

Vacuum Pad

ZP2 Series

More shapes and sizes of pads. Applicable for various types of work pieces. **RoHS**

Compact/Short/Nozzle $\phi 0.8$ to $\phi 15$ P.528 to 536

Compact,
Space-saving



Thin Flat/Flat $\phi 5$ to $\phi 30$ P.537 to 539

For sheets or vinyl



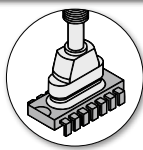
Bellows $\phi 2$ to $\phi 46$ P.540 to 548

For spherical work pieces or work pieces with inclined surface



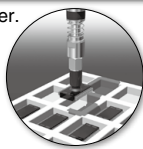
Oval 3.5×7 to 8×30 P.550 to 556

For rectangular
work pieces



Ball Spline Buffer $\phi 2$ to $\phi 8$ P.557

Ball spline guide is used to the buffer.



Mark-free $\phi 4$ to $\phi 125$ P.558 to 562

For use where adsorption marks must not be left on work pieces.



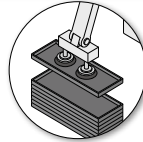
Sponge $\phi 4$ to $\phi 15$ P.563 to 565

For work pieces with bumps



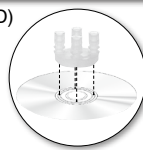
Heavy-duty $\phi 32$ to $\phi 340$ P.566 to 591

For heavy or large
work pieces



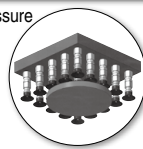
Special Configuration P.592 to 594

For stage setting of disks (CD, DVD)
or glass substrates



Vacuum Saving Valve P.627 to 635

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



ZP2/ZP Series Adapter/Buffer Applicable Pad List ---P.595

ZP2 Series Mounting Adapter Part No.P.602

ZP Series Mounting Adapter Part No.P.607

ZP2 Series Adapter Assembly Part No.P.610

ZP Series Adapter Assembly Part No.P.611

ZP2 Series Buffer Assembly Part No.P.613 to 621

ZP Series Buffer Assembly Part No. ---P.614 to 619, P.622 to 625

ZP3

ZP3E

ZP2

ZP2V

ZP

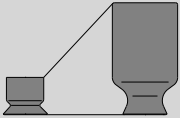
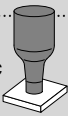
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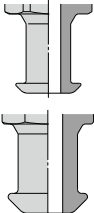
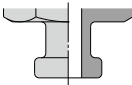
ZPR

XT661

ZP2 Series

Series Variations

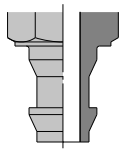
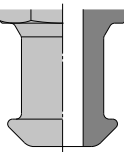
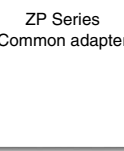
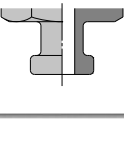
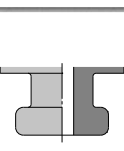
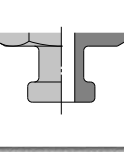
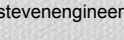
Variations	Pad			Adapter type	Page
	Symbol	Type	Diameter		
Compact Pad ■Flat For adsorption of general work pieces For adsorption of work pieces with flat and not deformed surface ■Flat with rib For a workpiece which is likely to deform or for releasing a workpiece certainly ■Thin flat For a workpiece which is likely to deform ■Bellows For adsorption of work pieces with inclined surface	 Single unit	U	Flat	ø3, ø4	P.528
	 Single unit	C	Flat with rib	ø6, ø7, ø8	P.528
	 Single unit	UT	Thin flat	ø5, ø6	P.528
	 Single unit	B	Bellows	ø6, ø8	P.528
Short-type Pad ■Space-saving in the height direction 	 Single unit With adapter	MU		ø2, ø3.5, ø4 ø5, ø6, ø8 ø10, ø15	P.529
	 Single unit With adapter	EU	Flat	ø2, ø4, ø6 ø8, ø15	P.532
	 Single unit	AU		ø2, ø3, ø4 ø6, ø8	P.535
Nozzle Pad ■For adsorption of small components such as IC chips 	 Single unit With adapter	AN	Nozzle	ø0.8, ø1.1	P.536
Thin Flat Pad ■For adsorption of soft work pieces 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	P.537

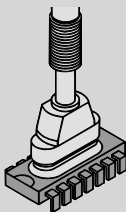
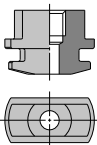
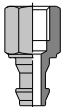
Variations	Pad			Adapter type	Page
	Symbol	Type	Diameter		
Flat Pad ■ For adsorption of flexible sheets or film. Deformation of the flat surface during adsorption is reduced.		MT	Thin flat (With groove)	ø10, ø15 ø20, ø25 ø30	 P.538
Bellows Pad ■ For use where there is no space for the buffer (spring type). For adsorption of work pieces with inclined surface		J	Bellows (Multistage type)	ø6, ø9, ø10 ø14, ø15 ø16, ø25 ø30	 P.540 ZP Series Common adapter
		MB		ø4, ø6, ø8 ø10, ø15 ø20	 P.541
		ZJ	Bellows	ø2, ø4, ø5 ø6, ø40, ø46	— P.543
				ø15, ø20 ø30, ø40 ø46	 P.544

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Variations	Pad			Adapter type	Page
	Symbol	Type	Diameter		
Blast-type Pad ■ Blast treatment to create finely uneven surface for adsorption. Work pieces can be removed easily.					
 Single unit	U	Flat	ø4		P.528
 Single unit	C	Flat with rib	ø6, ø8		P.528
 Single unit	B	Bellows	ø6, ø8		P.528
 Single unit	J	Bellows (Multistage type)	ø10, ø15 ø25, ø30	ZP Series Common adapter	P.540
 Single unit With adapter	MU	Flat	ø2, ø3.5, ø4 ø5, ø6, ø8 ø10, ø15		P.529
 Single unit With adapter	EU	Flat	ø2, ø4, ø6		P.532
 Single unit With adapter	MT	Thin flat (With groove)	ø10, ø15 ø20, ø25 ø30		P.538
 Single unit With adapter	MB	Bellows	ø4, ø6, ø8 ø10, ø15 ø20		P.541

Variations	Pad			Adapter type	Page
	Symbol	Type	Diameter		
Oval Pad ■ For work pieces with limitations on the adsorption surface 	 Single unit	W	Oval		P.550
 With adapter: Vacuum inlet direction Vertical	P.551				
 With buffer: Vacuum inlet direction Vertical	P.552				
 With adapter: Vacuum inlet direction Lateral	P.554				
 With buffer: Vacuum inlet direction Lateral	P.556				
 With buffer: Vacuum inlet direction Vertical	P.557				
Pad with Ball Spline Buffer ■ Ball spline guide is used to the buffer. 	 With buffer: Vacuum inlet direction Vertical	U	Flat	 ZP Series Common adapter	P.557

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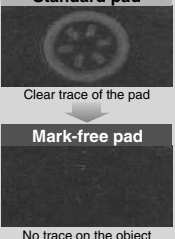
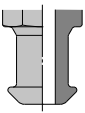
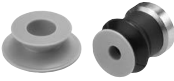
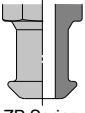
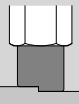
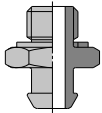
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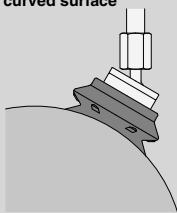
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Series Variations

Variations	Pad			Adapter type	Page
	Symbol	Type	Diameter		
Mark-free Pad ■ For use where adsorption marks must not be left on work pieces.  Standard pad Clear trace of the pad Mark-free pad No trace on the object ● Mark-free NBR pad ● Stuck fluororesin pad Related Pad <i>Made to Order</i> Cyclone Pad (Non-contact Gripper) P. 727		U	Flat	ø4, ø6, ø8 ø10, ø16 ø25, ø32 ø40, ø50	 ZP Series Common adapter P.560
	H	Heavy-duty (Flat with rib)	ø40, ø50 ø63, ø80 ø100, ø125	—	P.561
Resin Attachment ■ Mark-free. Prevents sticking of the rubber and the workpiece.  Attachment		—	Bellows	ø6, ø8 ø10, ø13 ø16, ø20 ø25, ø32	 ZP Series Common adapter P.562
Sponge Pad ■ For adsorption of work pieces with bumps 		S	Sponge	ø4, ø6 ø8, ø10 ø15	 P.563
					P.564
Heavy-duty Pad ■ For heavy or large work pieces		H	Heavy-duty (Flat with rib)	ø32, ø300 ø340	P.566
	HT	Heavy-duty (Thin flat with rib)	ø150, ø250	—	P.566
	HB	Heavy-duty (Bellows)	ø32, ø150	—	P.568
	HW	Heavy-duty (Oval)	30 x 50	—	P.569

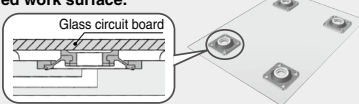
Variations	Pad			Page	
	Symbol	Type	Diameter		
Heavy-duty Ball Joint Pad ■ For adsorption of work pieces with inclined or curved surface 		H	Heavy-duty (Flat with rib)	ø40 ø50 ø63 ø80 ø100 ø125	P.570
	With adapter: Vacuum inlet direction Vertical				P.571
					P.571
	With adapter: Vacuum inlet direction Lateral				P.572
					P.572
	With buffer: Vacuum inlet direction Vertical				P.574
					P.574
	With buffer: Vacuum inlet direction Lateral				P.576
		HB	Heavy-duty (Bellows)	ø40 ø50 ø63 ø80 ø100 ø125	P.576
	With adapter: Vacuum inlet direction Vertical				P.577
					P.577
	With adapter: Vacuum inlet direction Lateral				P.578
					P.578
	With buffer: Vacuum inlet direction Vertical				P.580
					P.580
	With buffer: Vacuum inlet direction Lateral				P.580

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Variations		Pad			Adapter type	Page
		Symbol	Type	Diameter		
Heavy-duty Pad ■ Heavy-duty type (Flat with rib) Ideal for heavy or large work pieces such as CRT and automobile bodies ■ Heavy-duty type (Bellows) • Ideal for work pieces with curved surface • Ideal for heavy or large work pieces		H	Heavy-duty (Flat with rib)	ø40, ø50 ø63, ø80 ø100, ø125	ZP Series Common adapter	P.582
		HB	Heavy-duty (Bellows)			P.582

Applications (Pad/Adapter)

Variations		Note	Page
Vacuum Pad for Transferring Disks ■ For adsorbing circular components like CD and DVD ■ Bellows mechanism is realized in the pad to dampen the impact to the work. 		20 x 25 (ID x OD: PCD 22.5)	P.592
Vacuum Pad for Fixing Panel ■ For adsorbing and fixing the stage of panels or glass circuit board, etc. ■ Bellows mechanism allows complete contact with curved work surface. 		—	P.593
Vacuum Saving Valve ■ Can restrict the reduction of vacuum pressure even when there is no workpiece. ■ No need for switching operation when changing work pieces ■ Multiple vacuum pads can be operated by one ejector. 		Connection thread size for pad side • M5 x 0.8 • M6 x 1 • M8 x 1.25 • R1/8 • Rc1/8 • G1/8 • NPT1/8	P.627

ZP2/ZP Series Adapter/Buffer Applicable Pad List P.595

ZP2 Series Mounting Adapter Part No. P.602

ZP Series Mounting Adapter Part No. P.607

ZP2 Series Adapter Assembly Part No. P.610

ZP Series Adapter Assembly Part No. P.611

ZP2 Series Buffer Assembly Part No. P.613

ZP Series Buffer Assembly Part No. P.622

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Vacuum Equipment Model Selection

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8	Data	P.520
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1 Features and Precautions for Vacuum Adsorption

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

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

However, special care is required in the following conditions.

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

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

2 Vacuum Pad Selection

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

Example) Theoretical lifting force = Pressure x Area

Pad diameter	Area (cm²)	2 times	
		Vacuum pressure [-40 kPa]	Vacuum pressure [-80 kPa]
ø20	3.14	Theoretical lifting force 12 N	Theoretical lifting force 25 N
ø40	12.56	Theoretical lifting force 50 N	Theoretical lifting force 100 N

4 times

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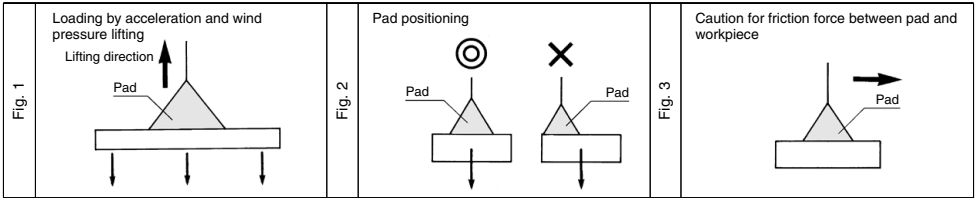
Model Selection

B. Shear Force and Moment Applied to Vacuum Pad

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

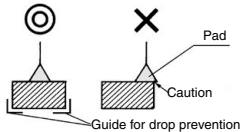
Lifting Force, Moment, Horizontal Force

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

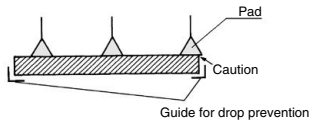


Balance of Pad and Workpiece

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



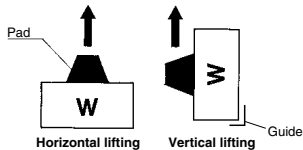
If multiple pads are used for transferring a flat object with a large surface area, properly allocate the pads to maintain balance. Also make sure that the pads are aligned properly to prevent them from becoming disengaged along the edges.



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

Mounting Position

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



● Lifting Force and Vacuum Pad Diameter

1. Theoretical Lifting Force

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

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

Calculation

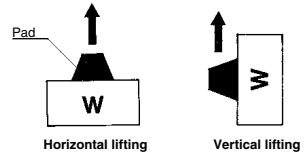
$$W = P \times S \times 0.1 \times \frac{1}{t}$$

W : Lifting force (N)

P : Vacuum pressure (kPa)

S : Pad area (cm²)

t : Safety factor Horizontal lifting: 4 or more
Vertical lifting: 8 or more



(This type of application should basically be avoided.)

Theoretical Lifting Force

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

Lifting force = Theoretical lifting force ÷ t

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

Pad Diameter (ø1.5 to ø50)

Pad diameter (mm)	ø1.5	ø2	ø3.5	ø4	ø6	ø8	ø10	ø13	ø16	ø20	ø25	ø32	ø40	ø50
Pad area S (cm ²)	0.02	0.03	0.10	0.13	0.28	0.50	0.79	1.33	2.01	3.14	4.91	8.04	12.6	19.6
Vacuum pressure (kPa)	-85	0.15	0.27	0.82	1.07	2.40	4.2	6.6	11	17	26	41	68	106
	-80	0.14	0.25	0.77	1.00	2.26	4.0	6.2	10	16	25	39	64	100
	-75	0.13	0.24	0.72	0.94	2.12	3.7	5.8	10	15	23	36	60	94
	-70	0.12	0.22	0.67	0.88	1.98	3.5	5.5	9.3	14	22	34	56	87
	-65	0.11	0.20	0.63	0.82	1.84	3.2	5.1	8.6	13	20	31	52	81
	-60	0.11	0.19	0.58	0.75	1.70	3.0	4.7	8.0	12	18	29	48	75
	-55	0.10	0.17	0.53	0.69	1.55	2.7	4.3	7.3	11	17	27	44	69
	-50	0.09	0.16	0.48	0.63	1.41	2.5	3.9	6.7	10	15	24	40	62
	-45	0.08	0.14	0.43	0.57	1.27	2.2	3.5	6.0	9.0	14	22	36	56
	-40	0.07	0.13	0.38	0.50	1.13	2.0	3.1	5.3	8.0	12	19	32	50

Pad Diameter (ø63 to ø340)

Pad diameter (mm)	ø63	ø80	ø100	ø125	ø150	ø200	ø250	ø300	ø340
Pad area S (cm ²)	31.2	50.2	78.5	122.7	176.6	314.0	490.6	706.5	907.5
Vacuum pressure (kPa)	-85	265	427	667	1043	1501	2669	4170	6005
	-80	250	402	628	982	1413	2512	3925	5652
	-75	234	377	589	920	1325	2355	3680	5299
	-70	218	351	550	859	1236	2198	3434	4946
	-65	203	326	510	798	1148	2041	3189	4592
	-60	187	301	471	736	1060	1884	2944	4239
	-55	172	276	432	675	971	1727	2698	3886
	-50	156	251	393	614	883	1570	2453	3533
	-45	140	226	353	552	795	1413	2208	3179
	-40	125	201	314	491	706	1256	1962	2826

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

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

Model Selection

● Vacuum Pad Type

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

Pad Type

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

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

● Vacuum Pad Material

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

Vacuum Pad/Example of Workpiece Transfer

Material

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

Model Selection

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

● Rubber Material and Properties

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

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

● Color and Identification (ZP/ZP2)

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

● Color and Identification (ZP3)

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

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



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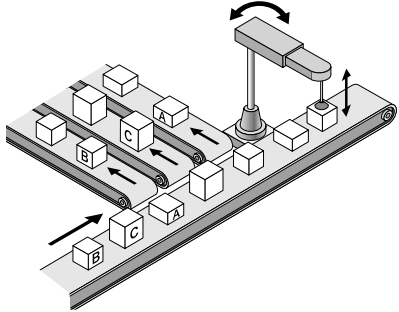
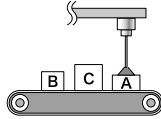
Model Selection

● Buffer Attachment

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

Unsteady Distance between Pad and Workpiece

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

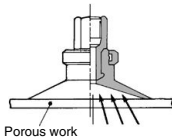


● Pad Selection by Workpiece Type

- Carefully select a pad for the following workpieces.

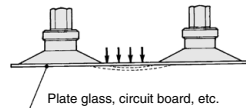
1. Porous Workpiece

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



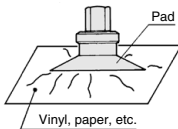
2. Flat Plate Workpiece

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



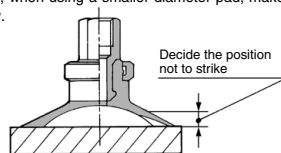
3. Soft Workpiece

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



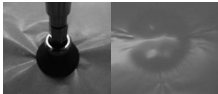
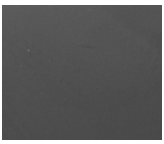
4. Impact to Pad

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



5. Adsorption Mark

The main adsorption marks are as follows:

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

Vacuum Pad Durability

- Need to be careful of the vacuum pad (rubber) deterioration.
- When the vacuum pad is used continuously, the following problems may occur.
 - 1) Wear-out of the adsorption surface.
 - Shrinkage of the pad dimensions, sticking of the part where the rubber materials come into contact with each other (bellows pad)
 - 2) Weakening of the rubber parts (skirt of the adsorption surface, bending parts, etc.)
- * It may occur at an early stage depending on the operating conditions (high vacuum pressure, suction time [vacuum holding], etc.).
- Decide when to replace the pads, referring to the signs of deterioration, such as changes in the appearance due to wear, reduction in the vacuum pressure or delay in the transport cycle time.

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Model Selection

3 Selection of Vacuum Ejector and Vacuum Switching Valve

● Calculating Vacuum Ejector and Switching Valve Size with the Formula

Average suction flow rate for achieving adsorption response time

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

$$T_2 = 3 \times T_1$$

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

V : Piping capacity (L)

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

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

Q_L : Leakage volume during workpiece adsorption L/min (ANR) ^{Note 1)}

Max. suction flow rate

$$Q_{max} = (2 \text{ to } 3) \times Q \text{ L/min (ANR)}$$

<Selection Procedure>

● Ejector

Select the ejector with the greater maximum suction flow rate from the **Q_{max}** indicated above.

● Direct operation valve

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

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

Note 1) **Q_L**: 0 when no leakage occurs during adsorbing a workpiece.

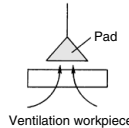
If there is leakage during adsorbing a workpiece, find the leakage volume based on "4. Leakage Volume during Workpiece Adsorption."

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

4 Leakage Volume during Workpiece Adsorption

Air could be drawn in depending on the type of workpiece. As a result, the vacuum pressure in the pad becomes reduced and the amount of vacuum that is necessary for adsorption cannot be attained.

When this type of workpiece must be handled, it is necessary to select the proper size of the ejector and the vacuum switching valve by taking into consideration the amount of air that could leak through the workpiece.



● Leakage Volume from Conductance of Workpiece

$$\text{Leakage volume } Q_L = 55.5 \times C_L$$

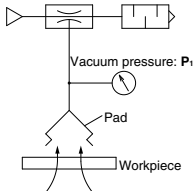
Q_L: Leakage volume L/min (ANR)

C_L: Conductance between workpiece and pad, and workpiece opening area [dm³/(s-bar)]

● Leakage Volume from Adsorption Test

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

At this time, read vacuum pressure **P_v**, 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.

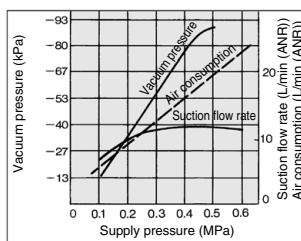
<Selection Procedure>

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). (A→B→C)

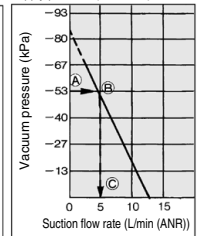
$$\text{Leakage volume} = \text{Suction flow rate } 5 \text{ L/min (ANR)}$$

ZH07BS, ZH07DS

Exhaust Characteristics



Flow rate Characteristics

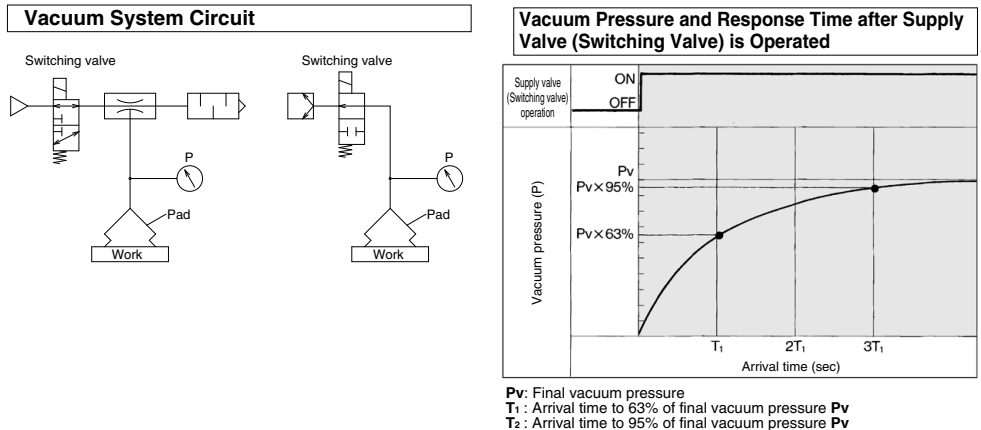


5 Adsorption Response Time

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

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

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



● Calculating Adsorption Response Time with the Formula

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

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

Adsorption response time $T_2 = 3 \times T_1$

Piping capacity

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

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

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

• Vacuum pump

$$Q_1 = (1/2 \text{ to } 1/3) \times 55.5 \times \text{Conductance of vacuum pump [dm}^3\text{/(s}\cdot\text{bar)]}$$

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

$$Q_2 = C \times 55.5 \text{ L/min [ANR]}$$

Q: Smaller one between the **Q₁** and **Q₂** L/min [ANR]

C: Conductance of piping [dm³/(s·bar)]

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

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Model Selection

● Adsorption Response Time from the Selection Graph

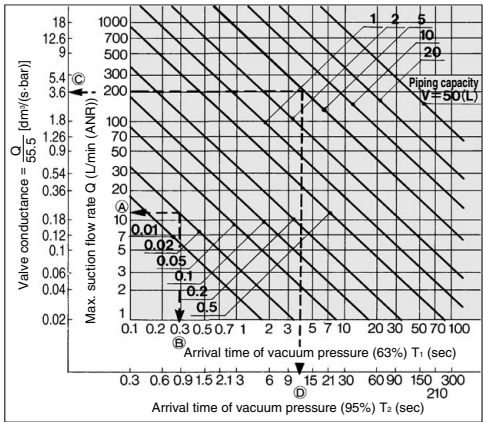
1. Tube Piping Capacity

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

2. Obtain the adsorption response times.

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

Selection Graph (1) Adsorption Response Time



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

How to read the graph

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

<Selection Procedure>

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

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

<Selection Procedure>

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

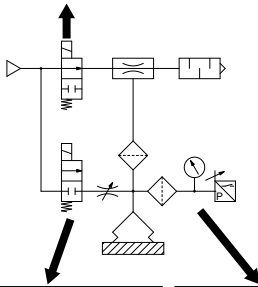
6 Precautions on Vacuum Equipment Selection and SMC's Proposal

● Safety Measures

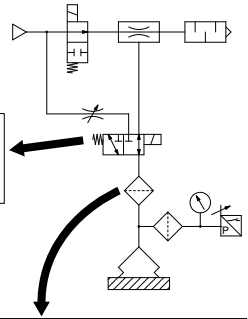
- Make sure to provide a safe design for a vacuum pressure drop due to a disruption of power supply, or a lack of supply air. Drop prevention measures must be taken in particular when dropping a workpiece presents some degree of danger.

● Precautions on Vacuum Equipment Selection

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

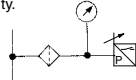


Be aware that the composite conductance consisting of the areas from the pad to the ejector of a vacuum switching valve does not decrease.



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

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



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

● Vacuum Ejector or Pump and Number of Vacuum Pads

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

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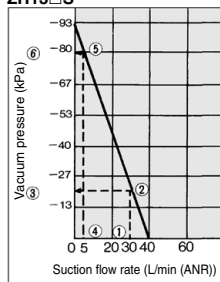
Model Selection

● Vacuum Ejector Selection and Handling Precautions

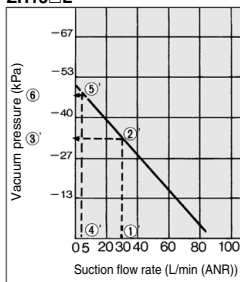
Ejector Selection

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

High Vacuum Type Flow Rate Characteristics/ ZH13□S



High Flow Type Flow Rate Characteristics/ ZH13□L



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

If the leakage volume is 30 L/min (ANR), the vacuum pressure of the S type is -20 kPa ① → ② → ③, and for the L type it is -33 kPa ①' → ②' → ③'. If the leakage volume is 5 L/min (ANR), the vacuum pressure of the S type is -80 kPa ④ → ⑤ → ⑥, and for the L type it is -47 kPa ④' → ⑤' → ⑥'. Thus, if the leakage volume is 30 L/min (ANR) the L type can attain a higher vacuum pressure, and if the leakage volume is 5 L/min (ANR), the S type can attain a higher vacuum pressure.

Thus, during the selection process, make sure to take the flow rate characteristics of the high vacuum type (S type) and the high flow type (L type) into consideration in order to select the type that is optimal for your application.

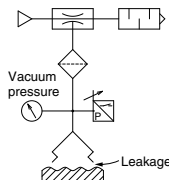
- If the vacuum ejector makes an intermittent noise (abnormal noise) from exhaust at a certain supply pressure, the vacuum pressure will not be stable. It will not be any problem if the vacuum ejector is used under this condition. However, if the noise is disturbing or might affect the operation of the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

● Supply Pressure of Vacuum Ejector

- It is recommended to use the vacuum ejector at the standard supply pressure.

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

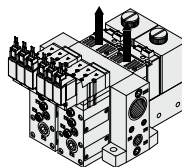
Ejector Nozzle Diameter Selection



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

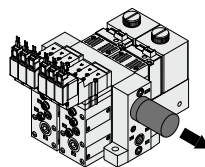
Manifold Use

Individual exhaust



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

Centralized exhaust



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

● Timing for Vacuum Generation and Suction Verification

A. Timing for Vacuum Generation

The time for opening/closing the valve will be counted if a vacuum is generated after the adsorption pad descends to adsorb a workpiece. Also, there is a timing delay risk for the generating vacuum since the operational pattern for the verification switch, which is used for detecting the descending vacuum pad, is not even.

To solve this issue, we recommend that vacuum be generated in advance, before the vacuum pad begins to descend to the workpiece. Adopt this method after confirming that there will be no misalignment resulting from the workpiece's light mass.

B. Suction Verification

When lifting the vacuum pad after absorbing a workpiece, confirm that there is a suction verification signal from the vacuum pressure switch, before the vacuum pad is lifted. If the vacuum pad is lifted, based on the timing of a timer, etc., there is a risk that the workpiece may be left behind.

In general adsorption transfer, the time for adsorbing a workpiece is slightly different since the position of the vacuum pad and the workpiece are different after every operation. Therefore, program a sequence in which the suction completion is verified by a vacuum pressure switch, etc. before moving to the next operation.

C. Set Pressure for Vacuum Pressure Switch

Set the optimum value after calculating the required vacuum pressure for lifting a workpiece.

If a higher pressure than required is set, there is a possibility of being unable to confirm the suction even though the workpiece is adsorbed. This will result in a suction error.

When setting vacuum pressure switch set values, you should set using a lower pressure, with which a workpiece can be adsorbed, only after considering the acceleration or vibration when a workpiece is transferred. The set value of the vacuum pressure switch shortens the time to lift a workpiece. Since the switch detects whether the workpiece is lifted or not, the pressure must be set high enough to detect it.

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

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

Approx. $\phi 1$ adsorption nozzle

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

Note) • A vacuum generator with a large suction capacity will not be detected properly, so an ejector with an appropriate capacity must be selected.

- Since the hysteresis is small, vacuum pressure must be stabilized.



Vacuum pressure switch
ZSE10, ZSE30A



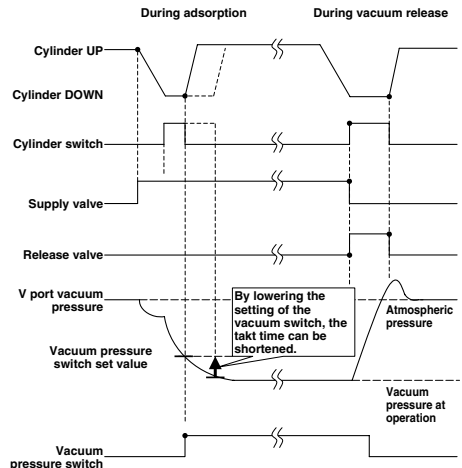
Flow sensor
PFMV



Vacuum pressure
gauge
GZ46

Refer to the Best Pneumatics No. 8 for details.

Timing Chart Example



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● Dust Handling of Vacuum Equipment

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

Air Suction Filter (ZFA, ZFB, ZFC Series)

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

Vacuum Line Equipment Selection

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

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

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

7 Vacuum Equipment Selection Example

● Transfer of Semiconductor Chips

Selection conditions:

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

1. Vacuum Pad Selection

- (1) Based on the workpiece size, the pad diameter is 4 mm (1 pc.).
- (2) Using the formula on page 507, confirm the lifting force.

$$\begin{aligned} W &= P \times S \times 0.1 \times 1/t \\ 0.0098 &= P \times 0.13 \times 0.1 \times 1/4 \\ P &= 3.0 \text{ kPa} \end{aligned} \quad \left\{ \begin{aligned} W &= 1 \text{ g} = 0.0098 \text{ N} \\ S &= \pi/4 \times (0.4)^2 = 0.13 \text{ cm}^2 \\ t &= 4 \text{ (Horizontal lifting)} \end{aligned} \right.$$

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

- (3) Based on the workpiece shape and type, select:
Pad type: Flat with groove
Pad material: Silicone rubber
- (4) According to the results above, select a vacuum pad part number ZP3-04UMS.

2. Vacuum Ejector Selection

- (1) Find the vacuum piping capacity.
Assuming that the tube I.D. is 2 mm, the piping capacity is as follows:
$$V = \pi/4 \times D^2 \times L \times 1/1000 = \pi/4 \times 2^2 \times 1 \times 1/1000 = 0.0031 \text{ L}$$
- (2) Assuming that leakage (Q_L) during adsorption is 0, find the average suction flow rate to meet the adsorption response time using the formula on page 512.

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

From the formula on page 512, the maximum suction flow rate Q_{max} is

$$\begin{aligned} Q_{max} &= (2 \text{ to } 3) \times Q = (2 \text{ to } 3) \times 0.62 \\ &= 1.24 \text{ to } 1.86 \text{ L/min (ANR)} \end{aligned}$$

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

3. Adsorption Response Time Confirmation

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

- (1) The maximum suction flow rate of the vacuum ejector ZX105□ is 5 L/min (ANR). From the formula on page 513, the average suction flow rate Q_1 is as follows:

$$\begin{aligned} Q_1 &= (1/2 \text{ to } 1/3) \times \text{Ejector max. suction flow rate} \\ &= (1/2 \text{ to } 1/3) \times 5 = 2.5 \text{ to } 1.7 \text{ L/min (ANR)} \end{aligned}$$

- (2) Next, find the maximum flow rate Q_2 of the piping. The conductance **C** is **0.22** from the Selection Graph (3).
From the formula on page 513, the maximum flow rate is as follows:

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

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

Thus, from the formula on page 513, the adsorption response time is as follows:

$$\begin{aligned} T &= (V \times 60) / Q = (0.0031 \times 60) / 1.7 = 0.109 \text{ seconds} \\ &= 109 \text{ msec} \end{aligned}$$

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

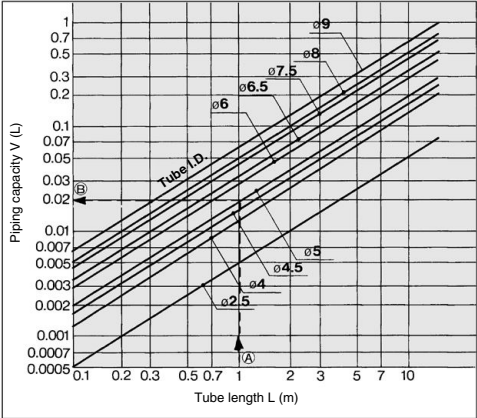
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8 Data

● Selection Graph

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



How to read the graph

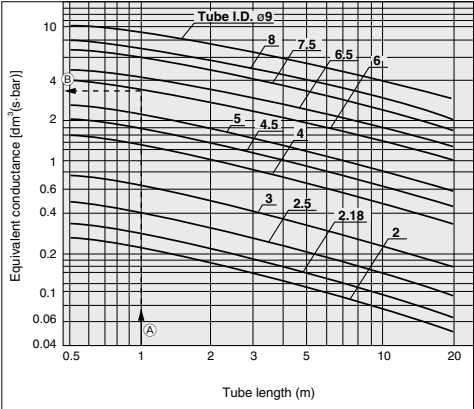
Example: For obtaining the capacity of tube I.D. ø5 and 1 meter length

<Selection Procedure>

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

Piping capacity = 0.02 L

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



How to read the graph

Example: Tube size ø8/ø6 and 1 meter length

<Selection Procedure>

By extending leftward from the point at which the 1 meter tube length on the horizontal axis intersects the line for a tube I.D. ø6, the equivalent conductance approximately 3.6 [dm²/(s·bar)] can be obtained on the vertical axis.

Equivalent conductance = 3.6 [dm²/(s·bar)]

● Glossary of Terms

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

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● Countermeasures for Vacuum Adsorption System Problems (Troubleshooting)

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

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

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● Non-conformance Examples

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

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

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

[Possible causes]

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

[Remedy]

Tighten the nut to the recommended tightening torque.

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

ZP/ZP2

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

郑3

Pad diameter	Product specifications		Nut tightening torque
	Product part no.	Mounting thread size	
ø1.5 to ø3.5	郑3-*(015 to 035) U*	M6 x 0.75 M8 x 0.75	1.5 to 1.8 N·m 2.0 to 2.5 N·m
ø4 to ø16	郑3-*(04 to 16) UM,B* 郑3-*(10 to 16) UM,B*	M8 x 0.75	2.0 to 2.5 N·m

Heavy-duty Pad

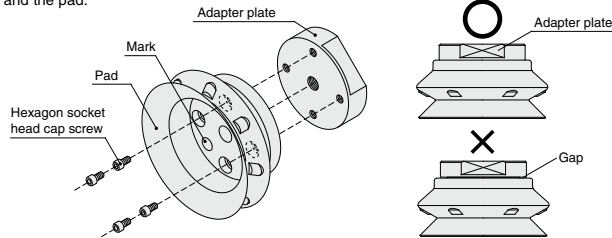
Pad diameter	Product specifications			Nut tightening torque
	Product part no.	Mounting thread size	Buffer body material	
ø40, ø50	ZP□ (40/50) H□	M18 x 1.5	Aluminum alloy	9.5 to 10.5 N·m
	ZP□ (40/50) HB□		Brass	28 to 32 N·m
			Steel	48 to 52 N·m
ø63, ø80	ZP□ (63/80) H□	M18 x 1.5	Aluminum alloy	9.5 to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

Heavy-duty Ball Joint Pad

Pad diameter	Product specifications			Nut tightening torque
	Product part no.	Mounting thread size	Buffer body material	
ø40, ø50	郑2-□F (40/50) H□	M18 x 1.5	Brass	28 to 32 N·m
	郑2-□F (40/50) HB□		Steel	48 to 52 N·m
ø63, ø80	郑2-□F (63/80) H□	M22 x 1.5	Brass	45 to 50 N·m
	郑2-□F (63/80) HB□		Steel	75 to 80 N·m
ø100, ø125	郑2-□F (100/125) H□	M22 x 1.5	Brass	45 to 50 N·m
	郑2-□F (100/125) HB□		Steel	75 to 80 N·m

How to Replace the Pad

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



●Time of Replacement of Vacuum Pad

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

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

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

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

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

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

Recommended Tightening Torque for Replacement of Heavy-duty Pad

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

Tighten the nut to the recommended tightening torque.

ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT
ZPR

XT661



Compact Pad

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

Symbol/Type

U: Flat
C: Flat with rib
UT: Thin flat
B: Bellows

- 7 types of $\varnothing 3$ to $\varnothing 8$ are added.
- Applicable for the ZP series adapter

How to Order

Pad unit **ZP2-03 U N**



Pad diameter		
Symbol	Pad diameter	Blast type
03	$\varnothing 3$	
B04	$\varnothing 4$	●
05	$\varnothing 5$	
06	$\varnothing 6$	
B06	$\varnothing 6$	●
07	$\varnothing 7$	
B08	$\varnothing 8$	●

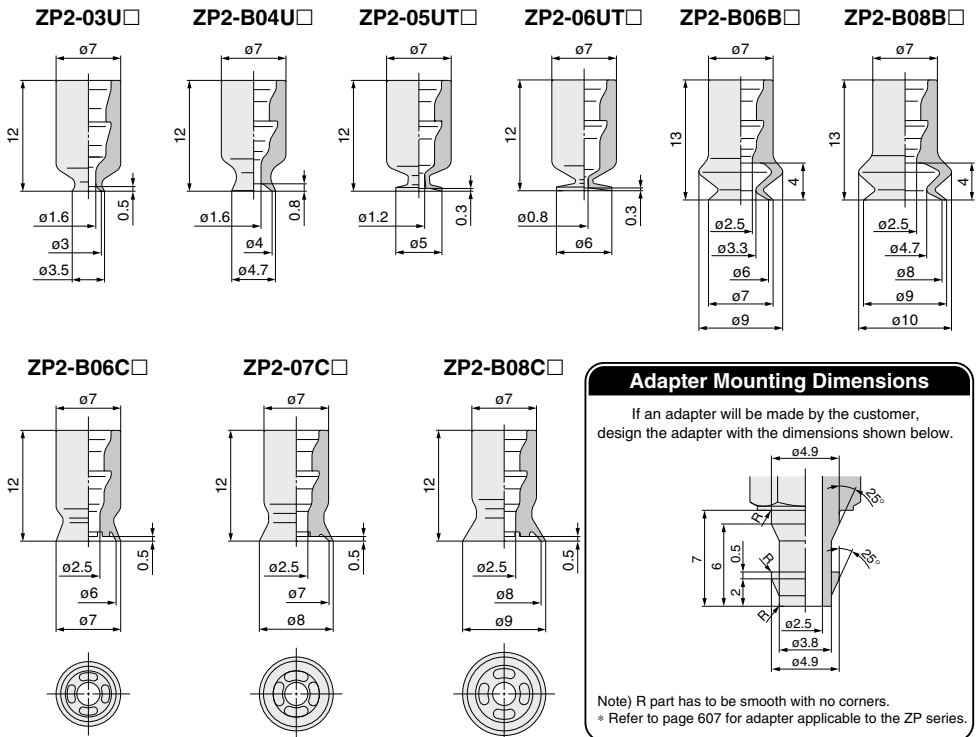
* Blast type: Work pieces can be removed easily.

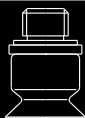
Pad material	
Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

Pad type—Pad diameter

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

Dimensions: Pad Unit





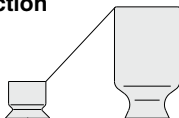
Short-type Pad

Pad diameter $\varnothing 2, \varnothing 3.5, \varnothing 4, \varnothing 5, \varnothing 6, \varnothing 8, \varnothing 10, \varnothing 15$

Symbol/Type

MU: Flat

■ Space-saving in the height direction



How to Order



Pad unit

ZP2 - B02 MU N

Pad diameter

Symbol	Pad diameter	Blast type
B02	$\varnothing 2$	●
B035	$\varnothing 3.5$	●
B04	$\varnothing 4$	●
B05	$\varnothing 5$	●
B06	$\varnothing 6$	●
B08	$\varnothing 8$	●
B10	$\varnothing 10$	●
B15	$\varnothing 15$	●

* Blast type: Work pieces can be removed easily.

Pad type

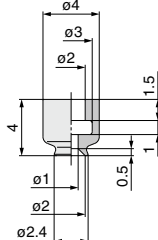
Symbol	Type
MU	Flat

Pad material

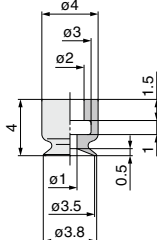
Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

Dimensions: Pad Unit

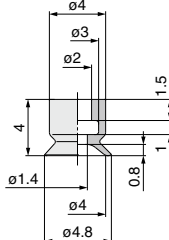
ZP2-B02MU□



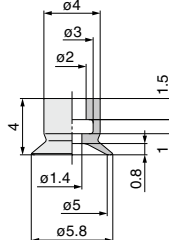
ZP2-B035MU□



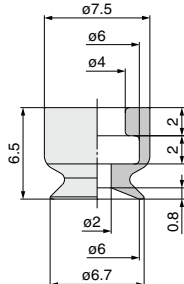
ZP2-B04MU□



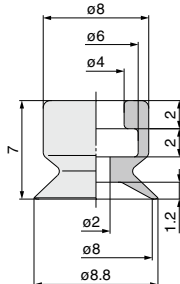
ZP2-B05MU□



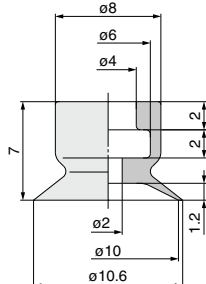
ZP2-B06MU□



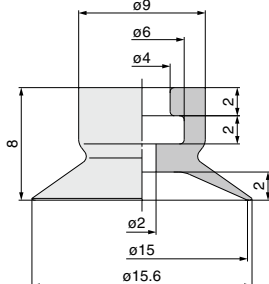
ZP2-B08MU□



ZP2-B10MU□



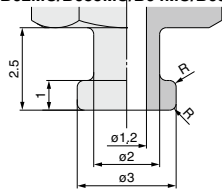
ZP2-B15MU□



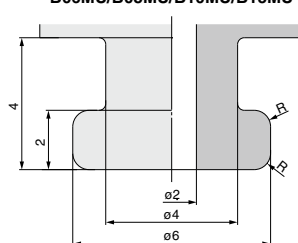
Adapter Mounting Dimensions

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

Applicable pad
B02MU/B035MU/B04MU/B05MU



Applicable pad
B06MU/B08MU/B10MU/B15MU



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

* Refer to page 602 for adapter applicable to the ZP2 series.

ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

ZPR

XT661



How to Order

With adapter **ZP2 - T B02 MU N - A3**

Vacuum inlet direction

Symbol	Direction
T	Vertical

Pad diameter

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

* Blast type: Work pieces can be removed easily.

Pad type

Symbol	Type
MU	Flat

Mounting

Thread size	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

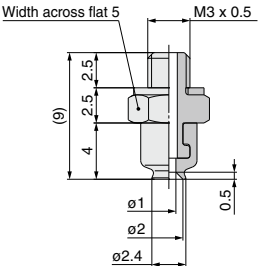
Replacement Part No.

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

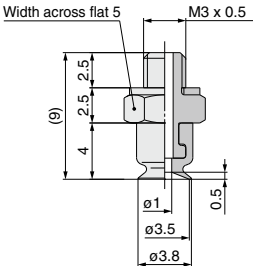
(Note) □ in the table indicates the pad material.

Dimensions: With Adapter

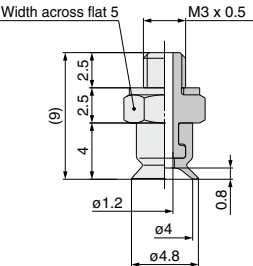
ZP2-TB02MU□-A3



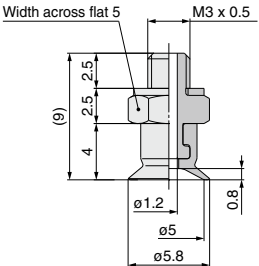
ZP2-TB035MU□-A3



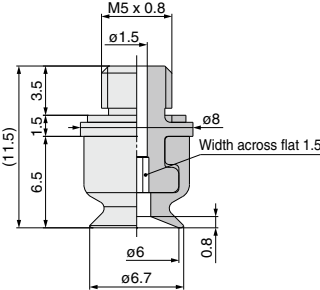
ZP2-TB04MU□-A3



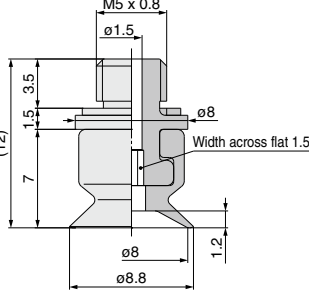
ZP2-TB05MU□-A3



ZP2-TB06MU□-H5

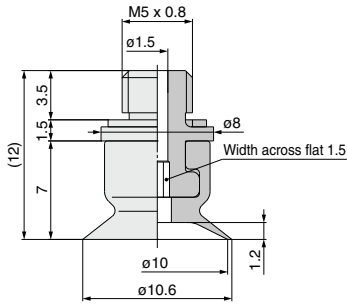


ZP2-TB08MU□-H5

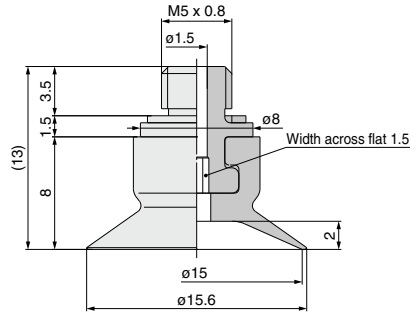


Dimensions: With Adapter

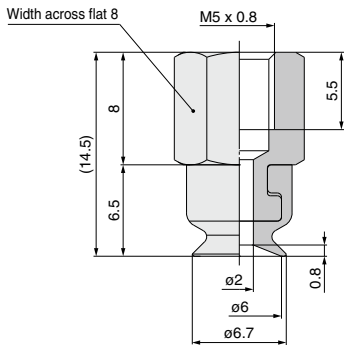
ZP2-TB10MU□-H5



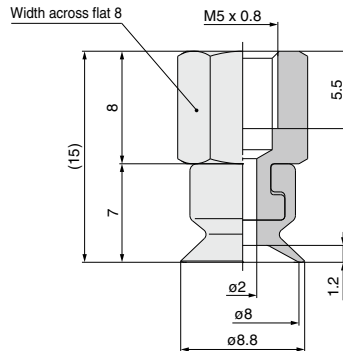
ZP2-TB15MU□-H5



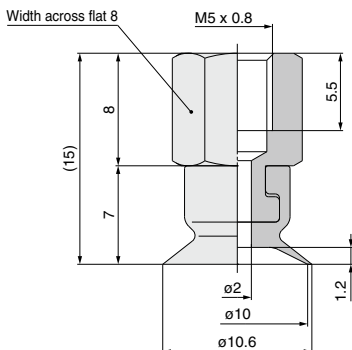
ZP2-TB06MU□-B5



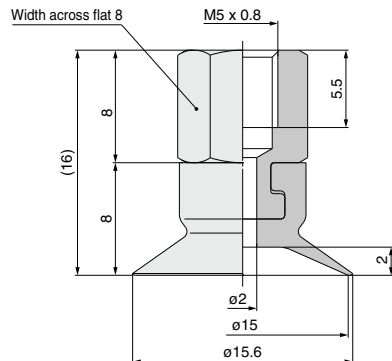
ZP2-TB08MU□-B5



ZP2-TB10MU□-B5



ZP2-TB15MU□-B5



ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

ZPR

XT661



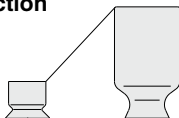
Short-type Pad

Symbol/Type

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

EU: Flat

■ Space-saving in the height direction



How to Order

Pad unit **ZP2 - B02 EU N**



Pad diameter

Symbol	Pad diameter	Blast type
B02	$\varnothing 2$	●
B04	$\varnothing 4$	●
B06	$\varnothing 6$	●
08	$\varnothing 8$	—
15	$\varnothing 15$	—

* Blast type: Work pieces can be removed easily.

Pad material

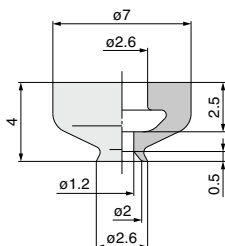
Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

Pad type

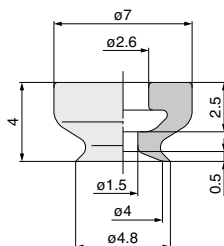
Symbol	Type
EU	Flat

Dimensions: Pad Unit

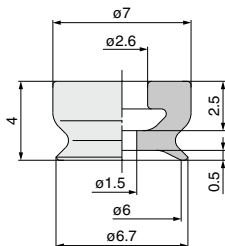
ZP2-B02EU □



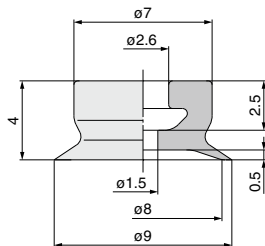
ZP2-B04EU □



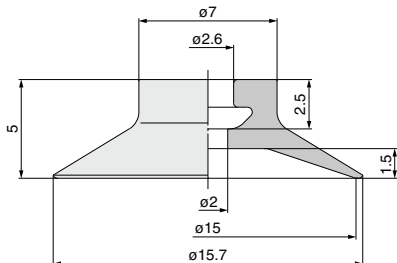
ZP2-B06EU □



ZP2-08EU □

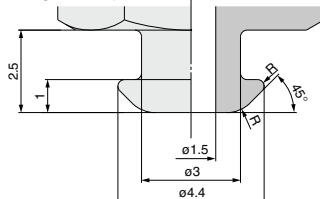


ZP2-15EU □



Adapter Mounting Dimensions

If an adapter will be 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 603 for adapter applicable to the ZP2 series.

How to Order



With adapter **ZP2 - T B02 EU N - A5**

Vacuum inlet direction

Symbol	Direction
T	Vertical

Pad diameter

Symbol	Pad diameter	Blast type
B02	ø2	●
B04	ø4	●
B06	ø6	●
08	ø8	—
15	ø15	—

* Blast type: Work pieces 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

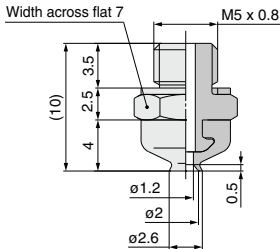
Replacement Part No.

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

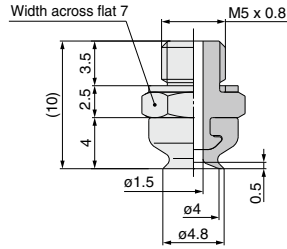
Note) □ in the table indicates the pad material.

Dimensions: With Adapter

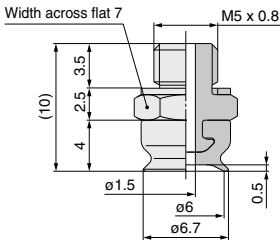
ZP2-TB02EU□-A5



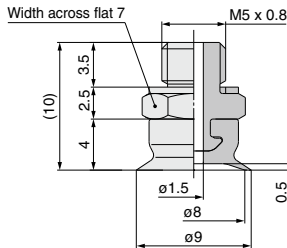
ZP2-TB04EU□-A5



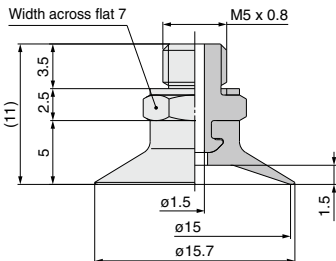
ZP2-TB06EU□-A5



ZP2-T08EU□-A5



ZP2-T15EU□-A5



ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

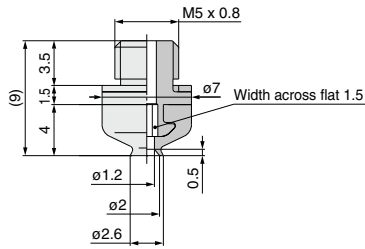
ZPR

XT661

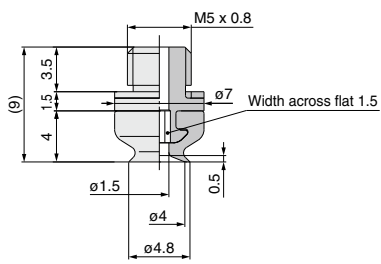
ZP2 Series

Dimensions: With Adapter

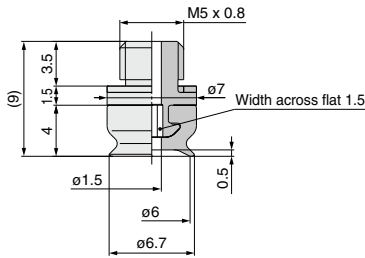
ZP2-TB02EU□-H5



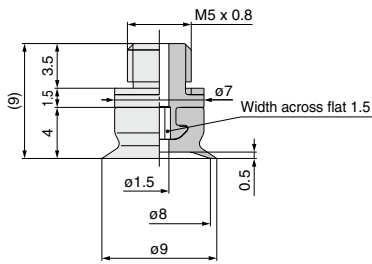
ZP2-TB04EU□-H5



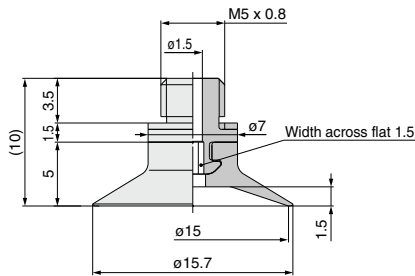
ZP2-TB06EU□-H5



ZP2-T08EU□-H5



ZP2-T15EU□-H5





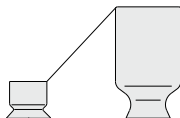
Short-type Pad

Symbol/Type

AU: Flat

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

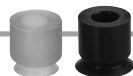
■ Space-saving in the height direction



Note) The mounting adapter is available as a special order.

How to Order

Pad unit **ZP2-02 AU N**



Pad diameter

Symbol	Pad diameter	Blast type
02	$\varnothing 2$	—
03	$\varnothing 3$	—
04	$\varnothing 4$	—
06	$\varnothing 6$	—
B08	$\varnothing 8$	●

* Blast type: Work pieces can be removed easily.

Pad material

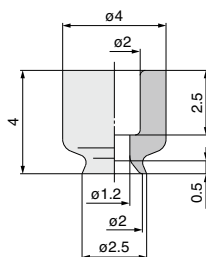
Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

Pad type

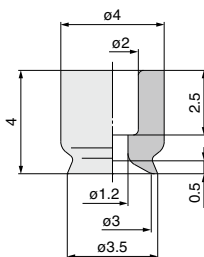
Symbol	Type
AU	Flat

Dimensions: Pad Unit

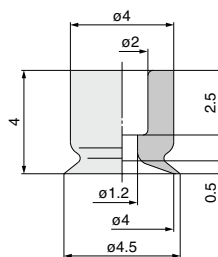
ZP2-02AU □



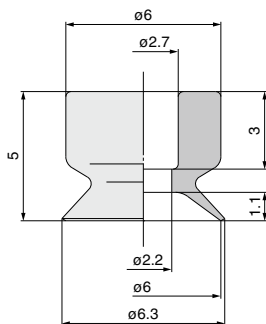
ZP2-03AU □



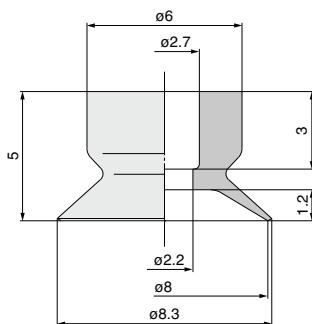
ZP2-04AU □



ZP2-06AU □



ZP2-B08AU □



ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

ZPR

XT661



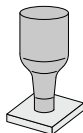
Nozzle Pad

Pad diameter $\varnothing 0.8, \varnothing 1.1$

Symbol/Type

AN: Nozzle

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



How to Order

Pad unit **ZP2-08 AN N**

Pad diameter

Symbol	Pad diameter
08	$\varnothing 0.8$
11	$\varnothing 1.1$

Pad type

Symbol	Type
AN	Nozzle

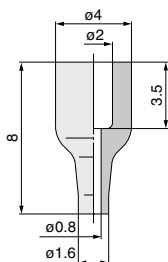
Pad material

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

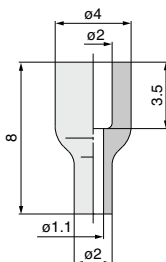


Dimensions: Pad Unit

ZP2-08AN□

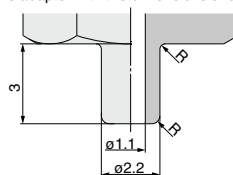


ZP2-11AN□



Adapter Mounting Dimensions

If an adapter will be 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 603 for adapter applicable to the ZP2 series.

How to Order

With adapter **ZP2-T 08 AN N-A5**

Vacuum entry direction

Symbol	Direction
T	Vertical

Pad diameter

Symbol	Pad diameter
08	$\varnothing 0.8$
11	$\varnothing 1.1$

Pad type

Symbol	Type
AN	Nozzle

Pad material

Symbol	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



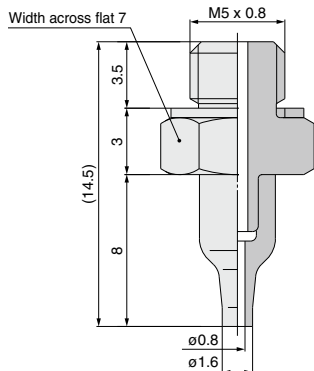
Replacement Part No.

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

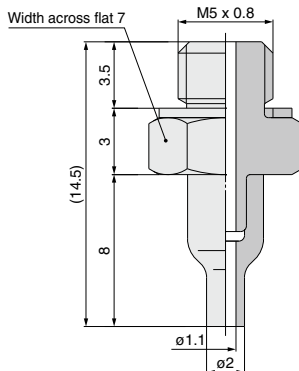
Note) □ in the table indicates the pad material.

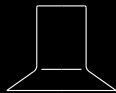
Dimensions: With Adapter

ZP2-T08AN□-A5



ZP2-T11AN□-A5





Thin Flat Pad

Pad diameter $\varnothing 5, \varnothing 6, \varnothing 11, \varnothing 14, \varnothing 18, \varnothing 20$

Symbol/Type

UT: Thin flat (Skirt)

■ For adsorption of soft work pieces such as thin sheets or vinyl. Wrinkling or deformation during adsorption is reduced.

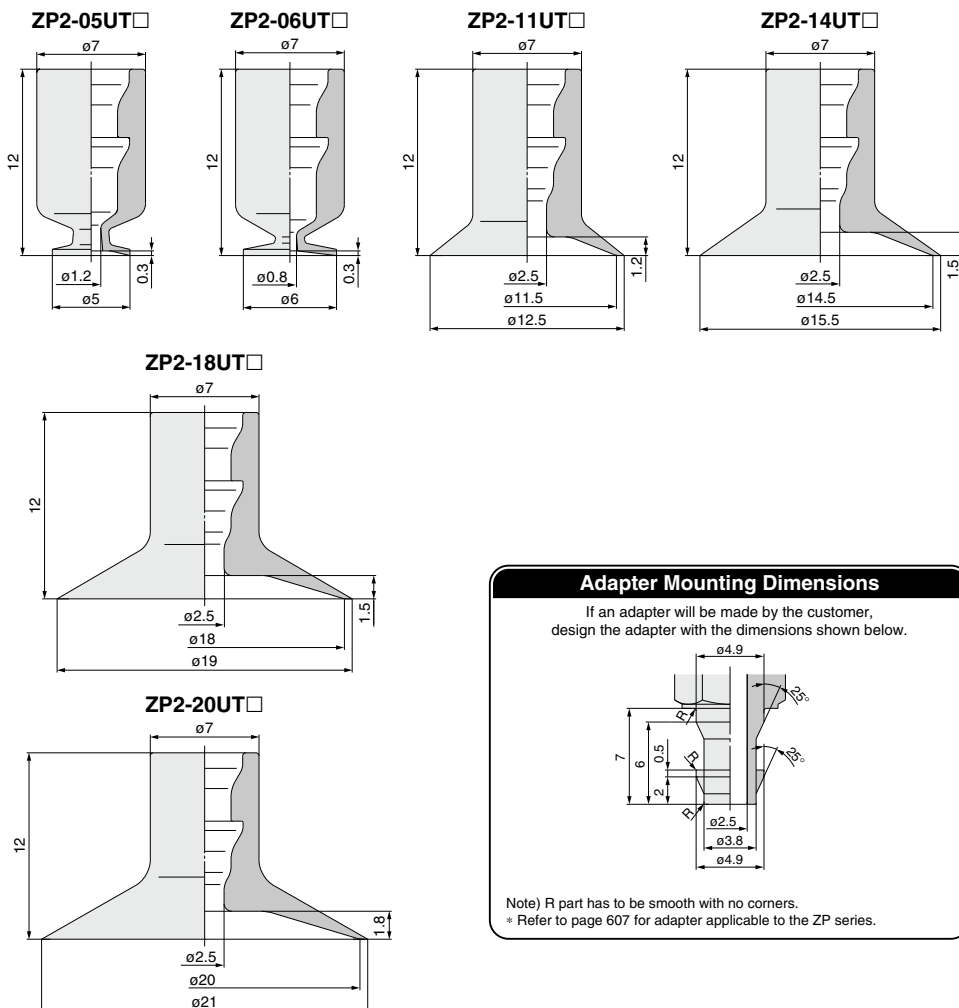
■ Applicable for the ZP series adapter

How to Order

Pad unit		ZP2 - 11 UT		N	
Pad diameter		Pad type		Pad material	
Symbol	Pad diameter	Symbol	Type	Symbol	Material
05	ø5	UT	Thin flat (Skirt)	N	NBR
06	ø6			S	Silicone rubber
11	ø11			U	Urethane rubber
14	ø14			F	FKM
18	ø18			GN	Conductive NBR
20	ø20			GS	Conductive silicone rubber

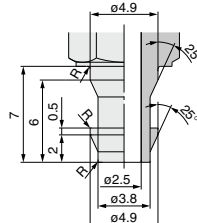


Dimensions: Pad Unit



Adapter Mounting Dimensions

If an adapter will be 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 607 for adapter applicable to the ZP series.

ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

ZPR

XT661



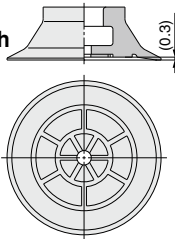
Flat Pad

Pad diameter $\varnothing 10, \varnothing 15, \varnothing 20, \varnothing 25, \varnothing 30$

Symbol/Type

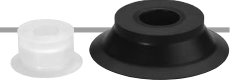
MT: Thin flat
(with groove)

■ Adsorption surface with groove



How to Order

Pad unit **ZP2 - B10 MT N**



Pad diameter		
Symbol	Pad diameter	Blast type
B10	$\varnothing 10$	●
B15	$\varnothing 15$	●
B20	$\varnothing 20$	●
B25	$\varnothing 25$	●
B30	$\varnothing 30$	●

* Blast type: Work pieces can be removed easily.

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

■ For adsorption of thin sheets or film

Deformation of the flat surface during adsorption is reduced.

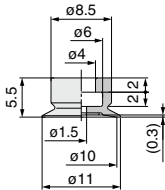
Note 1) Not suitable for transferring work pieces which apply a load.
Note 2) Wrinkling may be generated depending on the sheet thickness.
Confirm the thickness before use.

Pad type

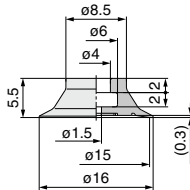
Symbol	Type
MT	Thin flat (With groove)

Dimensions: Pad Unit

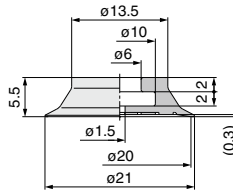
ZP2-B10MT



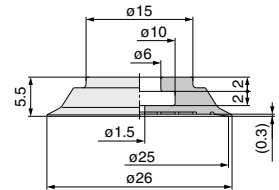
ZP2-B15MT



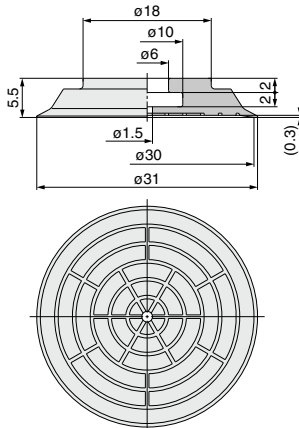
ZP2-B20MT



ZP2-B25MT



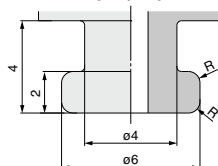
ZP2-B30MT



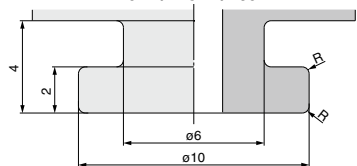
Adapter Mounting Dimensions

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

Applicable pad
B10MT/B15MT



Applicable pad
B20MT/B25MT/B30MT



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

* Refer to page 602 for adapter applicable to the ZP2 series.

How to Order



With adapter **ZP2 - T B10 MT N - H5**

Vacuum inlet direction

Symbol Direction
T Vertical

Pad diameter

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

Pad type

Symbol Type
MT Thin flat (With groove)

* Blast type: Work pieces can be removed easily.

Note) Use a commercially available sealant for mounting.

Mounting

Pad diameter (Symbol)	B10	B15	B20	B25	B30
Thread size (Symbol)					
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

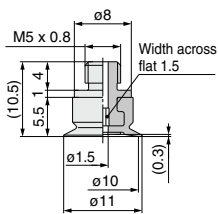
Replacement Part No.

Model	Pad unit part no.	Adapter part no.
ZP2-TB10MT□-H5	ZP2-B10MT□	ZP2A-M02
ZP2-TB15MT□-H5	ZP2-B15MT□	
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□	

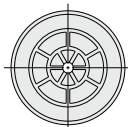
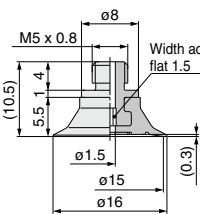
Note) □ in the table indicates the pad material.

Dimensions: With Adapter

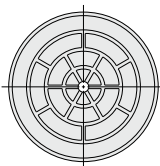
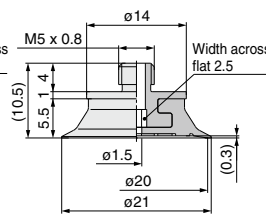
ZP2-TB10MT□-H5



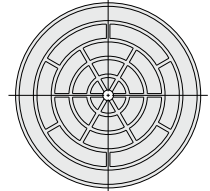
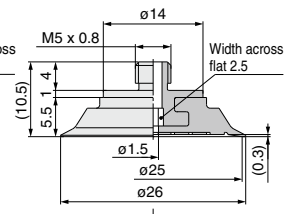
ZP2-TB15MT□-H5



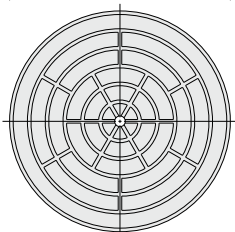
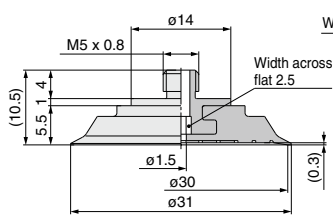
ZP2-TB20MT□-H5



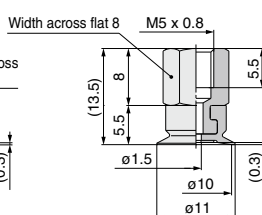
ZP2-TB25MT□-H5



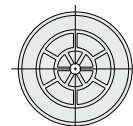
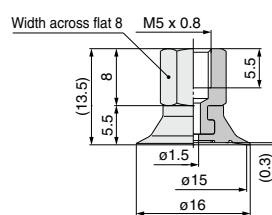
ZP2-TB30MT□-H5



ZP2-TB10MT□-B5



ZP2-TB15MT□-B5



ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

ZPR

XT661



Bellows Pad

Pad diameter $\varnothing 6, \varnothing 9, \varnothing 10, \varnothing 14, \varnothing 15, \varnothing 16, \varnothing 25, \varnothing 30$

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

Pad unit **ZP2-06 J N-X19**

Pad diameter		
Symbol	Pad diameter	Blast type
06	$\varnothing 6$	—
09	$\varnothing 9$	—
B10	$\varnothing 10$	●
14	$\varnothing 14$	—
B15	$\varnothing 15$	●
16	$\varnothing 16$	—
B25	$\varnothing 25$	●
B30	$\varnothing 30$	●

* 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

Symbol	Type
J	Bellows (Multistage type)



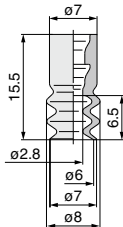
With/Without lock ring

N11 With lock ring
X19 Without lock ring (Note)

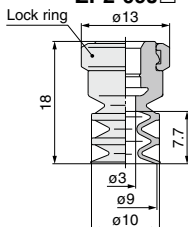
(Note) $\varnothing 6, \varnothing 10, \varnothing 15$ are not available.

Dimensions: Pad Unit

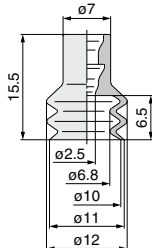
ZP2-06J



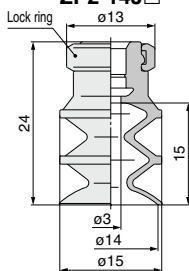
ZP2-09J



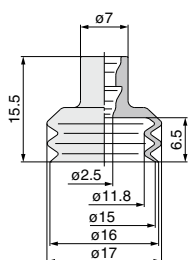
ZP2-B10J



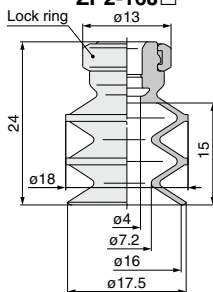
ZP2-14J



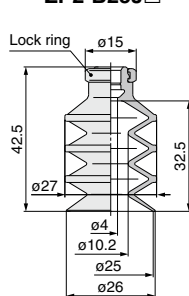
ZP2-B15J



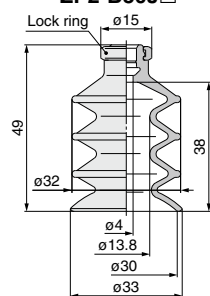
ZP2-16J



ZP2-B25J



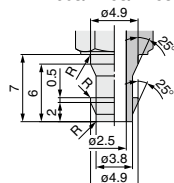
ZP2-B30J



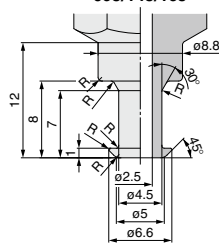
Adapter Mounting Dimensions

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

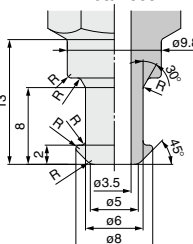
Applicable pad
06J/B10J/B15J



Applicable pad
09J/14J/16J



Applicable pad
B25J/B30J



(Note) R part has to be smooth with no corners.
* Refer to page 607 for adapter applicable to the ZP series.



Bellows Pad

Pad diameter $\varnothing 4, \varnothing 6, \varnothing 8, \varnothing 10, \varnothing 15, \varnothing 20$

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 diameter		
Symbol	Pad diameter	Blast type
B04	$\varnothing 4$	●
B06	$\varnothing 6$	●
B08	$\varnothing 8$	●
B10	$\varnothing 10$	●
B15	$\varnothing 15$	●
B20	$\varnothing 20$	●

Pad type	
Symbol	Type
MB	Bellows

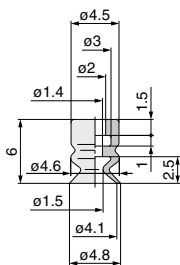
Pad material	
Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber



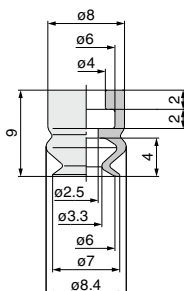
* Blast type: Workpieces can be removed easily.

Dimensions: Pad Unit

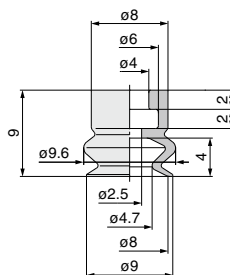
ZP2-B04MB



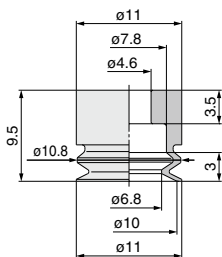
ZP2-B06MB



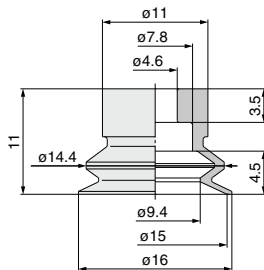
ZP2-B08MB



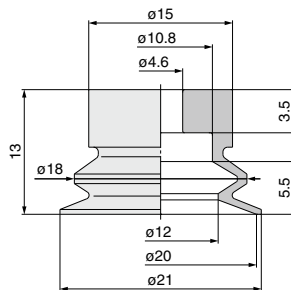
ZP2-B10MB



ZP2-B15MB



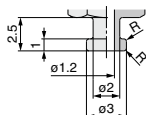
ZP2-B20MB



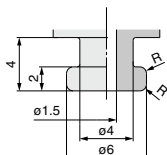
Adapter Mounting Dimensions

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

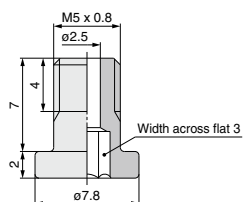
Applicable pad B04MB



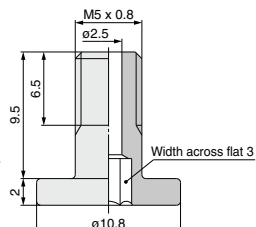
Applicable pad B06MB/B08MB



Applicable pad B10MB/B15MB



Applicable pad B20MB



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

* Refer to pages 602 and 603 for adapter applicable to the ZP2 series.



ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

ZPR

XT661

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: Work pieces can be removed easily.

Mounting

Thread size (Symbol)	Pad diameter (Symbol)	B04	B06	B08	B10	B15	B20
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

Pad type

Symbol	Type
MB	Bel lows

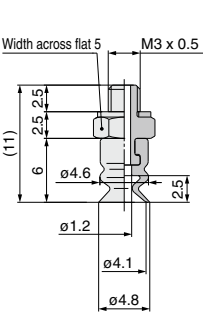
Replacement Part No.

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□	ZP2A-M05
ZP2-TB10MB□-H5	ZP2-B10MB□	ZP2A-M06
ZP2-TB15MB□-H5	ZP2-B15MB□	ZP2A-M04
ZP2-TB20MB□-H5	ZP2-B20MB□	
ZP2-TB06MB□-B5	ZP2-B06MB□	
ZP2-TB08MB□-B5	ZP2-B08MB□	

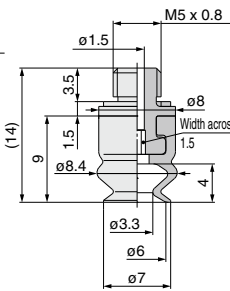
(Note) □ in the table indicates the pad material.

