/JF)50	IVIT DOILS
ZP2-XF80H□(JB/JF)75	2 7 601 1	ZP2B-XF2(JB/JF)75	
ZP2-XF80H□(JB/JF)100		ZP2B-XF2(JB/JF)100	
ZP2-XF100H□(JB/JF)25		ZP2B-XF3(JB/JF)25	
ZP2-XF100H□(JB/JF)50	ZP100H□	ZP2B-XF3(JB/JF)50	
ZP2-XF100H□(JB/JF)75	ZF 10011L	ZP2B-XF3(JB/JF)75	
ZP2-XF100H□(JB/JF)100		ZP2B-XF3(JB/JF)100	With four
ZP2-XF125H□(JB/JF)25		ZP2B-XF3(JB/JF)25	M5 bolts
ZP2-XF125H□(JB/JF)50	ZP125H□	ZP2B-XF3(JB/JF)50]
ZP2-XF125H□(JB/JF)75	21 12311	ZP2B-XF3(JB/JF)75	
ZP2-XF125H□(JB/JF)100		ZP2B-XF3(JB/JF)100	

Note) \square Indicates the pad material.

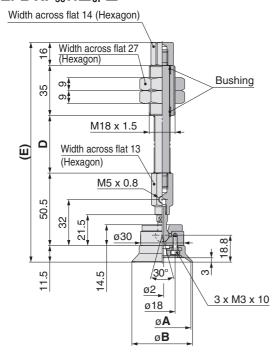
Buffer Specifications

Pad diameter		ø 40 , ø 50	ø 63 , ø 80 , ø 100 , ø 125	
Stroke (mm)		25, 50, 75 25, 50, 75, 100		
Spring reactive force	At 0 stroke (N)	6.9	10	
Spring reactive force	At buffer stroke (N)	11.8	15	
JB		Rotating With bushing Buffer body material: Brass		
Buffer enecifications		Tightening torque: 30 N·m ±5% Tightening torque: 45 N		
Buffer specifications JF		Rotating With bushing Buffer body material: Steel		
		Tightening torque: 50 N⋅m ±5%	Tightening torque: 75 N·m ±5%	



Dimensions: With Buffer

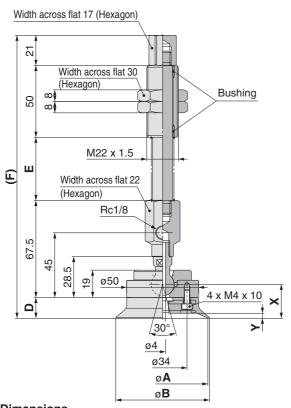
ZP2-XF⁴⁰H□児■



Dimensions

Model	Α	В	D	Е
ZP2-XF40H□(JB/JF)25			40	153
ZP2-XF40H□(JB/JF)50	40	42	75	188
ZP2-XF40H□(JB/JF)75			111	224
ZP2-XF50H□(JB/JF)25			40	153
ZP2-XF50H□(JB/JF)50	50	52	75	188
ZP2-XF50H□(JB/JF)75			111	224

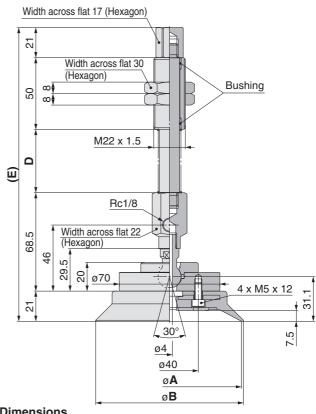
ZP2-XF88H□児■



Dimensions

Model	Α	В	D	Е	F	Х	Υ
ZP2-XF63H□(JB/JF)25				44	197		
ZP2-XF63H□(JB/JF)50	63	65	14.5	80	233	23.6	3.5
ZP2-XF63H□(JB/JF)75	63	65	14.5	120	273	23.0	3.5
ZP2-XF63H□(JB/JF)100				155	308		
ZP2-XF80H□(JB/JF)25				44	199		
ZP2-XF80H□(JB/JF)50	80	82	10.5	80	235	05.6	4.5
ZP2-XF80H□(JB/JF)75	80	82	16.5	120	275	25.6	4.5
ZP2-XF80H□(JB/JF)100				155	310		

ZP2-XF¹⁰⁰₁₂₅**H**□^{JB}_{JF}■



Model	Α	В	D	Е
ZP2-XF100H□(JB/JF)25			44	204.5
ZP2-XF100H□(JB/JF)50	100	103	80	240.5
ZP2-XF100H□(JB/JF)75	100	103	120	280.5
ZP2-XF100H□(JB/JF)100			155	315.5
ZP2-XF125H□(JB/JF)25			44	204.5
ZP2-XF125H□(JB/JF)50	125	128	80	240.5
ZP2-XF125H□(JB/JF)75	125	128	120	280.5
ZP2-XF125H□(JB/JF)100			155	315.5





High Rigidity Ball Joint Pad

Pad diameter Ø40, Ø50, Ø63, Ø80, Ø100, Ø125

HB: High rigidity (Bellows type)

■For the adsorption of workpieces with inclined or curved surfaces



· With sheet

Prevents the bellows part from sticking during press-and-hold applications and applications in which the workpiece is adsorbed for a long period of time, improving service life For sheet unit part numbers and dimensions, refer to page 342-1.

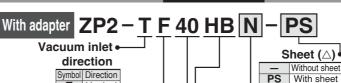


Replacement Part Nos.

Model	Pad unit part no.	Adapter asser	mbly part no.	
ZP2-TF40HB□	ZP40HB□	ZP2A-TF1	With three	
ZP2-TF50HB□	ZP50HB□	ZI ZA-11 1	M3 bolts	
ZP2-TF63HB□	ZP63HB□	ZP2A-TF2	With four	
ZP2-TF80HB□	ZP80HB□	ZF ZA-11 Z	M4 bolts	
ZP2-TF100HB□	ZP100HB□	ZP2A-TF3	With four	
ZP2-TF125HB□	ZP125HB□	ZF ZA-11 3	M5 bolts	

∗ □ in the table indicates the pad material

How to Order



Vertical Specification (mechanism)

Symbol Specification Ball joint Pad diameter

Symbol Pad diameter Pad form 4 5 6

40	ø40		rau ioiii
50	ø50	Symbol	Form
63	ø63	НВ	High rigidity
80	ø80	ПВ	(Bellows type)
100	ø100		
125	ø125	l	

Pad material (□)

Symbol	Material
N	NBR
S	Silicone rubber*1*2
U	Urethane rubber
F	FKM
Е	EPDM

Vacuum inlet direction Vertical

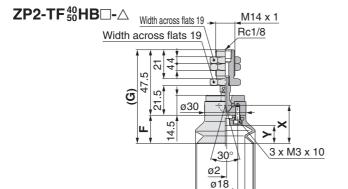
dip.c.

*1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rub-

ber articles intended for repeated use"
Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/ packaging" (D3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).

For pad unit dimensions with a sheet, refer to page 49.

Dimensions: With Adapter



Dimensions

Model	Α	В	D	Е	F	G	X	Υ
ZP2-TF40HB□	40	41.4	28.3	42.3	20.5	68	27.8	13
ZP2-TF50HB□	50	52	36.2	52.7	24	71.5	31.3	16.5

ZP2-TF100HB

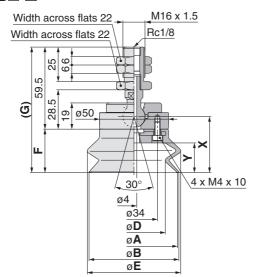
ZP2-TF125HB□

100 103

125

128.5

ZP2-TF ⁶³₈₀HB□-△



øD øΑ øΒ øΕ

Dimensions

Model	Α	В	D	Е	F	G	X	Υ
ZP2-TF63HB□	63	65.1	46	66.4	31.5	91	40.6	21.5
ZP2-TF80HB□	80	82.8	60.1	83.8	37	96.5	46.1	27.5

ZP2-TF¹⁰⁰₁₂₅HB□-△ Width across flats 22 M16 x 1.5 Width across flats 22 Rc1/8 60.5 4 x M5 x 12 ø70 29. 20 G 30° ø4 ø40 øD øΑ øΒ øΕ **Dimensions** Model

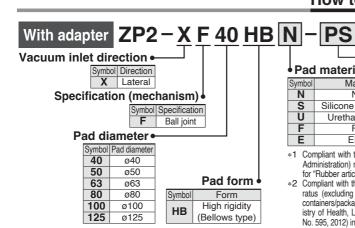
72.5 103.9

92.2 | 131.6 | 56

47.5 108 57.6

35.5





Sheet (△) Pad material (□) Without sheet With sheet Materia

N NBR Silicone rubber*1*2 <u>S</u> U Urethane rubber F FKM **EPDM**

Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles intended for repeated use" *2 Compliant with the standards for "Rubber appa-

ratus (excluding baby drinking apparatus) and containers/packaging" (D3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation_Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).



Vacuum inlet direction Lateral

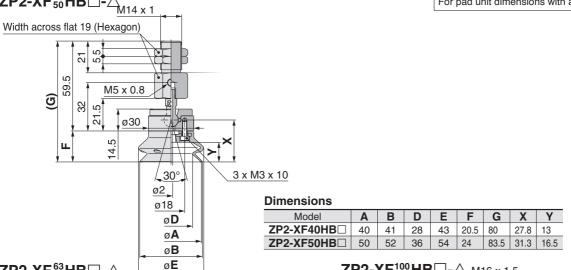
Replacement Part Nos.

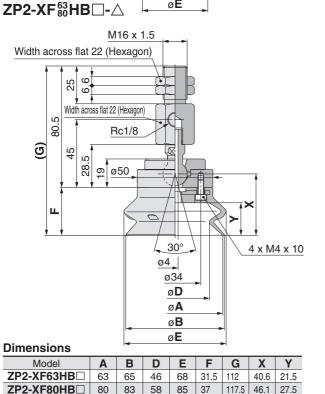
Model	Pad unit part no.	Adapter assembly part			
ZP2-XF40HB□	ZP40HB□	ZP2A-XF1	With three		
ZP2-XF50HB□	ZP50HB□	ZFZA-XI I	M3 bolts		
ZP2-XF63HB□	ZP63HB□	7P2A-XF2	With four		
ZP2-XF80HB□	ZP80HB□	ZFZA-AFZ	M4 bolts		
ZP2-XF100HB□	ZP100HB□	ZP2A-XF3	With four		
ZP2-XF125HB□	ZP125HB□	ZFZA-XI 3	M5 bolts		

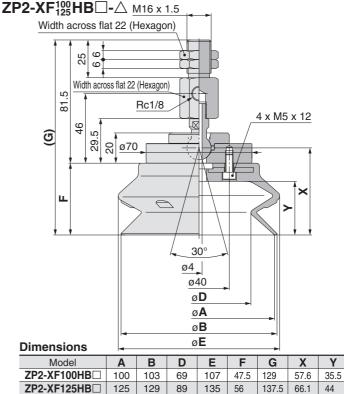
* \square in the table indicates the pad material

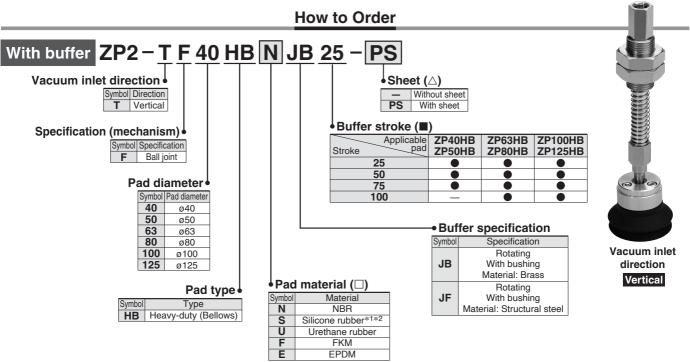
Dimensions: With Adapter











- Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600
- Compliant with the Tay Cosa Tood and Ding Administration) regulation 21ct High 77.2006 for "Rubber articles intended for repeated use"

 Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).

Replacement Part No.

neplacement Part No.					
Model	Pad unit part no.	Buffer assembly part	no.		
ZP2-TF40HB□(JB/JF)25		ZP2B-TF1(JB/JF)25			
ZP2-TF40HB□(JB/JF)50	ZP40HB□	ZP2B-TF1(JB/JF)50			
ZP2-TF40HB□(JB/JF)75		ZP2B-TF1(JB/JF)75	With three		
ZP2-TF50HB□(JB/JF)25		ZP2B-TF1(JB/JF)25	M3 bolts		
ZP2-TF50HB□(JB/JF)50	ZP50HB□	ZP2B-TF1(JB/JF)50			
ZP2-TF50HB□(JB/JF)75		ZP2B-TF1(JB/JF)75			
ZP2-TF63HB□(JB/JF)25		ZP2B-TF2(JB/JF)25			
ZP2-TF63HB□(JB/JF)50	ZP63HB□	ZP2B-TF2(JB/JF)50			
ZP2-TF63HB□(JB/JF)75		ZP2B-TF2(JB/JF)75			
ZP2-TF63HB□(JB/JF)100		ZP2B-TF2(JB/JF)100	With four		
ZP2-TF80HB□(JB/JF)25		ZP2B-TF2(JB/JF)25	M4 bolts		
ZP2-TF80HB□(JB/JF)50	ZP80HB□	ZP2B-TF2(JB/JF)50			
ZP2-TF80HB□(JB/JF)75	21 001 10	ZP2B-TF2(JB/JF)75]		
ZP2-TF80HB□(JB/JF)100		ZP2B-TF2(JB/JF)100			
ZP2-TF100HB□(JB/JF)25		ZP2B-TF3(JB/JF)25			
ZP2-TF100HB□(JB/JF)50	ZP100HB□	ZP2B-TF3(JB/JF)50]		
ZP2-TF100HB□(JB/JF)75	ZF 10011B	ZP2B-TF3(JB/JF)75]		
ZP2-TF100HB□(JB/JF)100		ZP2B-TF3(JB/JF)100	With four		
ZP2-TF125HB□(JB/JF)25		ZP2B-TF3(JB/JF)25	M5 bolts		
ZP2-TF125HB□(JB/JF)50	ZP125HB□	ZP2B-TF3(JB/JF)50]		
ZP2-TF125HB□(JB/JF)75	21 123110	ZP2B-TF3(JB/JF)75]		
ZP2-TF125HB□(JB/JF)100		ZP2B-TF3(JB/JF)100			

Note)

Indicates the pad material.

Buffer Specifications

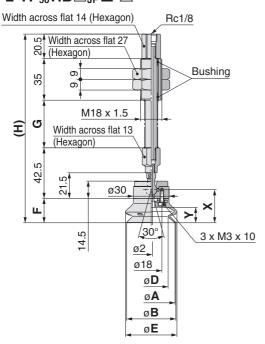
Pad diameter		ø 40 , ø 50	ø 63 , ø 80 , ø 100 , ø 125		
Stroke (mm)		25, 50, 75	25, 50, 75, 100		
Coring reactive force	At 0 stroke (N)	6.9	10		
Spring reactive force	At buffer stroke (N)	11.8	15		
	JB	With b Buffer body n	ating ushing naterial: Brass Tightening torque: 45 N⋅m ±5%		
Buffer specifications	JF	Rotating With bushing Buffer body material: Steel Tightening torque: 50 N·m ±5% Tightening torque: 75 N·			



Dimensions: With Buffer

ZP2-TF₅₀HB□JB■-△

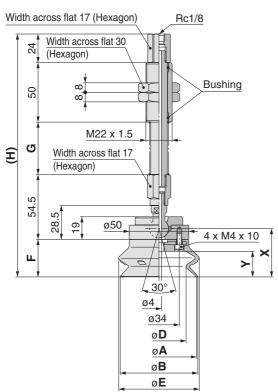
For pad unit dimensions with a sheet, refer to page 49.



Dimensions

Model	Α	В	D	Е	F	G	Н	Х	Υ
ZP2-TF40HB□(JB/JF)25						40	158.5		
ZP2-TF40HB□(JB/JF)50	40	42	28	43	20.5	75	193.5	27.8	13
ZP2-TF40HB□(JB/JF)75						111	229.5		
ZP2-TF50HB□(JB/JF)25						40	162		
ZP2-TF50HB□(JB/JF)50	50	52	36	54	24	75	197	31.3	16.5
ZP2-TF50HB□(JB/JF)75						111	233		

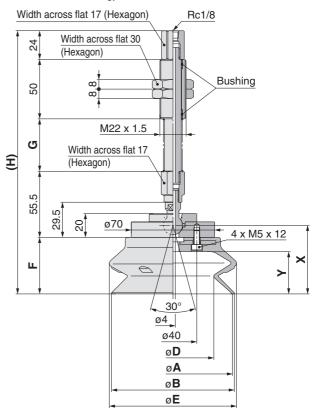
ZP2-TF₈₀HB□JF■-△



Dimensions

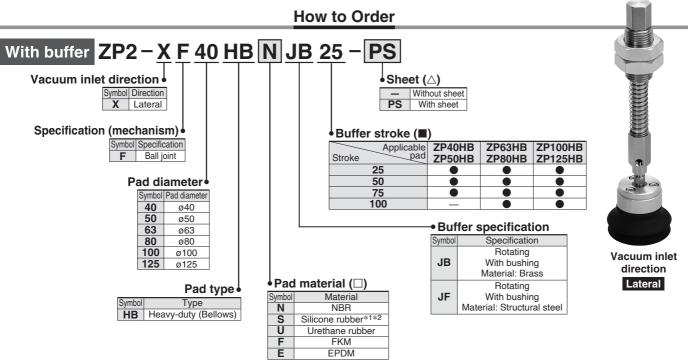
Model	Α	В	D	Е	F	G	Н	Х	Υ
ZP2-TF63HB□(JB/JF)25						44	204		
ZP2-TF63HB□(JB/JF)50	63	65	46	68	31.5	80	240	40.6	01.5
ZP2-TF63HB□(JB/JF)75	63	00	46	00	31.5	120	280	40.6	21.5
ZP2-TF63HB□(JB/JF)100						155	315		
ZP2-TF80HB□(JB/JF)25						44	209.5		
ZP2-TF80HB□(JB/JF)50	00	00	FO	O.F.	07	80	245.5	40.4	27.5
ZP2-TF80HB□(JB/JF)75	80	83	58	85	37	120	285.5	46.1	27.5
ZP2-TF80HB□(JB/JF)100						155	320.5		

ZP2-TF¹⁰⁰₁₂₅HB□¹/₃■-△



Model	Α	В	D	Е	F	G	Н	Х	Υ
ZP2-TF100HB□(JB/JF)25						44	221		
ZP2-TF100HB□(JB/JF)50	100	103	69	107	47.5	80	257	57.6	0F F
ZP2-TF100HB□(JB/JF)75	100	103	09	107	47.5	120	297	37.0	33.3
ZP2-TF100HB□(JB/JF)100						155	332		
ZP2-TF125HB□(JB/JF)25						44	229.5		
ZP2-TF125HB□(JB/JF)50	105	100	00	105	E.C.	80	265.5	66.1	4.4
ZP2-TF125HB□(JB/JF)75	125	129	89	135	56	120	305.5	00.1	44
ZP2-TF125HB□(JB/JF)100						155	340.5		





- Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600
- **Todipliant with the PDA (OSA Food and Drug Administration) regulation 2 TCFN§177.2600 for "Rubber articles intended for repeated use"
 *2 Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).