Dimensions: With Adapter

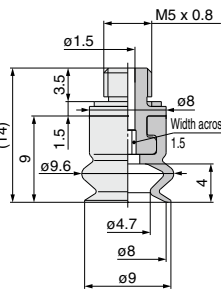
ZP2-TB04MB□□-A3



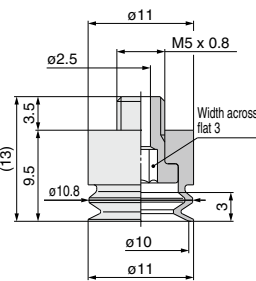
ZP2-TB06MB□□-H5



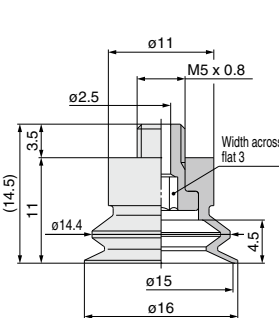
ZP2-TB08MB□□-H5



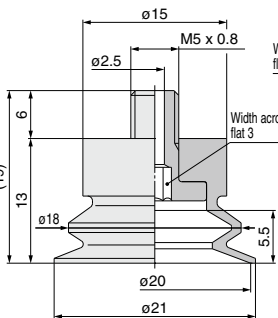
ZP2-TB10MB□□-H5



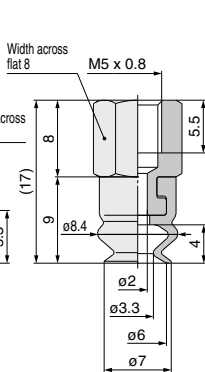
ZP2-TB15MB□□-H5



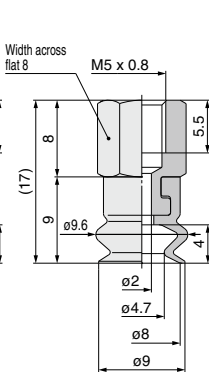
ZP2-TB20MB□□-H5



ZP2-TB06MB□□-B5



ZP2-TB08MB□□-B5





Bellows Pad

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

Symbol/Type

ZJ: Bellows

- For use where there is no space for the buffer (spring type)
- Work pieces with inclined adsorption surface

How to Order

Pad unit **ZP2 - 02 ZJ N**

Pad diameter

Symbol	Pad diameter
02	$\varnothing 2$
04	$\varnothing 4$
05	$\varnothing 5$
06	$\varnothing 6$

Pad material

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

Pad type

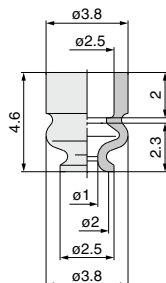
Symbol	Type
ZJ	Bellows



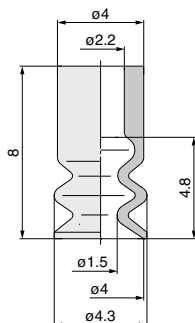
Note) The mounting adapter is available as a special order.

Dimensions: Pad Unit

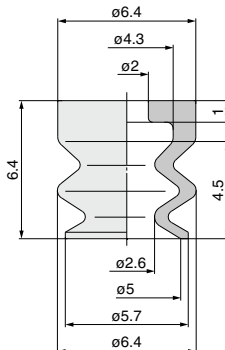
ZP2-02ZJ $\square$ [0.1g]



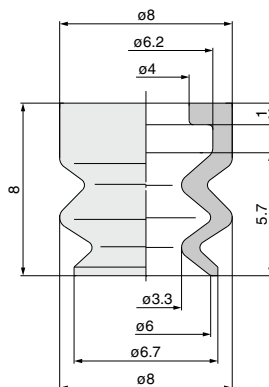
ZP2-04ZJ $\square$ [0.1g]



ZP2-05ZJ $\square$ [0.2g]



ZP2-06ZJ $\square$ [0.3g]



ZP3

ZP3E

ZP2

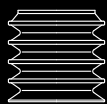
ZP2V

ZP

ZPT

ZPR

XT661



4.5-Stage Bellows Pad

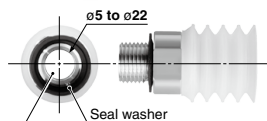
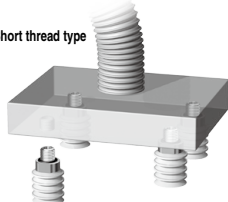
Symbol/Type

ZJ: Bellows

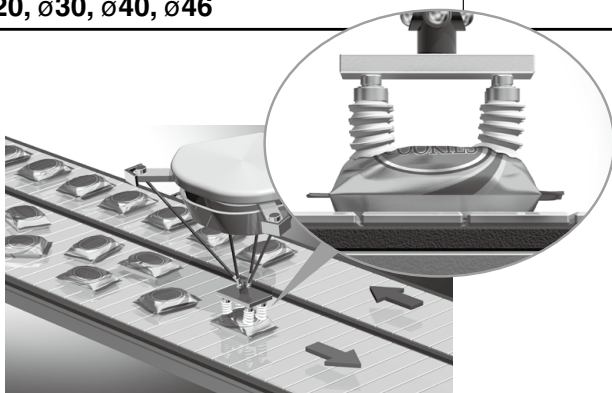
Pad diameter $\varnothing 15, \varnothing 20, \varnothing 30, \varnothing 40, \varnothing 46$

- For adsorbing workpieces flowing at high speeds
- Follows various shapes of workpieces.
- Pad material: Silicone rubber (Rubber hardness: A40, A50, A60)

● Short thread type



- Large opening size (short thread type): $\varnothing 5$ to $\varnothing 22$
For vacuum blower pumps with high suction flow rates



● One-touch fitting type

Built-in One-touch fitting

How to Order

Vertical vacuum inlet
with adapter

ZP2-T B15 ZJ S-A10-06

Pad diameter

Symbol	Pad diameter
B15	$\varnothing 15$
B20	$\varnothing 20$
B30	$\varnothing 30$
40	$\varnothing 40$
46	$\varnothing 46$

Pad type

Symbol	Type
ZJ	Bellows

Pad material

Symbol	Material	Applicable pad diameter				
		$\varnothing 15$	$\varnothing 20$	$\varnothing 30$	$\varnothing 40$	$\varnothing 46$
N	NBR	—	—	—	●	●
U	Urethane rubber	—	—	—	●	●
F	FKM	—	—	—	●	●
GN	Conductive NBR	—	—	—	●	●
GS	Conductive silicone rubber (White)	—	—	—	●	●
S	Silicone rubber (White)	●	●	●	●	●
		Hardness A40 (Note)				
		Hardness A50				
S6	Silicone rubber High-hardness type (White)	●	●	●	—	—
		Hardness A60				

Note) Identification of rubber hardness: Painted with pink 1 dot

● Vacuum inlet

Symbol	Vacuum inlet	Mounting thread size					
		A10	A16	A20	A30	AL12	AL14
Nil	Short thread	●	●	●	●	—	—
06	One-touch fitting ($\varnothing 6$)	—	—	—	—	●	●

● Mounting thread size

Type	Symbol	Thread size (Male thread)	$\varnothing 15$	$\varnothing 20$	$\varnothing 30$	$\varnothing 40$	$\varnothing 46$
Short thread	A10	M10 x 1	●	●	—	—	—
	A16	M16 x 1.5	—	—	●	—	—
	A20	M20 x 1.5	—	—	—	●	—
	A30	M30 x 1.5	—	—	—	—	●
One-touch fitting	AL12	M12 x 1	●	●	—	—	—
	AL14	M14 x 1	—	—	●	●	●

Replacement Part No. (Short Thread Type)

Product part no.	Pad unit part no.	Adapter part no.
ZP2-TB15ZJS□-A10	ZP2-B15ZJS□	ZP2A-Z31-1P
ZP2-TB20ZJS□-A10	ZP2-B20ZJS□	ZP2A-Z31-2P
ZP2-TB30ZJS□-A16	ZP2-B30ZJS□	ZP2A-Z31-3P
ZP2-T40ZJS□-A20	ZP2-40ZJS	ZP2A-Z31-4P
ZP2-T46ZJS□-A30	ZP2-46ZJS	ZP2A-Z31-5P

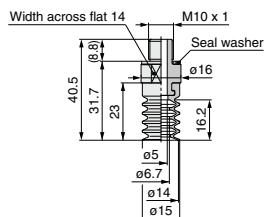
Replacement Part No. (One-touch Fitting Type)

Product part no.	Pad unit part no.	Adapter part no.
ZP2-TB15ZJS□-AL12-06	ZP2-B15ZJS□	ZP2A-Z32-1
ZP2-TB20ZJS□-AL12-06	ZP2-B20ZJS□	ZP2A-Z32-2
ZP2-TB30ZJS□-AL14-06	ZP2-B30ZJS□	ZP2A-Z32-3
ZP2-T40ZJS□-AL14-06	ZP2-40ZJS	ZP2A-Z32-4
ZP2-T46ZJS□-AL14-06	ZP2-46ZJS	ZP2A-Z32-5

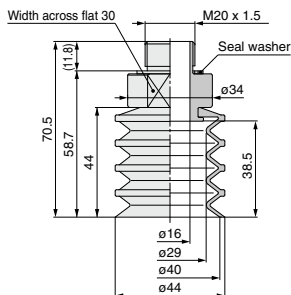
Dimensions

■ Vacuum inlet: Short thread type

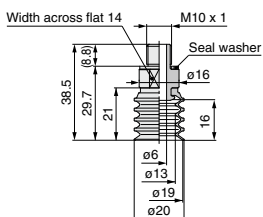
ZP2-TB15ZJS□-A10



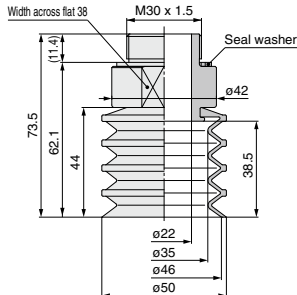
ZP2-T40ZJ□-A20



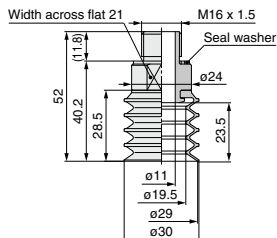
ZP2-TB20ZJS□-A10



ZP2-T46ZJ□-A30



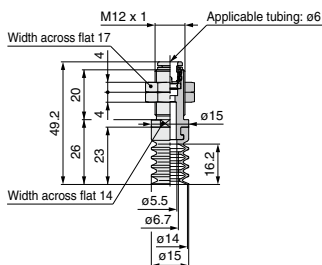
ZP2-TB30ZJS□-A16



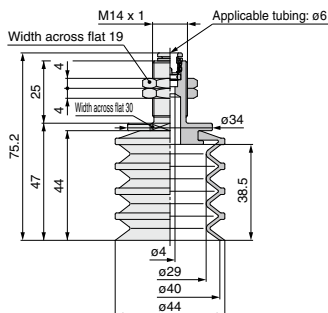
Weight	[g]
ZIP2-TB15ZJS□-A10	9.0
ZIP2-TB20ZJS□-A10	9.0
ZIP2-TB30ZJS□-A16	20.5
ZIP2-T40ZN-A20	50.0
ZIP2-T40ZJS□-A20	51.0
ZIP2-T40ZJU-A20	51.0
ZIP2-T40ZJF-A20	60.0
ZIP2-T40ZJGN-A20	51.0
ZIP2-T40ZJGS-A20	51.0
ZIP2-T46ZJN-A30	84.0
ZIP2-T46ZJS□-A30	82.0
ZIP2-T46ZJU-A30	84.0
ZIP2-T46ZJF-A30	95.0
ZIP2-T46ZJGN-A30	84.0
ZIP2-T46ZJGS-A30	84.0

■ Vacuum inlet: One-touch fitting type

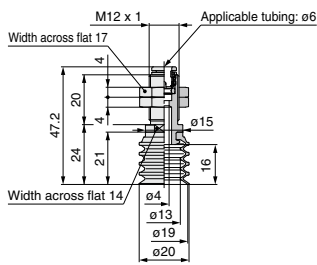
ZP2-TB15ZJS□-AL12-06



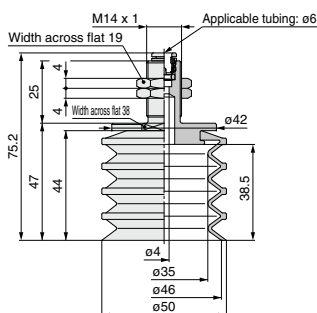
ZP2-T40ZJ□-AL14-06



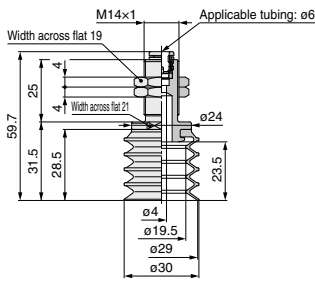
ZP2-TB20ZJS□-AL12-06



ZP2-T46ZJ□-AL14-06



ZP2-TB30ZJS□-AL14-06



Weight	[g]
ZIP2-TB15ZJS□-AL12-06	17.0
ZIP2-TB20ZJS□-AL12-06	17.0
ZIP2-TB30ZJS□-AL14-06	26.5
ZIP2-T40ZJN-AL14-06	46.0
ZIP2-T40ZJS□-AL14-06	46.0
ZIP2-T40ZJU-AL14-06	46.0
ZIP2-T40ZJF-AL14-06	55.0
ZIP2-T40ZJGN-AL14-06	46.0
ZIP2-T40ZJGS-AL14-06	46.0
ZIP2-T46ZJN-AL14-06	56.0
ZIP2-T46ZJS□-AL14-06	54.0
ZIP2-T46ZJU-AL14-06	56.0
ZIP2-T46ZJF-AL14-06	67.0
ZIP2-T46ZJGN-AL14-06	56.0
ZIP2-T46ZJGS-AL14-06	56.0

How to Order

Pad unit **ZP2-B15ZJ S**

Pad diameter

Symbol	Pad diameter
B15	ø15
B20	ø20
B30	ø30
40	ø40
46	ø46

Pad type

Symbol	Type
ZJ	Bellows

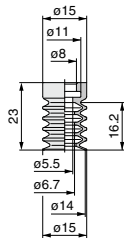
Pad material

Symbol	Material	Applicable pad diameter				
		ø15	ø20	ø30	ø40	ø46
N	NBR	—	—	—	●	●
U	Urethane rubber	—	—	—	●	●
F	FKM	—	—	—	●	●
GN	Conductive NBR	—	—	—	●	●
GS	Conductive silicone rubber (White)	—	—	—	●	●
S	Silicone rubber (White)	●	—	●	—	—
	Hardness A40 Note	—	—	—	—	—
	Hardness A50	—	—	—	—	—
S6	Silicone rubber High-hardness type (White)	●	●	●	—	—
	Hardness A60	—	—	—	—	—

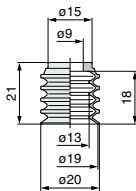
Note) Identification of rubber hardness: Painted with pink 1 dot

Dimensions: Pad Unit

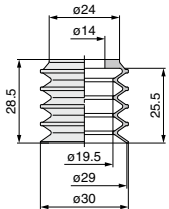
ZP2-B15ZJS□



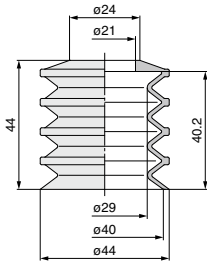
ZP2-B20ZJS□



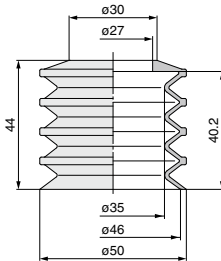
ZP2-B30ZJS□



ZP2-40ZJ□



ZP2-46ZJ□

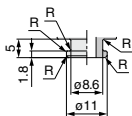


Weight	[g]
ZP2-B15ZJS□	2.0
ZP2-B20ZJS□	2.0
ZP2-B30ZJS□	4.5
ZP2-40ZJN	16.0
ZP2-40ZJS□	15.0
ZP2-40ZJU	16.0
ZP2-40ZJF	25.0
ZP2-40ZJGN	16.0
ZP2-40ZJGS	16.0
ZP2-46ZJN	19.0
ZP2-46ZJS□	17.0
ZP2-46ZJU	19.0
ZP2-46ZJF	30.0
ZP2-46ZJGN	19.0
ZP2-46ZJGS	19.0

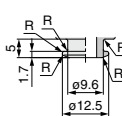
Adapter (Mounting) Dimensions

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

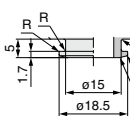
Applicable pad
ZP2-B15ZJS□



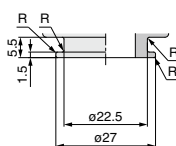
Applicable pad
ZP2-B20ZJS□



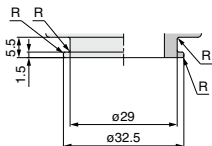
Applicable pad
ZP2-B30ZJS□



Applicable pad
ZP2-40ZJ□



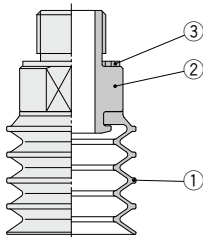
Applicable pad
ZP2-46ZJ□



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

Component Parts

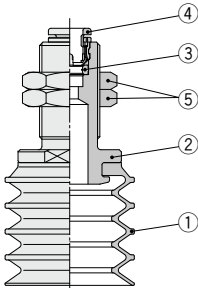
■ Short thread type (Pad with adapter)



Component Parts

No.	Description	Material (Surface treatment)
1	Pad	Refer to the pad material (page 544).
2	Adapter	Aluminum alloy (Anodized)
3	Seal washer	Structural steel/NBR

■ One-touch fitting type (Pad with adapter)



Component Parts

No.	Description	Material (Surface treatment)
1	Pad	Refer to the pad material (page 544).
2	Adapter	Aluminum alloy (Anodized)
3	Seal	NBR
4	Cassette	—
5	Nut	Structural steel (Trivalent chromated)

ZP3

ZP3E

ZP2

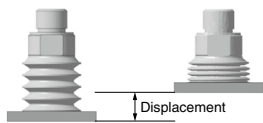
ZP2V

ZP

ZPT
ZPR

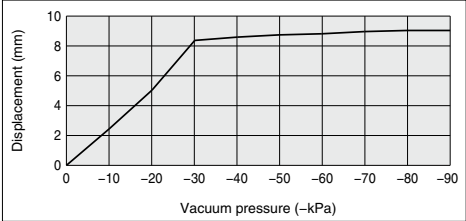
XT661

Pad Displacement to Vacuum Pressure (Pad material: Silicone rubber)

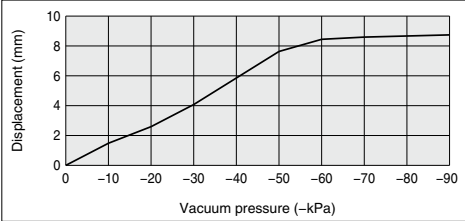


The data shown below are not guaranteed but actual measured (initial value). These values depend on the operating environment, workpiece weight and transfer method, so they cannot be guaranteed by SMC. Thorough research and confirmation are necessary before use.

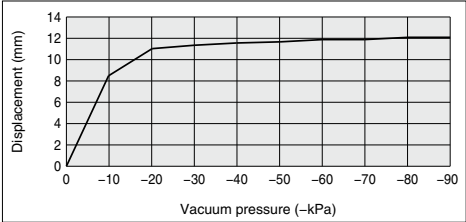
ZP2-B15ZJS



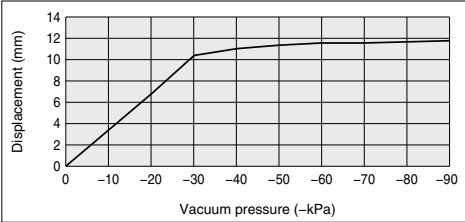
ZP2-B15ZJS6



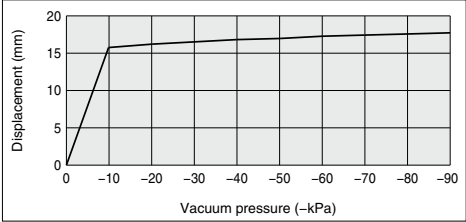
ZP2-B20ZJS



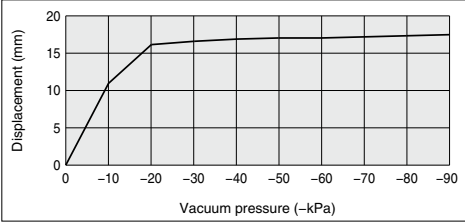
ZP2-B20ZJS6



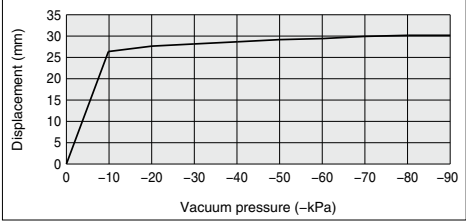
ZP2-B30ZJS



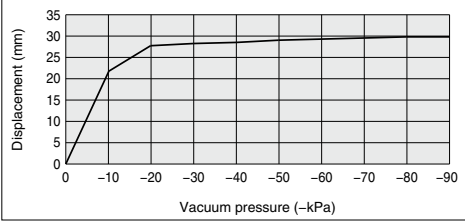
ZP2-B30ZJS6



ZP2-40ZJS



ZP2-46ZJS



ZP3
ZP3E
ZP2
ZP2V
ZP
ZPT ZPR
XT661



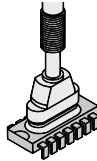
Oval Pad

Pad size **3.5 x 7 to 8 x 30**

Symbol/Type

W: Oval

■ For work pieces with limitations on the adsorption surface



How to Order

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

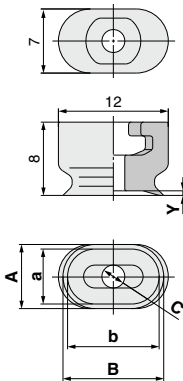
Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
GN	Conductive NBR
GS	Conductive silicone rubber

Pad type

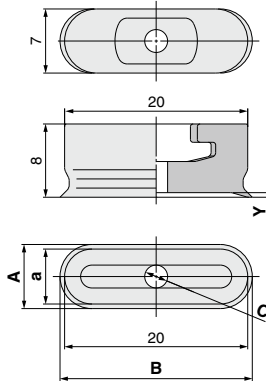
Symbol	Type
W	Oval

Dimensions: Pad Unit

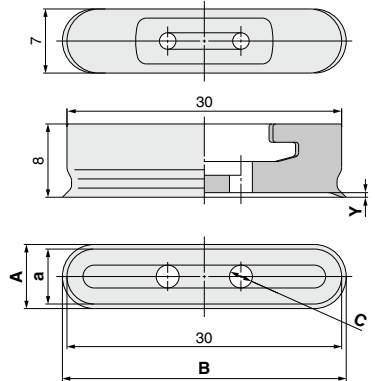
ZP2- W



ZP2- 20 W



ZP2- 30 W



Dimensions

Model	a	A	B	C	Y
ZP2-3507W	3.5	4.3	7	7.8	2 x 1.5
ZP2-4010W	4	4.8	10	10.8	0.5
ZP2-5010W	5	6	10	11	2.5
ZP2-6010W	6	7	11	11	

Dimensions

Model	a	A	B	C	Y
ZP2-4020W	4	4.8	20.8	2 x 1.8	
ZP2-5020W	5	6	21	2 x 2	0.5
ZP2-6020W	6	7	21	2.5	
ZP2-8020W	8	9	21	3	0.8

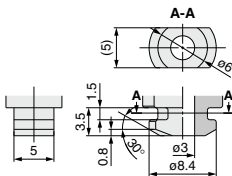
Dimensions

Model	a	A	B	C	Y
ZP2-4030W	4	4.8	30.8	2 x 1.8	
ZP2-5030W	5	6	31		0.5
ZP2-6030W	6	7	31	2 x 2.5	
ZP2-8030W	8	9	31		0.8

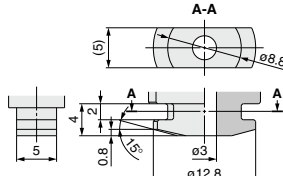
Adapter Mounting Dimensions

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

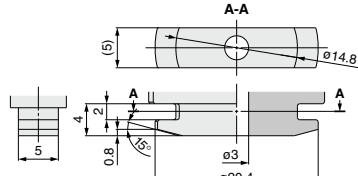
Applicable pad
3507W/4010W/5010W/6010W



Applicable pad
4020W/5020W/6020W/8020W



Applicable pad
4030W/5030W/6030W/8030W



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

* Refer to page 602 for adapter applicable to the ZP2 series.

How to Order



With adapter **ZP2 - T 3507 W N - B5**

Vacuum inlet direction

Symbol	Direction
T	Vertical

Vacuum inlet

Symbol	Thread size
B5	M5 x 0.8

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
W	Oval

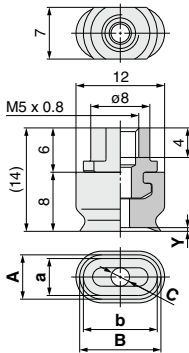
Replacement Part No.

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

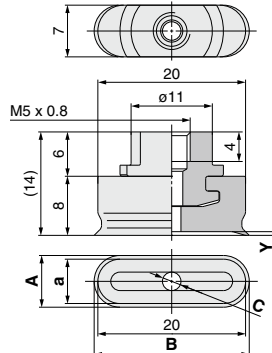
Note) □ in the table indicates the pad material.

Dimensions: With Adapter

ZP2-T□W□-B5



ZP2-T□20W□-B5



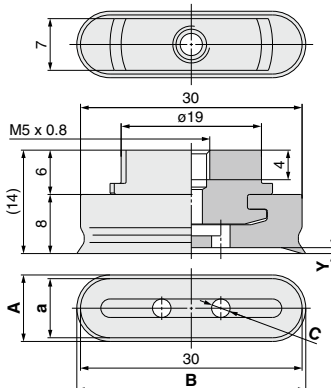
Dimensions

Model	a	A	b	B	C	Y
ZP2-T3507W□-B5	3.5	4.3	7	7.8	2 x 1.5	0.5
ZP2-T4010W□-B5	4	4.8		10.8		
ZP2-T5010W□-B5	5	6	10	11	2.5	
ZP2-T6010W□-B5	6	7		11		

Dimensions

Model	a	A	B	C	Y
ZP2-T4020W□-B5	4	4.8	20.8	2 x 1.8	0.5
ZP2-T5020W□-B5	5	6	21	2 x 2	
ZP2-T6020W□-B5	6	7	21	2.5	
ZP2-T8020W□-B5	8	9	21	3	0.8

ZP2-T□30W□-B5



Dimensions

Model	a	A	B	C	Y
ZP2-T4030W□-B5	4	4.8	30.8	2 x 1.8	0.5
ZP2-T5030W□-B5	5	6	31		
ZP2-T6030W□-B5	6	7	31	2 x 2.5	
ZP2-T8030W□-B5	8	9	31		0.8



ZP3

ZP3E

ZP2

ZP2V

ZP

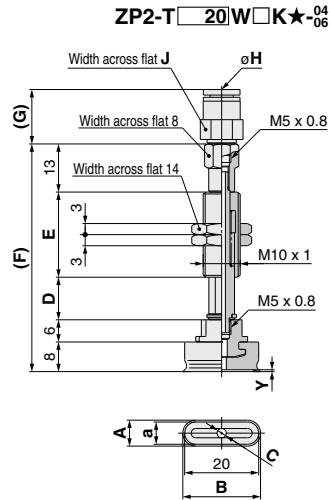
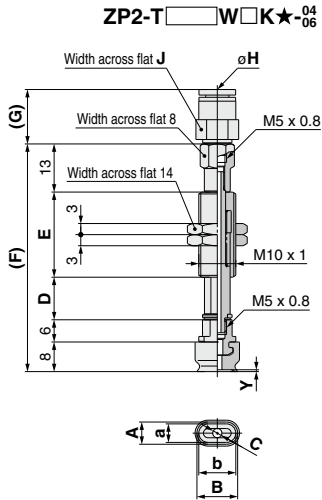
ZPT

ZPR

XT661

#

Dimensions: With Buffer

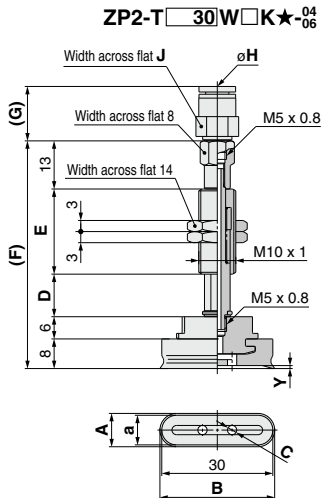


Dimensions

Model	a	A	b	B	C	Y
ZP2-T3507W□K★ ⁰⁴ ₀₆	3.5	4.3	7	7.8	2 x 1.5	0.5
ZP2-T4010W□K★ ⁰⁴ ₀₆	4	4.8	10	10.8		
ZP2-T5010W□K★ ⁰⁴ ₀₆	5	6		11	2.5	
ZP2-T6010W□K★ ⁰⁴ ₀₆	6	7		11		

Dimensions

Model	a	A	B	C	Y
ZP2-T4020W K★ ⁰⁴ ₀₆	4	4.8	20.8	2 x 1.8	0.5
ZP2-T5020W K★ ⁰⁴ ₀₆	5	6	21	2 x 2	
ZP2-T6020W K★ ⁰⁴ ₀₆	6	7	21	2.5	
ZP2-T8020W K★ ⁰⁴ ₀₆	8	9	21	3	



Dimensions

Model	a	A	B	C	Y
ZP2-T4030W K★ ⁰⁴ ₀₆	4	4.8	30.8	2 x 1.8	0.5
ZP2-T5030W K★ ⁰⁴ ₀₆	5	6	31		
ZP2-T6030W K★ ⁰⁴ ₀₆	6	7	31	2 x 2.5	0.8
ZP2-T8030W K★ ⁰⁴ ₀₆	8	9	31		

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

Stroke (★)	D	E	F	H: ø4		H: ø6	
				G	J	G	J
10	11.5	23	61.5	13.9	8	14.7	10
20	21.5	51	99.5				
30	31.5		109.5				
40	41.5	77	145.5				
50	51.5		155.5				

ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

ZPR

XT661

ZP2 Series

Without buffer

ZP2 - R 3507 W N - 04 - A5

Vacuum inlet direction

Symbol

Direction

R

Lateral

Pad size

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

Pad type

Symbol	Type
W	Oval

Pad material (□)

Symbol	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 (Male thread)
B5	M5 x 0.8 (Female thread)

Vacuum inlet (■)

Symbol	Applicable tube O.D.
04	ø4
06	ø6

Male thread mounting

Female thread mounting

Replacement Part No.

Model	Pad unit part no.	Adapter part no.	Type R adapter part no.
ZP2-R3507W□-■A5	ZP2-R3507W□-■B5	ZP2-3507W□	ZP2A-001
ZP2-R4010W□-■A5	ZP2-R4010W□-■B5	ZP2-4010W□	
ZP2-R5010W□-■A5	ZP2-R5010W□-■B5	ZP2-5010W□	
ZP2-R6010W□-■A5	ZP2-R6010W□-■B5	ZP2-6010W□	
ZP2-R8020W□-■A5	ZP2-R8020W□-■B5	ZP2-8020W□	
ZP2-R5020W□-■A5	ZP2-R5020W□-■B5	ZP2-5020W□	ZP2A-002
ZP2-R6020W□-■A5	ZP2-R6020W□-■B5	ZP2-6020W□	
ZP2-R8020W□-■A5	ZP2-R8020W□-■B5	ZP2-8020W□	
ZP2-R4030W□-■A5	ZP2-R4030W□-■B5	ZP2-4030W□	
ZP2-R5030W□-■A5	ZP2-R5030W□-■B5	ZP2-5030W□	
ZP2-R6030W□-■A5	ZP2-R6030W□-■B5	ZP2-6030W□	ZP2A-003
ZP2-R8030W□-■A5	ZP2-R8030W□-■B5	ZP2-8030W□	

Note 1) □ in the table indicates the pad material.

Note 2) ■ in the table indicates the vacuum inlet.

Dimensions: Without Buffer

ZP2-R□W□-04-A5

ZP2-R□20W□-04-A5

ZP2-R□30W□-04-A5

Dimensions

Model	a	A	b	B	C	Y
ZP2-R3507W□-■A5	3.5	4.3	7	7.8	0.5	
ZP2-R4010W□-■A5	4	4.8		10.8		
ZP2-R5010W□-■A5	5	6	10	11		
ZP2-R6010W□-■A5	6	7		11		
ZP2-R8010W□-■A5	6	7		11		

Dimensions

Model	a	A	B	C	Y
ZP2-R4020W□-■A5	4	4.8	20.8	2 x 1.8	0.5
ZP2-R5020W□-■A5	5	6	21	2 x 2	
ZP2-R6020W□-■A5	6	7	21	2.5	
ZP2-R8020W□-■A5	8	9	21	3	
ZP2-R8020W□-■A5	8	9	21	3	

Dimensions

Model	a	A	B	C	Y
ZP2-R4030W□-■A5	4	4.8	30.8	2 x 1.8	0.5
ZP2-R5030W□-■A5	5	6	31		
ZP2-R6030W□-■A5	6	7	31	2 x 2.5	
ZP2-R8030W□-■A5	8	9	31		
ZP2-R8030W□-■A5	8	9	31		

Dimensions common for all three drawings

Dimensions (per applicable tube)

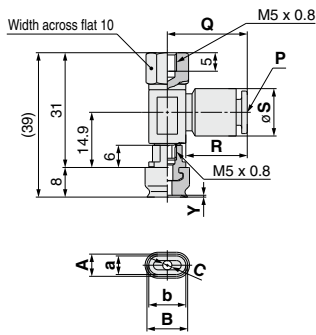
Applicable tube O.D. (■)	P	Q	R	S
ø4	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

554

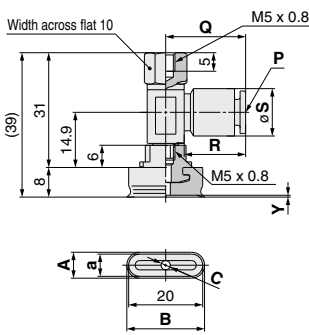
 Courtesy of Steven Engineering, Inc - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com

Dimensions: Without Buffer

ZP2-R W -⁰⁴/₀₆-B5



ZP2-R 20 W -⁰⁴/₀₆-B5



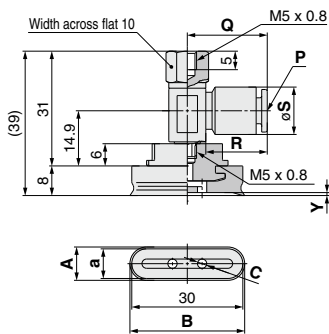
Dimensions

Model	a	A	b	B	C	Y
ZP2-R3507W -B5	3.5	4.3	7	7.8	2 x 1.5	0.5
ZP2-R4010W -B5	4	4.8	10.8			
ZP2-R5010W -B5	5	6	11		2.5	
ZP2-R6010W -B5	6	7	11			

Dimensions

Model	a	A	B	C	Y
ZP2-R4020W -B5	4	4.8	20.8	2 x 1.8	0.5
ZP2-R5020W -B5	5	6	21	2 x 2	
ZP2-R6020W -B5	6	7	21	2.5	
ZP2-R8020W -B5	8	9	21	3	

ZP2-R 30 W -⁰⁴/₀₆-B5



Dimensions

Model	a	A	B	C	Y
ZP2-R4030W -B5	4	4.8	30.8	2 x 1.8	0.5
ZP2-R5030W -B5	5	6	31		
ZP2-R6030W -B5	6	7	31	2 x 2.5	
ZP2-R8030W -B5	8	9	31		

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

Applicable tube O.D. (■)	P	Q	R	S
ø4	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8

ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

ZPR

XT661

ZP2 Series

How to Order

With buffer **ZP2 - R 3507 W** **N** **K** **10 - 04**

Vacuum inlet direction

Symbol	Direction
R	Lateral

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 type

Symbol	Type
W	Oval

Buffer specification

Symbol	Specification
K	Non-rotating

Vacuum inlet (■)

Symbol	Applicable tube O.D.
04	ø4
06	ø6

Buffer stroke (★)

Symbol	Stroke
10	10 mm
20	20 mm
30	30 mm
40	40 mm
50	50 mm



Replacement Part No.

Pad material (□)

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

Model	Pad unit part no.	Adapter part no.	Type R adapter part no.	Buffer assembly part no.
ZP2-R3507W□K★	■ ZP2-3507W□	ZP2A-001	ZPRS-■B5	ZPB2K★
ZP2-R4010W□K★	■ ZP2-4010W□			
ZP2-R5010W□K★	■ ZP2-5010W□			
ZP2-R6010W□K★	■ ZP2-6010W□			
ZP2-R4020W□K★	■ ZP2-4020W□	ZP2A-002	Vacuum inlet Symbol Applicable tube O.D. 04 ø4 06 ø6	Buffer stroke Symbol Stroke 10 10 mm 20 20 mm 30 30 mm 40 40 mm 50 50 mm
ZP2-R5020W□K★	■ ZP2-5020W□			
ZP2-R6020W□K★	■ ZP2-6020W□			
ZP2-R8020W□K★	■ ZP2-8020W□			
ZP2-R4030W□K★	■ ZP2-4030W□	ZP2A-003		
ZP2-R5030W□K★	■ ZP2-5030W□			
ZP2-R6030W□K★	■ ZP2-6030W□			
ZP2-R8030W□K★	■ ZP2-8030W□			

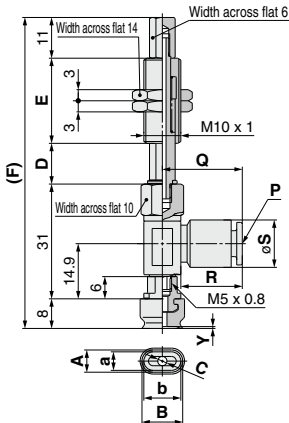
Note 1) □ in the table indicates the pad material. Note 3) ■ in the table indicates the vacuum inlet.
 Note 2) ★ in the table indicates the buffer stroke.

Buffer Specifications (Non-rotating)

Stroke (mm)	10, 20, 30, 40, 50
Spring reactive force	At 0 stroke 1.0 N
	At full stroke 3.0 N
Nut tightening torque	2.5 to 3.5 N·m

Dimensions: With Buffer

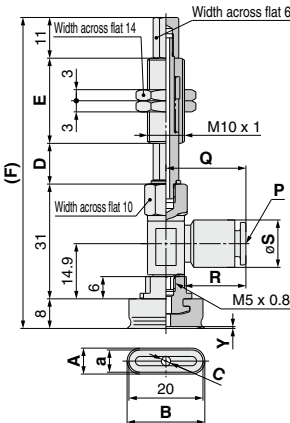
ZP2-R **W** **K** **04**



Dimensions

Model	a	A	b	B	C	Y
ZP2-R3507W□K★	3.5	4.3	7	7.8	2 x 1.5	0.5
ZP2-R4010W□K★	4	4.8	10	10.8		
ZP2-R5010W□K★	5	6	10	11	2.5	
ZP2-R6010W□K★	6	7	10	11		

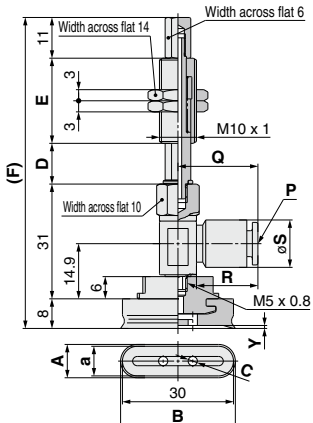
ZP2-R **20W** **K** **04**



Dimensions

Model	a	A	B	C	Y
ZP2-R4020W□K★	4	4.8	20.8	2 x 1.8	
ZP2-R5020W□K★	5	6	21	2 x 2	0.5
ZP2-R6020W□K★	6	7	21	2.5	
ZP2-R8020W□K★	8	9	21	3	0.8

ZP2-R **30W** **K** **04**



Dimensions

Model	a	A	B	C	Y
ZP2-R4030W□K★	4	4.8	30.8	2 x 1.8	
ZP2-R5030W□K★	5	6	31		0.5
ZP2-R6030W□K★	6	7	31	2 x 2.5	
ZP2-R8030W□K★	8	9	31		0.8

Dimensions common for all three drawings

Dimensions (per stroke)

Stroke (★)	D	E	F
10	11	23	84
20	21	51	122

Dimensions (per applicable tube)

Stroke (★)	D	E	F
30	31	51	132
40	41	77	168
50	51		178

Dimensions (per applicable tube)

Applicable tube O.D. (■)	P	Q	R	S
ø4	4	20.6	15.6	10.4
ø6	6	21.6	16.6	12.8



Pad with Ball Spline Buffer

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

Symbol/Type

U: Flat

■ Ball spline guide is used to the buffer.

How to Order

ZP2 - T 02 U **N** S 6

Vacuum inlet direction

Symbol	Direction
T	Vertical

Pad diameter

Symbol	Pad diameter
02	$\varnothing 2$
04	$\varnothing 4$
06	$\varnothing 6$
08	$\varnothing 8$

Pad type

Symbol	Type
U	Flat

Buffer stroke

Symbol	Stroke
6	6 mm

Buffer specification

Symbol	Specification
S	Ball spline

Pad material

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



Buffer Specifications

Specifications	Ball spline
Stroke	6 mm
Spring reactive force	At 0 stroke At full stroke
	0.8 N 1.1 N

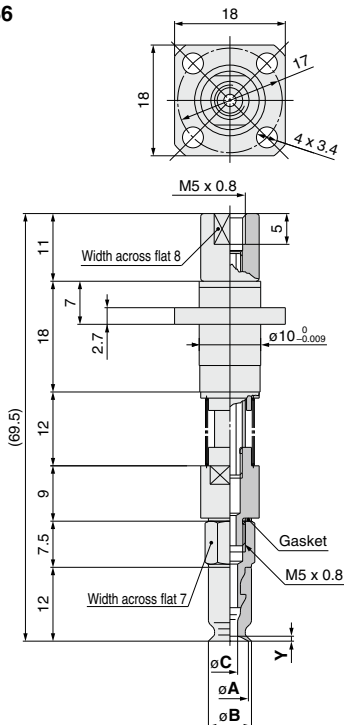
Replacement Part No.

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

Note) □ in the table indicates the pad material.

Dimensions

ZP2-T□U□S6



Dimensions

Model	A	B	C	Y
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	1
ZP2-T08U□S6	8	9		

ZP3

ZP3E

ZP2

ZP2V

ZP

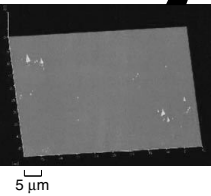
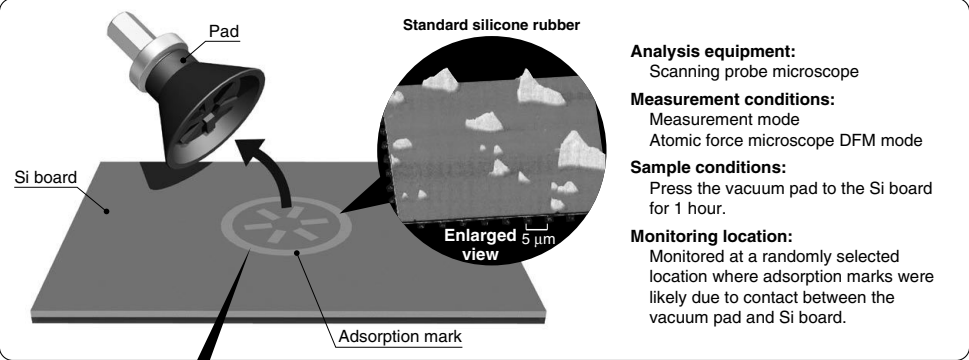
ZPT

ZPR

XT661

Mark-free Pad Series

Minimizes the transfer of rubber constituents to the workpiece.



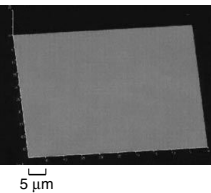
1 Mark-free NBR Pad

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

Pad diameter: $\phi 4$ to $\phi 125$



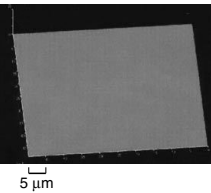
Heavy-duty type



2 Stuck Fluororesin Pad

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

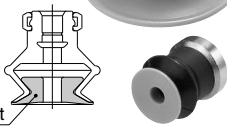
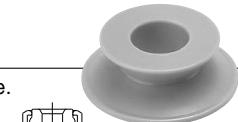
Pad diameter: $\phi 40$ to $\phi 125$



3 Resin Attachment

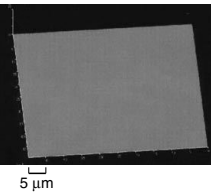
PEEK material is used for the pad adsorption surface. Prevents the transfer of rubber constituents.

Pad diameter: $\phi 6$ to $\phi 32$



Attachment

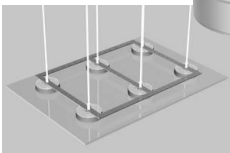
Related Pad



4 Non-contact Gripper

No adsorption mark is left because the vacuum pad does not come into contact with the workpiece.

Made to Order



P.727

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

Pad type		Material of the adsorption part (Part in contact with the workpiece)	Adsorption mark ^{*1}		Operating temperature range (°C)	Static friction ratio ^{*5}
			Condition ^{*2} (Initial value)			
			Visual checking	Vapor method ^{*3}		
Mark-free Pad Series	 Mark-free NBR pad 	Mark-free NBR (Specially treated ^{*4})	●	●	5 to 40	0.15 to 0.2
	 Stuck fluororesin pad 	NBR + Stuck fluororesin	●	●	5 to 60	0.1
		FKM + Stuck fluororesin	●	●	5 to 100	
	 Resin attachment  	PEEK	●	●	5 to 40	0.15 to 0.2
		Conductive PEEK (Volume resistivity: 1 x 10 ⁶ Ωcm)	●	●		
	 Non-contact Gripper <i>Made to Order</i> 	—	●	●	Standard: -5 to 60 (No freezing)	—
Standard	 ZP Series (Standard material)	NBR FKM Conductive NBR/Silicone rubber	×	×	—	—
		Silicone rubber Urethane rubber	○	×		

Adsorption mark characteristics [●: Little or no influence ○: Can be used depending on the conditions. ×: Not suitable]

* 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 **Vapor method** ——— Method of applying vapor 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.
 - * 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.)

ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT
ZPR

XT661



⚠ Specific Product Precautions

Be sure to read this before handling the products. Refer to back page 50 for Safety Instructions and pages 49 to 51 for Vacuum Equipment Precautions.

Although the adsorption marks (transfer of rubber component to workpieces) of this product are minimized compared with current rubber pads, confirm if the adsorption marks have any effect when used in the actual system before use.

1. High vacuum pressure leaks from the lip may occur in the mark-free pad series due to the manufacturing method compared with common rubber pads.
2. Note that this product cannot be used to hold a vacuum.
3. Secure as high a flow rate as possible to suppress the pressure effect caused by leakage to a minimum.
4. The "Stuck fluororesin pad" is a molded product where a fluororesin sheet is integrated with the rubber (NBR, FKM). Therefore, the height decreases due to deterioration of the rubber, and elongation of the fluororesin sheet from usage. This is caused by the pad coming into contact with the workpiece vertically (load is applied equally to the pad skirt).
For example, if the pad performs an operation where the shape changes as in the following conditions, the pad skirt may be deformed.
 - 1) The pad contacts the workpiece from a diagonal direction.
 - 2) When a load cannot be applied equally to the pad due to the uneven surface of a workpiece, or the pad is pressed against an irregularly shaped workpiece for adsorption.
 - 3) The pad is used in a stretched condition due to insufficient lifting force.
 When this problem occurs, please review the usage method.
5. Be sure to wash the portion of the pad that contacts the workpiece before use, or during periodic maintenance. If the pad is not washed correctly, deposits and solvents, etc. from the washing may remain as an adsorption mark.
6. When adsorbing workpieces with few impurities (high cleanliness), if "Mark-free NBR" is used, the edge of the pad may wear out early. Please consider using the "Stuck fluororesin pad" or "Resin attachment."

ZP3
ZP3E
ZP2
ZP2V
ZP
ZPT ZPR
XT661



Mark-free Pad

Symbol/Type

U: Flat

Pad diameter $\varnothing 4, \varnothing 6, \varnothing 8, \varnothing 10, \varnothing 16, \varnothing 25, \varnothing 32, \varnothing 40, \varnothing 50$

- 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 minimize the transfer of rubber constituents to the workpiece.
- Applicable for the ZP series adapter

How to Order

Pad unit **ZP2-04 U CL-X19**

Pad diameter

Symbol	Pad diameter
04	$\varnothing 4$
06	$\varnothing 6$
08	$\varnothing 8$
10	$\varnothing 10$
16	$\varnothing 16$
25	$\varnothing 25$
32	$\varnothing 32$
40	$\varnothing 40$
50	$\varnothing 50$

With/Without lock ring

Nil	With lock ring
X19	Without lock ring (Note)

(Note) $\varnothing 10$ or larger

Pad material

Symbol	Material
CL	Mark-free NBR

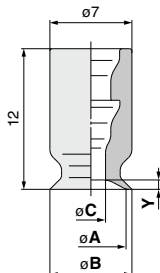
Pad type

Symbol	Type
U	Flat



Dimensions: Pad Unit

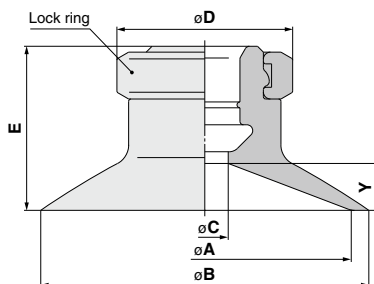
ZP2-04 to 08UCL



Dimensions

Model	A	B	C	Y
ZP2-04UCL	4	4.8	1.6	0.8
ZP2-06UCL	6	7	2.5	1
ZP2-08UCL	8	9	2.5	1

ZP2-10 to 50UCL



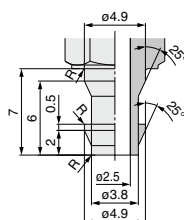
Dimensions

Model	A	B	C	D	E	Y
ZP2-10UCL	10	12		13	12	3
ZP2-16UCL	16	18	4		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			19.5	7.5

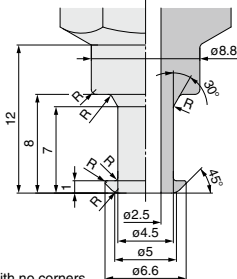
Adapter Mounting Dimensions

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

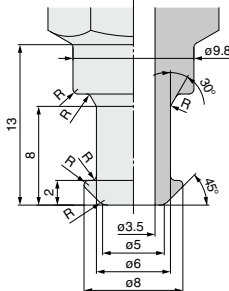
Applicable pad
04U/06U/08U



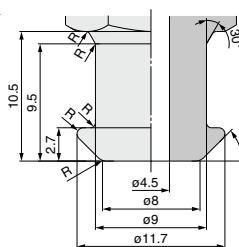
Applicable pad
10U/16U



Applicable pad
25U/32U



Applicable pad
40U/50U



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

* Refer to page 607 for adapter applicable to the ZP series.



Symbol/Type

H: Heavy-duty
(Flat with rib)

- 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 minimize 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.

How to Order

Pad unit **ZP2-40 H** **CL**

Pad diameter

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

Pad type

Symbol	Type
H	Heavy-duty (Flat with rib)

- Pad material

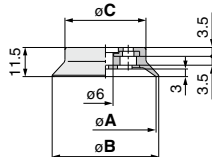
Symbol	Material
CL	Mark-free NBR
NT	NBR + Stuck fluororesin
FT	FKM + Stuck fluororesin



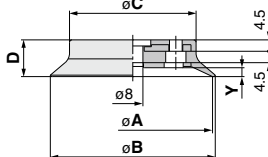
Stuck fluororesin

Dimensions: Pad Unit

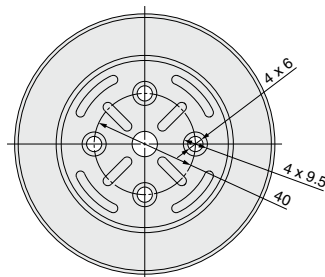
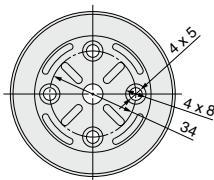
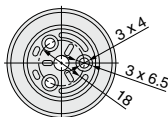
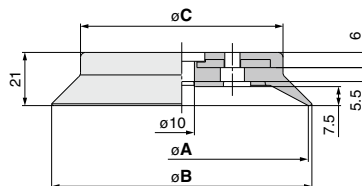
ZP2-⁴⁰₅₀H□



ZP2-⁶³₈₀H ☐



ZP2- $\frac{100}{125}$ H ☐



Dimensions

Model	A	B	C
ZP2-40H ☐	40	42	32
ZP2-50H ☐	50	53	42

Dimensions

Model	A	B	C	D	Y
ZP2-63H ☐	63	65	50	14.5	3.5
ZP2-80H ☐	80	82	61	16.5	4.5

Dimensions

Model	A	B	C
ZP2-100H ☐	100	103	80
ZP2-125H ☐	125	128	104

ZP3

ZP3E

ZP2

ZP2V

ZP

**ZPT
7DD**

XT66



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

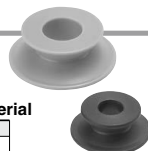
ZP2 - 06 K P

Pad diameter

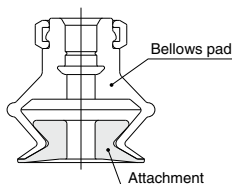
Symbol	Pad diameter
06	ZP06B ☐
08	ZP08B ☐
10	ZP10B ☐
13	ZP13B ☐
16	ZP16B ☐
20	ZP20B ☐
25	ZP25B ☐
32	ZP32B ☐

Attachment material

Symbol	Material
P	PEEK
GP	Conductive PEEK



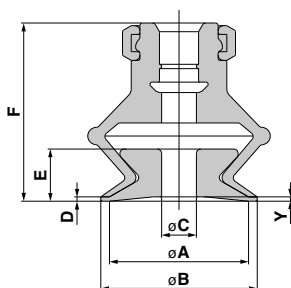
How to Order (When ordering with a pad)



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

Dimensions



Dimensions

Model	Applicable pad	A	B	C	D	E	F	Y
ZP2-06K ■	ZP06B ☐	6	7	1.6				
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			6	20.5	
ZP2-20K ■	ZP20B ☐	20	22	8			24.5	
ZP2-25K ■	ZP25B ☐	25	27		1	8.5	25	1
ZP2-32K ■	ZP32B ☐	32	34			11.5	30	

Note 1) ■ in the table indicates the attachment material.

Note 2) □ in the table indicates the pad material.

«Precautions»

1) Clean the product before using the attachment.

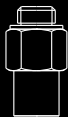
This product is not cleaned at shipment. If the product is used in the condition in which it is shipped, residual material may be left on the work pieces. Clean before usage. If you have any questions, please contact SMC.

2) The workpiece contact part of this product is made of resin and may have a larger vacuum pressure leakage during adsorption when compared to the general rubber pad. Therefore, maintain the flow rate as large as possible to minimize the pressure drop due to leakage.

3) Cannot be used for vacuum retention.

4) Customers are required to conduct the evaluation to judge whether or not the product is used.

- If contact with hard material is a problem, do not use this product.



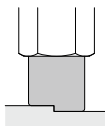
Sponge Pad

Pad diameter → $\varnothing 4, \varnothing 6, \varnothing 8, \varnothing 10, \varnothing 15$

Symbol/Type

S: Sponge

■ For adsorption of work pieces with bumps



How to Order

Pad unit **ZP2-06 S GS**

Pad O.D.

Symbol	Pad diameter
04	$\varnothing 4$
06	$\varnothing 6$
08	$\varnothing 8$
10	$\varnothing 10$
15	$\varnothing 15$

Pad material

Symbol	Material
GS	Conductive silicone
GC	Conductive CR

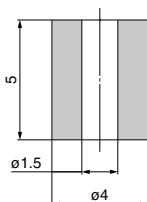
Pad type

Symbol	Type
S	Sponge

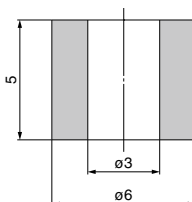


Dimensions: Pad Unit

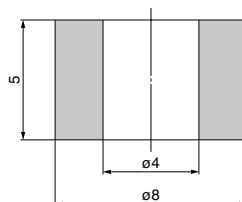
ZP2-04S□



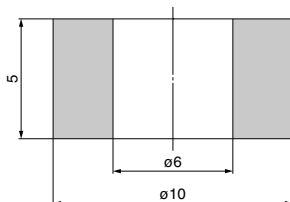
ZP2-06S□



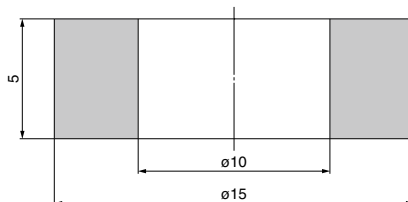
ZP2-08S□



ZP2-10S□



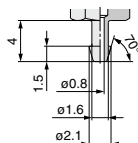
ZP2-15S□



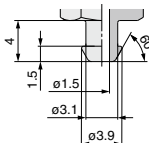
Adapter Mounting Dimensions

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

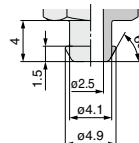
Applicable pad
04S



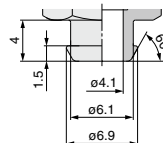
Applicable pad
06S



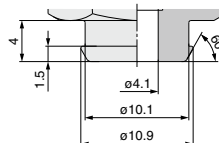
Applicable pad
08S



Applicable pad
10S



Applicable pad
15S



* Refer to pages 603 and 604 for adapter applicable to the ZP2 series.

ZP3

ZP3E

ZP2

ZP2V

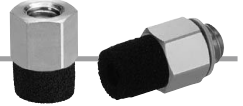
ZP

ZPT

ZPR

XT661

How to Order



With adapter **ZP2 - T 06 S GS - A3**

Vacuum inlet direction

Symbol	Direction
T	Vertical

Pad O.D.

Symbol	Pad diameter
04	ø4
06	ø6
08	ø8
10	ø10
15	ø15

Pad type

Symbol	Type
S	Sponge

Mounting

Symbol	Thread size	Applicable pad O.D. symbol				
		04	06	08	10	15
A3	M3 x 0.5 (Male thread)	●	—	—	—	—
A5	M5 x 0.8 (Male thread)	—	●	—	—	—
B3	M3 x 0.5 (Female thread)	●	—	—	—	—
B5	M5 x 0.8 (Female thread)	—	●	—	—	—

Pad material

Symbol	Material
GS	Conductive silicone
GC	Conductive CR

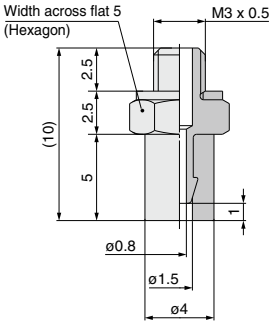
Replacement Part No.

Model	Pad unit part no.	Adapter part no.
ZP2-T04S □- A3	ZP2-04S□	ZP2A-S01P
ZP2-T06S □- A5	ZP2-06S□	ZP2A-S02P
ZP2-T08S □- A5	ZP2-08S□	ZP2A-S03P
ZP2-T10S □- A5	ZP2-10S□	ZP2A-S04P
ZP2-T15S □- A5	ZP2-15S□	ZP2A-S05P
ZP2-T04S □- B3	ZP2-04S□	ZP2A-S11
ZP2-T06S □- B5	ZP2-06S□	ZP2A-S12
ZP2-T08S □- B5	ZP2-08S□	ZP2A-S13
ZP2-T10S □- B5	ZP2-10S□	ZP2A-S14
ZP2-T15S □- B5	ZP2-15S□	ZP2A-S15

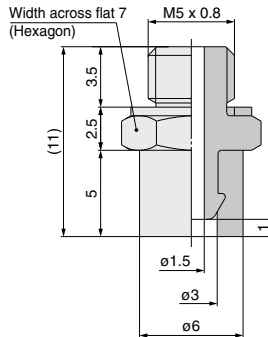
(Note) □ in the table indicates the pad material.

Dimensions: With Adapter

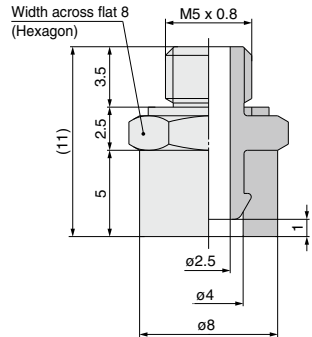
ZP2-T04S□-**A3**

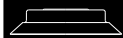


ZP2-T06S□-**A5**



ZP2-T08S□-**A5**





Heavy-duty Pad

Pad diameter $\varnothing 32, \varnothing 150, \varnothing 250, \varnothing 300, \varnothing 340$

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 work pieces

How to Order

Pad unit **ZP2-32 H N**

Pad diameter

Symbol	Pad diameter
32	$\varnothing 32$
150	$\varnothing 150$
250	$\varnothing 250$
300	$\varnothing 300$
340	$\varnothing 340$

Pad material

Symbol	Material
N	NBR
S	Silicone rubber ^{Note)}
F	FKM
C	CR

Note) Silicone rubber is only applicable to the $\varnothing 32$ pad.

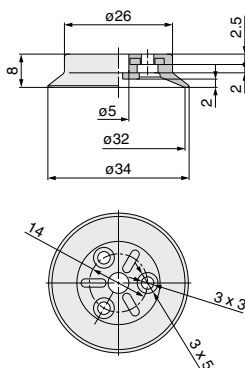
Pad type—Pad diameter

Pad type	Pad diameter (Symbol)	32	150	250	300	340
H (Flat with rib)		●	—	—	●	●
HT (Thin flat with rib)		—	●	●	—	—

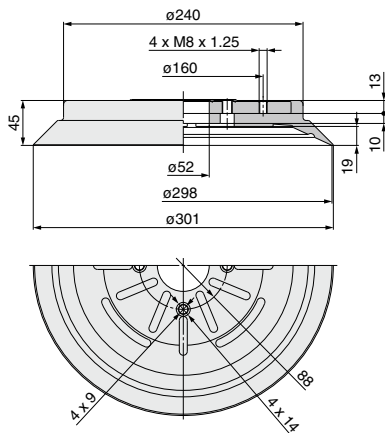
Note) The mounting adapter is available as a special order.

Dimensions: Pad Unit

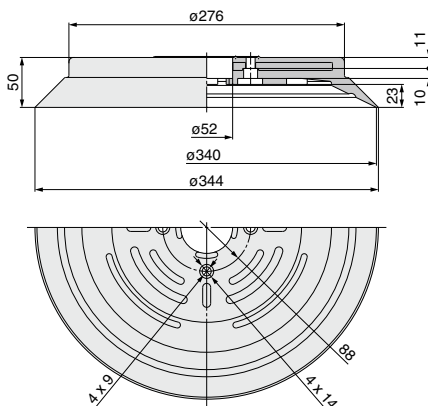
ZP2-32H□



ZP2-300H□

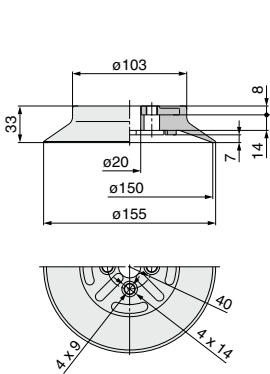


ZP2-340H□

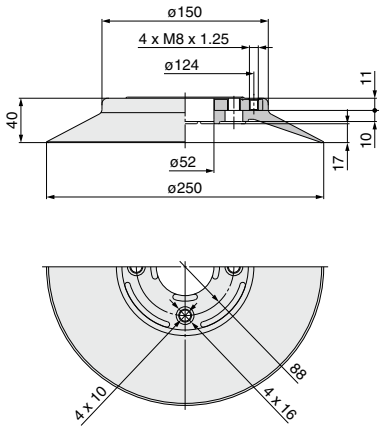


Dimensions

ZP2-150HT □



ZP2-250HT □



ZP3
ZP3E
ZP2
ZP2V
ZP
ZPT
ZPR
XT661



Heavy-duty Pad

Pad diameter $\varnothing 32, \varnothing 150$

Symbol/Type

HB: Heavy-duty (Bellows)

■ For heavy or large work pieces

How to Order



Pad unit **ZP2 - 32 HB N**

Pad diameter

Symbol	Pad diameter
32	$\varnothing 32$
150	$\varnothing 150$

Pad material

Symbol	Material
N	NBR
S	Silicone rubber ^{Note)}
F	FKM
C	CR

Note) Silicone rubber is only applicable to the $\varnothing 32$ pad.

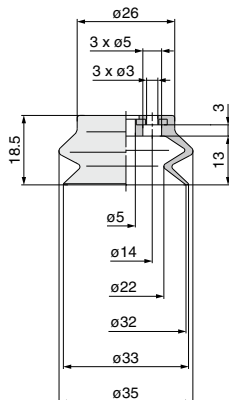
Pad type

Symbol	Type
HB	Heavy-duty (Bellows)

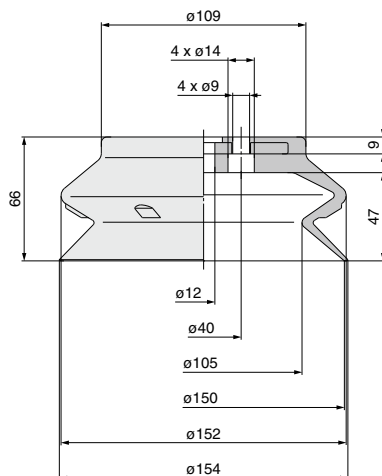
Note) The mounting adapter is available as a special order.

Dimensions: Pad Unit

ZP2-32HB□



ZP2-150HB□



 Heavy-duty Pad	Symbol/Type
	HW: Heavy-duty (Oval)
Pad size	30 x 50

■ For heavy or large work pieces

How to Order



Pad unit **ZP2-3050 HW N**

Pad size

Symbol	Pad size
3050	30 x 50

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
F	FKM
C	CR

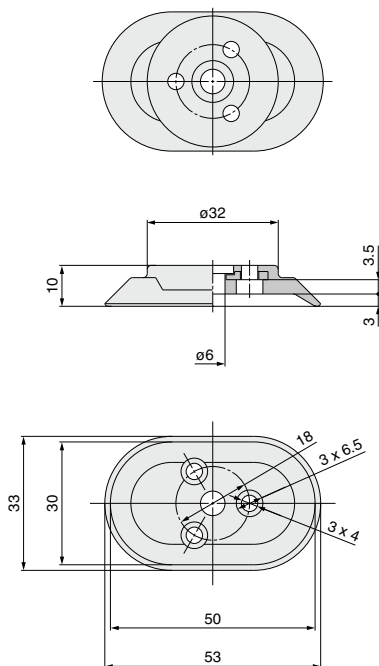
Pad type

Symbol	Type
HW	Heavy-duty (Oval)

Note) For details about the mounting bracket, refer to pages 611, 612, 622, and 623.

Dimensions: Pad Unit

ZP2-3050HW□



ZP3
ZP3E
ZP2
ZP2V
ZP
ZPT
ZPR
XT661



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

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

■ For adsorption of work pieces with inclined surface



With adapter ZP2-T F 40 H N

Vacuum inlet direction •

Specification (mechanism)

- Pad material (☐)

Pad diameter •

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

Pad type

Symbol	Type
H	Heavy-duty (Flat with rib)

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

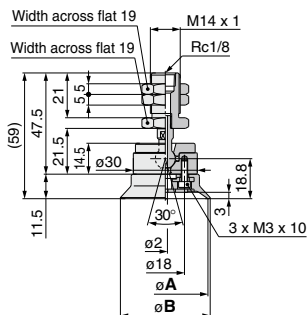
Replacement Part No.

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

Note) □ in the table indicates the pad material.

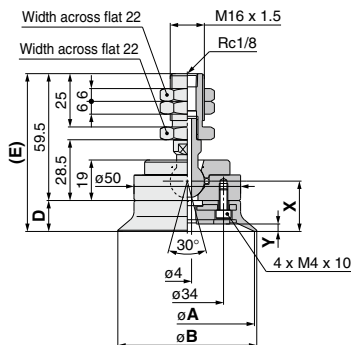
Dimensions: With Adapter

ZP2-TF^{40/50}H ☐



Dimensions

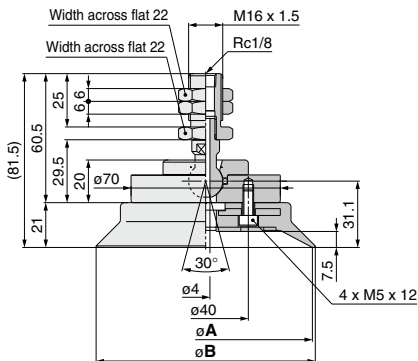
Model	A	B
ZP2-TF40H□	40	42
ZP2-TF50H□	50	52

ZP2-TF⁶³₈₀H□

Dimensions

Model	A	B	D	E	X	Y
ZP2-TF63H□	63	65	14.5	74	23.6	3.5
ZP2-TF80H□	80	82	16.5	76	25.6	4.5

ZP2-TF¹⁰⁰₁₂₅H ☐



Dimensions

Model	A	B
ZP2-TF100H□	100	103
ZP2-TF125H□	125	128

How to Order

With adapter **ZP2 – X F 40 H N**

Vacuum inlet direction •

Symbol	Direction
X	Lateral

Specification (mechanism)

Symbol	Specification
F	Ball joint

Pad diameter

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

• Pad material (☐)

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

- Pad type

Symbol	Type
H	Heavy-duty (Flat with rib)



Vacuum inlet direction **Lateral**

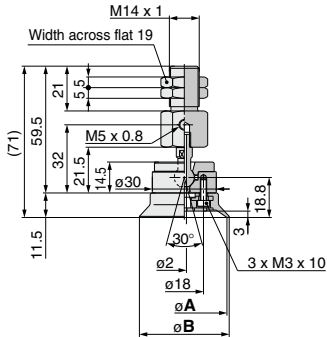
Replacement Part No.

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

Note) □ in the table indicates the pad material.

Dimensions: With Adapter

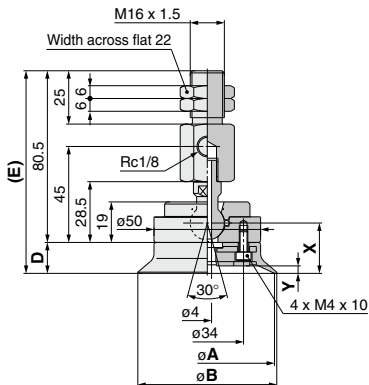
ZP2-XF⁴⁰₅₀H ☐



Dimensions

Model	A	B
ZP2-XF40H□	40	42
ZP2-XF50H□	50	52

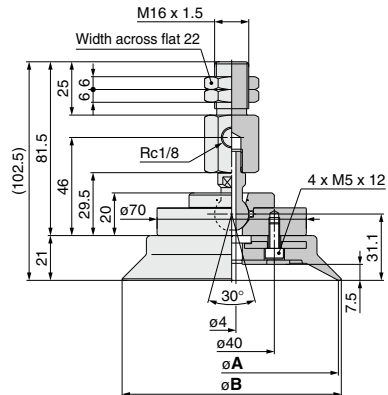
ZP2-XF⁶³₈₀H ☐



Dimensions

Model	A	B	D	E	X	Y
ZP2-XF63H□	63	65	14.5	95	23.6	3.5
ZP2-XF80H□	80	82	16.5	97	25.6	4.5

ZP2-XF¹⁰⁰₁₂₅H ☐



Dimensions

Model	A	B
ZP2-XF100H□	100	103
ZP2-XF125H□	125	128

ZP3
ZP3E
ZP2
ZP2V
ZP
ZPT
ZPR
XT661

How to Order

With buffer ZP2 – T F 40 H N JB 25

Vacuum inlet direction

Symbol	Direction
T	Vertical

Specification (mechanism)

Symbol	Specification
F	Ball joint

Pad diameter

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

Pad type

Symbol	Type
H	Heavy-duty (Flat with rib)

Buffer stroke (■)

Stroke	Applicable pad	ZP40H ZP50H	ZP63H ZP80H	ZP100H ZP125H
25		●	●	●
50		●	●	●
75		●	●	●
100		—	●	●

Buffer specification

Symbol	Specification
JB	Rotating With bushing Material: Brass
JF	Rotating With bushing Material: Steel

Pad material (□)

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



Vacuum inlet direction Vertical

Replacement Part No.

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

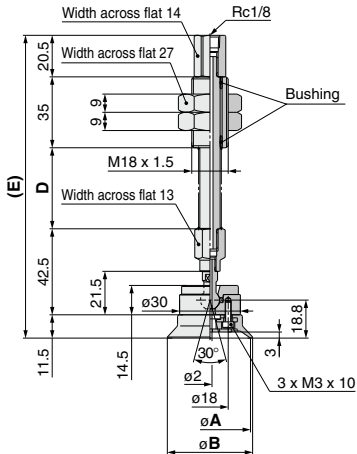
(Note) □ in the table indicates the pad material.

Buffer Specifications

Pad diameter		ø40, ø50	ø63, ø80, ø100, ø125
Stroke (mm)		25, 50, 75	25, 50, 75, 100
Spring reactive force	At 0 stroke	6.9 N	10 N
	At full stroke	11.8 N	15 N
Buffer specifications	JB	Rotating With bushing Buffer body material: Brass Nut tightening torque: 28 to 32 N·m / Nut tightening torque: 45 to 50 N·m	
	JF	Rotating With bushing Buffer body material: Steel Nut tightening torque: 48 to 52 N·m / Nut tightening torque: 75 to 80 N·m	

Dimensions: With Buffer

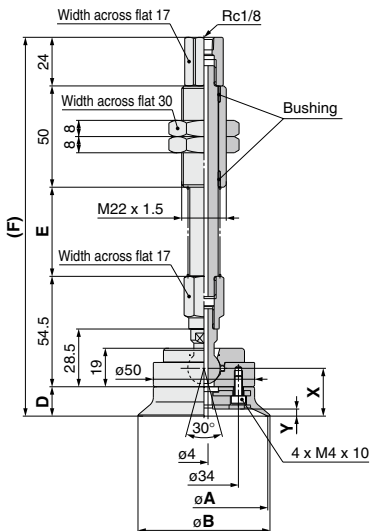
ZP2-TF⁴⁰₅₀H ☐ **JB** ☒ **JF**



Dimensions

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

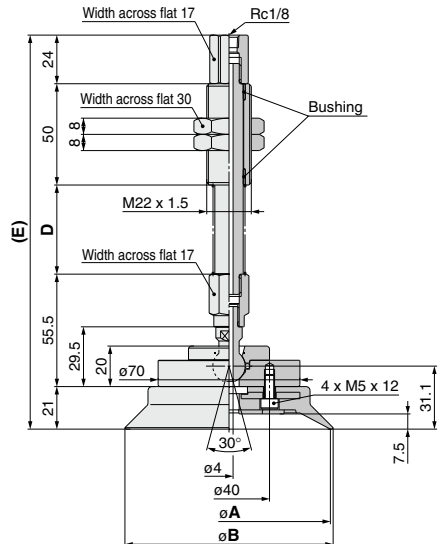
ZP2-TF⁶³₈₀H ☐ **JB** ☐



Dimensions

Model	A	B	D	E	F	X	Y
ZP2-TF63H□(JB/JF)25	63	65	14.5	44	187	23.6	3.5
ZP2-TF63H□(JB/JF)50				80	223		
ZP2-TF63H□(JB/JF)75				120	263		
ZP2-TF63H□(JB/JF)100				155	298		
ZP2-TF80H□(JB/JF)25	80	82	16.5	44	189	25.6	4.5
ZP2-TF80H□(JB/JF)50				80	225		
ZP2-TF80H□(JB/JF)75				120	265		
ZP2-TF80H□(JB/JF)100				155	300		

ZP2-TF¹⁰⁰₁₂₅H ☐ **JB** ☒ **JF**



Dimensions

Model		A	B	D	E
100	103	44	194.5		
		80	230.5		
		120	270.5		
		155	305.5		
		44	194.5		
125	128	80	230.5		
		120	270.5		
		155	305.5		
		44	194.5		
		80	230.5		

How to Order

With buffer **ZP2 – X F 40 H N JB 25**

Vacuum inlet direction

Symbol	Direction
X	Lateral

Specification (mechanism)

Symbol	Specification
F	Ball joint

Pad diameter

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

Pad type

Symbol	Type
H	Heavy-duty (Flat with rib)

Buffer stroke (■)

Stroke	Applicable pad	ZP40H ZP50H	ZP63H ZP80H	ZP100H ZP125H
25		●	●	●
50		●	●	●
75		●	●	●
100		—	●	●

Buffer specification

Symbol	Specification
JB	Rotating With bushing Material: Brass
JF	Rotating With bushing Material: Steel

Pad material (□)

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



Vacuum inlet direction **Lateral**

Replacement Part No.