Replacement Part No.

neplacement Part No.					
Model	Pad unit part no.	Buffer assembly part	no.		
ZP2-XF40HB□(JB/JF)25		ZP2B-XF1(JB/JF)25			
ZP2-XF40HB□(JB/JF)50	ZP40HB□	ZP2B-XF1(JB/JF)50			
ZP2-XF40HB□(JB/JF)75		ZP2B-XF1(JB/JF)75	With three		
ZP2-XF50HB□(JB/JF)25		ZP2B-XF1(JB/JF)25	M3 bolts		
ZP2-XF50HB□(JB/JF)50	ZP50HB□	ZP2B-XF1(JB/JF)50			
ZP2-XF50HB□(JB/JF)75		ZP2B-XF1(JB/JF)75			
ZP2-XF63HB□(JB/JF)25		ZP2B-XF2(JB/JF)25			
ZP2-XF63HB□(JB/JF)50	ZP63HB□	ZP2B-XF2(JB/JF)50			
ZP2-XF63HB□(JB/JF)75	ZF0311D	ZP2B-XF2(JB/JF)75			
ZP2-XF63HB□(JB/JF)100		ZP2B-XF2(JB/JF)100	With four		
ZP2-XF80HB□(JB/JF)25		ZP2B-XF2(JB/JF)25	M4 bolts		
ZP2-XF80HB□(JB/JF)50	ZP80HB□	ZP2B-XF2(JB/JF)50			
ZP2-XF80HB□(JB/JF)75	ZFOULD	ZP2B-XF2(JB/JF)75			
ZP2-XF80HB□(JB/JF)100		ZP2B-XF2(JB/JF)100			
ZP2-XF100HB□(JB/JF)25		ZP2B-XF3(JB/JF)25			
ZP2-XF100HB□(JB/JF)50	ZP100HB□	ZP2B-XF3(JB/JF)50			
ZP2-XF100HB□(JB/JF)75	ZF 10011BL	ZP2B-XF3(JB/JF)75			
ZP2-XF100HB□(JB/JF)100		ZP2B-XF3(JB/JF)100	With four		
ZP2-XF125HB□(JB/JF)25		ZP2B-XF3(JB/JF)25	M5 bolts		
ZP2-XF125HB□(JB/JF)50	ZP125HB□	ZP2B-XF3(JB/JF)50]		
ZP2-XF125HB□(JB/JF)75	ZP 125HB	ZP2B-XF3(JB/JF)75			
ZP2-XF125HB□(JB/JF)100		ZP2B-XF3(JB/JF)100			

Note)

Indicates the pad material.

Buffer Specifications

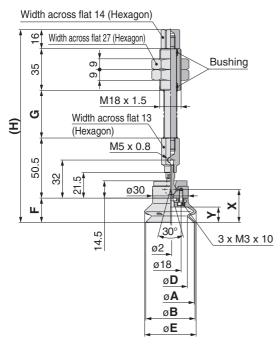
Pad dia	ameter	ø 40 , ø 50	ø 63 , ø 80 , ø 100 , ø 125			
Stroke (mm)		25, 50, 75	25, 50, 75, 100			
Spring reactive force	At 0 stroke (N)	6.9	10			
Spring reactive force	At buffer stroke (N)	11.8	15			
	JB	Rotating With bushing Buffer body material: Brass				
Puffor encoifications		Tightening torque: 30 N⋅m ±5%	Tightening torque: 45 N⋅m ±5%			
Buffer specifications	JF	Rotating With bushing Buffer body material: Steel				
		Tightening torque: 50 N⋅m ±5%	Tightening torque: 75 N·m ±5%			



Dimensions: With Buffer

ZP2-XF⁴⁰HB□J^B■-△

For pad unit dimensions with a sheet, refer to page 49.

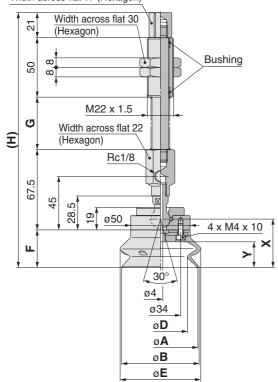


Dimensions

Model	Α	В	D	Е	F	G	Н	Х	Υ
ZP2-XF40HB□(JB/JF)25						40	162		
ZP2-XF40HB□(JB/JF)50	40	42	28	43	20.5	75	197	27.8	13
ZP2-XF40HB□(JB/JF)75						111	233		
ZP2-XF50HB□(JB/JF)25						40	165.5		
ZP2-XF50HB□(JB/JF)50	50	52	36	54	24	75	200.5	31.3	16.5
ZP2-XF50HB□(JB/JF)75						111	236.5		

ZP2-XF₈₀HB□児■-△

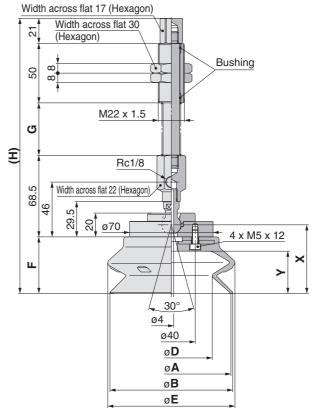




Dimensions

Model	Α	В	D	Е	F	G	Н	Х	Υ
ZP2-XF63HB□(JB/JF)25						44	214		
ZP2-XF63HB□(JB/JF)50	63	65	46	68	31.5	80	250	40.6	01.5
ZP2-XF63HB□(JB/JF)75	63	00	46	00	31.5	120	290	40.6	21.5
ZP2-XF63HB□(JB/JF)100						155	325		
ZP2-XF80HB□(JB/JF)25						44	219.5		
ZP2-XF80HB□(JB/JF)50	00	00	FO	O.F.	27	80	255.5	46.1	07.5
ZP2-XF80HB□(JB/JF)75	80	83	58	85	37	120	295.5	40.1	27.5
ZP2-XF80HB□(JB/JF)100						155	330.5		

ZP2-XF100HB□JB■-△



Model	Α	В	D	Е	F	G	Н	Х	Υ
ZP2-XF100HB□(JB/JF)25						44	231		
ZP2-XF100HB□(JB/JF)50	100	103	69	107	47.5	80	267	57.6	05.5
ZP2-XF100HB□(JB/JF)75	100	103	09	107	47.5	120	307	57.0	33.3
ZP2-XF100HB□(JB/JF)100						155	342		
ZP2-XF125HB□(JB/JF)25						44	239.5		
ZP2-XF125HB□(JB/JF)50	105	100	00	105	EC	80	275.5	66.1	4.4
ZP2-XF125HB□(JB/JF)75	125	129	89	135	56	120	315.5	00.1	44
ZP2-XF125HB□(JB/JF)100						155	350.5		





Heavy-duty Pad

Pad diameter Ø40, Ø50, Ø63, Ø80, Ø100, Ø125

Symbol/Type

H: Heavy-duty (Flat with rib) **HB: Heavy-duty**

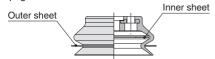
(Bellows)

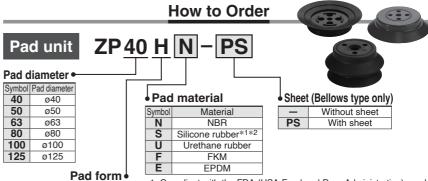
■ Reinforced pad prevents deformation when transferring heavy or large workpieces.

· With sheet

Prevents the bellows part from sticking during pressand-hold applications and applications in which the workpiece is adsorbed for a long period of time, improving service life

For sheet unit part numbers and dimensions, refer to page 342-1.



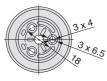


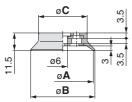
Form
High rigidity
(Flat type with ribs)
High rigidity
(Bellows type)

Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles intended for repeated use" Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D 3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additions of the Standards of the Standar tives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).

Dimensions: Pad Unit * For the bellows type pads, the dimensions with a sheet are shown.



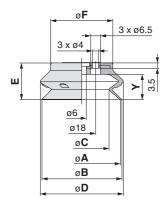




Dimensions

Model	Α	В	С
ZP40H□	40	42	32
ZP50H□	50	52	42

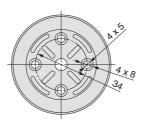
ZP⁴⁰₅₀HB□-PS

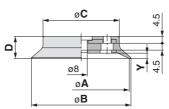


Dimensions

							G	
ZP40HB□-PS	40	41.4	28.3	42.3	20.5	30	44.7	13
ZP50HB□-PS	50	52	36.2	52.7	24	40.5	56.9	16.5

ZP⁶³₈₀H□

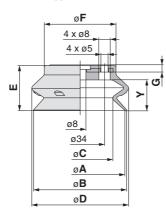




Dimensions

Model	Α	В	С	D	Υ
ZP63H□	63	65	50	14.5	3.5
ZP80H□	80	82	61	16.5	4.5

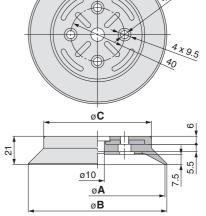
ZP⁶³₈₀ HB□-PS



Dimensions

Model	Α	В	С	D	Е	F	G	Н	Υ
ZP63HB□-PS									
ZP80HB□-PS	80	82.8	60.1	83.8	37	64	5	91.7	27.5

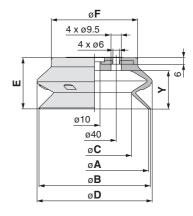
ZP¹⁰⁰₁₂₅ H□



Dimensions

Model	Α	В	С		
ZP100H□	100	103	80		
7P125H□	125	128	104		

ZP¹⁰⁰₁₂₅HB□-PS



Model	Α	В	С	D	Е	F	G	Υ
ZP100HB□-PS	100	103	72.5	103.9	47.5	80	111.7	35.5
ZP125HB□-PS	125	128.5	92.2	131.6	56	105	138.5	44



Vacuum inlet direction Vertical

How to Order

With adapter ZPT40 H N-A14-PS

Pad diameter

Symbol	Pad diameter
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

Pad type (*)

Symbol	Туре
Н	Heavy-duty (Flat with rib)
HB	Heavy-duty (Bellows)

Pad material (□) •

Symbol	Material			
N	NBR			
S	Silicone rubber			
U	Urethane rubber			
F	FKM			
E	EPR			

Sheet (△) (Bellows type only) Without sheet

	PS	With sheet
Mounting	thre	ad size

(Various in lat)			Symbol	Thread	Pad diameter		
(Vacuum inlet)			Symbol	size	ø 40 , ø 50	ø 63 , ø 80	ø100, ø125
	Male thread M14 x 1 M16 x 1.5	A14	Rc1/8		_	_	
		M14 x 1	A14N	NPT1/8		_	_
			A14T	NPTF1/8		_	_
			A16	Rc1/8	_		
Mounting		A16N	NPT1/8	_			
wounting			A16T	NPTF1/8	_		
			B8	M8 x 1.25			_
		o throad	B10	M10 x 1.5			_
	i emale imeau		B12	M12 x 1.75	_		
			B16	M16 x 1.5	_		

Replacement Part No.

Model	Pad unit part no.	Adapter assemb	oly part no.	
ZPT40 *□-A14		ZPA-T1-B01		
ZPT40∗□-A14N	ZP40*□	ZPA-T1-N01		
ZPT40∗□-A14T		ZPA-T1-T01	With three	
ZPT50*□-A14		ZPA-T1-B01	M3 bolts	
ZPT50∗□-A14N	ZP50*□	ZPA-T1-N01		
ZPT50∗□-A14T		ZPA-T1-T01		
ZPT63*□-A16		ZPA-T2-B01		
ZPT63∗□-A16N	ZP63*□	ZPA-T2-N01		
ZPT63∗□-A16T		ZPA-T2-T01	With four	
ZPT80*□-A16		ZPA-T2-B01	M4 bolts	
ZPT80∗□-A16N	ZP80*□	ZPA-T2-N01]	
ZPT80∗□-A16T		ZPA-T2-T01		
ZPT100*□-A16		ZPA-T3-B01		
ZPT100 ∗□-A16N	ZP100*□	ZPA-T3-N01		
ZPT100 *□-A16T		ZPA-T3-T01	With four	
ZPT125*□-A16		ZPA-T3-B01	M5 bolts	
ZPT125 ∗□-A16N	ZP125*□	ZPA-T3-N01		
ZPT125 *□-A16T		ZPA-T3-T01		

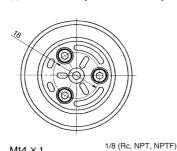
	Model	Pad unit part no.	Adapter assemb	oly part no.
	ZPT40∗□-B8	ZP40∗□	ZPA-T1-B8	
	ZPT40*□-B10	ZP40*	ZPA-T1-B10	With three
∍ [ZPT50∗□-B8	ZP50∗□	ZPA-T1-B8	M3 bolts
;	ZPT50*□-B10	ZF3U*	ZPA-T1-B10	
	ZPT63∗□-B8	ZP63∗□	ZPA-T2-B8	
	ZPT63*□-B10		ZPA-T2-B10	With four M4 bolts
	ZPT63*□-B12		ZPA-T2-B12	
	ZPT63*□-B16		ZPA-T2-B16	
r	ZPT80∗□-B8		ZPA-T2-B8	
;	ZPT80*□-B10	ZP80∗□	ZPA-T2-B10	
	ZPT80*□-B12	ZF0U*	ZPA-T2-B12	
	ZPT80*□-B16	1	ZPA-T2-B16	
	ZPT100∗□-B12	ZP100∗□	ZPA-T3-B12	
	ZPT100∗□-B16	ZF 100本口	ZPA-T3-B16	With four
r	ZPT125*□-B12	ZP125∗□	ZPA-T3-B12	M5 bolts
;	ZPT125*□-B16		ZPA-T3-B16	

Note 1) * Indicates the pad type. Note 2) \square Indicates the pad material.

Dimensions: With Adapter

For pad unit dimensions with a sheet, refer to page 49.

ZPT ⁴⁰₅₀H □-A14 (Male thread)



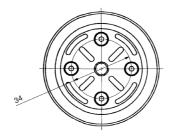
22 Width across flat 19 (Hexagon) 3 x M3 x 8 ø3

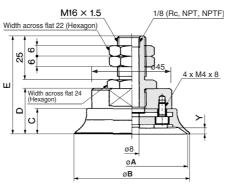
Dimensions

Model	Α	В
ZPT40H□-A14	40	42
ZPT50H□-A14	50	52

 $M14 \times 1$

ZPT⁶³₈₀H□-A16 (Male thread)

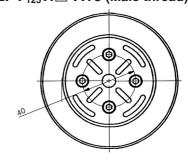


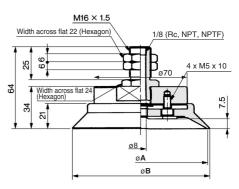


Dimensions

Model	Α	В	С	D	Е	Υ
ZPT63H□-A16	63	65	14.5	26	56	3.5
ZPT80H□-A16	80	82	16.5	28	58	4.5

ZPT¹⁰⁰₁₂₅ **H**□-**A**16 (Male thread)





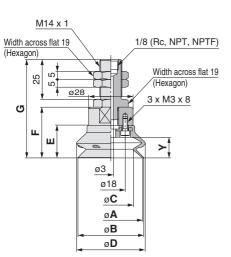
Model	Α	В
ZPT100H□-A16	100	103
ZPT125H □- A 16	125	128

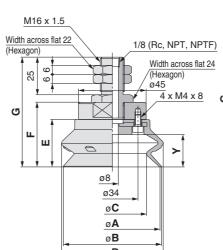


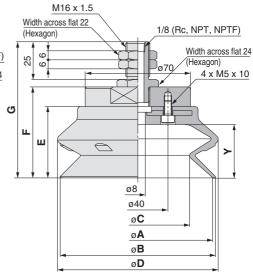
Dimensions: With Adapter

For pad unit dimensions with a sheet, refer to page 49.

ZPT $_{50}^{40}$ HB \square -A14- \triangle (Male thread) ZPT $_{80}^{63}$ HB \square -A16- \triangle (Male thread) ZPT $_{125}^{100}$ HB \square -A16- \triangle (Male thread)







Dimensions

Model	Α	В	С	D
ZPT40HB□-A14	40	41	28	43
ZPT50HB□-A14	50	52	36	54
Model	Е	F	G	Υ
Model ZPT40HB□-A14	E 20.5	F 32	G	Y

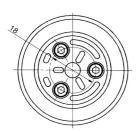
Dimensions

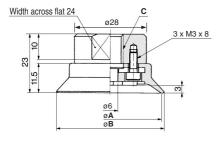
Model	Α	В	С	D
ZPT63HB□-A16	63	65	46	68
ZPT80HB□-A16	80	83	58	85
Model	Е	F	G	Υ
Model ZPT63HB□-A16		F 43	G 73	Y 21.5

Dimensions

Model	Α	В	С	D
ZPT100HB□-A16	100	103	69	107
ZPT125HB□-A16	125	129	89	135
Model	E	F	G	Υ
Model ZPT100HB□-A16	E 47.5	F 60.5	G 90.5	Y 35.5

ZPT⁴⁰₅₀**H**□-**B** (Female thread)

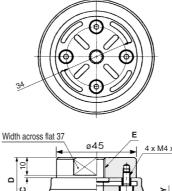


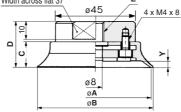


Dimensions

Model	Α	В	С
ZPT40H□-B8	40	42	M8 x 1.25
ZPT40H□-B10	40	42	M10 x 1.5
ZPT50H□-B8	50	52	M8 x 1.25
ZPT50H□-B10	50	52	M10 x 1.5

ZPT⁶³₈₀H□-B (Female thread)





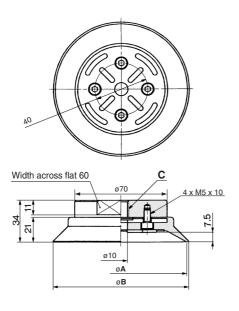
Model	Α	В	С	D	E	Υ
ZPT63H□-B8	63	65	14.5	26	M8 x 1.25	3.5
ZPT63H□-B10	63	65	14.5	26	M10 x 1.5	3.5
ZPT63H□-B12	63	65	14.5	26	M12 x 1.75	3.5
ZPT63H□-B16	63	65	14.5	26	M16 x 1.5	3.5
ZPT80H□-B8	80	82	16.5	28	M8 x 1.25	4.5
ZPT80H□-B10	80	82	16.5	28	M10 x 1.5	4.5
ZPT80H□-B12	80	82	16.5	28	M12 x 1.75	4.5
ZPT80H□-B16	80	82	16.5	28	M16 x 1.5	4.5



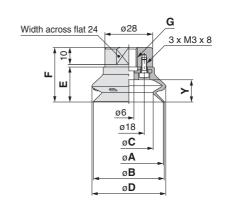
Dimensions: With Adapter

For pad unit dimensions with a sheet, refer to page 49.

ZPT¹⁰⁰₁₂₅H□-B (Female thread)



$\mathsf{ZPT}_{50}^{40}\mathsf{HB}\Box\mathsf{-B}\Box\mathsf{-}\triangle$ (Female thread)



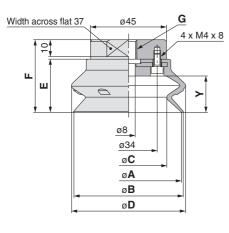
Dimensions

Model	Α	В	С
ZPT100H□-B12	100	103	M12 x 1.75
ZPT100H□-B16	100	103	M16 x 1.5
ZPT125H□-B12	125	128	M12 x 1.75
ZPT125H□-B16	125	128	M16 x 1.5

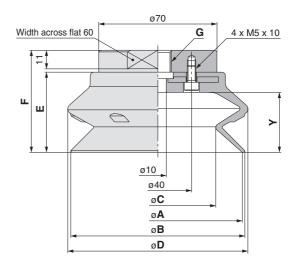
Dimensions

Model	Α	В	С	D	E	F	G	Υ
ZPT40HB□-B8	40	41	28	43	20.5	20	M8 x 1.25	13
ZPT40HB□-B10	40	41	20	43	20.5	32	M10 x 1.5	13
ZPT50HB□-B8	50	52	36	54	24	35.5	M8 x 1.25	16.5
ZPT50HB□-B10	30	52	30	34	24	35.5	M10 x 1.5	10.5

ZPT⁶³₈₀HB□-B□-△ (Female thread)



$\mathsf{ZPT}^{100}_{125}\mathsf{HB}\square$ -B \square - \triangle (Female thread)



Dimensions

Model	Α	В	С	D	Е	F	G	Υ
ZPT63HB□-B8							M8 x 1.25	
ZPT63HB□-B10		65	65 46	68	31.5	40	M10 x 1.5	21.5
ZPT63HB□-B12	63	00	40	00	31.5	43	M12 x 1.75	21.5
ZPT63HB□-B16							M16 x 1.5]
ZPT80HB□-B8							M8 x 1.25	
ZPT80HB□-B10	80	83	E0	85	37	48.5	M10 x 1.5	27.5
ZPT80HB□-B12	00	03	58	05	3/	46.5	M12 x 1.75	27.5
ZPT80HB□-B16							M16 x 1.5	

Model	Α	В	С	D	Е	F	G	Υ
ZPT100HB□-B12	100	103	69	107	17.5	60.5	M12 x 1.75	35.5
ZPT100HB□-B16	100	103	09	107	47.5	60.5	M16 x 1.5	35.5
ZPT125HB□-B12	125	129	89	135	56	69	M12 x 1.75	44
ZPT125HB□-B16	123	129	09	133	30	09	M16 x 1.5	44





Without buffer ZPX 40 H N - B01 - B8 - PS

Pad diameter

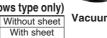
Symbol	Pad diameter
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

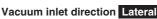
	ad type (∗) •
Symbol	Type
Н	Heavy-duty (Flat with rib)
НВ	Heavy-duty (Bellows)

Vacuum inlet thread size

Symbol	Thread size
B01	Rc1/8
N01	NPT1/8
T01	NPTF1/8







Mounting thread size

Cumbal	Thread size		Pad diamete	r
Syllibol	Tilleau Size	ø 40 , ø 50	ø 63, ø 80	ø100 , ø125
B8	M8 x 1.25			
B10	M10 x 1.5			
B12	M12 x 1.75	_		

Pad material (□) •

Symbol	Material
N	NBR
S	Silicone rubber*1*2
U	Urethane rubber
F	FKM
E	EPDM

- *1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles intended for repeated use"
- *2 Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D 3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370. 1959).

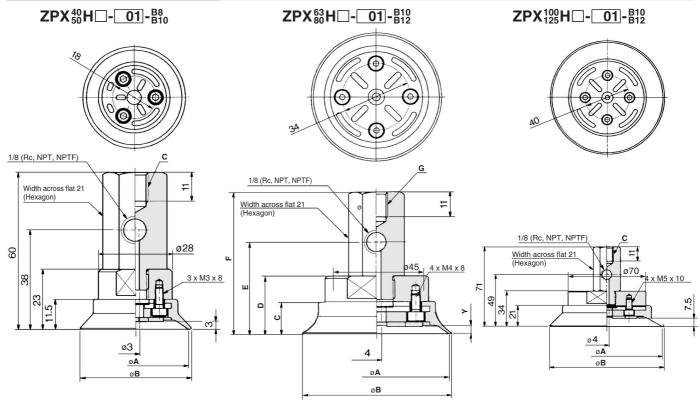
Replacement Part No.

Model	Pad unit part no.	Adapter assembly	part no.	Model	Pad unit part no.	Adapter assembly	part no.
ZPX40∗□-B01-B8		ZPA-X1-B01-B8		ZPX80∗□-B01-B10		ZPA-X2-B01-B10	
ZPX40*□-N01-B8		ZPA-X1-N01-B8		ZPX80*□-N01-B10		ZPA-X2-N01-B10	
ZPX40*□-T01-B8	ZP40∗□	ZPA-X1-T01-B8	With three	ZPX80*□-T01-B10	ZP80∗□	ZPA-X2-T01-B10	With four
ZPX40∗□-B01-B10	21 40%	ZPA-X1-B01-B10	M3 bolts	ZPX80∗□-B01-B12	21 00 4 🗆	ZPA-X2-B01-B12	M4 bolts
ZPX40*□-N01-B10		ZPA-X1-N01-B10		ZPX80*□-N01-B12		ZPA-X2-N01-B12	
ZPX40*□-T01-B10		ZPA-X1-T01-B10		ZPX80*□-T01-B12		ZPA-X2-T01-B12	
ZPX50∗□-B01-B8		ZPA-X1-B01-B8		ZPX100∗□-B01-B10		ZPA-X3-B01-B10	With four
ZPX50*□-N01-B8		ZPA-X1-N01-B8		ZPX100*□-N01-B10	-	ZPA-X3-N01-B10	
ZPX50*□-T01-B8	ZP50∗□	ZPA-X1-T01-B8	With three M3 bolts	ZPX100*□-T01-B10		ZPA-X3-T01-B10	
ZPX50∗□-B01-B10	21 30 %	ZPA-X1-B01-B10		21 100%	ZPA-X3-B01-B12	M5 bolts	
ZPX50*□-N01-B10		ZPA-X1-N01-B10		ZPX100 *□-N01-B12		ZPA-X3-N01-B12	-
ZPX50*□-T01-B10		ZPA-X1-T01-B10		ZPX100*□-T01-B12		ZPA-X3-T01-B12	
ZPX63*□-B01-B10		ZPA-X2-B01-B10		ZPX125*□-B01-B10		ZPA-X3-B01-B10	
ZPX63*□-N01-B10		ZPA-X2-N01-B10		ZPX125*□-N01-B10		ZPA-X3-N01-B10	
ZPX63*□-T01-B10	ZP63∗□	ZPA-X2-T01-B10	With four	ZPX125*□-T01-B10	ZP125∗□	ZPA-X3-T01-B10	With four
ZPX63*□-B01-B12		ZPA-X2-B01-B12	M4 bolts	ZPX125 *□-B01-B12	21 123*	ZPA-X3-B01-B12	M5 bolts
ZPX63*□-N01-B12		ZPA-X2-N01-B12]	ZPX125*□-N01-B12		ZPA-X3-N01-B12	
ZPX63*□-T01-B12		ZPA-X2-T01-B12		ZPX125*□-T01-B12		ZPA-X3-T01-B12	

Note 1) * Indicates the pad type. Note 2) \square Indicates the pad material.

Dimensions: Without Buffer

For pad unit dimensions with a sheet, refer to page 49.



Dimensions

Difficitions			
Model	Α	В	С
ZPX40H□01-B8	40	42	M8 x 1.25
ZPX40H□01-B10	40	42	M10 x 1.5
ZPX50H□01-B8	50	52	M8 x 1.25
ZPX50H□01-B10	50	52	M10 x 1.5

Dimensions

Model	Α	В	С	D	Е	F	Υ	G
ZPX63H□01-B10	63	65	14.5	26	41	63	3.5	M10 x 1.5
ZPX63H 01-B12	63	65	14.5	26	41	63	3.5	M12 x 1.75
ZPX80H - 01-B10	80	82	16.5	28	43	65	4.5	M10 x 1.5
ZPX80H - 01-B12	80	82	16.5	28	43	65	4.5	M12 x 1.75

Model	Α	В	C
ZPX100H - 01-B10	100	103	M10 x 1.5
ZPX100H 01-B12	100	103	M12 x 1.75
ZPX125H□01-B10	125	128	M10 x 1.5
ZPX125H - 01-B12	125	128	M12 x 1.75



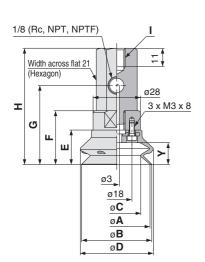
Dimensions: Without Buffer

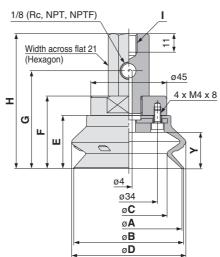
For pad unit dimensions with a sheet, refer to page 49.

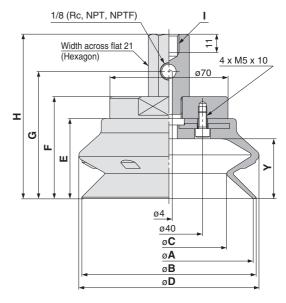
ZPX⁴⁰₅₀HB□-**01**-^{B8}_{B10}-△

$\mathsf{ZPX}^{63}_{80}\mathsf{HB}\Box\text{-}\boxed{01}\text{-}^{\mathsf{B}10}_{\mathsf{B}12}\text{-}\triangle$

$\mathsf{ZPX}^{100}_{125}\mathsf{HB}\Box\text{--}\!\!\!\Box\text{--}\!\!\!\Box\text{--}\!\!\!\Box\text{--}\!\!\!\Box$







Dimensions

Model	Α	В	С	D	Е	F
ZPX40HB 01-B8 ZPX40HB 01-B10	40	41	28	43	20.5	32
ZPX50HB - 01-B8 ZPX50HB - 01-B10	50	52	36	54	24	35.5

Model	G	Н	I	Υ
ZPX40HB - 01-B8	47	69	M8 x 1.25	10
ZPX40HB 01-B10	4/	69	M10 x 1.5	13
ZPX50HB□- 01-B8	50.5	72 5	M8 x 1.25	16.5
ZPX50HB - 01-B10	50.5	12.5	M10 x 1.5	10.5

Dimensions

Model	Α	В	С	D	Е	F
ZPX63HB□01-B10	63	65	46	60	31.5	43
ZPX63HB□- 01-B12	03	05	40	00	31.3	40
ZPX80HB 01-B10	80	83	58	85	27	48.5
ZPX80HB 01-B12	80	83	58	83	3/	48.5

Model	G	Н	I	Υ	
ZPX63HB□01-B10	58	80	M10 x 1.5	01.5	
ZPX63HB 01-B12	20	80	M12 x 1.75	21.5	
ZPX80HB□- 01-B10	63.5	85.5	M10 x 1.5	27.5	
ZPX80HB□- 01-B12	03.5	85.5	M12 x 1.75	27.5	

Model	Α	В	С	D	E	F
ZPX100HB - 01-B10 ZPX100HB - 01-B12	100	102	60	107	47 E	60 E
ZPX100HB□01-B12	100	103	09	107	47.5	00.5
ZPX125HB - 01-B10 ZPX125HB - 01-B12	105	100	00	105	EC.	69
ZPX125HB □- 01-B12	125	129	89	133	00	09

Model	G	Н	- 1	Υ
ZPX100HB□- 01-B10	75.5	07.5	M10 x 1.5	25.5
ZPX100HB 01-B12	75.5	97.5	M12 x 1.75	35.5
ZPX125HB□- <u>01</u> -B10	84	106	M10 x 1.5	44
ZPX125HB□- 01-B12	04	100	M12 x 1.75	44

How to Order

With buffer ZPT 40 H N J 25 - B01 - A18 - PS

 Buffer body material (★) Material

Aluminum alloy

Brass + With bushing Structural steel +

Pad diameter • Symbol Pad diameter
40 Ø40 50 63 ø50 ø63 80 ø80

ø100

ø125

100

125

Pad form (*) Symbo Form High rigidity (Flat type with ribs) High rigidity (Bellows type) HB

Vacuum inlet thread size

• till caa size								
Symbol	Thread size							
B01	Rc1/8							
N01	NPT1/8							
T01	NPTF1/8							

Sheet (△) (Bellows type only)

v	Vithout sheet
PS	With sheet



→ Buffer stroke (■	١

		<u>_/</u>				
Stroke	ø 40	ø 50	ø 63	ø 80	ø 100	ø 125
25	•		•	•	•	•
50						
75						•
100	_	_	_	_	•	•

Mounting thread size

Symbol	Thread size
A18	M18 x 1.5 (ø40 to ø80)
A22	M22 x 1.5 (ø100, ø125)

Pad material (□) •

Symbol	Material				
N	NBR				
S	Silicone rubber*1*2				
U	Urethane rubber				
F	FKM				
Е	EPDM				

JF With bushing

Symbo

JB

*1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles intended for repeated use"

*2 Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D 3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).

Buffer Specifications (Rotating)

F	Pad diameter	ø40 to ø80	ø100, ø125	
Stroke [m	ım]	25, 50, 75	25, 50, 75, 100	
Spring reactive	At 0 stroke	6.9	10	
force [N]	At full stroke	11.8	15	

Nut Tightening Torque

nar riginening	rorque		[IN·M]
Buffer body Mounting material thread size		Brass + With bushing	Structural steel + With bushing
M18 x 1.5	9.5 to 10.5	28 to 32	48 to 52
M22 x 1.5	9.5 to 10.5	45 to 50	75 to 80

Replacement Part Nos.

Model	Pad unit part no.	Buffer assembly part	no.	
ZPT40∗□★25-(B/N/T)01-A18		ZPB-T1★25-(B/N/T)01		
ZPT40∗□★50-(B/N/T)01-A18	ZP40∗□	ZPB-T1★50-(B/N/T)01		
ZPT40∗□★75-(B/N/T)01-A18		ZPB-T1 ★75-(B/N/T)01	With three M3 bolts	
ZPT50∗□★25-(B/N/T)01-A18		ZPB-T1★25-(B/N/T)01		
ZPT50∗□★50-(B/N/T)01-A18	ZP50∗□	ZPB-T1★50-(B/N/T)01		
ZPT50∗□★75-(B/N/T)01-A18		ZPB-T1 ★75-(B/N/T)01		
ZPT63∗□★25-(B/N/T)01-A18		ZPB-T2★25-(B/N/T)01		
ZPT63∗□★50-(B/N/T)01-A18	ZP63∗□	ZPB-T2★50-(B/N/T)01	With four	
ZPT63∗□★75-(B/N/T)01-A18		ZPB-T2★75-(B/N/T)01		
ZPT80∗□★25-(B/N/T)01-A18		ZPB-T2★25-(B/N/T)01	M4 bolts	
ZPT80∗□★50-(B/N/T)01-A18	ZP80∗□	ZPB-T2★50-(B/N/T)01		
ZPT80∗□★75-(B/N/T)01-A18		ZPB-T2★75-(B/N/T)01		
ZPT100∗□★25-(B/N/T)01-A22		ZPB-T3★25-(B/N/T)01		
ZPT100∗□★50-(B/N/T)01-A22	ZP100∗□	ZPB-T3★50-(B/N/T)01		
ZPT100∗□★75-(B/N/T)01-A22	ZF 100*	ZPB-T3★75-(B/N/T)01		
ZPT100∗□★100-(B/N/T)01-A22		ZPB-T3★100-(B/N/T)01	With four	
ZPT125∗□★25-(B/N/T)01-A22		ZPB-T3★25-(B/N/T)01	M5 bolts	
ZPT125∗□★50-(B/N/T)01-A22	ZP125∗□	ZPB-T3★50-(B/N/T)01		
ZPT125∗□★75-(B/N/T)01-A22	ZF 125*	ZPB-T3★75-(B/N/T)01		
ZPT125∗□★100-(B/N/T)01-A22		ZPB-T3★100-(B/N/T)01		

- * * in the table indicates the pad form
- $\ast \;\; \square$ in the table indicates the pad material
- * * in the table indicates the buffer body material

For pad unit dimensions with a sheet, refer to page 49.