Model	Pad unit part no.	Buffer assembly part no.	
ZP2-XF40H□(JB/JF)25	ZP40H□	ZP2B-XF1(JB/JF)25	With three M3 bolts
ZP2-XF40H□(JB/JF)50		ZP2B-XF1(JB/JF)50	
ZP2-XF40H□(JB/JF)75		ZP2B-XF1(JB/JF)75	
ZP2-XF50H□(JB/JF)25	ZP50H□	ZP2B-XF1(JB/JF)25	With three M3 bolts
ZP2-XF50H□(JB/JF)50		ZP2B-XF1(JB/JF)50	
ZP2-XF50H□(JB/JF)75		ZP2B-XF1(JB/JF)75	
ZP2-XF63H□(JB/JF)25	ZP63H□	ZP2B-XF2(JB/JF)25	With four M4 bolts
ZP2-XF63H□(JB/JF)50		ZP2B-XF2(JB/JF)50	
ZP2-XF63H□(JB/JF)75		ZP2B-XF2(JB/JF)75	
ZP2-XF63H□(JB/JF)100	ZP80H□	ZP2B-XF2(JB/JF)100	With four M4 bolts
ZP2-XF80H□(JB/JF)25		ZP2B-XF2(JB/JF)25	
ZP2-XF80H□(JB/JF)50		ZP2B-XF2(JB/JF)50	
ZP2-XF80H□(JB/JF)75	ZP100H□	ZP2B-XF2(JB/JF)75	With four M5 bolts
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	ZP125H□	ZP2B-XF3(JB/JF)50	With four M5 bolts
ZP2-XF100H□(JB/JF)75		ZP2B-XF3(JB/JF)75	
ZP2-XF100H□(JB/JF)100		ZP2B-XF3(JB/JF)100	
ZP2-XF125H□(JB/JF)25	ZP125H□	ZP2B-XF3(JB/JF)25	With four M5 bolts
ZP2-XF125H□(JB/JF)50		ZP2B-XF3(JB/JF)50	
ZP2-XF125H□(JB/JF)75		ZP2B-XF3(JB/JF)75	
ZP2-XF125H□(JB/JF)100		ZP2B-XF3(JB/JF)100	

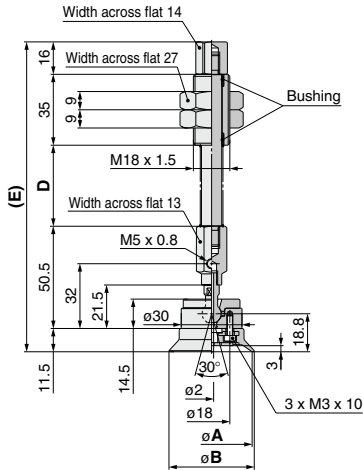
Note) □ in the table indicates the pad material.

Buffer Specifications

Pad diameter		ø40, ø50	ø63, ø80, ø100, ø125
Stroke (mm)		25, 50, 75	25, 50, 75, 100
Spring reactive force	At 0 stroke	6.9 N	10 N
	At full stroke	11.8 N	15 N
Buffer specifications	JB	Rotating With bushing Buffer body material: Brass Nut tightening torque: 28 to 32 N·m	
	JF	Rotating With bushing Buffer body material: Steel Nut tightening torque: 48 to 52 N·m	

Dimensions: With Buffer

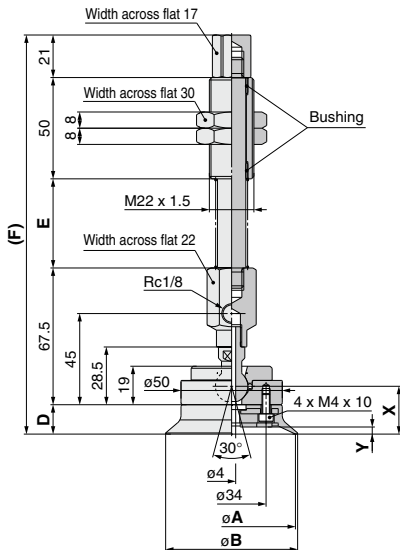
ZP2-XF⁴⁰₅₀H ☐ **JB** ☒ **JF**



Dimensions

Model	A	B	D	E
ZP2-XF40H□(JB/JF)25	40	42	40	153
ZP2-XF40H□(JB/JF)50			75	188
ZP2-XF40H□(JB/JF)75	50	52	111	224
ZP2-XF50H□(JB/JF)25			40	153
ZP2-XF50H□(JB/JF)50			75	188
ZP2-XF50H□(JB/JF)75			111	224

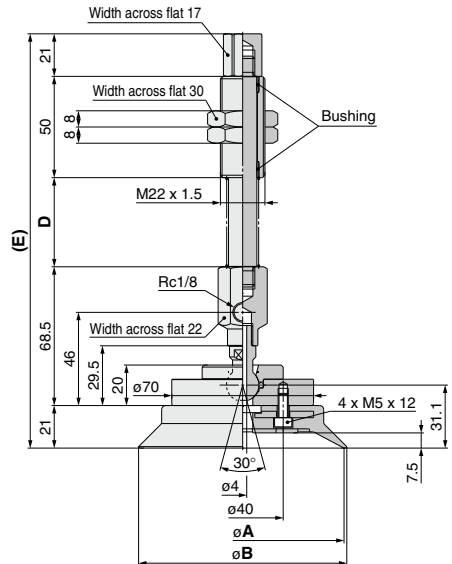
ZP2-XF⁶³₈₀H ☐ **JB** ☒ **JF**



Dimensions

Model	A	B	D	E	F	X	Y
ZP2-XF63H (JB/JF)25	63	65	14.5	44	197	23.6	3.5
ZP2-XF63H (JB/JF)50				80	233		
ZP2-XF63H (JB/JF)75				120	273		
ZP2-XF63H (JB/JF)100				155	308		
ZP2-XF80H (JB/JF)25	80	82	16.5	44	199	25.6	4.5
ZP2-XF80H (JB/JF)50				80	235		
ZP2-XF80H (JB/JF)75				120	275		
ZP2-XF80H (JB/JF)100				155	310		

ZP2-XF¹⁰⁰₁₂₅H ☐ **JB** ☒ **JF**



Dimensions

Model		A	B	D	E
100	2P2-XF100H (JB/JF)25	103		44	204.5
	2P2-XF100H (JB/JF)50			80	240.5
	2P2-XF100H (JB/JF)75			120	280.5
	2P2-XF100H (JB/JF)100			155	315.5
125	2P2-XF125H (JB/JF)25	128		44	204.5
	2P2-XF125H (JB/JF)50			80	240.5
	2P2-XF125H (JB/JF)75			120	280.5
	2P2-XF125H (JB/JF)100			155	315.5

ZP3
ZP3E
ZP2
ZP2V
ZP
ZPT
ZPR
XT661



Symbol/Type

**HB: Heavy-duty
(Bellows)**

A diagram showing a cross-section of a ballpoint pen tip. The tip is shown in contact with a surface, and a small reservoir of ink is visible within the tip's structure.

How to Order



Vacuum inlet direction **Vertical**

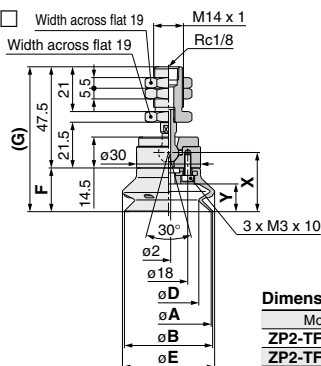
Replacement Part No.

Model	Pad unit part no.	Adapter assembly part no.	
ZP2-TF40HB ☐	ZP40HB ☐	ZP2A-TF1	With three M3 bolts
ZP2-TF50HB ☐	ZP50HB ☐		
ZP2-TF63HB ☐	ZP63HB ☐	ZP2A-TF2	With four M4 bolts
ZP2-TF80HB ☐	ZP80HB ☐		
ZP2-TF100HB ☐	ZP100HB ☐	ZP2A-TF3	With four M5 bolts
ZP2-TF125HB ☐	ZP125HB ☐		

Note) □ in the table indicates the pad material.

Dimensions: With Adapter

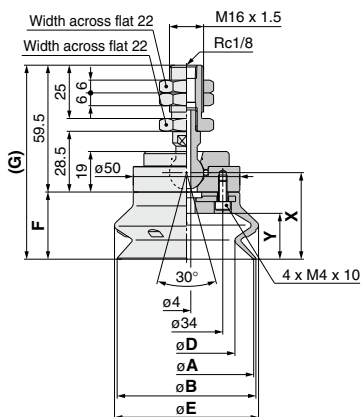
ZP2-TF⁴⁰₅₀HB ☐



Dimensions

Model	A	B	D	E	F	G	X	Y
ZP2-TF40HB□	40	41	28	43	20.5	68	27.8	13
ZP2-TF50HB□	50	52	36	54	24	71.5	31.3	16.5

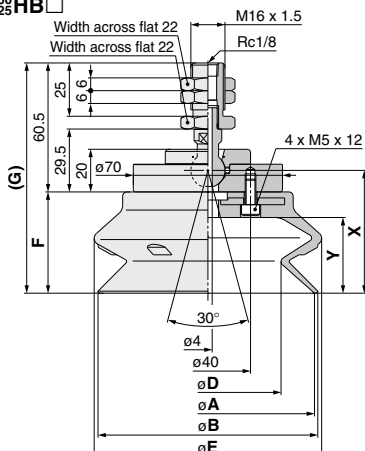
ZP2-TF⁶³₈₀HB ☐



Dimensions

Model	A	B	D	E	F	G	X	Y
ZP2-TF63HB□	63	65	46	68	31.5	91	40.6	21.5
ZP2-TF80HB□	80	83	58	85	37	96.5	46.1	27.5

ZP2-TF¹⁰⁰₁₂₅HB ☐



Dimensions

Model	A	B	D	E	F	G	X	Y
BP2-TF100HB	100	103	69	107	47.5	108	57.6	35.5
BP2-TF125HB	125	129	89	135	56	116.5	66.1	44

How to Order

With adapter **ZP2 - X F 40 HB N**

Vacuum inlet direction

Symbol	Direction
X	Lateral

Specification (mechanism)

Symbol	Specification
F	Ball joint

Pad diameter

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

Pad material (□)

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

Pad type

Symbol	Type
HB	Heavy-duty (Bellows)



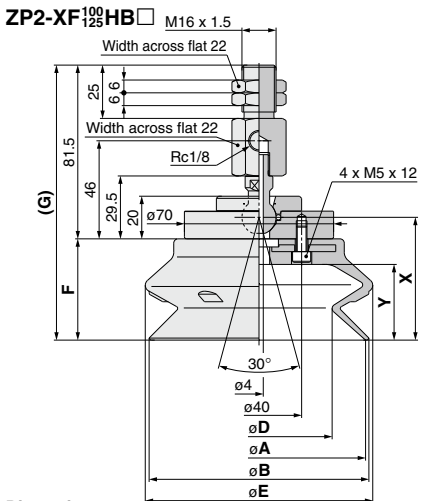
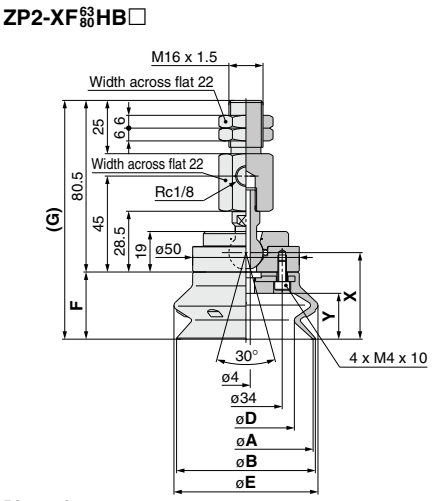
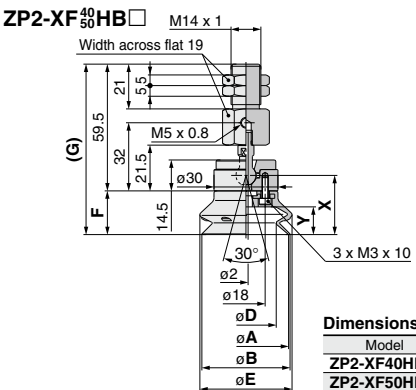
Vacuum inlet direction **Lateral**

Replacement Part No.

Model	Pad unit part no.	Adapter assembly part no.
ZP2-XF40HB□	ZP40HB□	ZP2A-XF1
ZP2-XF50HB□	ZP50HB□	
ZP2-XF63HB□	ZP63HB□	ZP2A-XF2
ZP2-XF80HB□	ZP80HB□	
ZP2-XF100HB□	ZP100HB□	ZP2A-XF3
ZP2-XF125HB□	ZP125HB□	

Note) □ in the table indicates the pad material.

Dimensions: With Adapter



- ZP3
- ZP3E
- ZP2**
- ZP2V
- ZP
- ZPT
- ZPR
- XT661



ZP2 Series

How to Order

With buffer **ZP2 – T F 40 HB N JB 25**

Vacuum inlet direction

Symbol	Direction
T	Vertical

Specification (mechanism)

Symbol	Specification
F	Ball joint

Pad diameter

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

Pad type

Symbol	Type
HB	Heavy-duty (Bellows)

Buffer stroke (■)

Stroke	Applicable pad	ZP40HB	ZP50HB	ZP63HB	ZP80HB	ZP100HB	ZP125HB
25		●	●	●	●	●	●
50		●	●	●	●	●	●
75		●	●	●	●	●	●
100		—	—	●	●	●	●

Buffer specification

Symbol	Specification
JB	Rotating With bushing Material: Brass
JF	Rotating With bushing Material: Steel

Pad material (□)

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



Vacuum inlet direction **Vertical**

Replacement Part No.

Model	Pad unit part no.	Buffer assembly part no.	
ZP2-TF40HB□(JB/JF)25	ZP40HB□	ZP2B-TF1(JB/JF)25	With three M3 bolts
ZP2-TF40HB□(JB/JF)50		ZP2B-TF1(JB/JF)50	
ZP2-TF40HB□(JB/JF)75		ZP2B-TF1(JB/JF)75	
ZP2-TF50HB□(JB/JF)25	ZP50HB□	ZP2B-TF1(JB/JF)25	With three M3 bolts
ZP2-TF50HB□(JB/JF)50		ZP2B-TF1(JB/JF)50	
ZP2-TF50HB□(JB/JF)75		ZP2B-TF1(JB/JF)75	
ZP2-TF63HB□(JB/JF)25	ZP63HB□	ZP2B-TF2(JB/JF)25	With four M4 bolts
ZP2-TF63HB□(JB/JF)50		ZP2B-TF2(JB/JF)50	
ZP2-TF63HB□(JB/JF)75		ZP2B-TF2(JB/JF)75	
ZP2-TF80HB□(JB/JF)25	ZP80HB□	ZP2B-TF2(JB/JF)100	With four M4 bolts
ZP2-TF80HB□(JB/JF)50		ZP2B-TF2(JB/JF)25	
ZP2-TF80HB□(JB/JF)75		ZP2B-TF2(JB/JF)50	
ZP2-TF100HB□(JB/JF)25	ZP100HB□	ZP2B-TF2(JB/JF)75	With four M5 bolts
ZP2-TF100HB□(JB/JF)50		ZP2B-TF2(JB/JF)100	
ZP2-TF100HB□(JB/JF)75		ZP2B-TF3(JB/JF)25	
ZP2-TF125HB□(JB/JF)25	ZP125HB□	ZP2B-TF3(JB/JF)50	With four M5 bolts
ZP2-TF125HB□(JB/JF)50		ZP2B-TF3(JB/JF)75	
ZP2-TF125HB□(JB/JF)75		ZP2B-TF3(JB/JF)100	

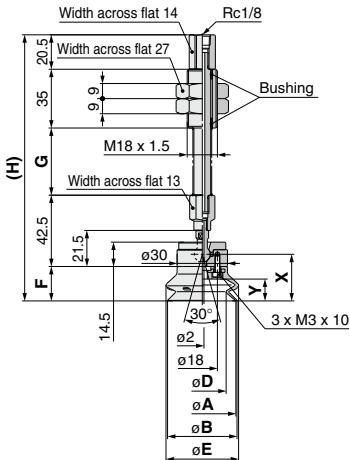
Note) □ in the table indicates the pad material.

Buffer Specifications

Pad diameter		ø40, ø50	ø63, ø80, ø100, ø125
Stroke (mm)		25, 50, 75	25, 50, 75, 100
Spring reactive force	At 0 stroke	6.9 N	10 N
	At full stroke	11.8 N	15 N
Buffer specifications	JB	Rotating With bushing Buffer body material: Brass	
		Nut tightening torque: 28 to 32 N·m Nut tightening torque: 45 to 50 N·m	
	JF	Rotating With bushing Buffer body material: Steel	
		Nut tightening torque: 48 to 52 N·m Nut tightening torque: 75 to 80 N·m	

Dimensions: With Buffer

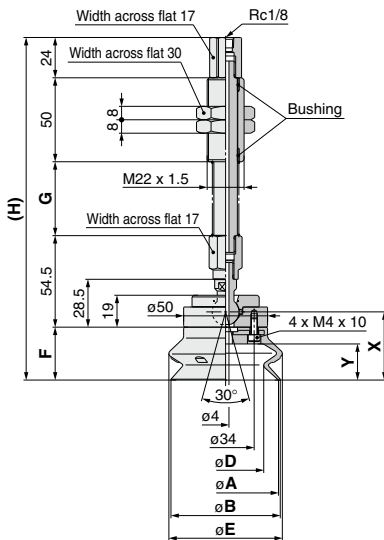
ZP2-TF⁴⁰₅₀HB ☐ JB ☒ JF ☐



Dimensions

Model	A	B	D	E	F	G	H	X	Y
ZP2-TF40HB□(JB/JF)25	40	41	28	43	20.5	40	158.5	27.8	13
ZP2-TF40HB□(JB/JF)50						75	193.5		
ZP2-TF40HB□(JB/JF)75						111	229.5		
ZP2-TF50HB□(JB/JF)25	50	52	36	54	24	40	162	31.3	16.5
ZP2-TF50HB□(JB/JF)50						75	197		
ZP2-TF50HB□(JB/JF)75						111	233		

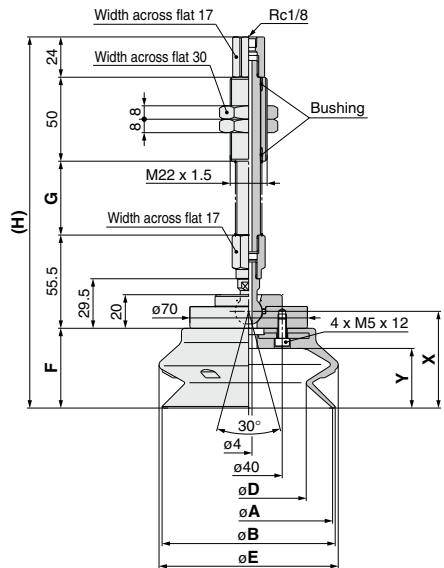
ZP2-TF⁶³₈₀HB ☐ **JB** ☐ **JF** ☒



Dimensions

Model	A	B	D	E	F	G	H	X	Y
ZP2-TF63HB (JB/JF)25						44	204		
ZP2-TF63HB (JB/JF)50	63	65	46	68	31.5	80	240	40.6	21.5
ZP2-TF63HB (JB/JF)75						120	280		
ZP2-TF63HB (JB/JF)100						155	315		
ZP2-TF80HB (JB/JF)25						44	209.5		
ZP2-TF80HB (JB/JF)50	80	83	58	85	37	80	245.5	46.1	27.5
ZP2-TF80HB (JB/JF)75						120	285.5		
ZP2-TF80HB (JB/JF)100						155	320.5		

ZP2-TF¹⁰⁰₁₂₅HB ☐ **JB** ☒ **JF** ☐



Dimensions

Model	A	B	D	E	F	G	H	X	Y
ZP2-TF100HB (JB/JF)25	100	103	69	107	47.5	44	221		
ZP2-TF100HB (JB/JF)50						80	257		
ZP2-TF100HB (JB/JF)75						120	297		
ZP2-TF100HB (JB/JF)100						155	332		
ZP2-TF125HB (JB/JF)25	125	129	89	135	56	44	263.5		
ZP2-TF125HB (JB/JF)50						80	295		
ZP2-TF125HB (JB/JF)75						120	305.5		
ZP2-TF125HB (JB/JF)100						155	340.5		

ZP3
ZP3E
ZP2
ZP2V
ZP
ZPT
ZPR
XT661

ZP2 Series

How to Order

With buffer **ZP2 - X F 40 HB N JB 25**

Vacuum inlet direction

Symbol	Direction
X	Lateral

Specification (mechanism)

Symbol	Specification
F	Ball joint

Pad diameter

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

Pad type

Symbol	Type
HB	Heavy-duty (Bellows)

Buffer stroke (■)

Stroke	Applicable pad	ZP40HB	ZP50HB	ZP63HB	ZP80HB	ZP100HB	ZP125HB
25		●	●	●	●	●	●
50		●	●	●	●	●	●
75		●	●	●	●	●	●
100		—	—	●	●	●	●

Buffer specification

Symbol	Specification
JB	Rotating With bushing Material: Brass
JF	Rotating With bushing Material: Steel

Pad material (□)

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



Vacuum inlet direction **Lateral**

Replacement Part No.

Model	Pad unit part no.	Buffer assembly part no.	
ZP2-XF40HB□(JB/JF)25	ZP40HB□	ZP2B-XF1(JB/JF)25	With three M3 bolts
ZP2-XF40HB□(JB/JF)50		ZP2B-XF1(JB/JF)50	
ZP2-XF40HB□(JB/JF)75		ZP2B-XF1(JB/JF)75	
ZP2-XF50HB□(JB/JF)25	ZP50HB□	ZP2B-XF1(JB/JF)25	With four M4 bolts
ZP2-XF50HB□(JB/JF)50		ZP2B-XF1(JB/JF)50	
ZP2-XF50HB□(JB/JF)75		ZP2B-XF1(JB/JF)75	
ZP2-XF63HB□(JB/JF)25	ZP63HB□	ZP2B-XF2(JB/JF)25	With four M4 bolts
ZP2-XF63HB□(JB/JF)50		ZP2B-XF2(JB/JF)50	
ZP2-XF63HB□(JB/JF)75		ZP2B-XF2(JB/JF)75	
ZP2-XF80HB□(JB/JF)25	ZP80HB□	ZP2B-XF2(JB/JF)100	With four M5 bolts
ZP2-XF80HB□(JB/JF)50		ZP2B-XF2(JB/JF)50	
ZP2-XF80HB□(JB/JF)75		ZP2B-XF2(JB/JF)75	
ZP2-XF100HB□(JB/JF)25	ZP100HB□	ZP2B-XF3(JB/JF)25	With four M5 bolts
ZP2-XF100HB□(JB/JF)50		ZP2B-XF3(JB/JF)50	
ZP2-XF100HB□(JB/JF)75		ZP2B-XF3(JB/JF)75	
ZP2-XF125HB□(JB/JF)25	ZP125HB□	ZP2B-XF3(JB/JF)100	With four M5 bolts
ZP2-XF125HB□(JB/JF)50		ZP2B-XF3(JB/JF)50	
ZP2-XF125HB□(JB/JF)75		ZP2B-XF3(JB/JF)75	
ZP2-XF125HB□(JB/JF)100		ZP2B-XF3(JB/JF)100	

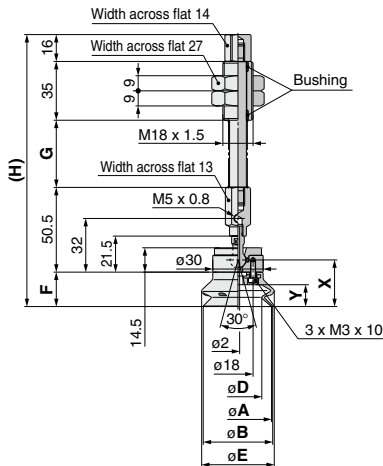
Note) □ in the table indicates the pad material.

Buffer Specifications

Pad diameter		ø40, ø50	ø63, ø80, ø100, ø125
Stroke (mm)		25, 50, 75	25, 50, 75, 100
Spring reactive force	At 0 stroke	6.9 N	10 N
	At full stroke	11.8 N	15 N
Buffer specifications	JB	Rotating With bushing Buffer body material: Brass	
		Nut tightening torque: 28 to 32 N·m Nut tightening torque: 45 to 50 N·m	
	JF	Rotating With bushing Buffer body material: Steel	
		Nut tightening torque: 48 to 52 N·m Nut tightening torque: 75 to 80 N·m	

Dimensions: With Buffer

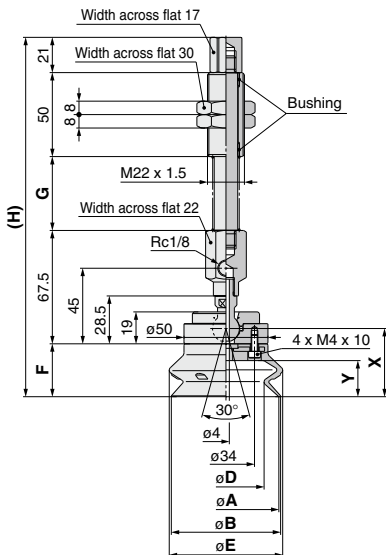
ZP2-XF⁴⁰₅₀HB ☐ **JB** ☐ **JF** ☒



Dimensions

Model	A	B	D	E	F	G	H	X	Y
ZP2-XF40HB□(JB/JF)25	40	41	28	43	20.5	40	162	27.8	13
ZP2-XF40HB□(JB/JF)50						75	197		
ZP2-XF40HB□(JB/JF)75						111	233		
ZP2-XF50HB□(JB/JF)25	50	52	36	54	24	40	165.5	31.3	16.5
ZP2-XF50HB□(JB/JF)50						75	200.5		
ZP2-XF50HB□(JB/JF)75						111	236.5		

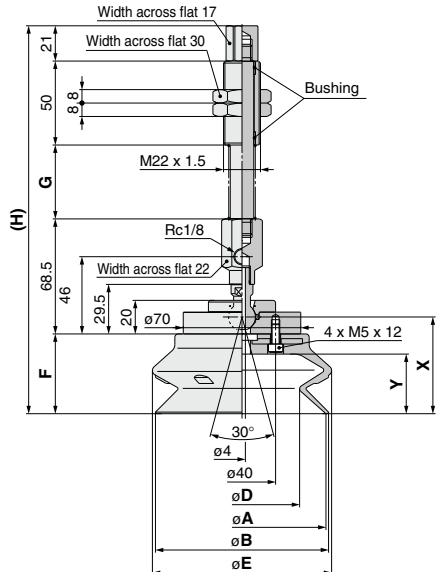
ZP2-XF⁶³₈₀HB ☐ **JB** ☒ **JF** ☐



Dimensions

Model	A	B	D	E	F	G	H	X	Y
ZP2-XF63HB (JB/JF)25	63	65	46	68	31.5	44	214	40.6	21.5
ZP2-XF63HB (JB/JF)50						80	250		
ZP2-XF63HB (JB/JF)75						120	290		
ZP2-XF63HB (JB/JF)100						155	325		
ZP2-XF80HB (JB/JF)25	80	83	58	85	37	44	219.5	46.1	27.5
ZP2-XF80HB (JB/JF)50						80	255.5		
ZP2-XF80HB (JB/JF)75						120	295.5		
ZP2-XF80HB (JB/JF)100						155	330.5		

ZP2-XF¹⁰⁰₁₂₅HB ☐ **JB** ☒ **JF** ☐



Dimensions

Model	A	B	D	E	F	G	H	X	Y
ZP2-XF100HB (JB/JF)25	100	103	69	107	47.5	44	231	57.6	35.5
ZP2-XF100HB (JB/JF)50						80	267		
ZP2-XF100HB (JB/JF)75						120	307		
ZP2-XF100HB (JB/JF)100						155	342		
ZP2-XF125HB (JB/JF)25	125	129	89	135	56	44	235.5	66.1	44
ZP2-XF125HB (JB/JF)50						80	279.5		
ZP2-XF125HB (JB/JF)75						120	315.5		
ZP2-XF125HB (JB/JF)100						155	350.5		

ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT
ZDD

XT661



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 work pieces.

How to Order



Pad unit

ZP 40 H N

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

- Pad material

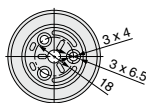
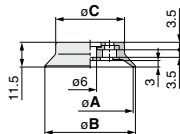
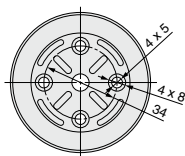
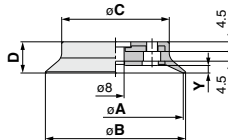
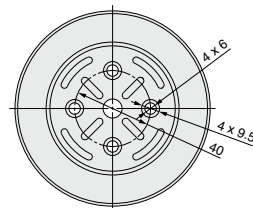
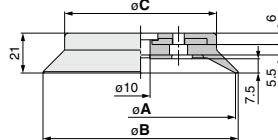
Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
E	EPB

- **Pad type**

Symbol	Type
H	Heavy-duty (Flat with rib)
HB	Heavy-duty (Bellows)

Dimensions: Pad Unit

ZP⁴⁰₅₀H□

ZP⁶³₈₀H□ZP¹⁰⁰₁₂₅H ☐

Dimensions

Model	A	B	C
ZP40H□	40	42	32
ZP50H□	50	52	42

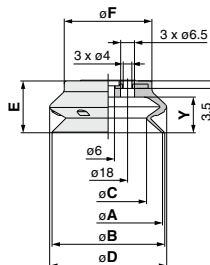
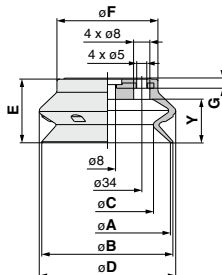
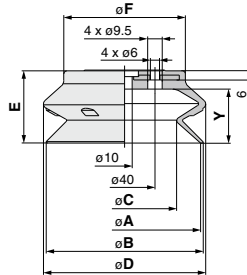
Dimensions

Model	A	B	C	D	Y
ZP63H□	63	65	50	14.5	3.5
ZP80H□	80	82	61	16.5	4.5

Dimensions

Model	A	B	C
ZP100H □	100	103	80
ZP125H □	125	128	104

ZP⁴⁰₅₀HB ☐

ZP⁶³₈₀HB□ZP¹⁰⁰₁₂₅HB□

Dimensions

Model	A	B	C	D	E	F	Y
ZP40HB 	40	41	28	43	20.5	30	13
ZP50HB 	50	52	36	54	24	40.5	16.5

Dimensions

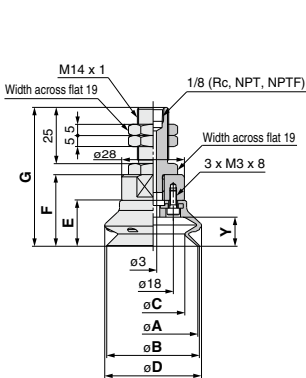
Model	A	B	C	D	E	F	G	Y
ZP63HB 	63	65	46	68	31.5	50	4.5	21.5
ZP80HB 	80	83	58	85	37	64	5	27.5

Dimensions

Model	A	B	C	D	E	F	Y
ZP100HB 	100	103	69	107	47.5	80	35.5
ZP125HB 	125	129	89	135	56	105	44

Dimensions: With Adapter

ZPT⁴⁰₅₀HB□-A14 (Male thread)

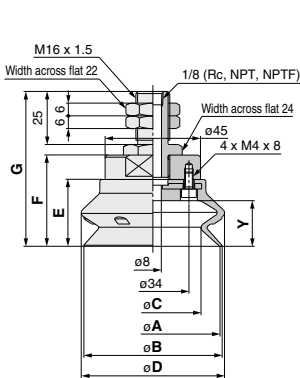


Dimensions

Model	A	B	C	D
ZPT40HB□-A14	40	41	28	43
ZPT50HB□-A14	50	52	36	54

Model	E	F	G	Y
ZPT40HB□-A14	20.5	32	62	13
ZPT50HB□-A14	24	35.5	65.5	16.5

ZPT⁶³₈₀HB□-A16 (Male thread)

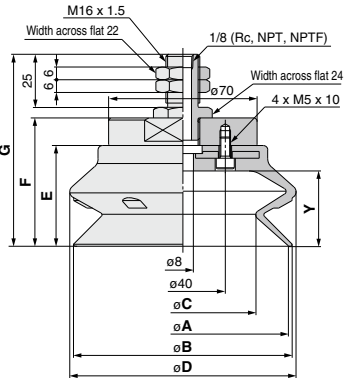


Dimensions

Model	A	B	C	D
ZPT63HB□-A16	63	65	46	68
ZPT80HB□-A16	80	83	58	85

Model	E	F	G	Y
ZPT63HB□-A16	31.5	43	73	21.5
ZPT80HB□-A16	37	48.5	78.5	27.5

ZPT¹⁰⁰₁₂₅HB□-A16 (Male thread)

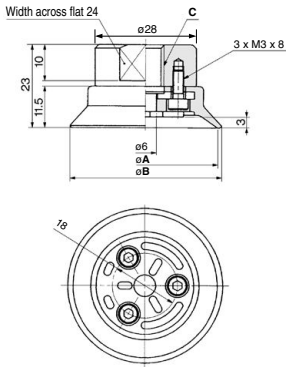


Dimensions

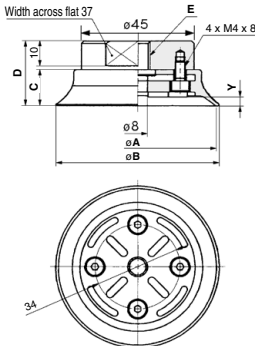
Model	A	B	C	D
ZPT100HB□-A16	100	103	69	107
ZPT125HB□-A16	125	129	89	135

Model	E	F	G	Y
ZPT100HB□-A16	47.5	60.5	90.5	35.5
ZPT125HB□-A16	56	69	99	44

ZPT⁴⁰₅₀H□-B□ (Female thread)



ZPT⁶³₈₀H□-B□ (Female thread)



Dimensions

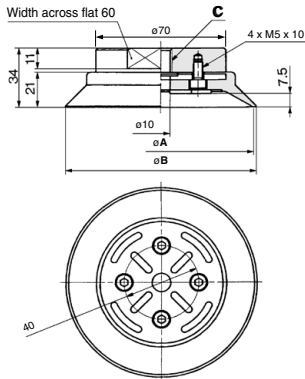
Model	A	B	C
ZPT40H□-B8	40	42	M8 x 1.25
ZPT40H□-B10			M10 x 1.5
ZPT50H□-B8	50	52	M8 x 1.25
ZPT50H□-B10			M10 x 1.5

Dimensions

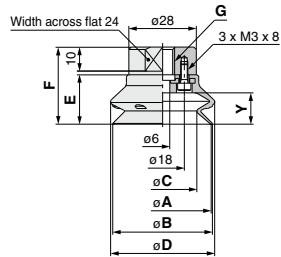
Model	A	B	C	D	E	Y
ZPT63H□-B8	63	65	14.5	26	M8 x 1.25	3.5
ZPT63H□-B10					M10 x 1.5	
ZPT63H□-B12					M12 x 1.75	
ZPT63H□-B16					M16 x 1.5	
ZPT80H□-B8	80	82	16.5	28	M8 x 1.25	4.5
ZPT80H□-B10					M10 x 1.5	
ZPT80H□-B12					M12 x 1.75	
ZPT80H□-B16					M16 x 1.5	

Dimensions: With Adapter

ZPT¹⁰⁰₁₂₅H□-B□ (Female thread)



ZPT⁴⁰₅₀H□-B□ (Female thread)



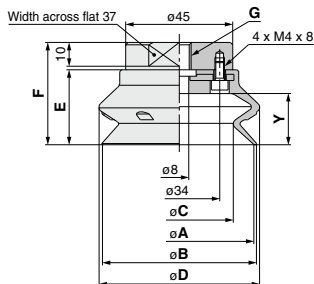
Dimensions

Model	A	B	C
ZPT100H□-B12	100	103	M12 x 1.75
ZPT100H□-B16			M16 x 1.5
ZPT125H□-B12	125	128	M12 x 1.75
ZPT125H□-B16			M16 x 1.5

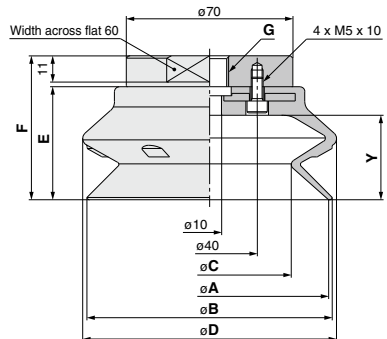
Dimensions

Model	A	B	C	D	E	F	G	Y
ZPT40HB□-B8	40	41	28	43	20.5	32	M8 x 1.25	13
ZPT40HB□-B10							M10 x 1.5	
ZPT50HB□-B8	50	52	36	54	24	35.5	M8 x 1.25	16.5
ZPT50HB□-B10							M10 x 1.5	

ZPT⁶³₈₀HB□-B□ (Female thread)



ZPT¹⁰⁰₁₂₅HB□-B□ (Female thread)



Dimensions

Model	A	B	C	D	E	F	G	Y
ZPT63HB□-B8	63	65	46	68	31.5	43	M8 x 1.25	21.5
ZPT63HB□-B10							M10 x 1.5	
ZPT63HB□-B12							M12 x 1.75	
ZPT63HB□-B16							M16 x 1.5	
ZPT80HB□-B8	80	83	58	85	37	48.5	M8 x 1.25	27.5
ZPT80HB□-B10							M10 x 1.5	
ZPT80HB□-B12							M12 x 1.75	
ZPT80HB□-B16							M16 x 1.5	

Dimensions

Model	A	B	C	D	E	F	G	Y
ZPT100HB□-B12	100	103	69	107	47.5	60.5	M12 x 1.75	35.5
ZPT100HB□-B16							M16 x 1.5	
ZPT125HB□-B12	125	129	89	135	56	69	M12 x 1.75	44
ZPT125HB□-B16							M16 x 1.5	

How to Order

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

Pad diameter

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

Pad type (*)

Symbol	Type
H	Heavy-duty (Flat with rib)
HB	Heavy-duty (Bellows)

Vacuum inlet thread size

Symbol	Thread size
B01	Rc 1/8
N01	NPT 1/8
T01	NPTF 1/8

Mounting thread size

Symbol	Thread size	Pad diameter		
		ø40, ø50	ø63, ø80	ø100, ø125
B8	M8 x 1.25	●	●	—
B10	M10 x 1.5	—	●	●
B12	M12 x 1.75	—	●	●

Vacuum inlet direction **Lateral**

Pad material (□)

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

Replacement Part No.