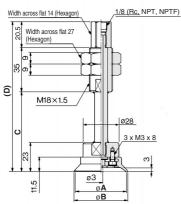
Dimensions: With Buffer

ZPT⁴⁰₅₀H□★■- 01-A18





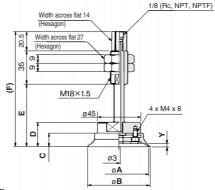




Dimensions

Model	Α	В	С	D
ZPT40H□★2501-A18	40	42	63	118.5
ZPT40H□★5001-A18	40	42	98	153.5
ZPT40H□★75-01-A18	40	42	134	189.5
ZPT50H□★25-01-A18	50	52	63	118.5
ZPT50H□★5001-A18	50	52	98	153.5
ZPT50H□★75- 01-A18	50	52	134	189.5

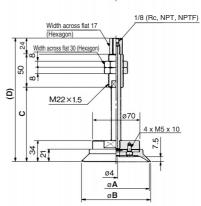




Dim

Model	Α	В	С	D	Е	F	Υ
ZPT63H□★2501-A18	63	65	14.5	26	66	121.5	3.5
ZPT63H□★50-01-A18	63	65	14.5	26	101	156.5	3.5
ZPT63H□★7501-A18	63	65	14.5	26	137	192.5	3.5
ZPT80H□★25-01-A18	80	83	16.5	28	68	123.5	4.5
ZPT80H□★5001-A18	80	83	16.5	28	103	158.5	4.5
ZPT80H□★7501-A18	80	83	16.5	28	139	194.5	4.5





iviouei	Α	В	C	D
ZPT100H□★2501-A22	100	103	78	152
ZPT100H□★5001-A22	100	103	114	188
ZPT100H□★75-01-A22	100	103	154	228
ZPT100H□★100-01-A22	100	103	189	263
ZPT125H□★2501-A22	125	128	78	152
ZPT125H□★5001-A22	125	128	114	188
ZPT125H□★75-01-A22	125	128	154	228
ZPT125H ★100- 01-A22	125	128	189	263



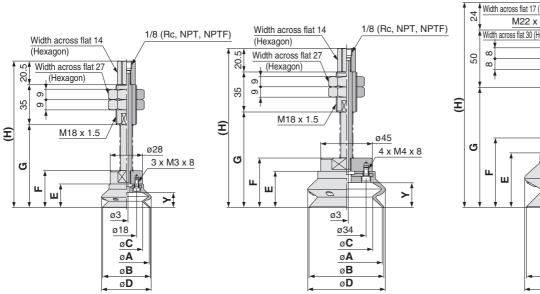
Dimensions: With Buffer

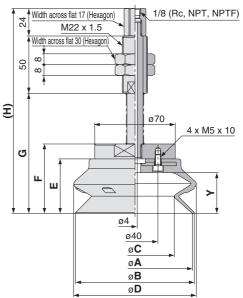
For pad unit dimensions with a sheet, refer to page 49.

ZPT⁴⁰HB□★■- 01-A18-△

ZPT⁶³₈₀**HB**□**★**■-**01**-A18-△

ZPT¹⁰⁰₁₂₅HB□★■- 01-A22-△





Dimensions

Model	Α	В	С	D	E
ZPT40HB□★2501-A18					
ZPT40HB□★5001-A18	40	41	28	43	20.5
ZPT40HB → 75- 01-A18					
ZPT50HB□★2501-A18					
ZPT50HB□★5001-A18	50	52	36	54	24
ZPT50HB□★7501-A18					

Model	F	G	Н	Υ
ZPT40HB ★25- 01-A18		72	127.5	
ZPT40HB → 50- 01-A18	32	107	162.5	13
ZPT40HB → 75- 01-A18		143	198.5	
ZPT50HB□★2501-A18		75.5	131	
ZPT50HB → 50- 01-A18	35.5	110.5	166	16.5
ZPT50HB → 75-01-A18		146.5	202	

Dimensions

Model	Α	В	С	D	Е
ZPT63HB					
ZPT63HB → 50- 01-A18	63	65	46	68	31.5
ZPT63HB → 75- 01-A18					
ZPT80HB					
ZPT80HB	80	83	58	85	37
ZPT80HB → 75- 01-A18					

Model	F	G	Н	Υ
ZPT63HB		83	138.5	
ZPT63HB□★5001-A18	43	118	173.5	21.5
ZPT63HB → 75- 01-A18		154	209.5	
ZPT80HB		88.5	144	
ZPT80HB	48.5	123.5	179	27.5
ZPT80HB → 75- 01-Δ18		159 5	215	

Model	Α	В	С	D	Е
ZPT100HB					
ZPT100HB	100	103	69	107	47.5
ZPT100HB → 75- 01-A22	100	103	09	107	47.5
ZPT100HB → 100- 01-A22					
ZPT125HB ★25- 01-A22					
ZPT125HB ★50- 01-A22	125	129	89	135	56
ZPT125HB ★75-01-A22	123	123	09	133	30
ZPT125HB → 100- 01-A22					

Model	F	G	Н	Υ
ZPT100HB		104.5	178.5	
ZPT100HB	60.5	140.5	214.5	35.5
ZPT100HB□★7501-A22	00.5	180.5	254.5	33.3
ZPT100HB□★100-01-A22		215.5	289.5	
ZPT125HB□★25-01-A22		113	187	
ZPT125HB□★5001-A22	69	149	223	44
ZPT125HB□★7501-A22	09	189	263	44
ZPT125HB → 100- 01-A22		224	298	

How to Order

With buffer ZPX 40 H N J 25 - B01 - A18 - PS

 Pad diameter

 Symbol Pad diameter

 40
 ø40

 50
 ø50

 63
 ø63

 80
 ø80

ø100

ø125

100

125

Pad form (*) ◆

Symbol Form

High rigidity
(Flat type with ribs)

High rigidity
(Bellows type)

Vacuum inlet thread size

Symbol	Thread size
B01	Rc1/8
N01	NPT1/8
T01	NPTF1/8

◆ Sheet (△)
(Bellows type only)

_	Without sheet
PS	With sheet
	•



Pad material (□)

	\ /
Symbol	Material
N	NBR
S	Silicone rubber*1*2
U	Urethane rubber
F	FKM
Е	EPDM

Buffer body material (★)

Symbol Material J Aluminum alloy JB Brass + With bushing JF With bushing		
JB Brass + With bushing Structural steel +	Symbol	Material
Structural steel +	J	Aluminum alloy
	JB	Brass + With bushing
vvitii busiiiig	JF	Structural steel + With bushing

- *1 Compliant with the FDA (USA Food and Drug Administration) regulation 21CFR§177.2600 for "Rubber articles intended for repeated use"
- Compliant with the standards for "Rubber apparatus (excluding baby drinking apparatus) and containers/packaging" (D 3) (Partial revision: Ministry of Health, Labour, and Welfare Notification No. 595, 2012) in Section 3 "Apparatus and Containers/Packaging" of the Food Sanitation Act, Article 18 "Specifications and Standards for Food and Food Additives, etc." (Ministry of Health and Welfare Notification No. 370, 1959).

Buffer Specifications (Rotating)

ı	Pad diameter	ø40 to ø80	ø100, ø125
Stroke [m	ım]	25, 50, 75	25, 50, 75, 100
Spring	At 0 stroke	6.9	10
force [N]	At full stroke	11.8	15

Nut Tightening Torque

rtat riginterning	, . o. quo		[14 111]
Buffer body Mounting material thread size		Brass + With bushing	Structural steel + With bushing
M18 x 1.5	9.5 to 10.5	28 to 32	48 to 52
M22 x 1.5	9.5 to 10.5	45 to 50	75 to 80

Buffer stroke (■)

		\-/				
Stroke	ø 40	ø 50	ø 63	ø 80	ø 100	ø 125
25	•	•	•	•	•	
50	•	•	•	•	•	•
75	•	•	•	•	•	•
100	_	-		-	•	•

Mounting thread size

Symbol	Thread size
A18	M18 x 1.5 (ø40 to ø80)
A22	M22 x 1.5 (ø100, ø125)

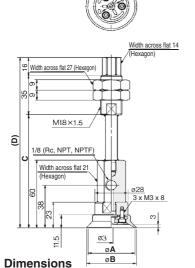
Replacement Part Nos.

Model	Pad unit part no.	Buffer assembly part	no.
ZPX40∗□★25-(B/N/T)01-A18		ZPB-X1★25-(B/N/T)01	
ZPX40∗□★50-(B/N/T)01-A18	ZP40*□	ZPB-X1★50-(B/N/T)01	
ZPX40∗□★75-(B/N/T)01-A18		ZPB-X1★75-(B/N/T)01	With three
ZPX50∗□★25-(B/N/T)01-A18		ZPB-X1★25-(B/N/T)01	M3 bolts
ZPX50∗□★50-(B/N/T)01-A18	ZP50*□	ZPB-X1★50-(B/N/T)01]
ZPX50∗□★75-(B/N/T)01-A18		ZPB-X1★75-(B/N/T)01	
ZPX63∗□★25-(B/N/T)01-A18		ZPB-X2★25-(B/N/T)01	
ZPX63∗□★50-(B/N/T)01-A18	ZP63*□	ZPB-X2★50-(B/N/T)01	With four
ZPX63∗□★75-(B/N/T)01-A18		ZPB-X2★75-(B/N/T)01	
ZPX80∗□★25-(B/N/T)01-A18		ZPB-X2★25-(B/N/T)01	M4 bolts
ZPX80∗□★50-(B/N/T)01-A18	ZP80*□	ZPB-X2★50-(B/N/T)01]
ZPX80∗□★75-(B/N/T)01-A18		ZPB-X2★75-(B/N/T)01	
ZPX100∗□★25-(B/N/T)01-A22		ZPB-X3★25-(B/N/T)01	
ZPX100∗□★50-(B/N/T)01-A22	ZP100∗□	ZPB-X3★50-(B/N/T)01]
ZPX100∗□★75-(B/N/T)01-A22	ZF 100*□	ZPB-X3★75-(B/N/T)01]
ZPX100∗□★100-(B/N/T)01-A22		ZPB-X3★100-(B/N/T)01	With four
ZPX125∗□★25-(B/N/T)01-A22		ZPB-X3★25-(B/N/T)01	M5 bolts
ZPX125*□★50-(B/N/T)01-A22	ZP125∗□	ZPB-X3★50-(B/N/T)01]
ZPX125∗□★75-(B/N/T)01-A22	ZF 123*□	ZPB-X3★75-(B/N/T)01]
ZPX125∗□★100-(B/N/T)01-A22		ZPB-X3★100-(B/N/T)01	

- st in the table indicates the pad form
- * \square in the table indicates the pad material
- \bigstar in the table indicates the buffer body material

For pad unit dimensions with a sheet, refer to page 49.

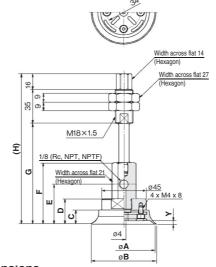
Dimensions: With Buffer ZPX 50 H → ■- 01 - A18



Model	Α	В	С	D
ZPX40H□★2501-A18	40	42	100	151
ZPX40H□★50-01-A18	40	42	135	186
ZPX40H□★7501-A18	40	42	171	222
ZPX50H□★25-01-A18	50	52	100	151
ZPX50H□★5001-A18	50	52	135	186
ZPX50H ★75- 01-A18	50	52	171	222

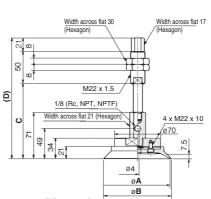
ZPX₈₀⁶³H□★■- 01-A18

[Nl·m]



Dimensions									
Model	Α	В	С	D	Е	F	G	Н	Υ
ZPX63H□★2501-A18	63	65	14.5	26	41	63	103	154	3.5
ZPX63H□★50-01-A18	63	65	14.5	26	41	63	136	189	3.5
ZPX63H□★7501-A18	63	65	14.5	26	41	63	172	225	3.5
ZPX80H□★2501-A18	80	82	16.5	28	43	65	105	156	4.5
ZPX80H□★5001-A18	80	82	16.5	28	43	65	138	191	4.5
ZPX80H□★75- <u>01</u> -A18	80	82	16.5	28	43	65	174	227	4.5

ZPX¹⁰⁰₁₂₅H□★■- 01-A22



ח	im	en	si	or	15
	••••	٠.,	٠.	٠.	

Model	Α	В	С	D
ZPX100H□★25-01-A22	100	103	115	186
ZPX100H□★50-01-A22	100	103	151	222
ZPX100H□★75-01-A22	100	103	191	262
ZPX100H□★100-01-A22	100	103	226	297
ZPX125H□★2501-A22	125	128	115	186
ZPX125H□★50-01-A22	125	128	151	222
ZPX125H□★75-01-A22	125	128	191	262
ZPX125H□★100-01-A22	125	128	226	297

Dimensions: With Buffer

For pad unit dimensions with a sheet, refer to page 49.

ZPX⁴⁰₅₀**HB**□**★■**-**01**-**A18**-△

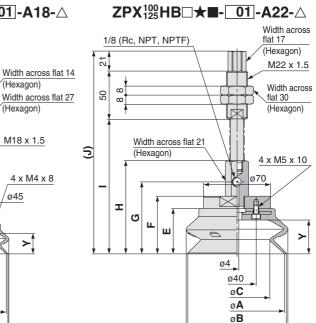
ZPX⁶³HB□★■- 01-A18-△

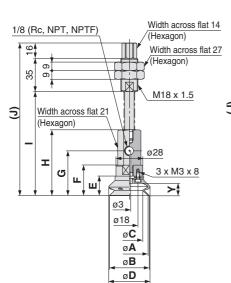
(Hexagon)

(Hexagon)

1/8 (Rc, NPT, NPTF)

35





M18 x 1.5 Width across flat 21 3 (Hexagon) 4 x M4 x 8 ø45 I G ш ш > ø3 ø34 øΟ øΑ øΒ øD **Dimensions**

Dimensions

Model	Α	В	С	D	Е	F
ZPX40HB□★2501-A18						
ZPX40HB□★50-01-A18	40	41	28	43	20.5	32
ZPX40HB□★7501-A18						
ZPX50HB□★25-01-A18						
ZPX50HB → 50- 01-A18	50	52	36	54	24	35.5
ZPX50HB□★7501-A18						

Model	G	Н		J	Υ	
ZPX40HB□★25-01-A18			109	160		
ZPX40HB□★50-01-A18	47	69	144	195	13	
ZPX40HB□★75-01-A18			180	231		
ZPX50HB□★25-01-A18			112.5	163.5		
ZPX50HB	50.5	72.5	147.5	198.5	16.5	
ZPX50HB ★75- 01-A18			183.5	234 5		

Model	Α	В	С	D	Е	F
ZPX63HB□★2501-A18						
ZPX63HB□★50-01-A18	63	65	46	68	31.5	43
ZPX63HB□★7501-A18						
ZPX80HB□★25-01-A18						
ZPX80HB□★50-01-A18	80	83	58	85	37	48.5
ZPX80HB□★75-01-A18						

Model	G	Н	Ι	J	Υ
ZPX63HB□★25-01-A18			120	171	
ZPX63HB□★50-01-A18	58	80	155	206	21.5
ZPX63HB → 75-01-A18			191	242	
ZPX80HB□★25-01-A18			125.5	176.5	
ZPX80HB	63.5	85.5	160.5	211.5	27.5
ZPX80HB → 75- 01-A18			196.5	247.5	

Dimensions

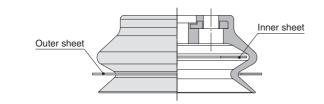
Model	Α	В	С	D	Е	F
ZPX100HB	100			107		
ZPX100HB ★50- 01-A22		100	03 69		47.5	60.5
ZPX100HB → 75- 01-A22		103			47.5	
ZPX100HB → 100- 01-A22						
ZPX125HB ★25- 01-A22				105		
ZPX125HB□★5001-A22	105	120	00		E6	
ZPX125HB□★7501-A22	125	129	09	133	30	69
ZPX125HB□★100-01-A22						

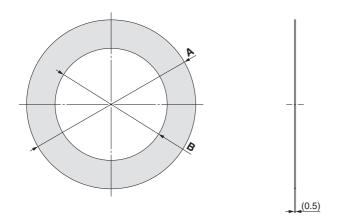
øD

Model	G	Н	I	J	Υ
ZPX100HB			141.5	212.5	
ZPX100HB	75.5	97.5	177.5	248.5	35.5
ZPX100HB		91.5	217.5	288.5	35.5
ZPX100HB → 100- 01-A22			252.5	323.5	
ZPX125HB ★25- 01-A22			150	221	
ZPX125HB	0.4	100	186	257	
ZPX125HB□★7501-A22	84 106	100	226	297	44
ZPX125HB → 100- 01-A22			261	332	

Series **ZP**

High Rigidity Pad (Bellows Type) Sheet Part Nos.





Replacement Parts								
		Applicable						
Inner/Outer	U	Material	pad part no.					
sheet set	et set Inner sheet Outer sh			pad part 110.				
ZPPS-40HB	ZPPS-40HB-1	ZPPS-40HB-2		ZP40HB□				
ZPPS-50HB	ZPPS-50HB-1	ZPPS-50HB-2		ZP50HB□				
ZPPS-63HB	ZPPS-63HB-1	ZPPS-63HB-2	PTFE	ZP63HB□				
ZPPS-80HB	ZPPS-80HB-1	ZPPS-80HB-2	PIFE	ZP80HB□				
ZPPS-100HB	ZPPS-100HB-1	ZPPS-100HB-2		ZP100HB□				
ZPPS-125HB	ZPPS-125HB-1	ZPPS-125HB-2		ZP125HB□				

Dimensions (Inner sheet)						
Model	Α	В				
ZPPS-40HB-1	36.8	23.1				
ZPPS-50HB-1	46.1	30.1				
ZPPS-63HB-1	58.3	37.1				
ZPPS-80HB-1	74.5	49.4				
ZPPS-100HB-1	93.5	61.3				
ZPPS-125HB-1	117.4	78.1				

Dimensions (O	uter s	heet)
Model	Α	В
ZPPS-40HB-2	44.7	33.8
ZPPS-50HB-2	56.9	42.7
ZPPS-63HB-2	70.4	54.1
ZPPS-80HB-2	91.7	69.1
ZPPS-100HB-2	111.7	82
ZPPS-125HB-2	138.5	104.1



Made to Order Specific Product Precautions

Be sure to read this before handling the products.

Mounting

1. Tighten the screw within the specified torque range when mounting the buffer.

Tightening with a torque outside of the specified range may cause malfunction.

ZP High Rigidity Series

Model	Connection thread	Buffer body material	Tightening torque [N·m]					
ZP□(40 to 80)□J□-□-□-□		Aluminum alloy	9.5 to 10.5					
ZP□(40 to 80)□JB□-□-□-□	M18 x 1.5	Brass	28 to 32					
ZP□(40 to 80)□JF□-□-□-□		Structural steel	48 to 52					
ZP□(100/125)□J□-□-□		Aluminum alloy	9.5 to 10.5					
ZP□(100/125)□JB□-□-□-□	M22 x 1.5	Brass	45 to 50					
ZP□(100/125)□JF□-□-□		Structural steel	75 to 80					

ZP2 High Rigidity Ball Joint Series

Model	Connection thread	Buffer body material	Tightening torque [N·m]	
ZP2-□(40/50)□JB□-□	M18 x 1.5	Brass	28 to 32	
ZP2-□(40/50)□JF□-□	WITO X 1.5	Structural steel	48 to 52	
ZP2-□(63 to 125)□JF□-□-□-□	M22 x 1.5	Brass	45 to 50	
ZP2-□(63 to 125)□JF□-□-□-□	10122 X 1.5	Structural steel	75 to 80	

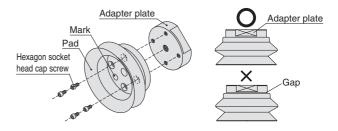
Pad Mounting

1. How to mount the ZP/ZP2 high rigidity pad

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

Tightening Torque for Replacement of High Rigidity Pads

Pad diameter	Connection thread	Tightening torque [N·m]
ø 40 , ø 50	M3 x 10	0.7 to 0.9
ø 63 , ø 80	M4 x 10	0.9 to 1.1
ø100, ø125	M5 x 12	2.3 to 2.7



Sheet Mounting

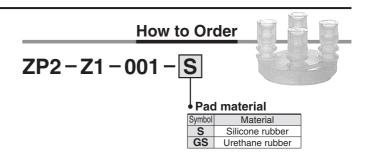
1. When mounting the sheet, be sure to insert it without allowing it to bend.

If the sheet is inserted in a bent state, it may fall out.



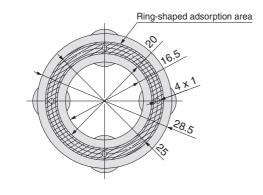
Vacuum Pad for Transferring Disks

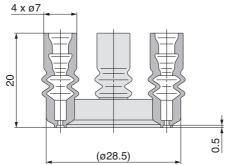
- ■For adsorbing and transferring disks of digital household electric appliances (CD, DVD)
 - For adsorbing circular components like CD and DVD
 - Bellows mechanism is realised in the pad to dampen the impact to the work.

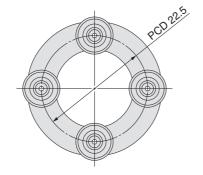


Dimensions

ZP2-Z1-001-

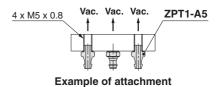


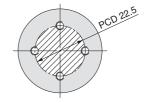




ZPT1-A5 is a recommended adapter. (Four adapters are necessary.)

See below for mounting. Refer to the Best Pneumatics No. 4 for details.







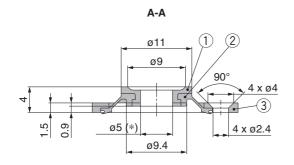
Vacuum Pad for Fixing Panel

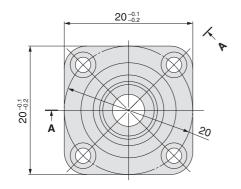
- ■For adsorbing and fixing the stage of LCD panels, etc.
- ■Bellows mechanism allows complete contact with curved work surface.



Dimensions

ZP2-Z002

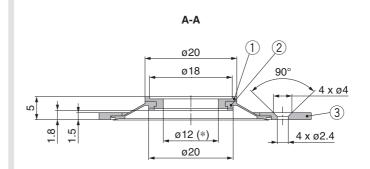


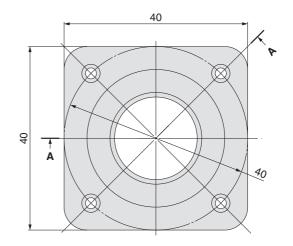


Component Parts

No.	Part no.	Description	Material	Note
1	ZP2-Z2A	Pad	PTFE	_
2	ZP2-Z2B	Joint	FKM	_
3	ZP2-Z2C	Mounting plate	Aluminum alloy	Clear anodized

ZP2-Z003





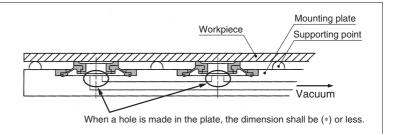
Component Parts

No.	Part no.	Description	Material	Note
1	ZP2-Z3A	Pad	PTFE	_
2	ZP2-Z3B	Joint	FKM	_
3	ZP2-Z3C	Mounting plate	Aluminum alloy	Clear anodized

How to use

The plate for air purging should be prepared by the customer. The plate needs to have supporting points.

(Avoid applying the weight of the workpiece directly to the pad.) Place the workpiece on the pad horizontally.

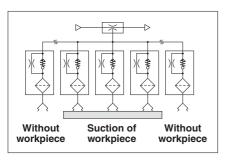




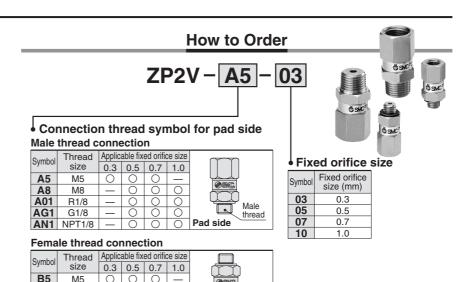
Vacuum Saving Valve

■ Can restrict the reduction of vacuum pressure even when there is no workpiece.

When multiple vacuum pads are operated by one vacuum generator, and some of them are not holding the workpiece, the reduction of vacuum pressure is restricted and the workpiece can remain held by the rest of pads.







Specifications

M6

Rc1/8

G1/8 **BN1** NPT1/8

B6

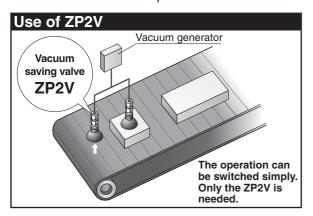
B01

BG1

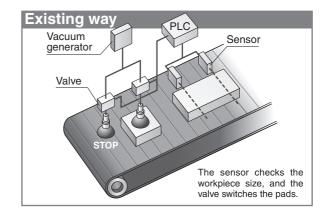
Connection thread size for pad side		M5, M	6	M8, R1/	/8, G1/8,	NPT1/8
Fixed orifice size (mm)	0.3	0.5	0.7	0.5	0.7	1.0
Fluid	Air					
Max. operating pressure range (MPa)	0 to 0.7					
Max. operating vacuum pressure range (kPa)	0 to -100					
Ambient and fluid temperature (°C)	5 to 60 (No freezing)					
Element nominal filtration rating (μm)	40					
Min. operating flow rate (//min (ANR))	3	5	8	5	8	16

■ No need for switching operation when changing workpieces

When the workpieces have different shapes, the control circuit can be simplified.







Model Selection

Select the quantity of vacuum saving valves that can be used with one vacuum generator.

Selection Conditions

Workpiece: No leakage and several sizes

Required vacuum pressure: -50 kPa or more of vacuum pressure per vacuum pad

Part number of vacuum saving valve used: ZP2V-A8-05

(Connection thread size for pad side: M8, Fixed orifice size: Ø0.5)

Check the flow-rate characteristics of the vacuum generator used.

From the flow-rate characteristics of the vacuum generator (Chart 1), calculate the suction flow rate (Q1) of the vacuum generator from the required vacuum pressure.

Vacuum pressure –50 kPa (1) \rightarrow 2) \rightarrow 3) = Suction flow rate (Q1) \approx 31 ℓ min (ANR).

2 Calculate the quantity (N) of vacuum saving valves.

Find the minimum operating flow rate (Q2) and the suction flow rate (Q1) of the vacuum generator from the specifications table (page 61), and calculate the quantity (N) of vacuum saving valves that can be used with one vacuum generator. Quantity of vacuum saving valves (N) = Suction flow rate of vacuum generator (Q1) Minimum operating flow rate (Q2)

Example) Vacuum saving valve used: ZP2V-A8-05 From Table 1, Q2 can be calculated as 5.0 dmin (ANR). 31 {*d*/min (ANR)} $N = \overline{5 \{\ell/\min(ANR)\}} \approx 6 \text{ (unit)}$

Table 1. Relationship between Minimum Operating Flow Rate and Fixed Orifice Size

Tiow Hate and Tixed Office Size	7
Connection thread size for pad side	M8
Fixed orifice size (mm)	0.5
Minimum operating flow rate (//min (ANR)) Q2	5.0

Chart 1. Flow-rate Characteristics of Vacuum Generator

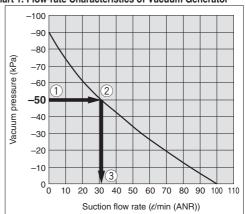
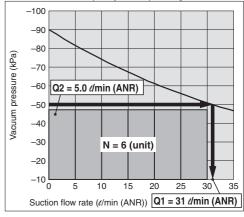


Chart 2. Selection Example by Min. Operating Flow Rate



The above selection example is based on a general method under the given selection conditions, and may not always be applicable. A final decision on operating conditions should be made based on test results performed at the responsibility of the customer.

pecific Product Precautions

Be sure to read before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" I I (M-E03-3) for Vacuum Equipment Precautions.

- 1. The product is not equipped with a vacuum holding function, and cannot be used for the purpose of holding vacuum.
- 2. Determine the quantity of products to be used by selection, and keep the recommended pad diameter per product shown in Table 1. Also, check the operation with the customer's machine well in advance.

Table 1. Recommended Pad Diameter per Product

Connection thread symbol for pad side	A 5	B5	В6	A8	A01	B01	AG1	BG1	AN1	BN1
Thread size	M5 M6		M8	R1	R1/8 G1/8		1/8	NP	Γ1/8	
Recommended pad diameter (mm)	25	or le	SS			3	2 to 5	50		

- 3. Do not disassemble the product. Once the product is disassembled and reassembled, it will not be able to satisfy
- pad side and vacuum generator side of product the wrong wav round. (Refer to Fig. 1.)

Enlarged view of name plate (Vacuum generator side)

ZP2V-A5-03 ASMC. MADE IN JAPAN (Pad side)

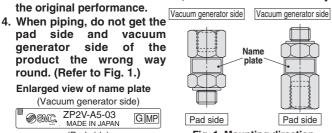


Fig. 1. Mounting direction

5. For mounting and removing the product, strictly follow the instructions below.

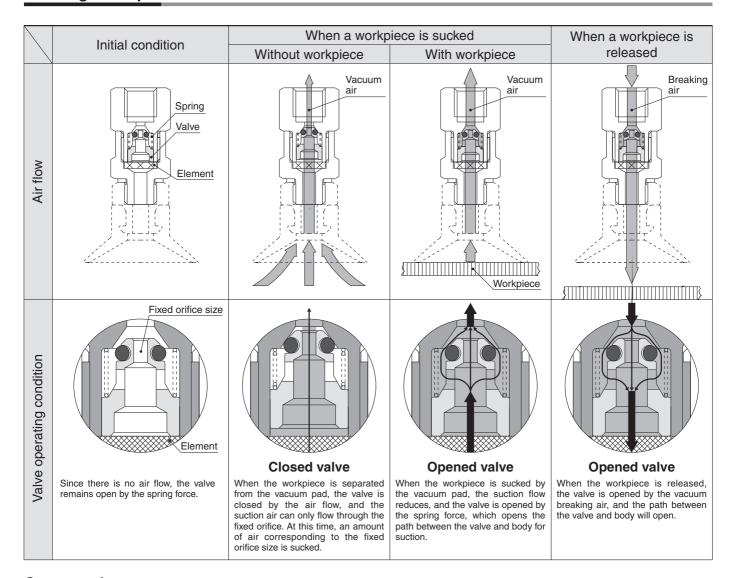
When mounting and removing the product, use the specified places shown in page 64 to apply tools. Also, when mounting, tighten to the specified torque shown in page 64. Excessive torque or applying a tool to places other than the specified place can cause damage or loss of original performance.

- 6. The reduction of the vacuum pressure while the workpiece is sucked and released depends on the flow-rate characteristics of the vacuum generator. Check the flow-rate characteristics of the vacuum generator before checking the operation with the customer's machine.
- 7. When the built-in element of the product gets clogged, replace the whole product.
- 8. When verifying the suction using such as a pressure sensor, check the operation with the customer's machine well in advance.
- 9. If there is leakage between the pad and a workpiece, for example if the workpiece is permeable, the quantity of products that can be used with one vacuum generator is

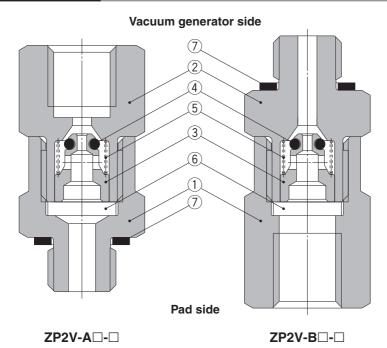
Take the leakage between the pad and workpiece into account and check the operation with the customer's machine before using.



Working Principle



Construction



Vacuum generator side



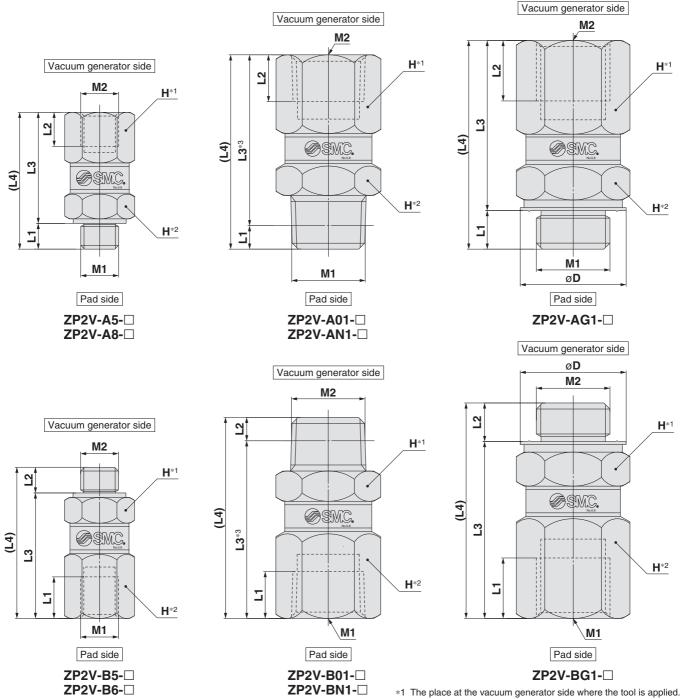
Pad side

* For the mounting direction of the product, refer to point 4 on page 62.

Component Parts

COII	oniponent raits					
No.	Description	Material	Surface treatment			
1	Body A	Brass	Electroless nickel plated			
2	Body B	Brass	Electroless nickel plated			
3	Valve	Aluminum	_			
4	O-ring	HNBR	_			
5	Spring	Stainless steel	_			
6	Element	BC	_			
7	Gasket	NBR + Stainless steel	_			

Dimensions



- *2 The place at the pad side where the tool is applied.
- *3 Referential dimensions after the R, NPT thread is screwed.

										(mm)
Model	M1	M2	L1	L2	L3	L4	H (Width across flat)	ø D	W (g)	Tightening torque (N·m) Note)
ZP2V-A5-□	M5 x 0.8	M5 x 0.8	3.4	4.5	14.7	18.1	8	_	6	1.0 to 1.5
ZP2V-A8-□	M8 x 1.25	M8 x 1.25	5.9	8	20.1	26	12	_	18	5.5 to 6.0
ZP2V-A01-□	R1/8	Rc1/8	3.1	6.2	22.6	25.7	12	_	18	7.0 to 9.0
ZP2V-AG1-□	G1/8	G1/8	5.1	8	22.5	27.6	13	14	23	5.5 to 6.0
ZP2V-AN1-□	NPT1/8	NPT1/8	3.2	6.9	23.3	26.5	12	_	23	7.0 to 9.0
ZP2V-B5-□	M5 x 0.8	M5 x 0.8	5.5	3.4	16.6	20	8	_	7	1.0 to 1.5
ZP2V-B6-□	M6 x 1	M6 x 1	5	4.5	16.2	20.7	8	_	7	2.0 to 2.5
ZP2V-B01-□	Rc1/8	R1/8	6.2	3.1	23.5	26.6	12	_	19	7.0 to 9.0
ZP2V-BG1-□	G1/8	G1/8	8	5.1	23.4	28.5	13	14	24	5.5 to 6.0
ZP2V-BN1-□	NPT1/8	NPT1/8	6.9	3.2	24.2	27.4	12	_	20	7.0 to 9.0

Note) When mounting and removing the product, apply a wrench or torque wrench to the place shown in Figures above. When mounting, tighten to the torque specified in the table.