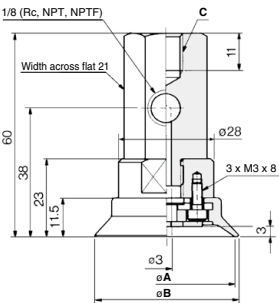
Model	Pad unit part no.	Adapter assembly part no.	Model	Pad unit part no.	Adapter assembly part no.
ZPX40*□-B01-B8	ZP40*□	ZPA-X1-B01-B8	ZPX80*□-B01-B10	ZP80*□	ZPA-X2-B01-B10
ZPX40*□-N01-B8		ZPA-X1-N01-B8	ZPX80*□-N01-B10		ZPA-X2-N01-B10
ZPX40*□-T01-B8		ZPA-X1-T01-B8	ZPX80*□-T01-B10		ZPA-X2-T01-B10
ZPX40*□-B01-B10		ZPA-X1-B01-B10	ZPX80*□-B01-B12		ZPA-X2-B01-B12
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	ZP50*□	ZPA-X1-B01-B8	ZPX100*□-B01-B10	ZP100*□	ZPA-X3-B01-B10
ZPX50*□-N01-B8		ZPA-X1-N01-B8	ZPX100*□-N01-B10		ZPA-X3-N01-B10
ZPX50*□-T01-B8		ZPA-X1-T01-B8	ZPX100*□-T01-B10		ZPA-X3-T01-B10
ZPX50*□-B01-B10		ZPA-X1-B01-B10	ZPX100*□-B01-B12		ZPA-X3-B01-B12
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	ZP63*□	ZPA-X2-B01-B10	ZPX125*□-B01-B10	ZP125*□	ZPA-X3-B01-B10
ZPX63*□-N01-B10		ZPA-X2-N01-B10	ZPX125*□-N01-B10		ZPA-X3-N01-B10
ZPX63*□-T01-B10		ZPA-X2-T01-B10	ZPX125*□-T01-B10		ZPA-X3-T01-B10
ZPX63*□-B01-B12		ZPA-X2-B01-B12	ZPX125*□-B01-B12		ZPA-X3-B01-B12
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) * in the table indicates the pad type.

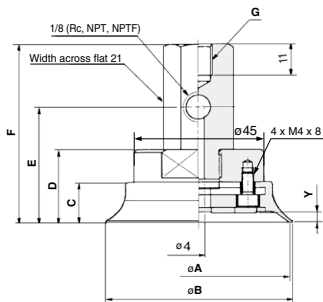
Note 2) □ in the table indicates the pad material.

Dimensions: Without Buffer

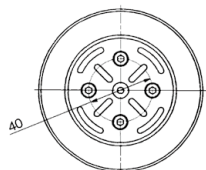
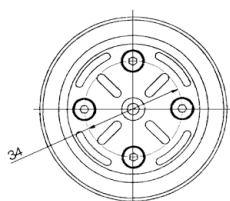
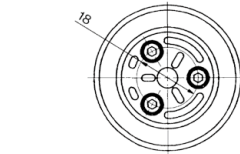
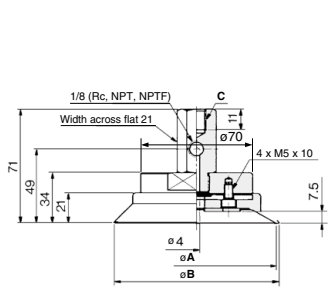
ZPX⁴⁰₅₀H□-□01-B₈_{B10}



ZPX⁶³₈₀H□-□01-B₁₀_{B12}



ZPX¹⁰⁰₁₂₅H□-□01-B₁₀_{B12}



Dimensions

Model	A	B	C
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

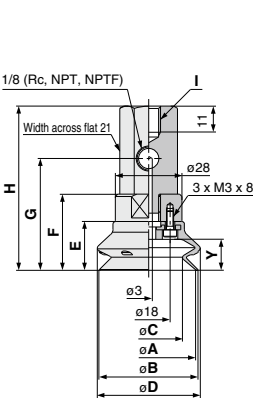
Model	A	B	C	D	E	F	Y	G
ZPX63H□-□01-B10	63	65	14.5	26	41	63	3.5	M10 x 1.5
ZPX63H□-□01-B12	63	65	14.5	26	41	63	3.5	M12 x 1.75
ZPX80H□-□01-B10	80	82	16.5	28	43	65	4.5	M10 x 1.5
ZPX80H□-□01-B12	80	82	16.5	28	43	65	4.5	M12 x 1.75

Dimensions

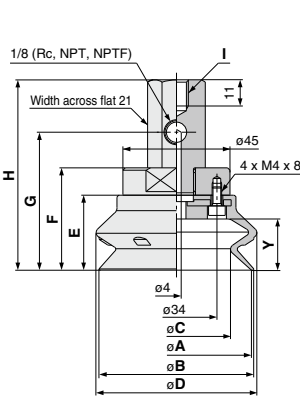
Model	A	B	C
ZPX100H□-□01-B10	100	103	M10 x 1.5
ZPX100H□-□01-B12	100	103	M12 x 1.75
ZPX125H□-□01-B10	125	128	M10 x 1.5
ZPX125H□-□01-B12	125	128	M12 x 1.75

Dimensions: Without Buffer

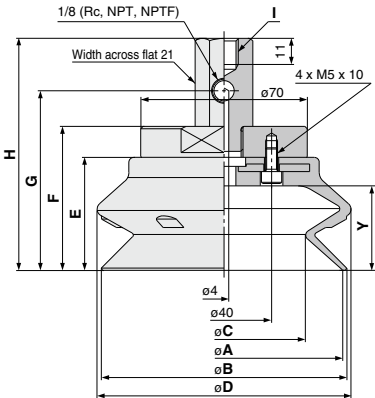
ZPX⁴⁰₅₀HB□-□01-B⁸_{B10}



ZPX⁶³₈₀HB□-□01-B¹⁰_{B12}



ZPX¹⁰⁰₁₂₅HB□-□01-B¹⁰_{B12}



Dimensions

Model	A	B	C	D	E	F
ZPX40HB□-□01-B8	40	41	28	43	20.5	32
ZPX40HB□-□01-B10						
ZPX50HB□-□01-B8	50	52	36	54	24	35.5
ZPX50HB□-□01-B10						

Model	G	H	I	Y
ZPX40HB□-□01-B8	47	69	M8 x 1.25	13
ZPX40HB□-□01-B10			M10 x 1.5	
ZPX50HB□-□01-B8			M8 x 1.25	
ZPX50HB□-□01-B10	50.5	72.5	M10 x 1.5	16.5

Dimensions

Model	A	B	C	D	E	F
ZPX63HB□-□01-B10	63	65	46	68	31.5	43
ZPX63HB□-□01-B12						
ZPX80HB□-□01-B10	80	83	58	85	37	48.5
ZPX80HB□-□01-B12						

Model	G	H	I	Y
ZPX63HB□-□01-B10	58	80	M10 x 1.5	21.5
ZPX63HB□-□01-B12			M12 x 1.75	
ZPX80HB□-□01-B10			M10 x 1.5	
ZPX80HB□-□01-B12	63.5	85.5	M12 x 1.75	27.5

Dimensions

Model	A	B	C	D	E	F
ZPX100HB□-□01-B10	100	103	69	107	47.5	60.5
ZPX100HB□-□01-B12						
ZPX125HB□-□01-B10	125	129	89	135	56	69
ZPX125HB□-□01-B12						

Model	G	H	I	Y
ZPX100HB□-□01-B10	75.5	97.5	M10 x 1.5	35.5
ZPX100HB□-□01-B12			M12 x 1.75	
ZPX125HB□-□01-B10			M10 x 1.5	
ZPX125HB□-□01-B12	84	106	M12 x 1.75	44

ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

ZPR

XT661

How to Order

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

Pad diameter	Symbol	Pad diameter
40	□40	
50	□50	
63	□63	
80	□80	
100	□100	
125	□125	

Symbol	Type
H	Heavy-duty (Flat with rib)
HB	Heavy-duty (Bellows)

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

Buffer body material (★)

Symbol	Material
J	Aluminum alloy
JB	Brass + With bushing
JF	Steel + With bushing

Vacuum inlet thread size

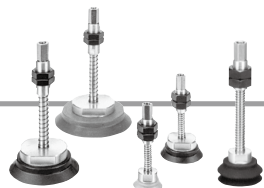
Symbol	Thread size
B01	Rc1/8
N01	NPT1/8
T01	NPTF1/8

Mounting thread size

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

Buffer stroke (■)

Stroke	□40	□50	□63	□80	□100	□125
25	●	●	●	●	●	●
50	●	●	●	●	●	●
75	●	●	●	●	●	●
100	—	—	—	—	●	●



Vacuum inlet direction **Vertical**

Buffer Specifications (Rotating)

Pad diameter	□40 to □80	□100, □125
Stroke (mm)	25, 50, 75	25, 50, 75, 100
Spring reactive force	At 0 stroke: 6.9 N At full stroke: 11.8 N	10 N 15 N

Nut Tightening Torque

(N·m)

Mounting thread size	Buffer body material	Aluminum alloy	Brass + With bushing	Steel + With bushing
M18 x 1.5	9.5 to 10.5 N·m	28 to 32 N·m	48 to 52 N·m	
M22 x 1.5	9.5 to 10.5 N·m	45 to 50 N·m	75 to 80 N·m	

Replacement Part No.

Model	Pad part no.	Buffer assembly part no.
ZPT40□□★25-(B/N/T)01-A18	ZP40□□	ZPB-T1★25-(B/N/T)01
ZPT40□□★50-(B/N/T)01-A18		ZPB-T1★50-(B/N/T)01
ZPT40□□★75-(B/N/T)01-A18		ZPB-T1★75-(B/N/T)01
ZPT50□□★25-(B/N/T)01-A18	ZP50□□	ZPB-T1★25-(B/N/T)01
ZPT50□□★50-(B/N/T)01-A18		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	ZP63□□	ZPB-T2★25-(B/N/T)01
ZPT63□□★50-(B/N/T)01-A18		ZPB-T2★50-(B/N/T)01
ZPT63□□★75-(B/N/T)01-A18		ZPB-T2★75-(B/N/T)01
ZPT80□□★25-(B/N/T)01-A18	ZP80□□	ZPB-T2★25-(B/N/T)01
ZPT80□□★50-(B/N/T)01-A18		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	ZP100□□	ZPB-T3★25-(B/N/T)01
ZPT100□□★50-(B/N/T)01-A22		ZPB-T3★50-(B/N/T)01
ZPT100□□★75-(B/N/T)01-A22		ZPB-T3★75-(B/N/T)01
ZPT100□□★100-(B/N/T)01-A22	ZP100□□	ZPB-T3★100-(B/N/T)01
ZPT125□□★25-(B/N/T)01-A22		ZPB-T3★25-(B/N/T)01
ZPT125□□★50-(B/N/T)01-A22		ZPB-T3★50-(B/N/T)01
ZPT125□□★75-(B/N/T)01-A22	ZP125□□	ZPB-T3★75-(B/N/T)01
ZPT125□□★100-(B/N/T)01-A22		ZPB-T3★100-(B/N/T)01

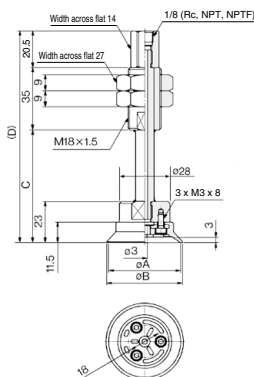
Note 1) * in the table indicates the pad type.

Note 2) □ in the table indicates the pad material.

Note 3) ★ in the table indicates the buffer body material.

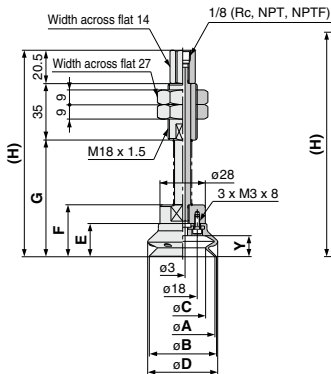
Dimensions: With Buffer

ZPT⁴⁰₅₀H□★■-□01-A18

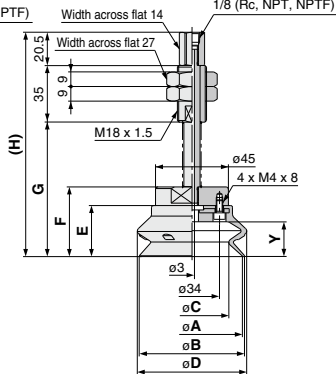


Dimensions: With Buffer

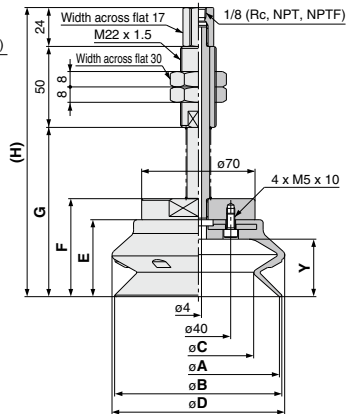
ZPT⁴⁰₅₀HB ☐ ★ ☒ - 01 - A18



ZPT⁶³₈₀HB ☐ **★** ☒ - 01 - **A18**



ZPT¹⁰⁰₁₂₅HB ☐ ★ ☒ - **01** - **A22**



Dimensions

Model	A	B	C	D	E
ZPT40HB □ ★25-01-A18	40	41	28	43	20.5
ZPT40HB □ ★50-01-A18					
ZPT40HB □ ★75-01-A18					
ZPT50HB □ ★25-01-A18	50	52	36	54	24
ZPT50HB □ ★50-01-A18					
ZPT50HB □ ★75-01-A18					

Model	F	G	H	Y
ZPT40HB  ★25-  -A18	32	72	127.5	13
ZPT40HB  ★50-  -A18		107	162.5	
ZPT40HB  ★75-  -A18		143	198.5	
ZPT50HB  ★25-  -A18	35.5	75.5	131	16.5
ZPT50HB  ★50-  -A18		110.5	166	
ZPT50HB  ★75-  -A18		146.5	202	

Dimensions

Model	A	B	C	D	E
ZPT63HB $\star 25$ -01-A18	63	65	46	68	31.5
ZPT63HB $\star 50$ -01-A18					
ZPT63HB $\star 75$ -01-A18					
ZPT80HB $\star 25$ -01-A18	80	83	58	85	37
ZPT80HB $\star 50$ -01-A18					
ZPT80HB $\star 75$ -01-A18					

Model	F	G	H	Y
ZPT63HB $\star 25_{-01}$ -A18	43	83	138.5	21.5
ZPT63HB $\star 50_{-01}$ -A18		118	173.5	
ZPT63HB $\star 75_{-01}$ -A18		154	209.5	
ZPT80HB $\star 25_{-01}$ -A18	48.5	88.5	144	27.5
ZPT80HB $\star 50_{-01}$ -A18		123.5	179	
ZPT80HB $\star 75_{-01}$ -A18		159.5	215	

Dimensions

Model	A	B	C	D	E
ZPT100HB $\star 25$ -01-A22	100	103	69	107	47.5
ZPT100HB $\star 50$ -01-A22					
ZPT100HB $\star 75$ -01-A22					
ZPT100HB $\star 100$ -01-A22					
ZPT125HB $\star 25$ -01-A22	125	129	89	135	56
ZPT125HB $\star 50$ -01-A22					
ZPT125HB $\star 75$ -01-A22					
ZPT125HB $\star 100$ -01-A22					

Model	F	G	H	Y
ZPT100HB□*25-□□-A22	60.5	104.5	178.5	35.5
ZPT100HB□*50-□□-A22		140.5	214.5	
ZPT100HB□*75-□□-A22		180.5	254.5	
ZPT100HB□*100-□□-A22	69	215.5	289.5	44
ZPT125HB□*25-□□-A22		113	187	
ZPT125HB□*50-□□-A22		149	223	
ZPT125HB□*75-□□-A22		189	263	
ZPT125HB□*100-□□-A22		224	298	

ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT
7PR

XT661

How to Order



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

Pad diameter

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

Pad type (*)

Symbol	Type
H	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

Buffer body material (★)

Symbol	Material
J	Aluminum alloy
JB	Brass + With bushing
JF	Steel + With bushing

Vacuum inlet thread size

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

Mounting thread size

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

Vacuum inlet direction **Lateral**

Buffer stroke (■)

Stroke	ø40	ø50	ø63	ø80	ø100	ø125
25	●	●	●	●	●	●
50	●	●	●	●	●	●
75	●	●	●	●	●	●
100	—	—	—	—	●	●

Buffer Specifications (Rotating)

Pad diameter	ø40 to ø80	ø100, ø125
Stroke (mm)	25, 50, 75	25, 50, 75, 100
Spring reactive force	At 0 stroke: 6.9 N At full stroke: 11.8 N	10 N 15 N

Nut Tightening Torque

(N·m)

Mounting thread size	Buffer body material	Aluminum alloy	Brass + With bushing	Steel + With bushing
M18 x 1.5		9.5 to 10.5 N·m	28 to 32 N·m	48 to 52 N·m
M22 x 1.5		9.5 to 10.5 N·m	45 to 50 N·m	75 to 80 N·m

Replacement Part No.

Model	Pad unit part no.	Buffer assembly part no.
ZPX40□★25-(B/N/T)01-A18	ZP40□□	ZPB-X1★25-(B/N/T)01
ZPX40□★50-(B/N/T)01-A18		ZPB-X1★50-(B/N/T)01
ZPX40□★75-(B/N/T)01-A18		ZPB-X1★75-(B/N/T)01
ZPX50□★25-(B/N/T)01-A18	ZP50□□	ZPB-X1★25-(B/N/T)01
ZPX50□★50-(B/N/T)01-A18		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	ZP63□□	ZPB-X2★25-(B/N/T)01
ZPX63□★50-(B/N/T)01-A18		ZPB-X2★50-(B/N/T)01
ZPX63□★75-(B/N/T)01-A18		ZPB-X2★75-(B/N/T)01
ZPX80□★25-(B/N/T)01-A18	ZP80□□	ZPB-X2★25-(B/N/T)01
ZPX80□★50-(B/N/T)01-A18		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	ZP100□□	ZPB-X3★25-(B/N/T)01
ZPX100□★50-(B/N/T)01-A22		ZPB-X3★50-(B/N/T)01
ZPX100□★75-(B/N/T)01-A22		ZPB-X3★75-(B/N/T)01
ZPX100□★100-(B/N/T)01-A22	ZP125□□	ZPB-X3★100-(B/N/T)01
ZPX125□★25-(B/N/T)01-A22		ZPB-X3★25-(B/N/T)01
ZPX125□★50-(B/N/T)01-A22		ZPB-X3★50-(B/N/T)01
ZPX125□★75-(B/N/T)01-A22		ZPB-X3★75-(B/N/T)01
ZPX125□★100-(B/N/T)01-A22		ZPB-X3★100-(B/N/T)01

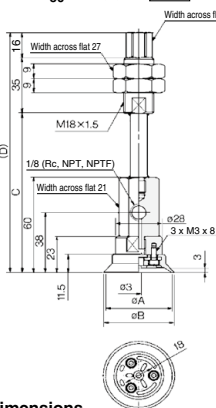
Note 1) * in the table indicates the pad type.

Note 2) □ in the table indicates the pad material.

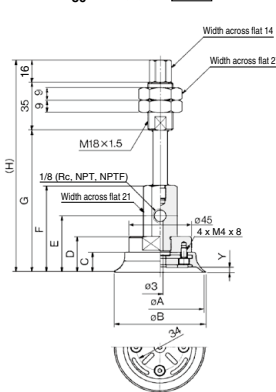
Note 3) ★ in the table indicates the buffer body material.

Dimensions: With Buffer

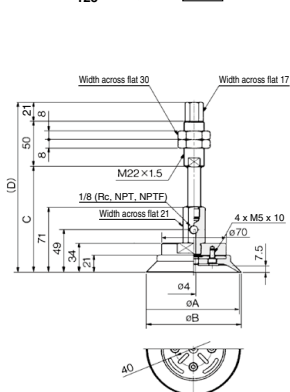
ZPX 40 H □ ★ ■ - 01 - A18



ZPX 63 80 H □ ★ ■ - 01 - A18



ZPX 100 125 H □ ★ ■ - 01 - A22



Dimensions

Model	A	B	C	D
ZPX40H□★25-01-A18	100	151		
ZPX40H□★50-01-A18	40	42	135	186
ZPX40H□★75-01-A18			171	222
ZPX50H□★25-01-A18	50	52	135	186
ZPX50H□★50-01-A18			171	222
ZPX50H□★75-01-A18				

Dimensions

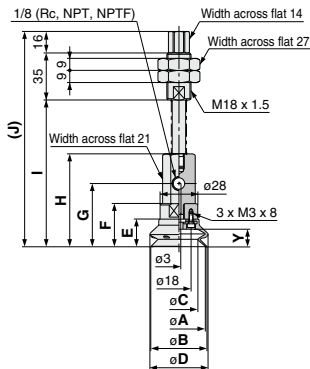
Model	A	B	C	D	E	F	G	H	Y
ZPX63H□★25-01-A18	63	65	14.5	26	41	63	103	154	
ZPX63H□★50-01-A18							138	189	3.5
ZPX63H□★75-01-A18							174	225	
ZPX80H□★25-01-A18	80	82	16.5	28	43	65	105	156	
ZPX80H□★50-01-A18							140	191	4.5
ZPX80H□★75-01-A18							176	227	

Dimensions

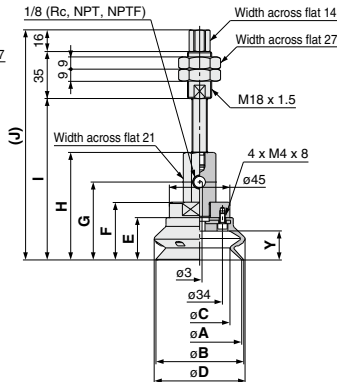
Model	A	B	C	D
ZPX100H□★25-01-A22	100	103	115	186
ZPX100H□★50-01-A22			151	222
ZPX100H□★75-01-A22			191	262
ZPX100H□★100-01-A22			226	297
ZPX125H□★25-01-A22	125	128	115	186
ZPX125H□★50-01-A22			151	222
ZPX125H□★75-01-A22			191	262
ZPX125H□★100-01-A22			226	297

Dimensions: With Buffer

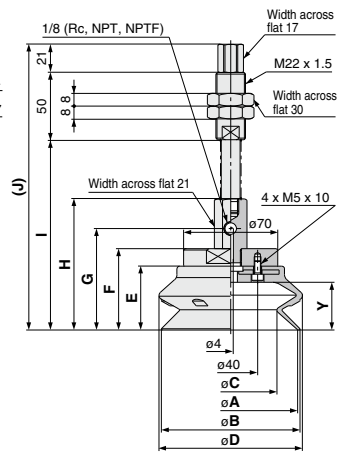
ZPX⁴⁰₅₀HB ☐ ★ ☒ - **01** - **A18**



ZPX⁶³₈₀HB - 01 - A18



ZPX¹⁰⁰₁₂₅HB ☐ ★ ☒ - **01** - A22



Dimensions

Model	A	B	C	D	E	F
ZPX40HB★25-01-A18	40	41	28	43	20.5	32
ZPX40HB□★50-01-A18						
ZPX40HB□★75-01-A18						
ZPX50HB★25-01-A18	50	52	36	54	24	35.5
ZPX50HB□★50-01-A18						
ZPX50HB□★75-01-A18						

Model	G	H	I	J	Y
ZPX40HB ☐ ★25- ☐ 01-A18	47	69	109	160	13
ZPX40HB ☒ ★50- ☐ 01-A18			144	195	
ZPX40HB ☒ ★75- ☐ 01-A18			180	231	
ZPX50HB ☒ ★25- ☐ 01-A18	50.5	72.5	112.5	163.5	16.5
ZPX50HB ☒ ★50- ☐ 01-A18			147.5	198.5	
ZPX50HB ☒ ★75- ☐ 01-A18			183.5	234.5	

Dimensions

Model	A	B	C	D	E	F
ZPX63HB □ ★25-01-A18	63	65	46	68	31.5	43
ZPX63HB □ ★50-01-A18						
ZPX63HB □ ★75-01-A18						
ZPX80HB □ ★25-01-A18	80	83	58	85	37	48.5
ZPX80HB □ ★50-01-A18						
ZPX80HB □ ★75-01-A18						

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

Dimensions

Model	A	B	C	D	E	F
ZPX100HB□★25-□01-A22	100	103	69	107	47.5	60.5
ZPX100HB□★50-□01-A22						
ZPX100HB□★75-□01-A22						
ZPX100HB□★100-□01-A22						
ZPX125HB□★25-□01-A22	125	129	89	135	56	69
ZPX125HB□★50-□01-A22						
ZPX125HB□★75-□01-A22						
ZPX125HB□★100-□01-A22						

Model	G	H	I	J	Y
ZPX100HB- $\star 25$ - $\overline{01}$ -A22			141.5	212.5	
ZPX100HB- $\star 50$ - $\overline{01}$ -A22			177.5	248.5	
ZPX100HB- $\star 75$ - $\overline{01}$ -A22	75.5	97.5	217.5	288.5	35.5
ZPX100HB- $\star 100$ - $\overline{01}$ -A22			252.5	323.5	
ZPX125HB- $\star 25$ - $\overline{01}$ -A22			150	221	
ZPX125HB- $\star 50$ - $\overline{01}$ -A22			186	257	
ZPX125HB- $\star 75$ - $\overline{01}$ -A22	84	106	226	297	44
ZPX125HB- $\star 100$ - $\overline{01}$ -A22			261	332	

ZP3

ZP3E

ZP2

ZP2V

ZPZPT
ZDDXT661



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 realized in the pad to dampen the impact to the work.

How to Order

ZP2-Z1-001-S

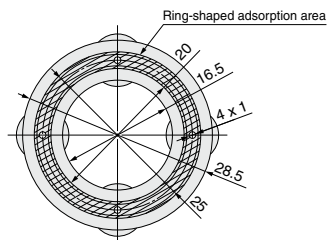
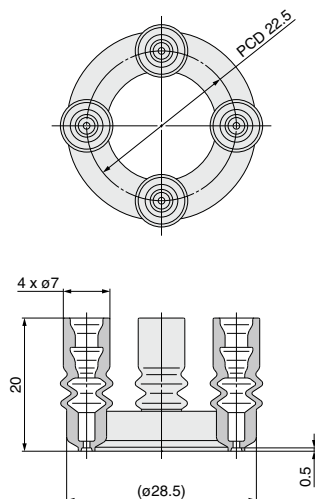


Pad material

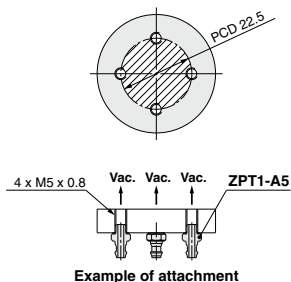
Symbol	Material
S	Silicone rubber
GS	Urethane rubber

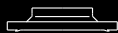
Dimensions

ZP2-Z1-001-□□



ZPT1-A5 is a recommended adapter.
(Four adapters are necessary.)
See below for mounting.
Refer to the pages 597 and 607 for details.





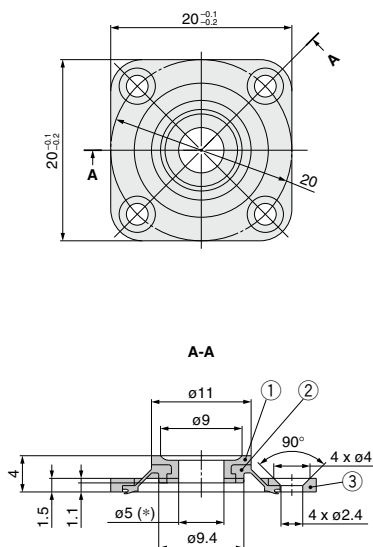
Vacuum Pad for Fixing Panel

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



Dimensions

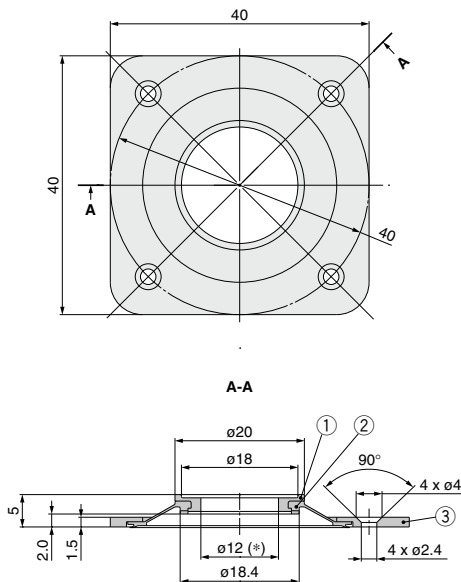
ZP2-Z002



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

ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

ZPR

XT661

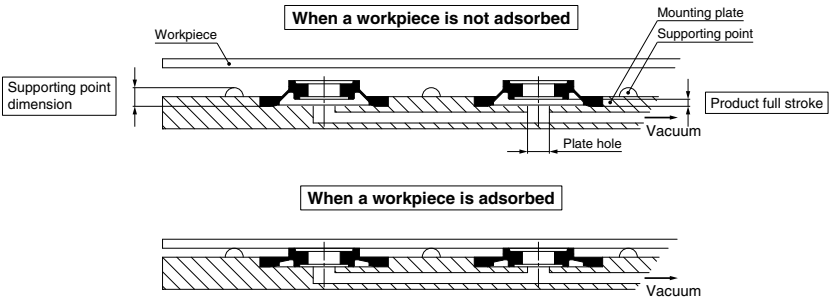
Take the following points into consideration when using this product.
Customers are required to conduct the evaluation to judge whether or not the product is used.

- 1) This product should be used in the horizontal direction and to fix the workpiece.
- 2) The pad (resin) may have a larger vacuum pressure leakage from the lip when compared to the general rubber pad. Therefore, maintain the flow rate as large as possible to minimize the pressure drop due to leakage.
- 3) Cannot be used for vacuum retention.
- 4) Design the pad mounting parts while referring to the "Table 1: References for Designing Mounting Parts" shown below. Additionally, avoid applying the weight of the workpiece directly to the pad.
- 5) Be sure to clean the workpiece contact part of the pad before use and during periodic maintenance.

Table 1: References for Designing Mounting Parts

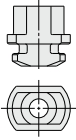
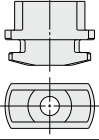
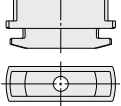
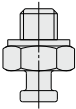
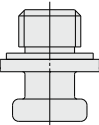
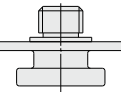
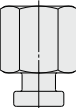
	Supporting point dimension	Plate hole	(Reference value) Product full stroke
ZP2-Z002	2.9 ± 0.1 mm	ø5 or less	1.1 mm
ZP2-Z003	3.0 ± 0.1 mm	ø12 or less	2.0 mm

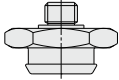
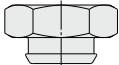
* Use this product with its full stroke. Avoid using the product with a stroke less than the product stroke (at an intermediate position) or with a stroke exceeding the product stroke.



Adapter/Buffer Applicable Pad List

ZP2 Series Mounting Adapter Part No.

Adapter model	Applicable pad model ZP2 Series	Page
ZP2A-001	 ZP2-3507W□ ZP2-4010W□ ZP2-5010W□ ZP2-6010W□	P. 602
ZP2A-002	 ZP2-4020W□ ZP2-5020W□ ZP2-6020W□ ZP2-8020W□	P. 602
ZP2A-003	 ZP2-4030W□ ZP2-5030W□ ZP2-6030W□ ZP2-8030W□	P. 602
ZP2A-M01P	 ZP2-B02MU□ ZP2-B035MU□ ZP2-B04MU□ ZP2-B05MU□ ZP2-B04MB□	P. 602
ZP2A-M02*	 ZP2-B06MU□ ZP2-B08MU□ ZP2-B10MU□ ZP2-B15MU□ ZP2-B06MB□ ZP2-B08MB□ ZP2-B10MT□ ZP2-B15MT□	P. 602
ZP2A-M03*	 ZP2-B20MT□ ZP2-B25MT□ ZP2-B30MT□	P. 602
ZP2A-M04	 ZP2-B06MU□ ZP2-B08MU□ ZP2-B10MU□ ZP2-B15MU□ ZP2-B06MB□ ZP2-B08MB□ ZP2-B10MT□ ZP2-B15MT□	P. 602
ZP2A-M05	 ZP2-B10MB□ ZP2-B15MB□	P. 602
ZP2A-M06	 ZP2-B20MB□	P. 603

Adapter model	Applicable pad model ZP2 Series	Page
ZP2A-Z01P	 ZP2-B02EU□ ZP2-B04EU□ ZP2-B06EU□ ZP2-08EU□ ZP2-15EU□	P. 603
ZP2A-Z02P	 ZP2-B02EU□ ZP2-B04EU□ ZP2-B06EU□ ZP2-08EU□ ZP2-15EU□	P. 603
ZP2A-Z21P	 ZP2-08AN□ ZP2-11AN□	P. 603
ZP2A-S01P	 ZP2-04S□	P. 603
ZP2A-S02P	 ZP2-06S□	P. 603
ZP2A-S03P	 ZP2-08S□	P. 603
ZP2A-S04P	 ZP2-10S□	P. 603
ZP2A-S05P	 ZP2-15S□	P. 604
ZP2A-S11	 ZP2-04S□	P. 604
ZP2A-S12	 ZP2-06S□	P. 604
ZP2A-S13	 ZP2-08S□	P. 604
ZP2A-S14	 ZP2-10S□	P. 604
ZP2A-S15	 ZP2-15S□	P. 604

ZP3

ZP3E

ZP2

ZP2V

ZP

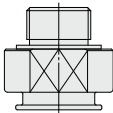
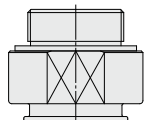
ZPT

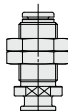
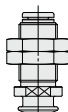
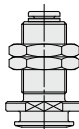
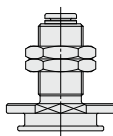
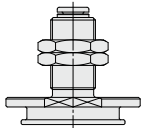
ZPR

XT661

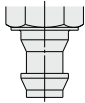
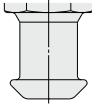
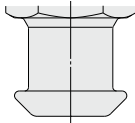
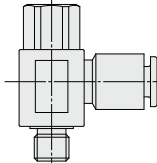
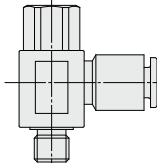
ZP2/ZP Series

ZP2 Series Mounting Adapter Part No.

Adapter part no.		Applicable pad part no. ZP2 Series	Page
ZP2A-Z31-1P		ZP2-B15ZJS□	P.605
ZP2A-Z31-2P		ZP2-B20ZJS□	P.605
ZP2A-Z31-3P		ZP2-B30ZJS□	P.605
ZP2A-Z31-4P		ZP2-40ZJ□	P.605
ZP2A-Z31-5P		ZP2-46ZJ□	P.605

Adapter part no.		Applicable pad part no. ZP2 Series	Page
ZP2A-Z32-1		ZP2-B15ZJS□	P.606
ZP2A-Z32-2		ZP2-B20ZJS□	P.606
ZP2A-Z32-3		ZP2-B30ZJS□	P.606
ZP2A-Z32-4		ZP2-40ZJ□	P.606
ZP2A-Z32-5		ZP2-46ZJ□	P.606

ZP Series Mounting Adapter Part No.

Adapter model		Applicable pad model		Page
		ZP series	ZP2 series	
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□ ZP2-07C□ ZP2-06J□ ZP2-B08C□ ZP2-B10J□ ZP2-B06B□ ZP2-B15J□ ZP2-B08B□ ZP2-04UCL ZP2-05UT□ ZP2-06UCL ZP2-06UT□ ZP2-08UCL ZP2-11UT□	P.607
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.607
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.607 P.608
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.607 P.608
ZPRS-◇◇-(B4 / B5) ZPRS-◇◇-(A5 / A6)		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□ ZP2-07C□ ZP2-06J□ ZP2-B08C□ ZP2-B10J□ ZP2-B06B□ ZP2-B15J□ ZP2-B08B□ ZP2-04UCL ZP2-05UT□ ZP2-06UCL ZP2-06UT□ ZP2-08UCL ZP2-11UT□	P.608
ZPRS-◇◇-(B5 / B6) ZPRS-◇◇-(A5 / A6)		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.608

ZP3

ZP3E

ZP2

ZP2V

ZP

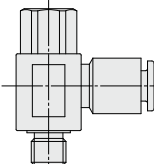
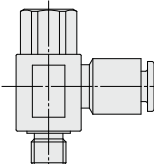
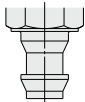
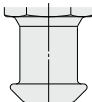
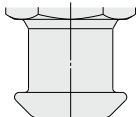
ZPT

ZPR

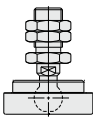
XT661

ZP2/ZP Series

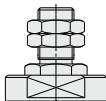
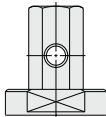
ZP Series Mounting Adapter Part No.