Series ZP2/ZP

Adapter/Buffer Applicable Pad List

Series **ZP2** Mounting Adapter Part No.

	oter model	Applicable pad model Series ZP2	Page
ZP2A-001		ZP2-3507W□ ZP2-4010W□ ZP2-5010W□ ZP2-6010W□	P. 69
ZP2A-002		ZP2-4020W□ ZP2-5020W□ ZP2-6020W□ ZP2-8020W□	P. 69
ZP2A-003		ZP2-4030W□ ZP2-5030W□ ZP2-6030W□ ZP2-8030W□	P. 69
ZP2A-M01P		ZP2-B02MU□ ZP2-B035MU□ ZP2-B04MU□ ZP2-B05MU□ ZP2-B04MB□	P. 69
ZP2A-M02*		ZP2-B06MU□ ZP2-B08MU□ ZP2-B10MU□ ZP2-B15MU□ ZP2-B06MB□ ZP2-B08MB□ ZP2-B10MT□ ZP2-B15MT□	P. 69
ZP2A-M03*		ZP2-B20MT□ ZP2-B25MT□ ZP2-B30MT□	P. 69
ZP2A-M04		ZP2-B06MU□ ZP2-B08MU□ ZP2-B10MU□ ZP2-B15MU□ ZP2-B06MB□ ZP2-B08MB□ ZP2-B10MT□ ZP2-B15MT□	P. 69
ZP2A-M05		ZP2-B10MB□ ZP2-B15MB□	P. 69
ZP2A-M06		ZP2-B20MB□	P. 70

Adap	oter model	Applicable pad model Series ZP2	Page
ZP2A-Z01P		ZP2-B02EU□ ZP2-B04EU□ ZP2-B06EU□ ZP2-08EU□ ZP2-15EU□	P. 70
ZP2A-Z02P		ZP2-B02EU□ ZP2-B04EU□ ZP2-B06EU□ ZP2-08EU□ ZP2-15EU□	P. 70
ZP2A-Z21P		ZP2-08AN□ ZP2-11AN□	P. 70
ZP2A-S01P		ZP2-04S□	P. 70
ZP2A-S02P		ZP2-06S□	P. 70
ZP2A-S03P		ZP2-08S□	P. 70
ZP2A-S04P		ZP2-10S□	P. 70
ZP2A-S05P		ZP2-15S□	P. 71
ZP2A-S11		ZP2-04S□	P. 71
ZP2A-S12		ZP2-06S□	P. 71
ZP2A-S13		ZP2-08S□	P. 71
ZP2A-S14		ZP2-10S□	P. 71
ZP2A-S15		ZP2-15S□	P. 71

Series **ZP** Mounting Adapter Part No.

Adapter model		Applicable pad model			
Adapte	model	Series ZP	Series ZP2	Page	
ZPT1-A5, A6 ZPT1-B4, B5		ZP (02, 04, 06, 08) U□ ZP (06, 08) B□ ZP (10, 13, 16) UT□ ZP (10, 13, 16) CT□ ZP2004U□ ZP3507U□ ZP4010U□	ZP2-03U□ ZP2-14UT□ ZP2-B04U□ ZP2-18UT□ ZP2-B06C□ ZP2-20UT□ ZP2-06J□ ZP2-B10J□ ZP2-B06B□ ZP2-B15J□ ZP2-B08B□ ZP2-04UCL ZP2-05UT□ ZP2-06UCL ZP2-11UT□ ZP2-08UCL	P. 72	
ZPT2-A5, A6 ZPT2-B5, B6 B01, N01 T01		ZP (10, 13, 16) U□ ZP (10, 13, 16) C□ ZP (10, 13, 16) B□ ZP (10, 16) D□	ZP2-09J□ ZP2-14J□ ZP2-16J□ ZP2-10UCL ZP2-16UCL	P. 72 P. 73	
ZPT3-A6, A8 ZPT3-B5, B6, B8 B01, N01 T01		ZP (20, 25, 32) U□ ZP (20, 25, 32) C□ ZP (20, 25, 32) B□ ZP25D□	ZP2-B25J□ ZP2-B30J□ ZP2-25UCL ZP2-32UCL	P. 72 P. 73	
ZPT4-A6, A8 ZPT4-B6, B8 B01, N01 T01		ZP (40, 50) U□ ZP (40, 50) C□ ZP (40, 50) B□ ZP40D□	ZP2-40UCL ZP2-50UCL	P. 72 P. 73	

Adapter Assembly Part No. (For Heavy-duty Ball Joint)

Adapter Assembly Part No. (For Heavy-duty Dan John)							
Adapter assembly model		Applicable	Page				
Adapter ass	sembly model	Serie	es ZP	I age			
ZP2A-TF1		ZP40H□ ZP50H□	ZP40HB□ ZP50HB□	P. 74			
ZP2A-TF2		ZP63H□ ZP80H□	ZP63HB□ ZP80HB□	P. 74			
ZP2A-TF3		ZP100H□ ZP125H□	ZP100HB□ ZP125HB□	P. 74			
ZP2A-XF1		ZP40H□ ZP50H□	ZP40HB□ ZP50HB□	P. 74			
ZP2A-XF2		ZP63H□ ZP80H□	ZP63HB□ ZP80HB□	P. 74			
ZP2A-XF3		ZP100H□ ZP125H□	ZP100HB□ ZP125HB□	P. 74			

Series ZP2/ZP

Adapter Assembly Part No. (for Heavy-duty)

Adapter ass	sembly model	Applicable pad model		
		Serie	es ZP	Page
ZPA-T1-B*		ZP40H□ ZP50H□	ZP40HB□ ZP50HB□	P. 75
ZPA-T2-B*		ZP63H□ ZP80H□	ZP63HB□ ZP80HB□	P. 75
ZPA-T3-B*		ZP100H□ ZP125H□	ZP100HB□ ZP125HB□	P. 75
ZPA-T1-*01		ZP40H□ ZP50H□	ZP40HB□ ZP50HB□	P. 75
ZPA-T2-*01		ZP63H□ ZP80H□	ZP63HB□ ZP80HB□	P. 75
ZPA-T3-*01		ZP100H□ ZP125H□	ZP100HB□ ZP125HB□	P. 75
ZPA-X1-*01-B*		ZP40H□ ZP50H□	ZP40HB□ ZP50HB□	P. 76
ZPA-X2-*01-B*		ZP63H□ ZP80H□	ZP63HB□ ZP80HB□	P. 76
ZPA-X3-*01-B*		ZP100H□ ZP125H□	ZP100HB□ ZP125HB□	P. 76

Buffer Assembly Part No. (for Ball Spline)

Duffey accepts	by we del	Applicable pad model	Page
Buffer assemb	ly model	Series ZP	
ZP2B-T3S6		ZP02U□ ZP04U□ ZP06U□ ZP08U□	P. 77

Buffer Assembly Part No. (for Heavy-duty Ball Joint)

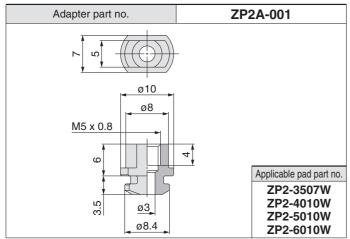
Buffer assembly model		Applicable pad model	
Dullel assembly	IIIOGGI	Series ZP	Page
ZP2B-TF1 (JB/JF)◆		ZP40H□ ZP50H□ ZP40HB□ ZP50HB□	P. 78
ZP2B-TF2 (JB/JF)◆		ZP63H□ ZP80H□ ZP63HB□ ZP80HB□	P. 78
ZP2B-TF3 (JB/JF)◆		ZP100H□ ZP125H□ ZP100HB□ ZP125HB□	P. 78
ZP2B-XF1 (JB/JF)◆		ZP40H□ ZP50H□ ZP40HB□ ZP50HB□	P. 79
ZP2B-XF2 (JB/JF)◆		ZP63H□ ZP80H□ ZP63HB□ ZP80HB□	P. 79
ZP2B-XF3 (JB/JF)◆		ZP100H□ ZP125H□ ZP100HB□ ZP125HB□	P. 79

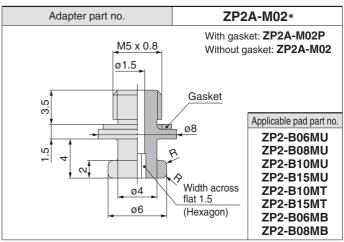
Buffer Assembly Part No. (for Heavy-duty)

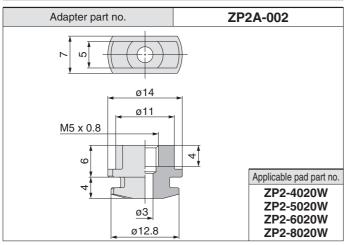
Buffer Assembly Part No. (1	ioi rieavy-duty)		
Buffer assembly m	odel	Applicable pad model	Page
Dullet assembly in	ouei	Series ZP	rage
		ZP40H□	
7DD T4 (/ /		ZP50H□	P. 80
ZPB-T1 (J/JB/JF)◆-*01		ZP40HB□	P. 81
		ZP50HB□	
		ZP63H□	
7DD T0 (/ D / E) 4 + 04		ZP80H□	P. 80
ZPB-T2 (J/JB/JF) ◆ -*01		ZP63HB□	P. 81
		ZP80HB□	
		ZP100H□	
ZPB-T3 (J/JB/JF) ♦ -*01		ZP125H□	P. 80
ZPB-13 (3/3B/3F)♥-*01		ZP100HB□	P. 81
		ZP125HB□	
	1	ZP40H□	
ZPB-X1 (J/JB/JF) ◆ -∗01		ZP50H□	P. 82
21 B-X1 (0/0B/01) \$\display = \display 1		ZP40HB□	P. 83
		ZP50HB□	
		ZP63H□	
ZPB-X2 (J/JB/JF) ◆ -∗01		ZP80H□	P. 82
21 B X2 (6/6B/61 / \$ 61	ili	ZP63HB□	P. 83
	7	ZP80HB□	
		ZP100H□	
ZPB-X3 (J/JB/JF) ◆ -∗01		ZP125H□	P. 82
		ZP100HB□	P. 83
		ZP125HB□	

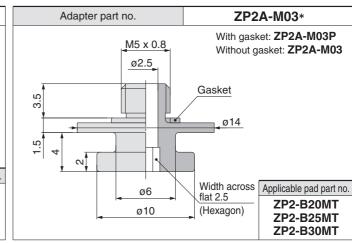
Series ZP2

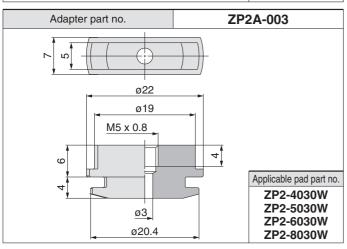
Mounting Adapter Part No.

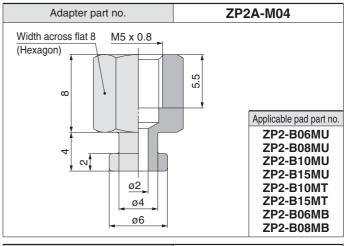


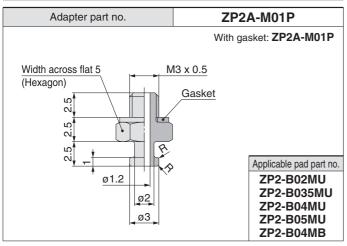


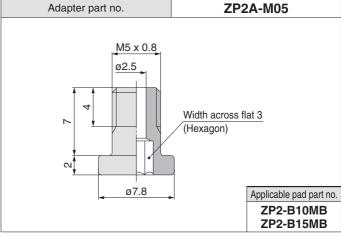


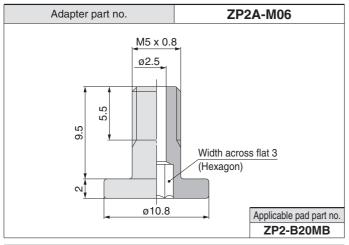


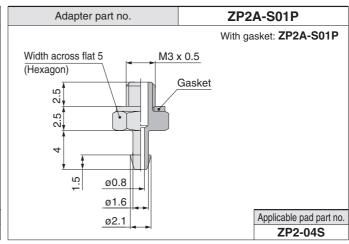


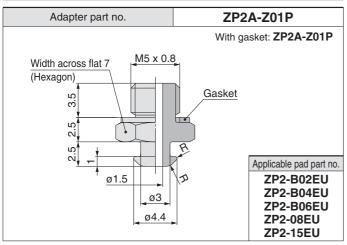


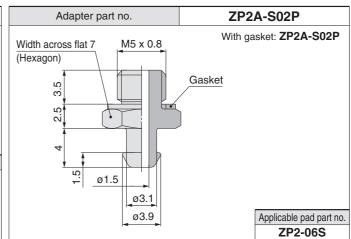


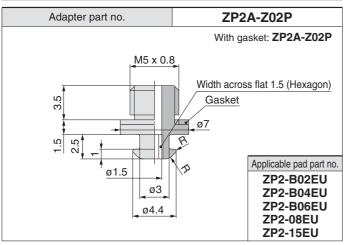


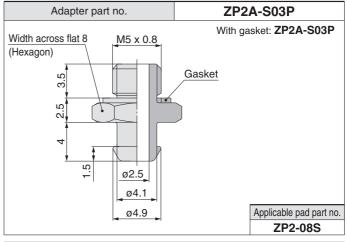


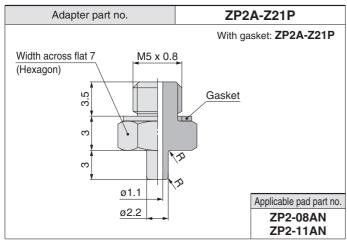


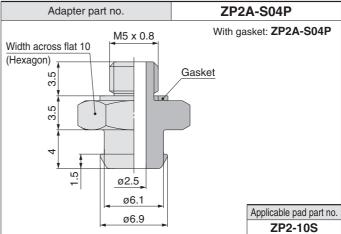




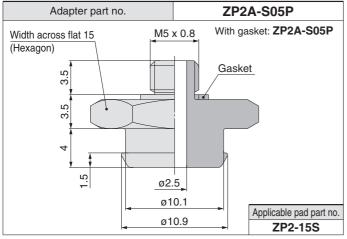


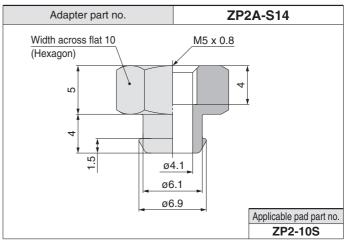


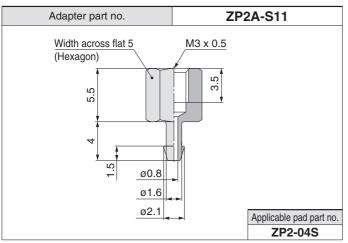


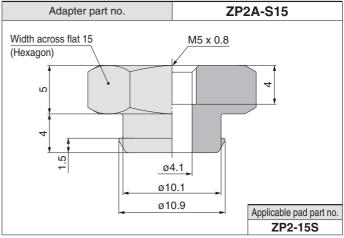


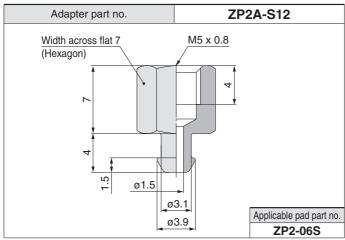
Series ZP2

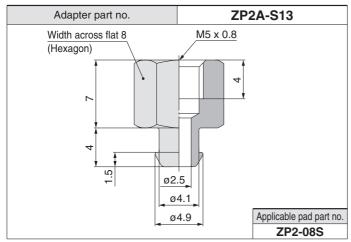




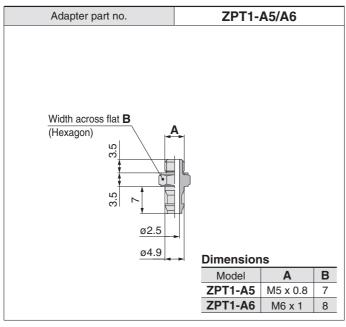


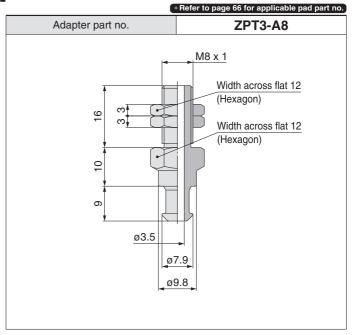


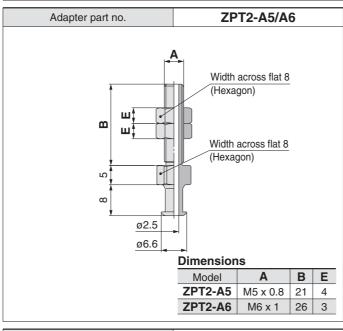


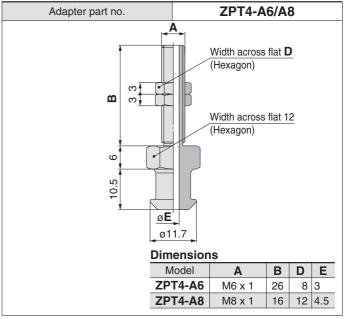


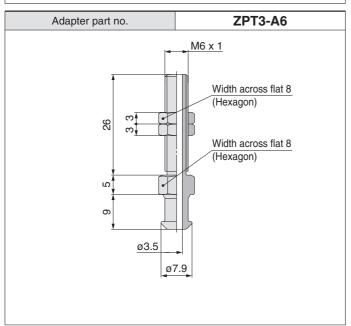
Mounting Adapter Part No.