Adapter model		Applicable pad model		Page
		ZP series	ZP2 series	
ZPRL-◇◇◇-(B5/B6/B8) ZPRL-◇◇◇-(A6 / A8)		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.608
ZPRL-◇◇◇-(B6 / B8) ZPRL-◇◇◇-(A6 / A8)		ZP(40, 50)U□ ZP(40, 50)C□ ZP(40, 50)B□ ZP40D□	ZP2-40UCL ZP2-50UCL	P.608
ZPY1-◇◇◇-(B4 / B5) ZPY1-◇◇◇-(A5 / A6)		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□ ZP2-07C□ ZP2-06J□ ZP2-B08C□ ZP2-B10J□ ZP2-B06B□ ZP2-B15J□ ZP2-B08B□ ZP2-04UCL ZP2-05UT□ ZP2-06UCL ZP2-06UT□ ZP2-08UCL ZP2-11UT□	P.609
ZPY2-◇◇◇-(B5 / B6) ZPY2-◇◇◇-(A5 / A6)		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.609
ZPY3-◇◇◇-(B5/B6/B8) ZPY3-◇◇◇-(A6 / A8)		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.609
ZPY4-◇◇◇-(B6 / B8) ZPY4-◇◇◇-(A6 / A8)		ZP(40, 50)U□ ZP(40, 50)C□ ZP(40, 50)B□ ZP40D□	ZP2-40UCL ZP2-50UCL	P.609

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

Adapter assembly model		Applicable pad model					Page
		ZP series		ZP2 series			
ZP2A-TF1		ZP40H□	ZP40HB□	ZP2-40HCL	ZP2-40HNT	ZP2-40HFT	P.610
ZP50H□		ZP50HB□	ZP2-50HCL	ZP2-50HNT	ZP2-50HFT		
ZP2A-TF2		ZP63H□	ZP63HB□	ZP2-63HCL	ZP2-63HNT	ZP2-63HFT	
ZP80H□	ZP80HB□	ZP2-80HCL	ZP2-80HNT	ZP2-80HFT			
ZP2A-TF3		ZP100H□	ZP100HB□	ZP2-100HCL	ZP2-100HNT	ZP2-100HFT	P.610
ZP125H□		ZP125HB□	ZP2-125HCL	ZP2-125HNT	ZP2-125HFT		
ZP2A-XF1		ZP40H□	ZP40HB□	ZP2-40HCL	ZP2-40HNT	ZP2-40HFT	
ZP50H□	ZP50HB□	ZP2-50HCL	ZP2-50HNT	ZP2-50HFT			
ZP2A-XF2	ZP63H□	ZP63HB□	ZP2-63HCL	ZP2-63HNT	ZP2-63HFT	P.610	
ZP80H□	ZP80HB□	ZP2-80HCL	ZP2-80HNT	ZP2-80HFT			
ZP2A-XF3		ZP100H□	ZP100HB□	ZP2-100HCL	ZP2-100HNT	ZP2-100HFT	P.610
ZP125H□		ZP125HB□	ZP2-125HCL	ZP2-125HNT	ZP2-125HFT		

Adapter Assembly Part No.(for Heavy-duty)

Adapter assembly model		Applicable pad model					Page
		ZP series		ZP2 series			
ZPA-T1-B*		ZP40H□ ZP50H□	ZP40HB□ ZP50HB□	ZP2-40HCL ZP2-50HCL	ZP2-40HNT ZP2-50HNT	ZP2-40HFT ZP2-50HFT	P.611
ZPA-T2-B*		ZP63H□ ZP80H□	ZP63HB□ ZP80HB□	ZP2-63HCL ZP2-80HCL	ZP2-63HNT ZP2-80HNT	ZP2-63HFT ZP2-80HFT	P.611
ZPA-T3-B*		ZP100H□ ZP125H□	ZP100HB□ ZP125HB□	ZP2-100HCL ZP2-125HCL	ZP2-100HNT ZP2-125HNT	ZP2-100HFT ZP2-125HFT	P.611
ZPA-T1-01		ZP40H□ ZP50H□	ZP40HB□ ZP50HB□	ZP2-40HCL ZP2-50HCL	ZP2-40HNT ZP2-50HNT	ZP2-40HFT ZP2-50HFT	P.611
ZPA-T2-01		ZP63H□ ZP80H□	ZP63HB□ ZP80HB□	ZP2-63HCL ZP2-80HCL	ZP2-63HNT ZP2-80HNT	ZP2-63HFT ZP2-80HFT	P.611
ZPA-T3-01		ZP100H□ ZP125H□	ZP100HB□ ZP125HB□	ZP2-100HCL ZP2-125HCL	ZP2-100HNT ZP2-125HNT	ZP2-100HFT ZP2-125HFT	P.611
ZPA-X1-01-B*		ZP40H□ ZP50H□	ZP40HB□ ZP50HB□	ZP2-40HCL ZP2-50HCL	ZP2-40HNT ZP2-50HNT	ZP2-40HFT ZP2-50HFT	P.612
ZPA-X2-01-B*		ZP63H□ ZP80H□	ZP63HB□ ZP80HB□	ZP2-63HCL ZP2-80HCL	ZP2-63HNT ZP2-80HNT	ZP2-63HFT ZP2-80HFT	P.612
ZPA-X3-01-B*		ZP100H□ ZP125H□	ZP100HB□ ZP125HB□	ZP2-100HCL ZP2-125HCL	ZP2-100HNT ZP2-125HNT	ZP2-100HFT ZP2-125HFT	P.612

ZP3

ZP3E

ZP2

ZP2V

ZP

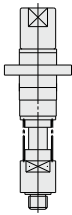
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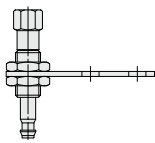
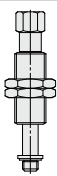
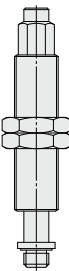
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ZP2/ZP Series

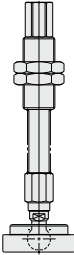
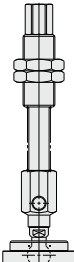
Buffer Assembly Part No.(for Ball Spline)

Buffer assembly model		Applicable pad model	Page
		ZP series	
ZP2B-T3S6		ZP02U□ ZP04U□ ZP06U□ ZP08U□	P.613

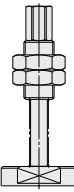
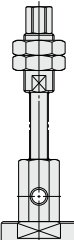
ZP Series Buffer Assembly Part No.

Buffer assembly model		Applicable pad model		Page
		ZP series	ZP2 series	
ZPB1(J / K)■-◇◇ ZPB1(J / K)■		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□ ZP2-07C□ ZP2-06J□ ZP2-B08C□ ZP2-B10J□ ZP2-B06B□ ZP2-B15J□ ZP2-B08B□ ZP2-04UCL ZP2-05UT□ ZP2-06UCL ZP2-06UT□ ZP2-08UCL ZP2-11UT□	P.614 P.615
ZPB2(J / K)■-◇◇ ZPB2(J / K)■		ZP(10, 13, 16, 20, 25, 32)U□ ZP(10, 13, 16, 20, 25, 32)C□ ZP(10, 13, 16, 20, 25, 32)B□ ZP(10, 16, 25)D□	ZP2-09J□ ZP2-B25J□ ZP2-14J□ ZP2-B30J□ ZP2-16J□ ZP2-25UCL ZP2-10UCL ZP2-32UCL ZP2-16UCL	P.616 P.617
ZPB3(J / K)■-◇◇ ZPB3(J / K)■		ZP(40, 50)U□ ZP(40, 50)C□ ZP(40, 50)B□ ZP40D□	ZP2-40UCL ZP2-50UCL	P.618 P.619

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

Buffer assembly model		Applicable pad model		Page
		ZP series	ZP2 series	
ZP2B-TF1(JB/JF)◆		ZP40H□ ZP40HB□ ZP50H□ ZP50HB□	ZP2-40HCL ZP2-40HNT ZP2-40HFT ZP2-50HCL ZP2-50HNT ZP2-50HFT	P.620
ZP2B-TF2(JB/JF)◆		ZP63H□ ZP63HB□ ZP80H□ ZP80HB□	ZP2-63HCL ZP2-63HNT ZP2-63HFT ZP2-80HCL ZP2-80HNT ZP2-80HFT	P.620
ZP2B-TF3(JB/JF)◆		ZP100H□ ZP100HB□ ZP125H□ ZP125HB□	ZP2-100HCL ZP2-100HNT ZP2-100HFT ZP2-125HCL ZP2-125HNT ZP2-125HFT	P.620
ZP2B-XF1(JB/JF)◆		ZP40H□ ZP40HB□ ZP50H□ ZP50HB□	ZP2-40HCL ZP2-40HNT ZP2-40HFT ZP2-50HCL ZP2-50HNT ZP2-50HFT	P.621
ZP2B-XF2(JB/JF)◆		ZP63H□ ZP63HB□ ZP80H□ ZP80HB□	ZP2-63HCL ZP2-63HNT ZP2-63HFT ZP2-80HCL ZP2-80HNT ZP2-80HFT	P.621
ZP2B-XF3(JB/JF)◆		ZP100H□ ZP100HB□ ZP125H□ ZP125HB□	ZP2-100HCL ZP2-100HNT ZP2-100HFT ZP2-125HCL ZP2-125HNT ZP2-125HFT	P.621

Buffer Assembly Part No. (for Heavy-duty)

Buffer assembly model		Applicable pad model		Page
		ZP series	ZP2 series	
ZPB-T1(J/JB/JF)◆※01		ZP40H□ ZP40HB□ ZP50H□ ZP50HB□	ZP2-40HCL ZP2-40HNT ZP2-40HFT ZP2-50HCL ZP2-50HNT ZP2-50HFT	P.622 P.623
ZPB-T2(J/JB/JF)◆※01		ZP63H□ ZP63HB□ ZP80H□ ZP80HB□	ZP2-63HCL ZP2-63HNT ZP2-63HFT ZP2-80HCL ZP2-80HNT ZP2-80HFT	P.622 P.623
ZPB-T3(J/JB/JF)◆※01		ZP100H□ ZP100HB□ ZP125H□ ZP125HB□	ZP2-100HCL ZP2-100HNT ZP2-100HFT ZP2-125HCL ZP2-125HNT ZP2-125HFT	P.622 P.623
ZPB-X1(J/JB/JF)◆※01		ZP40H□ ZP40HB□ ZP50H□ ZP50HB□	ZP2-40HCL ZP2-40HNT ZP2-40HFT ZP2-50HCL ZP2-50HNT ZP2-50HFT	P.624 P.625
ZPB-X2(J/JB/JF)◆※01		ZP63H□ ZP63HB□ ZP80H□ ZP80HB□	ZP2-63HCL ZP2-63HNT ZP2-63HFT ZP2-80HCL ZP2-80HNT ZP2-80HFT	P.624 P.625
ZPB-X3(J/JB/JF)◆※01		ZP100H□ ZP100HB□ ZP125H□ ZP125HB□	ZP2-100HCL ZP2-100HNT ZP2-100HFT ZP2-125HCL ZP2-125HNT ZP2-125HFT	P.624 P.625

ZP3

ZP3E

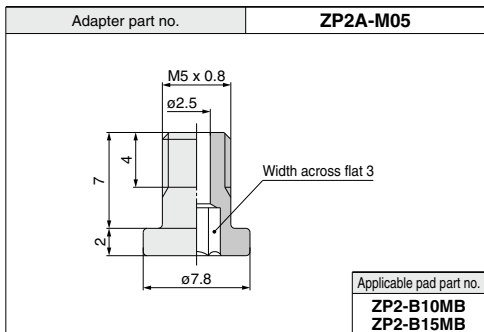
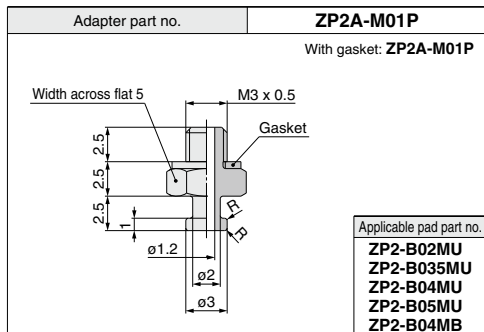
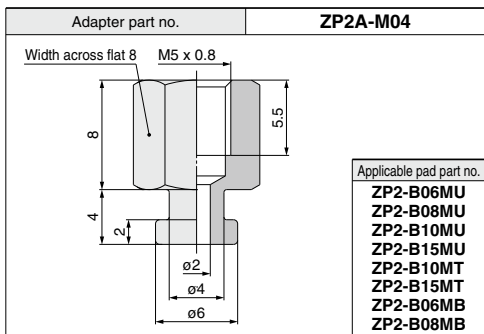
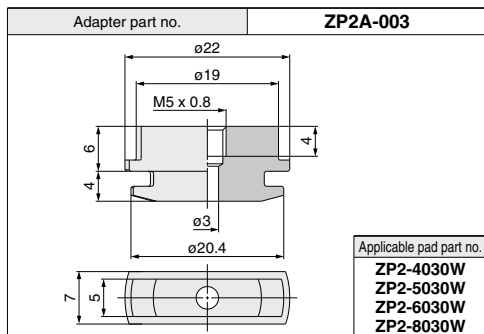
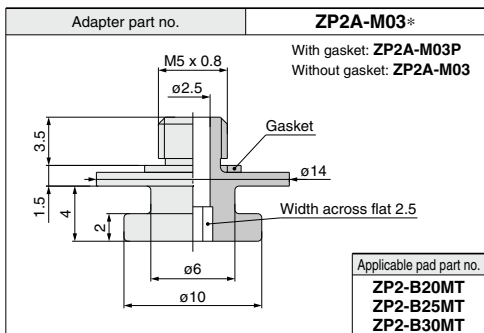
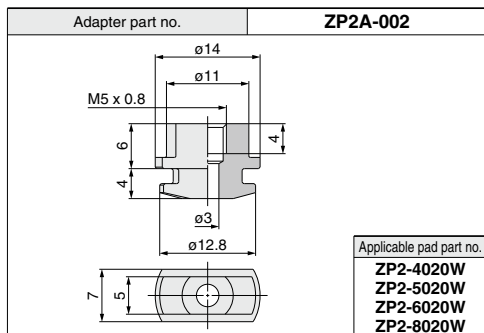
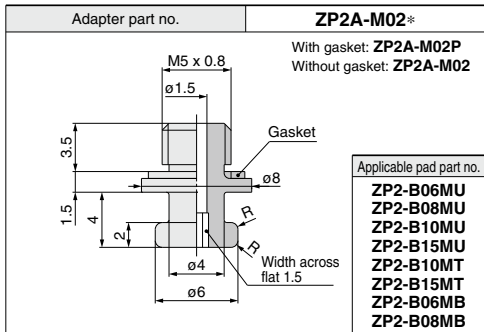
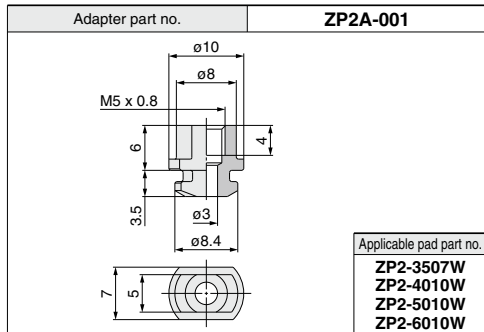
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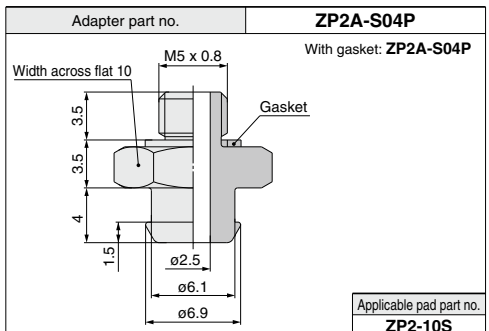
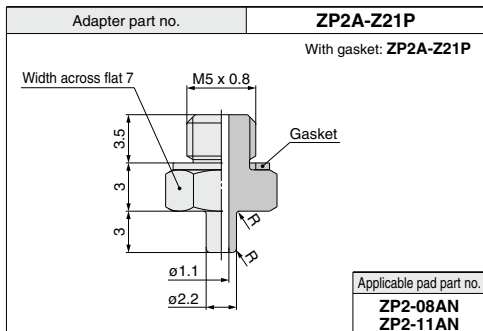
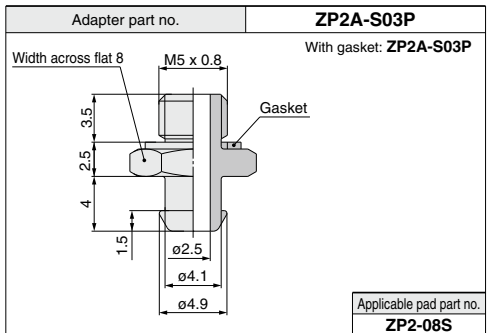
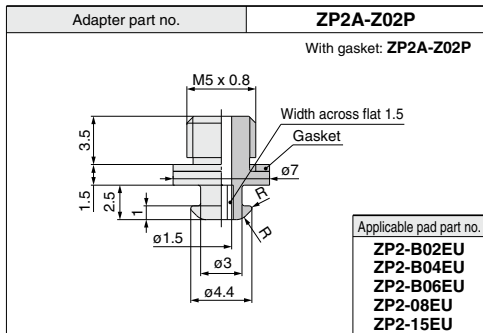
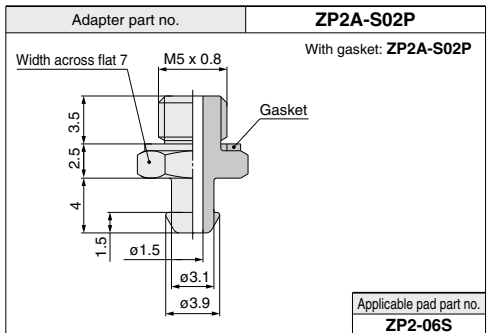
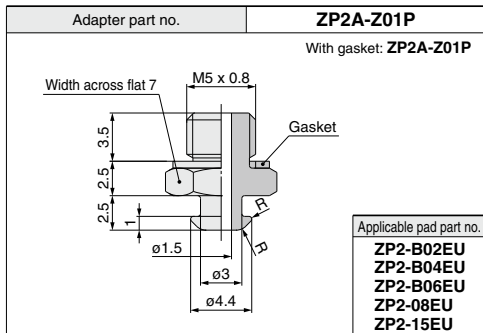
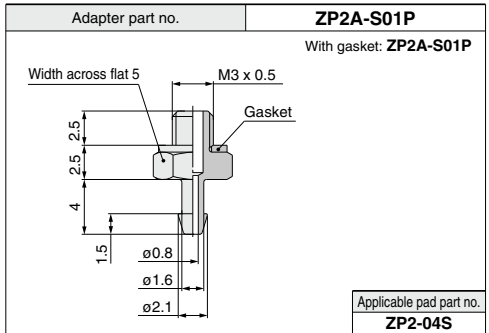
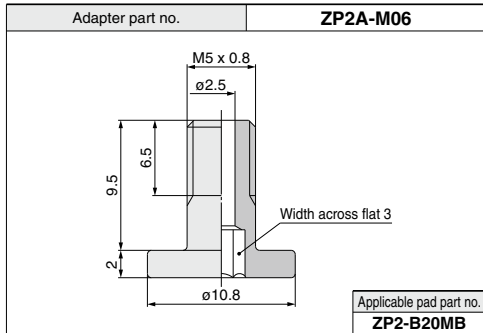
ZP2V

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ZP3

ZP3E

ZP2

ZP2V

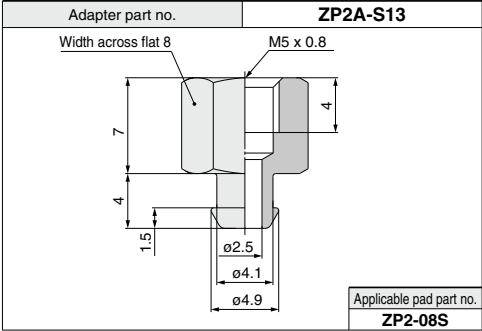
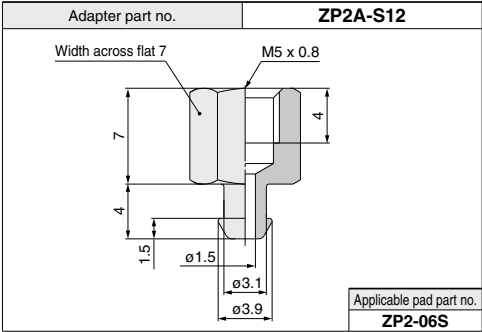
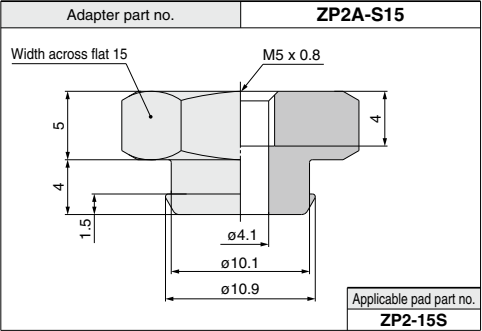
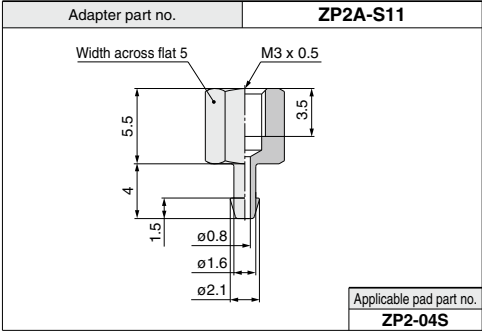
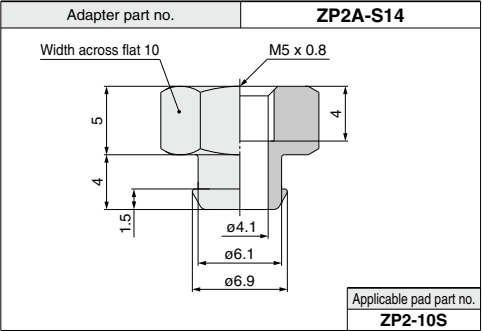
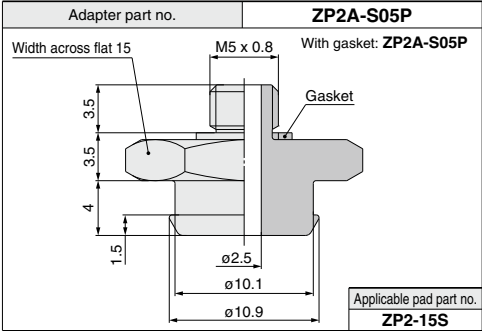
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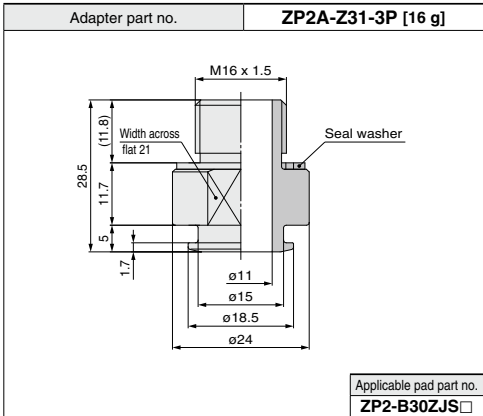
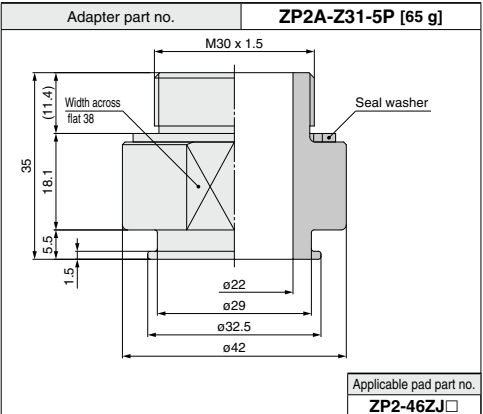
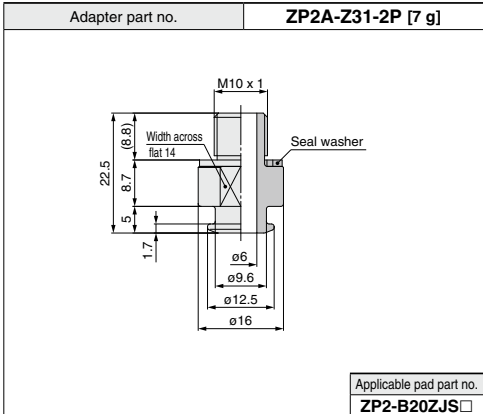
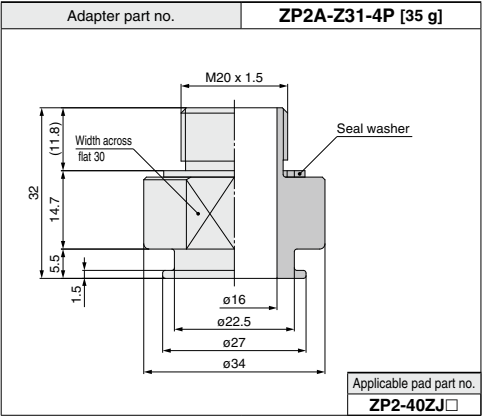
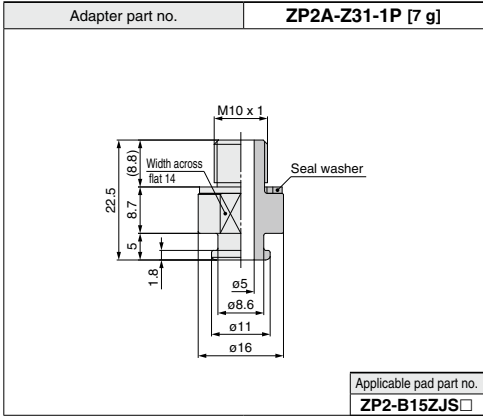
ZPT

ZPR

XT661

ZP2 Series

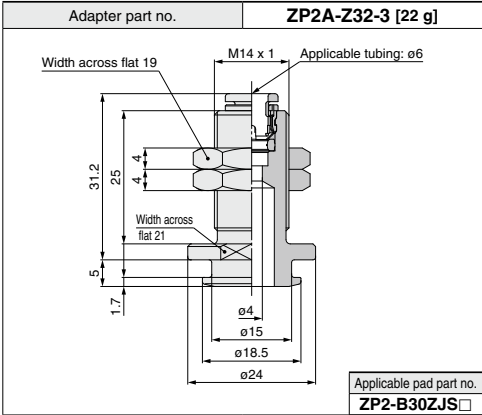
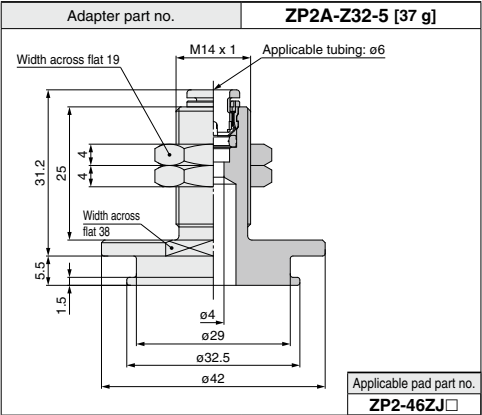
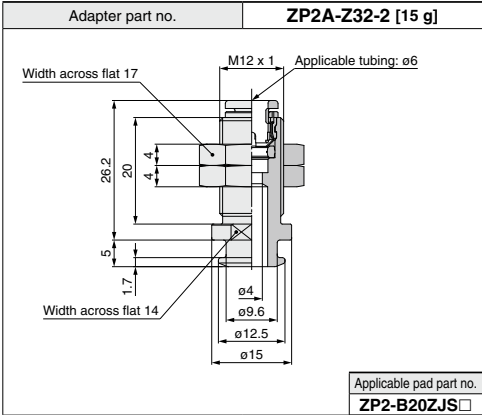
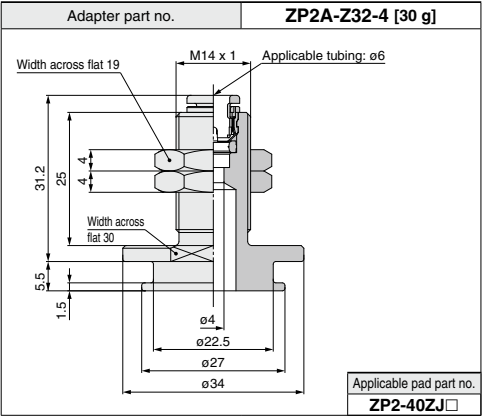
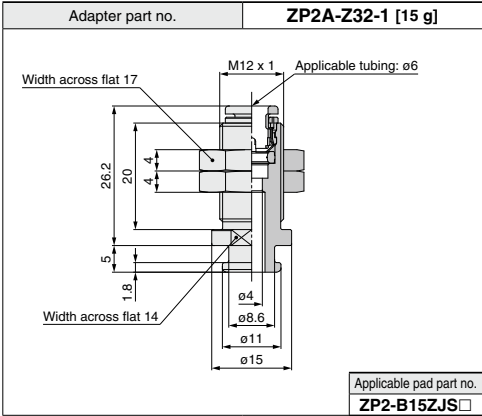




- ZP3**
- ZP3E**
- ZP2**
- ZP2V**
- ZP**
- ZPT**
- ZPR**
- XT661**

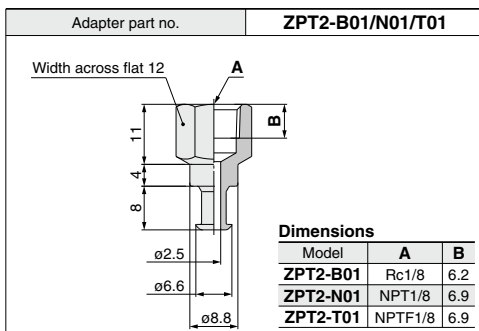
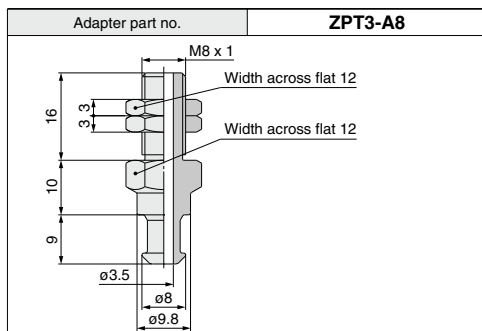
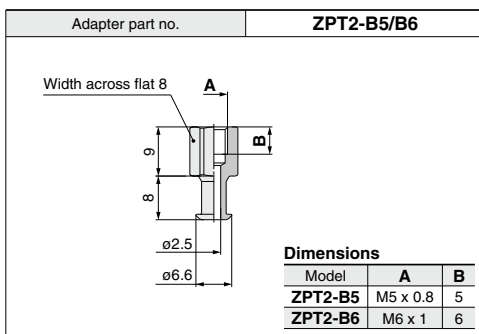
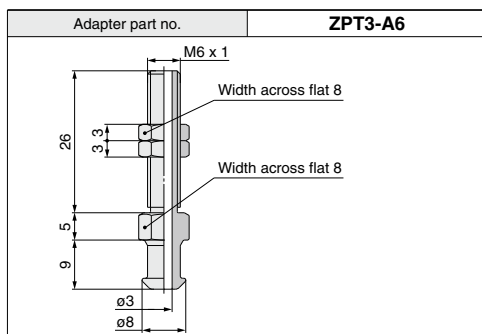
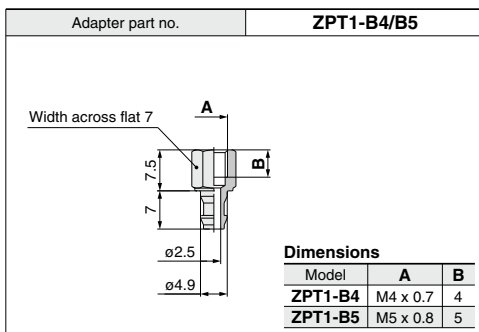
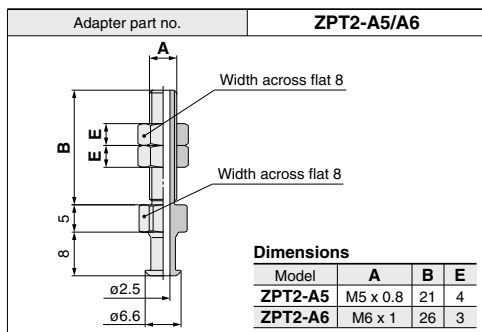
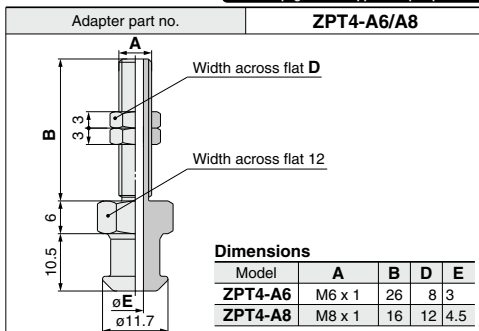
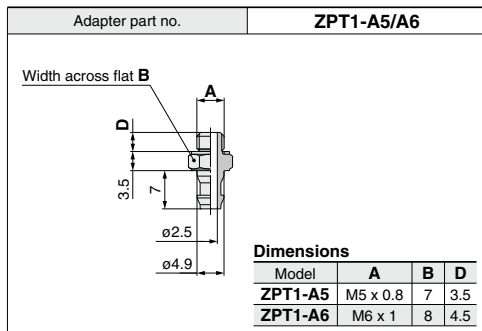


ZP2 Series



Mounting Adapter Part No.

*Refer to page 597 for applicable pad part no.



ZP3

ZP3E

ZP2

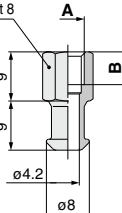
ZP2V

ZP

ZPT

ZPR

XT661

Adapter part no.	ZPT3-B5/B6		
			
Dimensions			
Model	A	B	
ZPT3-B5	M5 x 0.8	5	
ZPT3-B6	M6 x 1	6	

Adapter part no.	ZPRS--A*				
Dimensions1(per mounting connection thread)					
Model	E	A	B	D	
ZPRS--A5	M5 x 0.8	21	46	4	
ZPRS--A6	M6 x 1	26	51	3	
Dimensions2(per applicable tube O.D.)					
Model	P	Q	R	S	
ZPRS-04-A*	4	20.6	15.6	10.4	
ZPRS-06-A*	6	21.6	16.6	12.8	

Adapter part no.	ZPT3-B8/B01/N01/T01		
Width across flat 12 A B 11 4 9 ø3.5 ø8 ø9.8			
Dimensions			
Model	A	B	
ZPT3-B8	M8 x 1.25	8	
ZPT3-B01	Rc1/8	6.2	
ZPT3-N01	NPT1/8	6.9	
ZPT3-T01	NPTF1/8	6.9	

Adapter part no.

ZPRS--B*

Technical drawing of the ZPRS adapter showing dimensions and components. The drawing includes the following labels and dimensions:

- Width across flat 10
- Q
- Gasket
- Applicable tube O.D. ϕP
- E
- U
- 8.9
- 25
- 3.5
- $\phi 2.5$
- R
- S
- M5 x 0.8

Dimensions1(per mounting connection thread)

Model	E	F
ZPRS--B4	M4 x 0.7	4
ZPRS--B5	M5 x 0.8	5
ZPRS--B6	M6 x 1	6

Dimensions2(per applicable tube O.D.)

Model	P	Q	R	S
ZPRS-04-B*	4	20.6	15.6	10.4
ZPRS-06-B*	6	21.6	16.6	12.8

Adapter part no.	ZPT4-B6/B8		
Dimensions			
Model	A	B	D
ZPT4-B6	M6 x 1	6	4.9
ZPT4-B8	M8 x 1.25	8	7.5

Adapter part no.

ZPRL-**-A*

Technical drawing of the ZPRL adapter showing dimensions and components. The drawing includes the following labels and dimensions:

- Width across flat D**: Dimension across the top flat surface.
- Q**: Total length of the adapter.
- Width across flat 12**: Dimension across the middle flat surface.
- A**: Distance from the top flat surface to the gasket.
- B**: Distance from the bottom of the adapter to the gasket.
- 3**: Distance from the top flat surface to the first step.
- 3**: Distance from the first step to the gasket.
- 10.8**: Distance from the bottom of the adapter to the gasket.
- Gasket**: The component between the adapter and the tube.
- Applicable tube**: The tube being connected.
- O.D. øP**: Outer diameter of the applicable tube.
- 7.5**: Distance from the bottom of the adapter to the gasket.
- (28.5)**: Total length of the adapter.
- 28.5**: Total length of the adapter.
- 10.8**: Distance from the bottom of the adapter to the gasket.
- 7.5**: Distance from the bottom of the adapter to the gasket.
- ø4**: Inner diameter of the bottom flange.
- M8 x 1.25**: Thread specification for the bottom flange.
- R**: Radius of the bottom flange.
- S**: Distance from the bottom of the adapter to the gasket.

Dimensions1(per mounting connection thread)

Model	E	A	B	D
ZPRL-◇◇-A6	M6 x 1	26	54.5	8
ZPRL-◇◇-A8	M8 x 1.25	16	44.5	12

Dimensions2(per applicable tube O.D.)

Model	P	Q	R	S
ZPRL-04-A ₆	4	23.3	15.8	10.4
ZPRL-06-A ₆	6	24.3	16.8	12.8
ZPRL-08-A ₆	8	26.2	18.7	15.2

Adapter part no.	ZPT4-B01/N01/T01		
Dimensions			
Model	A	B	
ZPT4-B01	Rc1/8	6.2	
ZPT4-N01	NPT1/8	6.9	
ZPT4-T01	NPTF1/8	6.9	

Adapter part no.