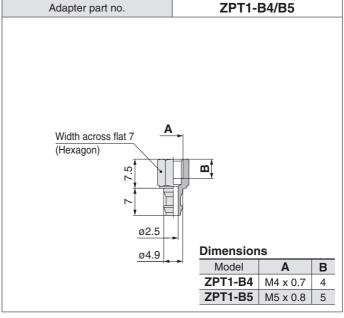


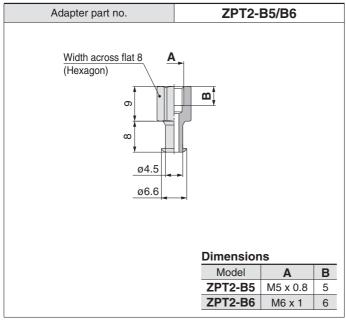


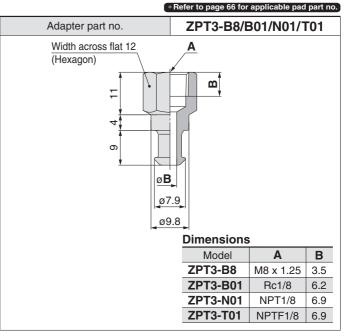


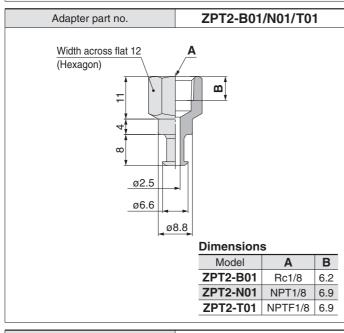


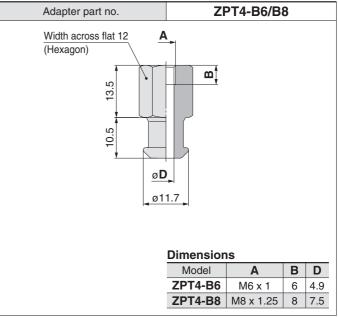


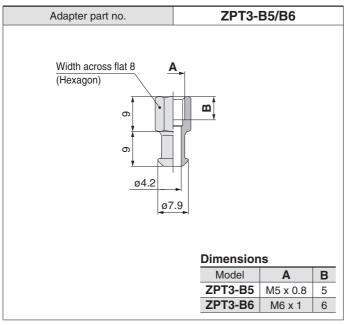


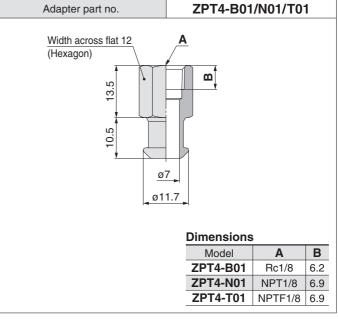






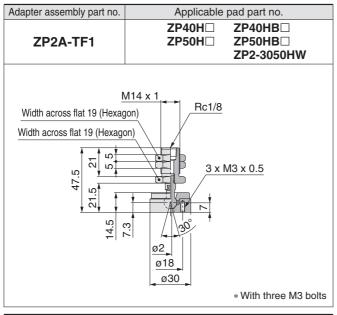




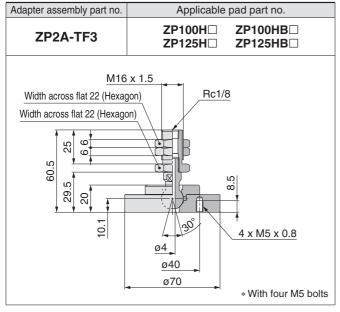


Adapter Assembly Part No.

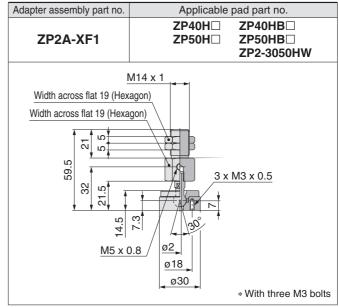
Heavy-duty Ball Joint Adapter Assembly Part No. (Type T)



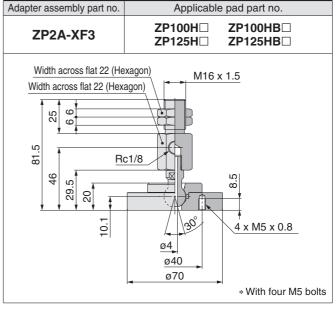
Adapter assembly part no.	Applicable pad part no.
ZP2A-TF2	ZP63H□ ZP63HB□ ZP80H□ ZP80HB□
Width across flat 22 (Hexagon Width across flat 22 (Hexagon S) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	
	* With four M4 bolts



Heavy-duty Ball Joint Adapter Assembly Part No. (Type X)

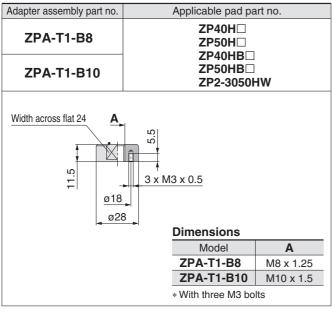


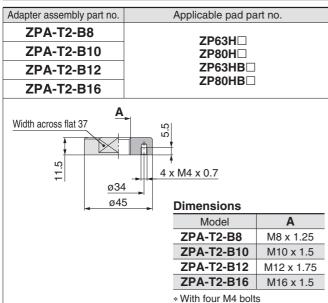
Adapter assembly part no.	Applicable pad part no.
ZP2A-XF2	ZP63H□ ZP63HB□ ZP80H□ ZP80HB□
Width across flat 22 (Hexagover Midth across flat 22 (Hexagove	ac1/8

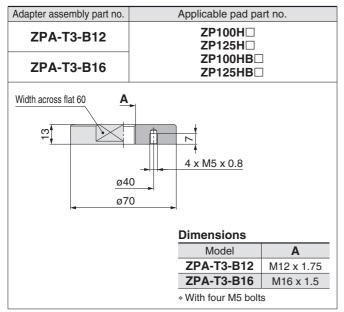


Adapter Assembly Part No.

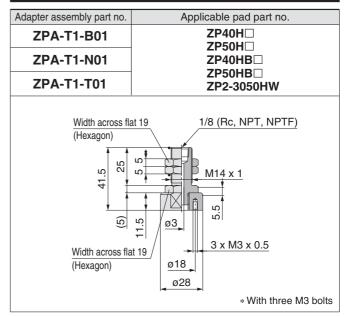
Heavy-duty Adapter Assembly Part No. (Type T, Female thread)



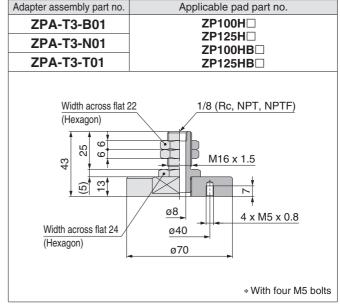




Heavy-duty Adapter Assembly Part No. (Type T, Male thread)



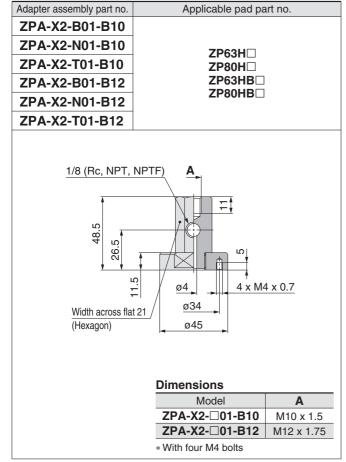
Adapter assembly part no.	Applicable pad part no.
ZPA-T2-B01	ZP63H□
ZPA-T2-N01	ZP80H□
ZPA-T2-T01	ZP63HB□ ZP80HB□
Width across flat (Hexagon) (1) (2) (2) Width across flat 24 (Hexagon)	M16 x 1.5 M8 4 x M4 x 0.7 Ø34 Ø45
	* With four M4 bolts



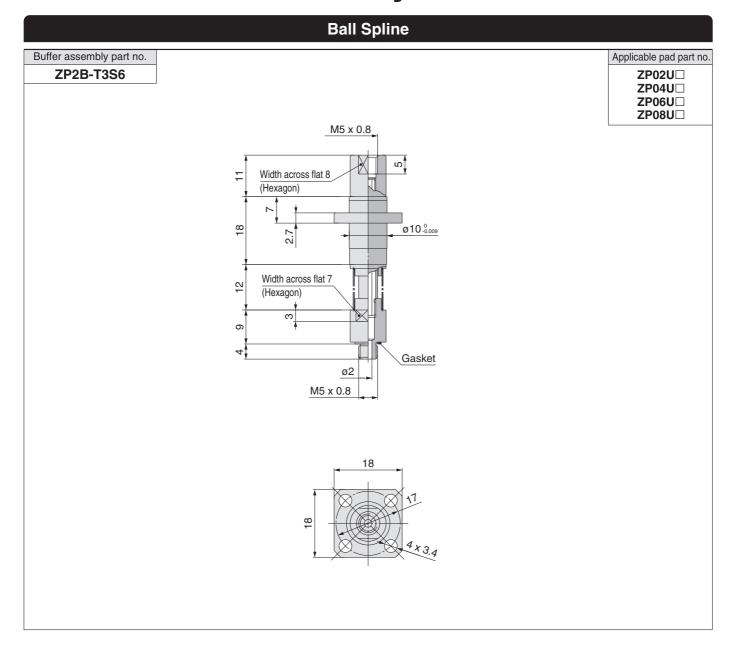
Heavy-duty Adapter Assembly Part No. (Type X, Female thread)

Adapter assembly part no.	Applicable pad pa	ert no.					
ZPA-X1-B01-B8							
ZPA-X1-N01-B8	ZP40H□ ZP50H□						
ZPA-X1-T01-B8							
ZPA-X1-B01-B10	ZP40HB□ ZP50HB□ ZP2-3050HW						
ZPA-X1-N01-B10							
ZPA-X1-T01-B10	-						
1/8 (Rc, NPT,	3 x M3 x	<u>0.5</u>					
	Dimensions Model	Α					
	ZPA-X1-□01-B8	M8 x 1.25					
	ZPA-X1- □ 01-B10 M10 x 1.5						
	* With three M3 bolts						

Adapter assembly part no.	Applicable pad pa	ırt no.	
ZPA-X3-B01-B10 ZPA-X3-N01-B10 ZPA-X3-T01-B10 ZPA-X3-B01-B12 ZPA-X3-N01-B12 ZPA-X3-T01-B12	ZP100H□ ZP125H□ ZP100HB□ ZP125HB□		
1/8 (Rc, NPT, N	Ø4 4x Ø40 Ø70 Dimensions	M5 x 0.8	
	Model	Α	
	ZPA-X3-□01-B10	M10 x 1.5	
	ZPA-X3-□01-B12	M12 x 1.75	
	* With four M5 bolts		



Buffer Assembly Part No.



ZP40H□

ZP50H□ ZP40HB□

ZP50HB□ **ZP2-3050HW**

В

Α

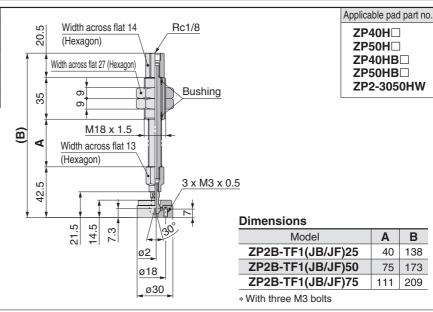
40 138

75 173

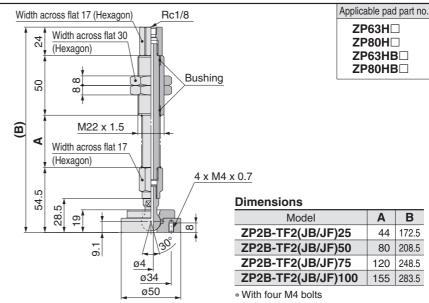
111 209

Heavy-duty Ball Joint Buffer Assembly Part No. (Type T)

Buffer assembly part no.					
Buffer body	Buffer body				
(Material: Brass)	(Material: Steel)				
ZP2B-TF1JB25	ZP2B-TF1JF25				
ZP2B-TF1JB50	ZP2B-TF1JF50				
ZP2B-TF1JB75	ZP2B-TF1JF75				

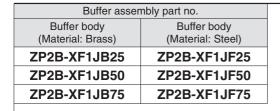


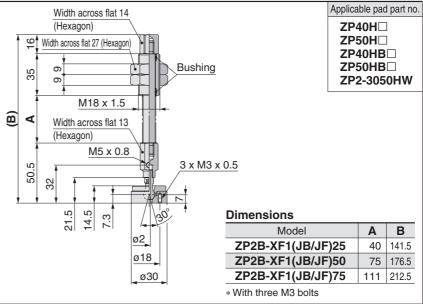
Buffer assembly part no.					
Buffer body (Material: Brass)	Buffer body (Material: Steel)				
ZP2B-TF2JB25	ZP2B-TF2JF25				
ZP2B-TF2JB50 ZP2B-TF2JF50					
ZP2B-TF2JB75	ZP2B-TF2JF75				
ZP2B-TF2JB100	ZP2B-TF2JF100				



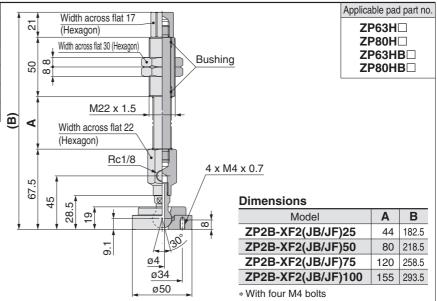
Buffer asser	nbly part no.	W	Vidth	across flat 17 (Hexagon)	Rc1/8	Α	Applicable pa	d part no.
Buffer body (Material: Brass)	Buffer body (Material: Steel)] <u> </u>	24	Width across flat 30 (Hexagon)			ZP100H ZP125H	
ZP2B-TF3JB25	ZP2B-TF3JF25		*	(Hexagon)	44		ZP100H	
ZP2B-TF3JB50	ZP2B-TF3JF50			ω ·	Bushing		ZP125H	HB⊔
ZP2B-TF3JB75	ZP2B-TF3JF75		20	ω				
ZP2B-TF3JB100	ZP2B-TF3JF100			M22 x 1.5				
		(B)	55.5 A	Width across flat 17 (Hexagon)	4 x M5	x 0.8 Dimensions		
			-/	20 20 20		Model	Α	В
		<u>*</u>	*	,		ZP2B-TF3(JB/JF)2	!5 44	173.5
				10.1	/ 30°	ZP2B-TF3(JB/JF)5	80	209.5
				$=$ $ $ $\underline{\emptyset}_{4}$	4	ZP2B-TF3(JB/JF)7	'5 120	249.5
					o40	ZP2B-TF3(JB/JF)1	00 155	284.5
					ø70 -	* With four M5 bolts		

Heavy-duty Ball Joint Buffer Assembly Part No. (Type X)





Buffer assembly part no.				
Buffer body	Buffer body			
(Material: Brass)	(Material: Steel)			
ZP2B-XF2JB25	ZP2B-XF2JF25			
ZP2B-XF2JB50	ZP2B-XF2JF50			
ZP2B-XF2JB75	ZP2B-XF2JF75			
ZP2B-XF2JB100	ZP2B-XF2JF100			

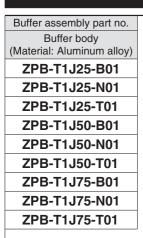


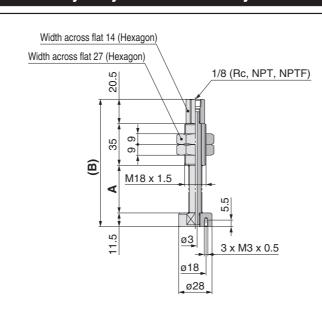
Buffer asser	mbly part no.	Ā		Width across flat 17	Ap	oplicable pa	d part no.
Buffer body (Material: Brass)	Buffer body (Material: Steel)		21	(Hexagon) Width across flat 30 (Hexagon)		ZP100H ZP125H	
ZP2B-XF3JB25	ZP2B-XF3JF25		50	Bushing		ZP100F	
ZP2B-XF3JB50	ZP2B-XF3JF50		2	8		ZP125F	IB⊔
ZP2B-XF3JB75	ZP2B-XF3JF75		1	Mag 15			
ZP2B-XF3JB100	ZP2B-XF3JF100	<u> </u>	A	M22 x 1.5			
			68.5	4 rú 8 rú rú rú rú rú sann ar 57 (Hexadhill)	//5 x 0.8 Dimensions		
		1	, ,	8 8	Model	Α	В
		1		7 7 30	ZP2B-XF3(JB/JF)25	5 44	183.5
				<u>5</u>	ZP2B-XF3(JB/JF)50	08 0	219.5
				<u>Ø4</u>	ZP2B-XF3(JB/JF)75	5 120	259.5
				<u>Ø40</u> ▶	ZP2B-XF3(JB/JF)10	155	294.5
				ø70 →	* With four M5 bolts		

Buffer Assembly Part No.

* Refer to the front matter 30 for nut tightening torque.

Heavy-duty Buffer Assembly Part No. (Type T)





Applicable pad part no.

ZP40H□

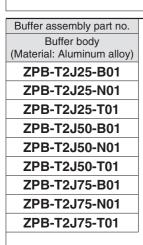
ZP50H□

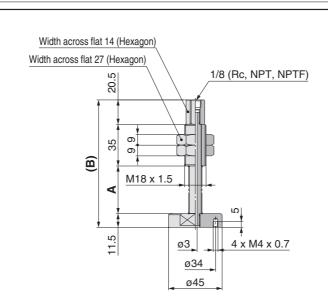
ZP40HB□ ZP50HB□ ZP2-3050HW

Dimensions

Model	Α	В
ZPB-T1J25-□01	40	107
ZPB-T1J50-□01	75	142
ZPB-T1J75-□01	111	178

* With three M3 bolts





Applicable pad part no.

ZP63H□

ZP80H□

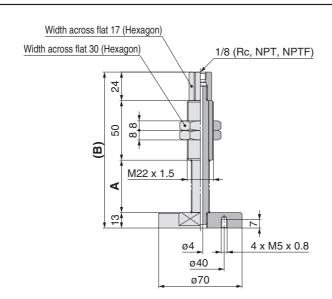
ZP63HB□ ZP80HB□

Dimensions

Model	Α	В
ZPB-T2J25-□01	40	107
ZPB-T2J50-□01	75	142
ZPB-T2J75-□01	111	178

* With four M4 bolts

Buffer assembly part no.
Buffer body
(Material: Aluminum alloy)
ZPB-T3J25-B01
ZPB-T3J25-N01
ZPB-T3J25-T01
ZPB-T3J50-B01
ZPB-T3J50-N01
ZPB-T3J50-T01
ZPB-T3J75-B01
ZPB-T3J75-N01
ZPB-T3J75-T01
ZPB-T3J100-B01
ZPB-T3J100-N01
ZPB-T3J100-T01



ZP100H□ ZP125H□ ZP100HB□ ZP125HB□

Applicable pad part no.

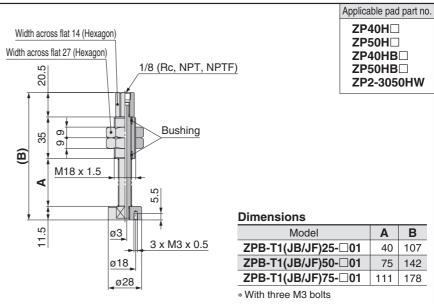
Dimensions

Model	Α	В
ZPB-T3J25-□01	44	131
ZPB-T3J50-□01	80	167
ZPB-T3J75-□01	120	207
ZPB-T3J100- □ 01	155	242

* With four M5 bolts

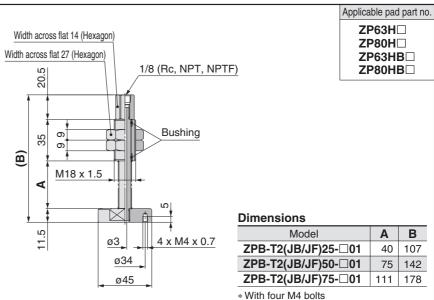
Heavy-duty Buffer Assembly Part No. (Type T)

Buffer assembly part no.		
Buffer body (Material: Brass)	Buffer body (Material: Steel)	
ZPB-T1JB25-B01	ZPB-T1JF25-B01	
ZPB-T1JB25-N01	ZPB-T1JF25-N01	
ZPB-T1JB25-T01	ZPB-T1JF25-T01	
ZPB-T1JB50-B01	ZPB-T1JF50-B01	
ZPB-T1JB50-N01	ZPB-T1JF50-N01	
ZPB-T1JB50-T01	ZPB-T1JF50-T01	
ZPB-T1JB75-B01	ZPB-T1JF75-B01	
ZPB-T1JB75-N01	ZPB-T1JF75-N01	
ZPB-T1JB75-T01	ZPB-T1JF75-T01	
21 0-110075-101	21 0-110175-101	

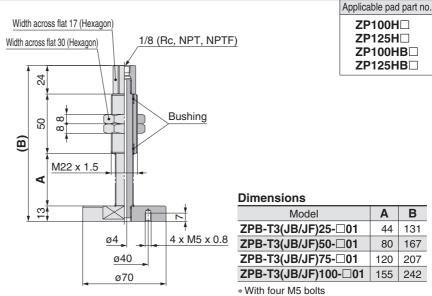


Buffer assembly part no.		
Buffer body (Material: Brass)	Buffer body (Material: Steel)	
ZPB-T2JB25-B01	ZPB-T2JF25-B01	
ZPB-T2JB25-N01	ZPB-T2JF25-N01	
ZPB-T2JB25-T01	ZPB-T2JF25-T01	
ZPB-T2JB50-B01	ZPB-T2JF50-B01	
ZPB-T2JB50-N01	ZPB-T2JF50-N01	
ZPB-T2JB50-T01	ZPB-T2JF50-T01	
ZPB-T2JB75-B01	ZPB-T2JF75-B01	
ZPB-T2JB75-N01	ZPB-T2JF75-N01	
ZPB-T2JB75-T01	ZPB-T2JF75-T01	

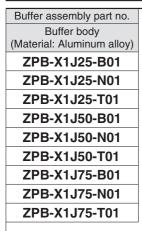
Buffer assembly part no

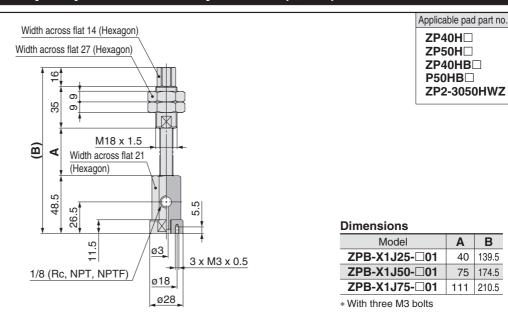


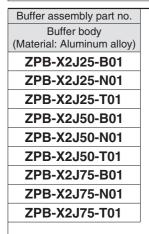
Buffer body (Material: Brass)	Buffer body (Material: Steel)	Width across flat 17 (Hexagon) Width across flat 30 (Hexagon)
ZPB-T3JB25-B01	ZPB-T3JF25-B01	Width across flat 30 (Hexagon) 1/8
ZPB-T3JB25-N01	ZPB-T3JF25-N01	4
ZPB-T3JB25-T01	ZPB-T3JF25-T01	
ZPB-T3JB50-B01	ZPB-T3JF50-B01	
ZPB-T3JB50-N01	ZPB-T3JF50-N01	
ZPB-T3JB50-T01	ZPB-T3JF50-T01	
ZPB-T3JB75-B01	ZPB-T3JF75-B01	M22 x 1.5
ZPB-T3JB75-N01	ZPB-T3JF75-N01	
ZPB-T3JB75-T01	ZPB-T3JF75-T01	20
ZPB-T3JB100-B01	ZPB-T3JF100-B01	<u> </u>
ZPB-T3JB100-N01	ZPB-T3JF100-N01	<u>Ø4</u>
ZPB-T3JB100-T01	ZPB-T3JF100-T01	<u>ø40</u> ▶
		▼ Ø70

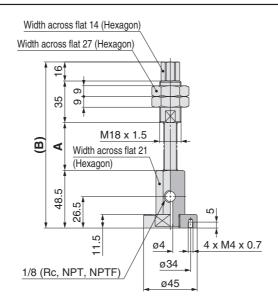


Heavy-duty Buffer Assembly Part No. (Type X)









		263H 280H	
L			
Dimensions Model		A	В
	⊒01	A 40	_
Model			139.5
Model ZPB-X2J25-]01	40	B 139.5 174.5 210.5

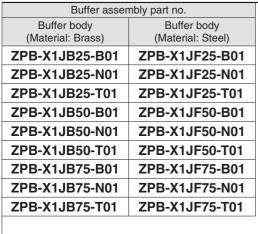
Applicable pad part no.

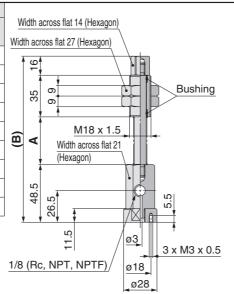
ZP63H□

ZP80H□

Buffer assembly part no.		Applicabl	le pad	part no
Buffer body	Width across flat 17 (Hexagon)	ZP1	00H	
(Material: Aluminum alloy)	↑ → Width across flat 30 \	ZP1	25H	
ZPB-X3J25-B01	(Hexagon)	1	00H	
ZPB-X3J25-N01		ZP1	25H	В⊔
ZPB-X3J25-T01	000			
ZPB-X3J50-B01				
ZPB-X3J50-N01	M22 x 1.5			
ZPB-X3J50-T01	Width across flat 21			
ZPB-X3J75-B01	(Hexagon)			
ZPB-X3J75-N01				
ZPB-X3J75-T01	Dimensions Dimensions	_		
ZPB-X3J100-B01	Mode 7PR-Y3.125		Α	В
	21 B-X3020		44	165
ZPB-X3J100-N01	1/8 (Rc, NPT, NPTF) Ø4		80	201
ZPB-X3J100-T01	ZPB-X3J75	j-□01 _	120	241
	Ø40 ZPB-X3J1 ()0-□01 ⁻	155	276
	ø70 * With four M5	bolts		

Heavy-duty Buffer Assembly Part No. (Type X)





Applicable pad part no.

ZP40H□

ZP50H□

ZP40HB□

ZP50HB□

ZP2-3050HWZ

Applicable pad part no.

ZP63HB□

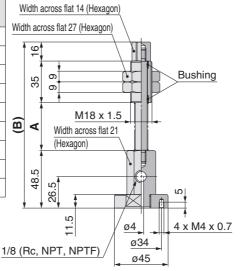
ZP63H□ ZP80H□

Dimensions

Model	Α	В
ZPB-X1(JB/JF)25-□01	40	139.5
ZPB-X1(JB/JF)50-□01	75	174.5
ZPB-X1(JB/JF)75-□01	111	210.5

* With three M3 bolts

Buffer assembly part no.		
Buffer body	Buffer body	
(Material: Brass)	(Material: Steel)	
ZPB-X2JB25-B01	ZPB-X2JF25-B01	
ZPB-X2JB25-N01	ZPB-X2JF25-N01	
ZPB-X2JB25-T01	ZPB-X2JF25-T01	
ZPB-X2JB50-B01	ZPB-X2JF50-B01	
ZPB-X2JB50-N01	ZPB-X2JF50-N01	
ZPB-X2JB50-T01	ZPB-X2JF50-T01	
ZPB-X2JB75-B01	ZPB-X2JF75-B01	
ZPB-X2JB75-N01	ZPB-X2JF75-N01	
ZPB-X2JB75-T01	ZPB-X2JF75-T01	



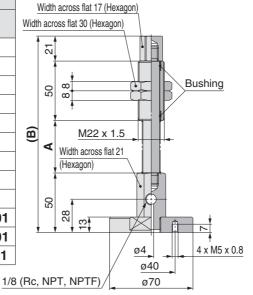
2. 00115

Dimensions

Model	Α	В
ZPB-X2(JB/JF)25-□01	40	139.5
ZPB-X2(JB/JF)50-□01	75	174.5
ZPB-X2(JB/JF)75-□01	111	210.5

* With four M4 bolts

Buffer assembly part no.		
Buffer body (Material: Brass)	Buffer body (Material: Steel)	
ZPB-X3JB25-B01	ZPB-X3JF25-B01	
ZPB-X3JB25-N01	ZPB-X3JF25-N01	
ZPB-X3JB25-T01	ZPB-X3JF25-T01	
ZPB-X3JB50-B01	ZPB-X3JF50-B01	
ZPB-X3JB50-N01	ZPB-X3JF50-N01	
ZPB-X3JB50-T01	ZPB-X3JF50-T01	
ZPB-X3JB75-B01	ZPB-X3JF75-B01	
ZPB-X3JB75-N01	ZPB-X3JF75-N01	
ZPB-X3JB75-T01	ZPB-X3JF75-T01	
ZPB-X3JB100-B01	ZPB-X3JF100-B01	
ZPB-X3JB100-N01	ZPB-X3JF100-N01	
ZPB-X3JB100-T01	ZPB-X3JF100-T01	



ZP100H□ ZP125H□
ZP100HB□
ZP125HB□

Applicable pad part no.

Dimensions

Model	Α	В
ZPB-X3(JB/JF)25-□01	44	165
ZPB-X3(JB/JF)50-□01	80	201
ZPB-X3(JB/JF)75-□01	120	241
ZPB-X3(JB/JF)100-□01	155	276

* With four M5 bolts



Vacuum Equipment Precautions 1

Be sure to read this before handling.

Design/Selection

⚠ Warning

1. Confirm the specifications.

Products represented in this catalogue are designed only for use in compressed air systems (including vacuum).

Do not operate at pressures or temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications.)

Please contact SMC when using a fluid other than compressed air (including vacuum).

We do not guarantee against any damage if the product is used outside of the specification range.

Safe designs should be developed, which account for the possibility of accidents resulting from a drop in vacuum pressure due to power failure or trouble with the air supply, etc.

If vacuum pressure drops and there is a loss of vacuum pad adsorption force, workpieces being carried may fall, causing human injury or damage to machinery. Sufficient safety measures should be implemented, such as drop prevention, to avoid any accidents.

3. Follow vacuum specifications for vacuum switching valves and vacuum release valves.

If non-vacuum equipment is installed in a vacuum piping, vacuum leakage will occur. Therefore, select only equipment for vacuum specifications.

4. Select an ejector which has a suitable suction flow rate.

<When there is vacuum leakage from the workpiece or the piping>

If the ejector's suction flow rate is too low, the adsorption will be poor.

<When piping is long or the diameter is large>

The adsorption response time will delay due to the increased volume of the piping.

Select an ejector with a suitable suction flow rate by referring to the technical data.

5. If the suction flow rate is too high, setting of vacuum switch will become difficult.

Setting the vacuum switch when absorbing a small (few millimeter) workpiece will sometimes become difficult, if the selected ejector has a high suction rate and there is a small pressure difference when absorbing and releasing the workpiece.

6. When two or more pads are piped to one ejector, if one pad releases its workpiece, the other pads will also release.

When one pad releases its workpiece, there is a drop in vacuum pressure which causes the other pad to release its workpiece as well.

Do not disassemble the product or make any modifications, including additional machining.

It may cause human injury and/or an accident. When disassembling or assembling the product for the purpose of replacing parts, etc., be certain to follow the operation manual or catalogues.

8. Check valve

SMC can issue no guarantees regarding the maintenance of workpiece adsorption when using check valves. Take separate safety measures to prevent workpieces from dropping in the case of an electrical power outage, etc. Please consult with SMC when using check valves as a means of preventing interference caused by the exhaust from nearby ejectors.

⚠ Caution

1. Mounting the suction filter

Because the suction of vacuum equipment acts not only on workpieces but also on dust or water droplets in the surrounding atmosphere, steps must be taken to prevent their penetration into the equipment's interior.

Even when using equipment equipped with filters, if there is a considerable amount of dust in the environment, use a separately ordered large-size filter as well.

If there is a possibility of water droplets being sucked in by the vacuum, use a drain separator for vacuum.

2. The maximum vacuum pressure of the vacuum ejector is affected by the atmospheric pressure of the operating environment.

As atmospheric pressure changes based on altitude, climate, etc., the actual maximum vacuum pressure may not reach the value listed in the specifications.

- For information on related items, such as directional control equipment and drive equipment, refer to the caution sections in each respective catalogue.
- 4. Do not use the product in an environment that exposes it to vibration. If the product is used in such an environment, we can offer a lock nut type product to prevent it from loosening. Please contact SMC for model number.

Mounting

Marning

1. Operation manual

Install the products and operate them only after reading the operation manual carefully and understanding its contents. Also, keep the manual available whenever necessary.

2. Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance.

3. Tighten threads with the proper tightening torque.

When installing the products, follow the listed torque specifications

4. Do not obstruct the exhaust port of the ejector.

If the exhaust port is obstructed when mounted, a vacuum will not be generated. Also, do not obstruct the exhaust port with the goal of removing the workpiece. It may cause damage to the equipment.





Vacuum Equipment Precautions 2

Be sure to read this before handling.

Piping

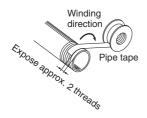
 Refer to the Fittings and Tubing Precautions (Best Pneumatics No. 6) for handling onetouch fittings.

2. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

3. Wrapping of pipe tape

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not enter the piping. Also, if pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



4. Use piping with an adequate conductance.

Select equipment and piping for the vacuum side which has an adequate conductance so that the ejector's maximum suction flow rate can be accommodated by the piping.

Also, make sure that there are no unnecessary restrictions or leaks, etc., along the course of the piping. Furthermore, design the air supply taking into consideration the ejector's maximum air consumption and the air consumption of other pneumatic circuits.

5. Avoid disorganized piping.

Use direct piping with the shortest possible length should be used for both the vacuum and supply sides. Disorganized piping should be avoided. Unnecessary length increases the piping volume, and the response time.

6. Use piping with a large conductance on the exhaust side of the ejector.

If the exhaust piping is restrictive, there will be a decline in the ejector's performance.

7. Be certain that there are no crushed areas in the piping due to damage or bending.

Air Supply

Warning

1. Type of fluids

Please consult with SMC when using the product in applications other than compressed air.

2. When there is a large amount of drainage.

Compressed air containing a large amount of drainage can cause malfunction of pneumatic equipment. An air dryer or water separator should be installed upstream from filters.

Air Supply

Marning

3. Drain flushing

If condensation in the water separator and drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. It causes malfunction of pneumatic equipment.

If the drain bowl is difficult to check and remove, installation of a drain bowl with an auto drain option is recommended. For compressed air quality, refer to SMC's Best Pneumatics catalogue.

4. Use clean air.

Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, as it can cause damage or malfunction.

Operating Environment

Marning

- Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these substances.
- 2. Do not use in a place subject to heavy vibration and/or shock.
- 3. Do not use in an environment where flammable gas or explosive gas exists, as it may cause fire or explosion. The products do not have an explosion proof construction.
- 4. The valve should not be exposed to prolonged sunlight. Use a protective cover.
- 5. Remove any sources of excessive heat.
- 6. In locations where there is contact with spatter from water, oil, solder, etc., take suitable protective measures.
- 7. In cases where the vacuum unit is surrounded by other equipment, or the unit is energized for an extended time, take measures to exhaust excess heat so that the temperature is within specifications.

⚠ Caution

1. Under certain conditions, the exhaust of the vacuum ejector may generate intermittent noises, and vacuum pressure may be uneven.

Using the ejector under these conditions will not result in decreased performance, but if the intermittent noise becomes a nuisance, or if there is an adverse effect on the operation of the vacuum pressure switch, try lowering or raising the supply pressure of the vacuum ejector to find a supply pressure level at which the intermittent noise ceases.





Vacuum Equipment Precautions 3

Be sure to read this before handling.

Maintenance

Marning

Perform maintenance inspection according to the procedures indicated in the operation manual

If handled improperly, malfunction and damage of machinery or equipment may occur.

2. Maintenance work

If handled improperly, compressed air can be dangerous. Assembly, handling, repair and element replacement of pneumatic systems should be performed by a knowledgeable and experienced person.

3. Drain flushing

Remove drainage regularly from the water separator, air filters, vacuum drain separator, etc.

4. Removal of equipment, and supply/exhaust of compressed air

When components are removed, first confirm that measures are in place to prevent workpieces from dropping, run-away equipment, etc. Then, cut off the supply pressure and electric power, and exhaust all compressed air from the system using the residual pressure release function.

When machinery is restarted after remounting or replacement, first confirm that measures are in place to prevent lurching of actuators. Then, confirm that the equipment is operating normally.

5. Clean suction filters and silencers on a regular basis.

The performance of an ejector will deteriorate due to clogged filters and silencers. High flow filters should be used, especially in dusty locations.



These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) 1), and other safety regulations.

♠ Danger:

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious

iniurv.

Marning:

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate

1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components.

ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components.

IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)

ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

- 3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.
 - 1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
 - 2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
 - 3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
- 4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.
 - 1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
 - 2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogues and operation manuals.
 - 3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.

Use in non-manufacturing industries is not covered.

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and **Disclaimer/Compliance** Requirements

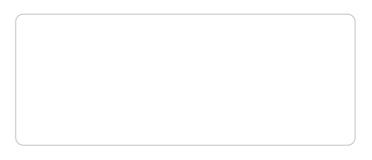
The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements". Read and accept them before using the product.

Limited warranty and Disclaimer

- 1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first. ²⁾ Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
- 2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product
- 3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.
- 2) Vacuum pads are excluded from this 1 year warranty. A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited

Compliance Requirements

- 1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
- 2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed



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