ZPRL--B***

Width across flat 12

Technical drawing of the ZPRL adapter showing dimensions and labels. The drawing includes a cross-section of the adapter with the following dimensions and labels:

- Width across flat:** 12
- Overall height:** 28.5
- Flange thickness:** 10.8
- Flange outer diameter:** ϕS
- Flange inner diameter:** ϕP
- Flange width:** Q
- Flange thickness:** E
- Flange width:** F
- Flange width:** R
- Flange width:** S
- Flange width:** 7.5
- Flange width:** $\phi 4$
- Flange width:** $M8 \times 1.25$
- Labels:** Gasket, Applicable tube O.D. ϕP

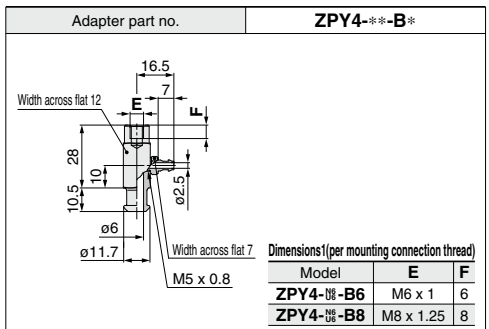
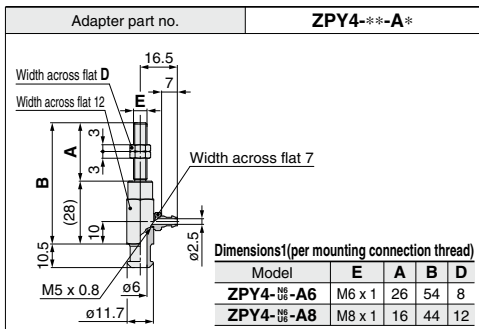
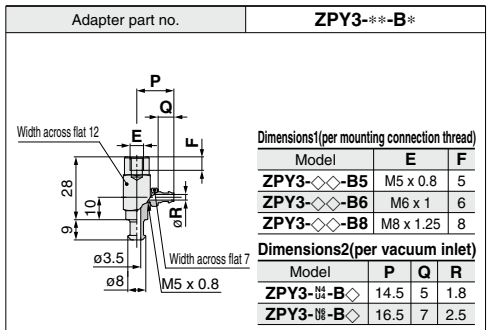
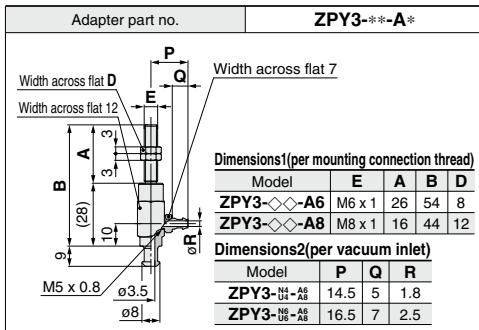
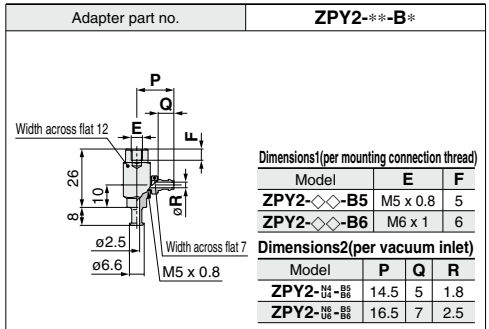
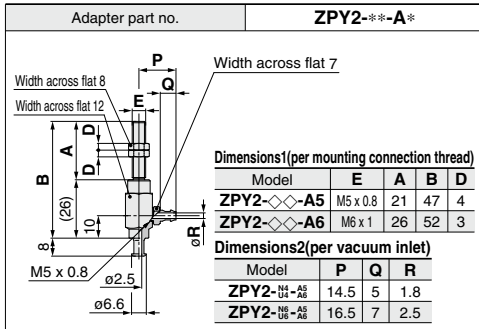
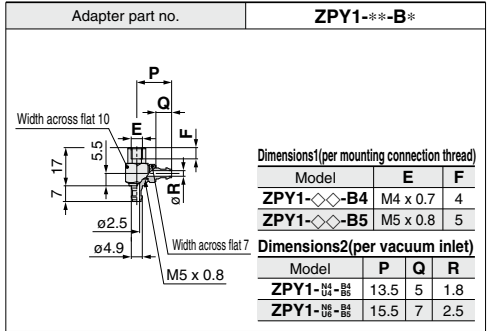
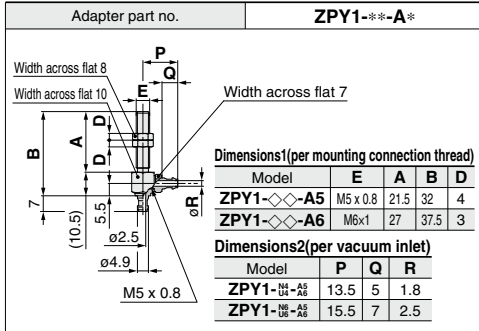
Dimensions1(per mounting connection thread)

Model	E	F
ZPRL-◇◇-B5	M5 x 0.8	5
ZPRL-◇◇-B6	M6 x 1	6
ZPRL-◇◇-B8	M8 x 1.25	8

Dimensions2(per applicable tube O.D.)

Model	P	Q	R	S
ZPRL-04-B*	4	23.3	15.8	10.4
ZPRL-06-B*	6	24.3	16.8	12.8
ZPRL-08-B*	8	26.2	18.7	15.2

*Refer to page 598 for applicable pad part no.



ZP3

ZP3E

ZP2

ZP2V

ZP

ZPT

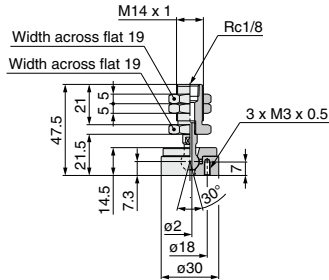
ZPR

XT661

Adapter Assembly Part No.

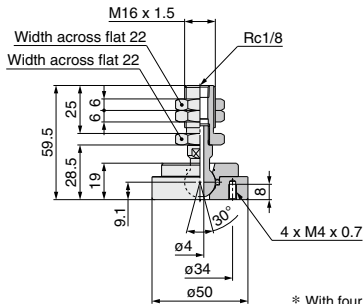
Heavy-duty Ball Joint Adapter Assembly Part No. (Type T)

Adapter assembly part no.	Applicable pad part no.		
ZP2A-TF1	ZP40H□	ZP40HB□	
	ZP50H□	ZP50HB□	
	ZP2-40HCL	ZP2-40HNT	ZP2-40HFT
	ZP2-50HCL	ZP2-50HNT	ZP2-50HFT



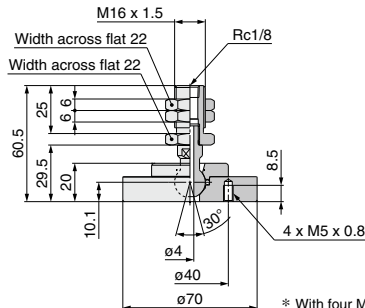
* With three M3 bolts

Adapter assembly part no.	Applicable pad part no.		
ZP2A-TF2	ZP63H□	ZP63HB□	
	ZP80H□	ZP80HB□	
	ZP2-63HCL	ZP2-63HNT	ZP2-63HFT
	ZP2-80HCL	ZP2-80HNT	ZP2-80HFT



* With four M4 bolts

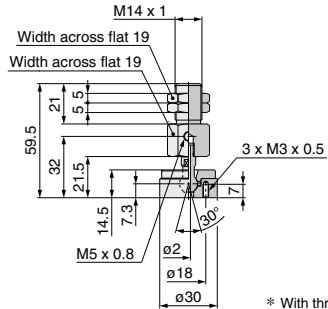
Adapter assembly part no.	Applicable pad part no.		
ZP2A-TF3	ZP100H□	ZP100HB□	
	ZP125H□	ZP125HB□	
	ZP2-100HCL	ZP2-100HNT	ZP2-100HFT
	ZP2-125HCL	ZP2-125HNT	ZP2-125HFT



* With four M5 bolts

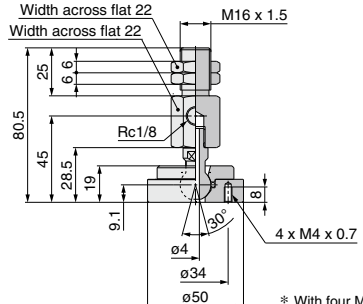
Heavy-duty Ball Joint Adapter Assembly Part No. (Type X)

Adapter assembly part no.	Applicable pad part no.		
ZP2A-XF1	ZP40H□	ZP40HB□	
	ZP50H□	ZP50HB□	
	ZP2-40HCL	ZP2-40HNT	ZP2-40HFT
	ZP2-50HCL	ZP2-50HNT	ZP2-50HFT



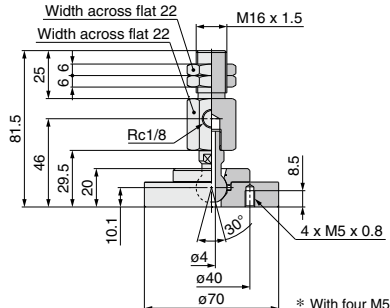
* With three M3 bolts

Adapter assembly part no.	Applicable pad part no.		
ZP2A-XF2	ZP63H□	ZP63HB□	
	ZP80H□	ZP80HB□	
	ZP2-63HCL	ZP2-63HNT	ZP2-63HFT
	ZP2-80HCL	ZP2-80HNT	ZP2-80HFT



* With four M4 bolts

Adapter assembly part no.	Applicable pad part no.		
ZP2A-XF3	ZP100H□	ZP100HB□	
	ZP125H□	ZP125HB□	
	ZP2-100HCL	ZP2-100HNT	ZP2-100HFT
	ZP2-125HCL	ZP2-125HNT	ZP2-125HFT

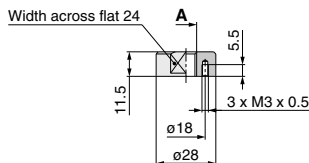


* With four M5 bolts

Adapter Assembly Part No.

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

Adapter assembly part no.	Applicable pad part no.			
ZPA-T1-B8	ZP40H□	ZP2-40HCL	ZP2-50HNT	
	ZP50H□	ZP2-40HNT	ZP2-50HFT	
ZPA-T1-B10	ZP40HB□	ZP2-40HFT	ZP2-3050HW□	
	ZP50HB□	ZP2-50HCL		

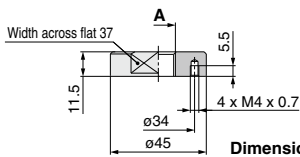


Dimensions

Model	A
ZPA-T1-B8	M8 x 1.25
ZPA-T1-B10	M10 x 1.5

*With three M3 bolts

Adapter assembly part no.	Applicable pad part no.			
ZPA-T2-B8	ZP63H□	ZP2-63HCL	ZP2-80HNT	
ZPA-T2-B10	ZP80H□	ZP2-63HNT	ZP2-80HFT	
ZPA-T2-B12	ZP63HB□	ZP2-63HFT		
ZPA-T2-B16	ZP80HB□	ZP2-80HCL		

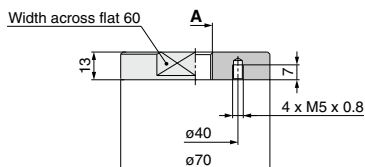


Dimensions

Model	A
ZPA-T2-B8	M8 x 1.25
ZPA-T2-B10	M10 x 1.5
ZPA-T2-B12	M12 x 1.75
ZPA-T2-B16	M16 x 1.5

*With four M4 bolts

Adapter assembly part no.	Applicable pad part no.			
ZPA-T3-B12	ZP100H□	ZP2-100HCL	ZP2-125HNT	
ZPA-T3-B16	ZP125H□	ZP2-100HNT	ZP2-125HFT	
	ZP100HB□	ZP2-100HFT		
	ZP125HB□	ZP2-125HCL		



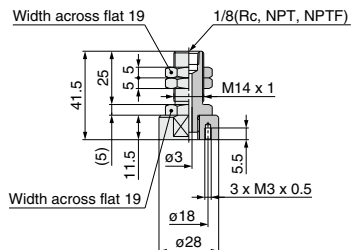
Dimensions

Model	A
ZPA-T3-B12	M12 x 1.75
ZPA-T3-B16	M16 x 1.5

*With four M5 bolts

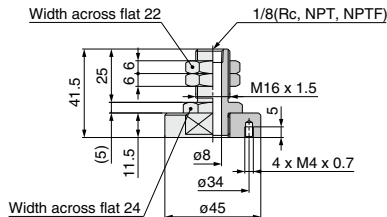
Heavy-duty Adapter Assembly Part No. (Type T, Male thread)

Adapter assembly part no.	Applicable pad part no.			
ZPA-T1-B01	ZP40H□	ZP2-40HCL	ZP2-50HNT	
ZPA-T1-N01	ZP50H□	ZP2-40HNT	ZP2-50HFT	
ZPA-T1-T01	ZP40HB□	ZP2-40HFT	ZP2-3050HW□	
	ZP50HB□	ZP2-50HCL		



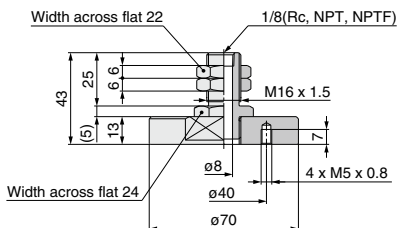
*With three M3 bolts

Adapter assembly part no.	Applicable pad part no.			
ZPA-T2-B01	ZP63H□	ZP2-63HCL	ZP2-80HNT	
ZPA-T2-N01	ZP80H□	ZP2-63HNT	ZP2-80HFT	
ZPA-T2-T01	ZP63HB□	ZP2-63HFT		
	ZP80HB□	ZP2-80HCL		



*With four M4 bolts

Adapter assembly part no.	Applicable pad part no.			
ZPA-T3-B01	ZP100H□	ZP2-100HCL	ZP2-125HNT	
ZPA-T3-N01	ZP125H□	ZP2-100HNT	ZP2-125HFT	
ZPA-T3-T01	ZP100HB□	ZP2-100HFT		
	ZP125HB□	ZP2-125HCL		



*With four M5 bolts

ZP3

ZP3E

ZP2

ZP2V

ZP

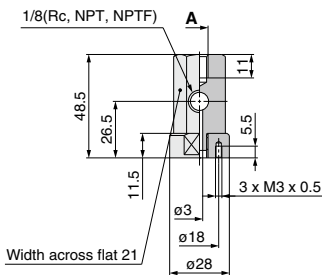
ZPT

ZPR

XT661

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

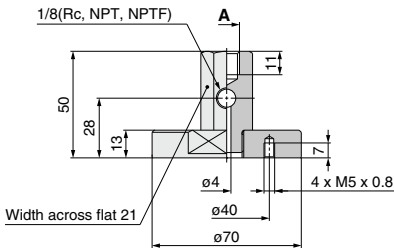
Adapter assembly part no.	Applicable pad part no.	
ZPA-X1-B01-B8	ZP40H□	ZP2-40HCL
ZPA-X1-N01-B8	ZP50H□	ZP2-40HNT
ZPA-X1-T01-B8	ZP40HB□	ZP2-40HFT
ZPA-X1-B01-B10	ZP50HB□	ZP2-50HCL
ZPA-X1-N01-B10		ZP2-50HNT
ZPA-X1-T01-B10		ZP2-50HFT
		ZP2-3050HW□



Dimensions	
Model	A
ZPA-X1-□01-B8	M8 x 1.25
ZPA-X1-□01-B10	M10 x 1.5

*With three M3 bolts

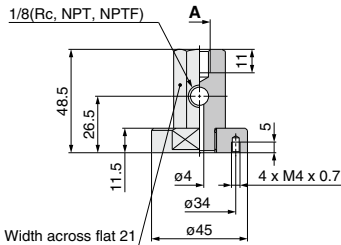
Adapter assembly part no.	Applicable pad part no.	
ZPA-X3-B01-B10	ZP100H□	ZP2-100HCL
ZPA-X3-N01-B10	ZP125H□	ZP2-100HNT
ZPA-X3-T01-B10	ZP100HB□	ZP2-100HFT
ZPA-X3-B01-B12	ZP125HB□	ZP2-125HCL
ZPA-X3-N01-B12		ZP2-125HNT
ZPA-X3-T01-B12		ZP2-125HFT



Dimensions	
Model	A
ZPA-X3-□01-B10	M10 x 1.5
ZPA-X3-□01-B12	M12 x 1.75

*With four M5 bolts

Adapter assembly part no.	Applicable pad part no.	
ZPA-X2-B01-B10	ZP63H□	ZP2-63HCL
ZPA-X2-N01-B10	ZP80H□	ZP2-63HNT
ZPA-X2-T01-B10	ZP63HB□	ZP2-63HFT
ZPA-X2-B01-B12	ZP80HB□	ZP2-80HCL
ZPA-X2-N01-B12		ZP2-80HNT
ZPA-X2-T01-B12		ZP2-80HFT



Dimensions	
Model	A
ZPA-X2-□01-B10	M10 x 1.5
ZPA-X2-□01-B12	M12 x 1.75

*With four M4 bolts

ZP2 Series

Buffer Assembly Part No.

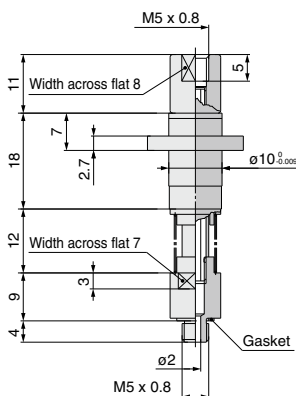
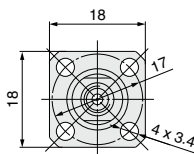
Ball Spline

Buffer assembly part no.

ZP2B-T3S6

Applicable pad part no.

ZP02U ☐
ZP04U ☐
ZP06U ☐
ZP08U ☐



ZP3

ZP3E

ZP2

ZP2V

ZP

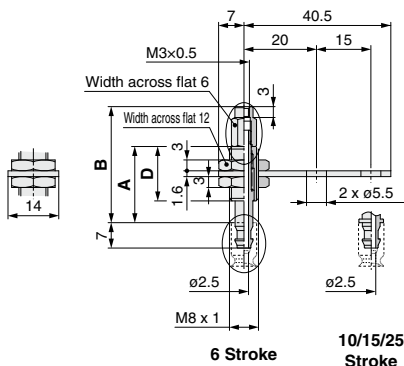
ZPT
ZPR

XT661



Vacuum Entry Vertical/Buffer Assembly Part No.

ZPB1J^{6 15}_{10 25}-B3

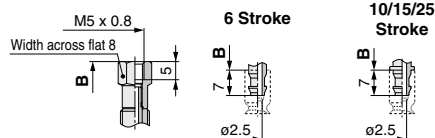


Dimensions

(Vacuum entry: Female thread M3 x 0.5)

Model	A	B	D
ZPB1J6-B3	21	32	15
ZPB1J10-B3	54	65	
ZPB1J15-B3	59	70	43
ZPB1J25-B3	69	80	

ZPB1J^{6 15}_{10 25}-B5

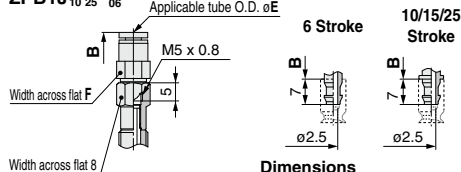


Dimensions

(Vacuum entry: Female thread M5 x 0.8)

Model	A	B	D
ZPB1J6-B5	21	34	15
ZPB1J10-B5	54	67	
ZPB1J15-B5	59	72	43
ZPB1J25-B5	69	82	

ZPB1J^{6 15}_{10 25}-04

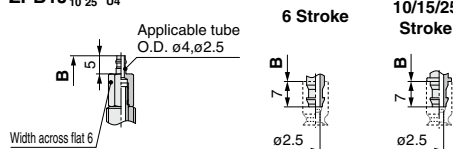


Dimensions

(Vacuum entry: One-touch type)

Model	A	D	E.4	E.6
ZPB1J6- ⁰⁴ _{10 25}	21	15	47.9	48.7
ZPB1J10- ⁰⁴ _{10 25}	54		80.9	81.7
ZPB1J15- ⁰⁴ _{10 25}	59	43	85.9	86.7
ZPB1J25- ⁰⁴ _{10 25}	69		95.9	96.7

ZPB1J^{6 15}_{10 25}-N4

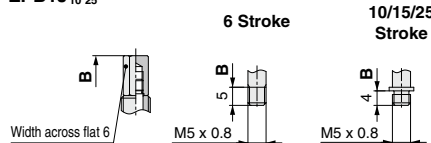


Dimensions

(Vacuum entry: Barb type)

Model	A	B	D
ZPB1J6-N4	21	35	15
ZPB1J10-N4	54	68	
ZPB1J15-N4	59	73	43
ZPB1J25-N4	69	83	

ZPB1J^{6 15}_{10 25}



Dimensions

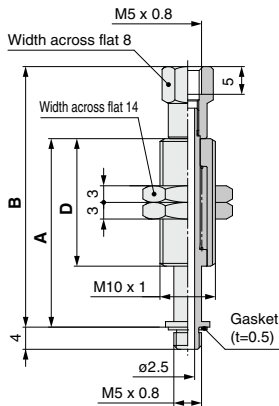
(Buffer for ZPR/ZPY)

Model	A	B	D
ZPB1J6	21	34	15
ZPB1J10	54	65	
ZPB1J15	59	70	43
ZPB1J25	69	80	

* Refer to page 526 for nut tightening torque.

Vacuum Entry Vertical/Buffer Assembly Part No.

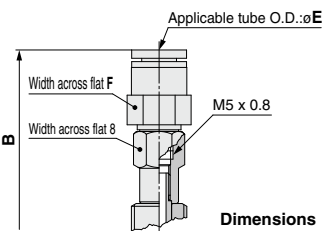
ZPB2J^{10 40}_{20 30}-B5



Dimensions
(Vacuum entry: Female thread M5 x 0.8)

Model	A	B	D
ZPB2J10-B5	34	47	23
ZPB2J20-B5	72	85	51
ZPB2J30-B5	82	95	
ZPB2J40-B5	118	131	
ZPB2J50-B5	128	141	77

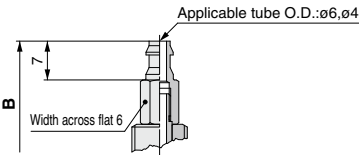
ZPB2J^{10 40}_{20 30}-⁰⁴₀₆



Dimensions
(Vacuum entry: One-touch type)

Model	A	D	E:4		E:6	
			B	F	B	F
ZPB2J10- ⁰⁴ ₀₆	34	23	60.9		61.7	
ZPB2J20- ⁰⁴ ₀₆	72	51	98.9		99.7	
ZPB2J30- ⁰⁴ ₀₆	82		108.9	8	109.7	10
ZPB2J40- ⁰⁴ ₀₆	118		144.9		145.7	
ZPB2J50- ⁰⁴ ₀₆	128	77	154.9		155.7	

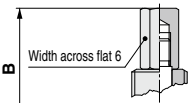
ZPB2J^{10 40}_{20 30}-^{N6}_{U6}



Dimensions
(Vacuum entry: Barb type)

Model	A	B	D
ZPB2J10- ^{N6} _{U6}	34	49	23
ZPB2J20- ^{N6} _{U6}	72	87	
ZPB2J30- ^{N6} _{U6}	82	97	51
ZPB2J40- ^{N6} _{U6}	118	133	
ZPB2J50- ^{N6} _{U6}	128	143	77

ZPB2J^{10 40}_{20 30} (Without gasket)



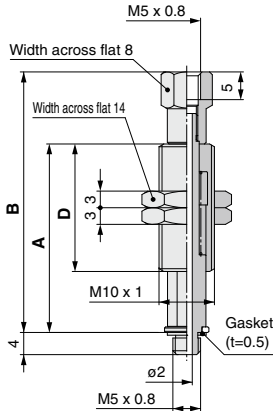
Dimensions
(Buffer for ZPR/ZPY)

Model	A	B	D
ZPB2J10	34	45	23
ZPB2J20	72	83	
ZPB2J30	82	93	51
ZPB2J40	118	129	
ZPB2J50	128	139	77

* Refer to page 526 for nut tightening torque.

Vacuum Entry Vertical/Buffer Assembly Part No.

ZPB2K^{10 40}_{20 50}-B5

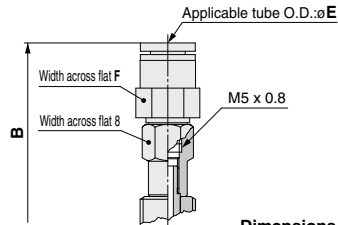


Dimensions

(Vacuum entry: Female thread M5 x 0.8)

Model	A	B	D
ZPB2K10-B5	34	47	23
ZPB2K20-B5	72	85	51
ZPB2K30-B5	82	95	
ZPB2K40-B5	118	131	77
ZPB2K50-B5	128	141	

ZPB2K^{10 40}_{20 50}-ø4

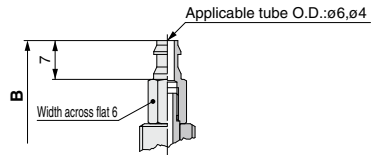


Dimensions

(Vacuum entry: One-touch type)

Model	A	D	E:4		E:6	
			B	F	B	F
ZPB2K10-ø4	34	23	60.9		61.7	
ZPB2K20-ø4	72	51	96.9		99.7	
ZPB2K30-ø4	82		106.9	8	109.7	10
ZPB2K40-ø4	118		144.9		145.7	
ZPB2K50-ø4	128	77	154.9		155.7	

ZPB2K^{10 40}_{20 50}-N6

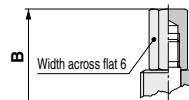


Dimensions

(Vacuum entry: Barb type)

Model	A	B	D
ZPB2K10-N6	34	49	23
ZPB2K20-N6	72	87	
ZPB2K30-N6	82	97	51
ZPB2K40-N6	118	133	
ZPB2K50-N6	128	143	77

ZPB2K^{10 40}_{20 50} (Without gasket)



Dimensions

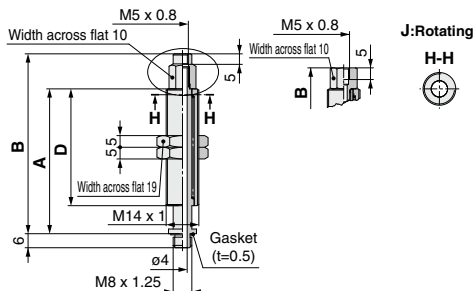
(Buffer for ZPR/ZPY)

Model	A	B	D
ZPB2K10	34	45	23
ZPB2K20	72	83	
ZPB2K30	82	93	51
ZPB2K40	118	129	
ZPB2K50	128	139	77

Vacuum Entry Vertical/Buffer Assembly Part No.

ZPB3J10-B5

ZPB3J²⁰₃₀-B5



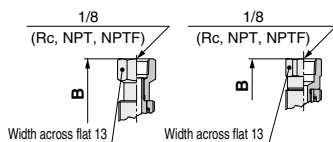
Dimensions

(Vacuum entry: Female thread M5 x 0.8)

Model	A	B	D
ZPB3J10-B5	62	77	
ZPB3J20-B5	72	81	50
ZPB3J30-B5	82	91	
ZPB3J50-B5	127	136	75

ZPB3J10-◇01

ZPB3J²⁰₃₀-◇01



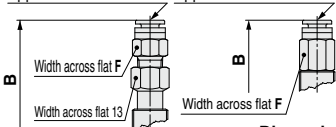
Dimensions (Vacuum entry: 1/8 type)

Model	A	B	D
ZPB3J10-◇01	62	78.5	
ZPB3J20-◇01	72	84	50
ZPB3J30-◇01	82	94	
ZPB3J50-◇01	127	139	75

ZPB3J10-⁰⁶₀₈

ZPB3J²⁰₃₀-⁰⁶₀₈

Applicable tube O.D.: ϕ E Applicable tube O.D.: ϕ E



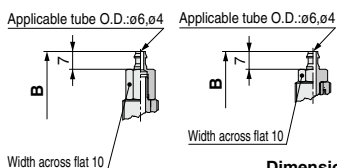
Dimensions

(Vacuum entry: One-touch type)

Model	A	D	E:6	E:8	B	F
ZPB3J10- ⁰⁶ ₀₈	62	97		102.5		
ZPB3J20- ⁰⁶ ₀₈	72	50	91.9	96.9		14
ZPB3J30- ⁰⁶ ₀₈	82		101.9	106.9		
ZPB3J50- ⁰⁶ ₀₈	127	75	146.9	151.9		

ZPB3J10-^{N6}_{U6}

ZPB3J²⁰₃₀-^{N6}_{U6}



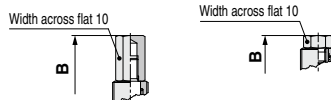
Dimensions

(Vacuum entry: Barb type)

Model	A	B	D
ZPB3J10- ^{N6} _{U6}	62	81	
ZPB3J20- ^{N6} _{U6}	72	84	50
ZPB3J30- ^{N6} _{U6}	82	94	
ZPB3J50- ^{N6} _{U6}	127	139	75

ZPB3J10
(Without gasket)

ZPB3J²⁰₃₀
(Without gasket)



Dimensions (Buffer for ZPR/ZPY)

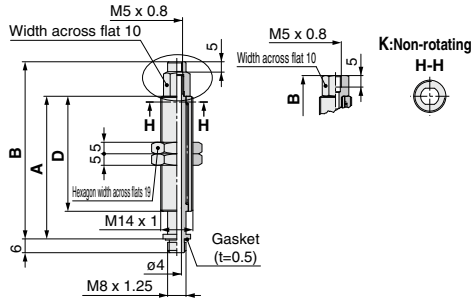
Model	A	B	D
ZPB3J10	62	80	
ZPB3J20	72	77	50
ZPB3J30	82	87	
ZPB3J50	127	132	75

* Refer to page 526 for nut tightening torque.

Vacuum Entry Vertical/Buffer Assembly Part No.

ZPB3K10-B5

ZPB3K²⁰₃₀-B5



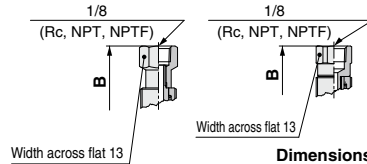
Dimensions

(Vacuum entry: Female thread M5 x 0.8)

Model	A	B	D
ZPB3K10-B5	62	77	
ZPB3K20-B5	72	81	50
ZPB3K30-B5	82	91	
ZPB3K50-B5	127	136	75

ZPB3K10-◇01

ZPB3K²⁰₃₀-◇01



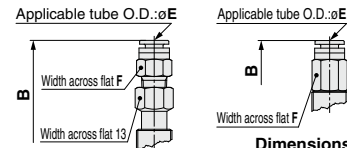
Dimensions

(Vacuum entry: 1/8 type)

Model	A	B	D
ZPB3K10-◇01	62	78.5	
ZPB3K20-◇01	72	84	50
ZPB3K30-◇01	82	94	
ZPB3K50-◇01	127	139	75

ZPB3K10-⁰⁶₀₈

ZPB3K²⁰₃₀-⁰⁶₀₈



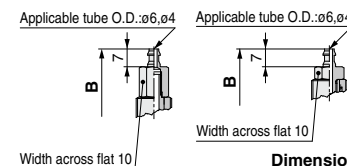
Dimensions

(Vacuum entry: One-touch type)

Model	A	D	E:6	E:8
ZPB3K10- ⁰⁶ ₀₈	62	97	102.5	
ZPB3K20- ⁰⁶ ₀₈	72	50	91.9	96.9
ZPB3K30- ⁰⁶ ₀₈	82	101.9	106.9	114
ZPB3K50- ⁰⁶ ₀₈	127	75	146.9	151.9

ZPB3K10-¹⁶₁₈

ZPB3K²⁰₃₀-¹⁶₁₈



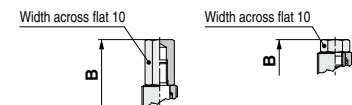
Dimensions

(Vacuum entry: Barb type)

Model	A	B	D
ZPB3K10- ¹⁶ ₁₈	62	81	
ZPB3K20- ¹⁶ ₁₈	72	84	50
ZPB3K30- ¹⁶ ₁₈	82	94	
ZPB3K50- ¹⁶ ₁₈	127	139	75

ZPB3K10
(Without gasket)

ZPB3K²⁰₃₀
(Without gasket)



Dimensions

(Buffer for ZPR/ZPY)

Model	A	B	D
ZPB3K10	62	80	
ZPB3K20	72	77	50
ZPB3K30	82	87	
ZPB3K50	127	132	75

ZP3

ZP3E

ZP2

ZP2V

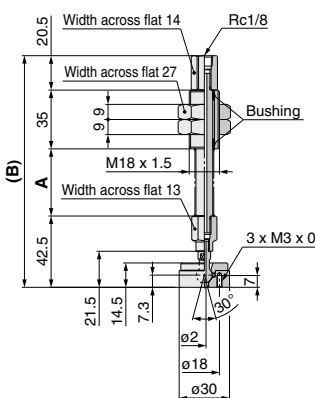
ZP

ZPT

ZPR

XT661

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

Buffer assembly part no.			Applicable pad part no. ZP40H□ ZP50H□ ZP40HB□ ZP50HB□ ZP2-40H□ ZP2-50H□
Buffer body (Material: Brass)	Buffer body (Material: Steel)		
ZP2B-TF1JB25	ZP2B-TF1JF25		
ZP2B-TF1JB50	ZP2B-TF1JF50		
ZP2B-TF1JB75	ZP2B-TF1JF75		

Width across flat 14

Width across flat 27

Width across flat 13

M18 x 1.5

3 x M3 x 0.5

30°

21.5

14.5

7.3

20.5

35

42.5

9.9

7

ø2

ø18

ø30

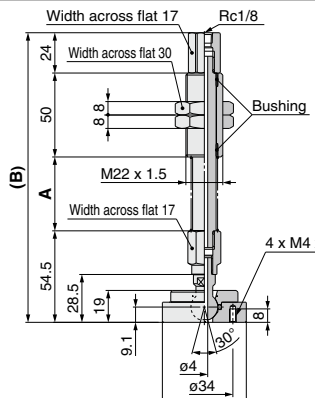
Rc1/8

Bushing

Dimensions

Model	A	B
ZP2B-TF1(JB/JF)25	40	138
ZP2B-TF1(JB/JF)50	75	173
ZP2B-TF1(JB/JF)75	111	209

* With three M3 bolts

Buffer assembly part no.			Applicable pad 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		ZP63H□ ZP80H□ ZP63HB□ ZP80HB□ ZP2-63H□ ZP2-80H□

Width across flat 17

Rc1/8

Width across flat 30

Bushing

ø 8

M22 x 1.5

Width across flat 17

4 x M4 x 0.7

30°

ø4

ø34

ø50

9.1

28.5

19

54.5

A

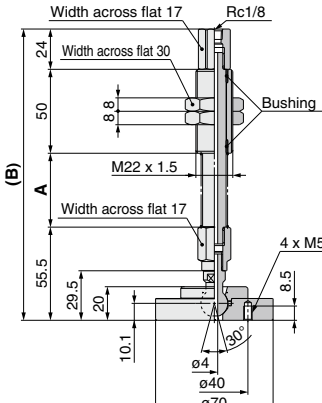
B

24

50

Dimensions		
Model	A	B
ZP2B-TF2(JB/JF)25	44	172.5
ZP2B-TF2(JB/JF)50	80	208.5
ZP2B-TF2(JB/JF)75	120	248.5
ZP2B-TF2(JB/JF)100	155	283.5

* With four M4 bolts

Buffer assembly part no.			Applicable pad part no.
Buffer body (Material: Brass)	Buffer body (Material: Steel)		
ZP2B-TF3JB25	ZP2B-TF3JF25		
ZP2B-TF3JB50	ZP2B-TF3JF50		
ZP2B-TF3JB75	ZP2B-TF3JF75		
ZP2B-TF3JB100	ZP2B-TF3JF100		

ZP100H□

ZP125H□

ZP100HB□

ZP125HB□

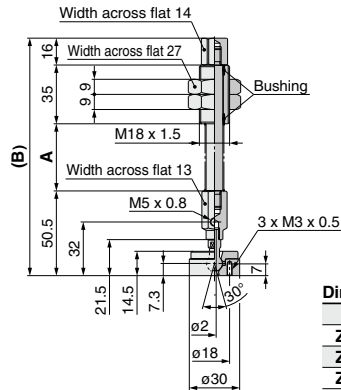
ZP2-100H□

ZP2-125H□

Dimensions		
Model	A	B
ZP2B-TF3(JB/JF)25	44	173.5
ZP2B-TF3(JB/JF)50	80	209.5
ZP2B-TF3(JB/JF)75	120	249.5
ZP2B-TF3(JB/JF)100	155	284.5

* With four M5 bolts

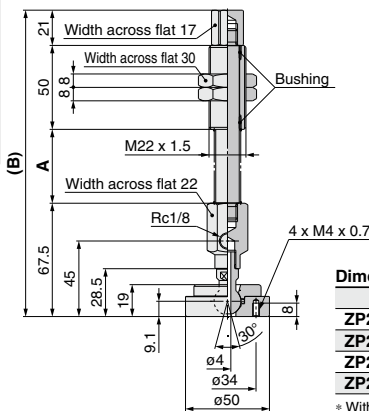
Buffer assembly part no.	
Buffer body (Material: Brass)	Buffer body (Material: Steel)
2P2B-XF1JB25	2P2B-XF1JF25
2P2B-XF1JB50	2P2B-XF1JF50
2P2B-XF1JB75	2P2B-XF1JF75



Model	A	B
ZP2B-XF1(JB/JF)25	40	141.5
ZP2B-XF1(JB/JF)50	75	176.5
ZP2B-XF1(JB/JF)75	111	212.5

Applicable pad part no.
ZP40H☐ ZP50H☐ ZP40HB☐ ZP50HB☐ ZP2-40H☐ ZP2-50H☐

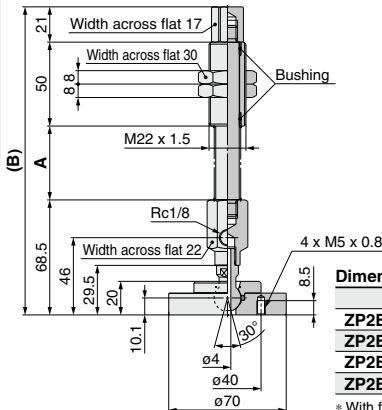
Buffer assembly part no.	
Buffer body (Material: Brass)	Buffer body (Material: Steel)
ZP2B-XF2JB25	ZP2B-XF2JF25
ZP2B-XF2JB50	ZP2B-XF2JF50
ZP2B-XF2JB75	ZP2B-XF2JF75
ZP2B-XF2JB100	ZP2B-XF2JF100



Dimensions		
Model	A	B
ZP2B-XF2(JB/JF)25	44	182.5
ZP2B-XF2(JB/JF)50	80	218.5
ZP2B-XF2(JB/JF)75	120	258.5
ZP2B-XF2(JB/JF)100	155	293.5

Applicable pad part no.
ZP63H ☐
ZP80H ☐
ZP63HB ☐
ZP80HB ☐
ZP2-63H ☐
ZP2-80H ☐

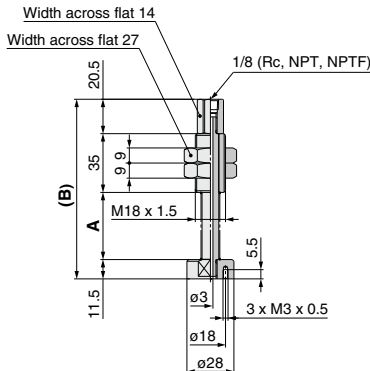
Buffer assembly part no.	
Buffer body (Material: Brass)	Buffer body (Material: Steel)
郑2B-XF3JB25	郑2B-XF3JF25
郑2B-XF3JB50	郑2B-XF3JF50
郑2B-XF3JB75	郑2B-XF3JF75
郑2B-XF3JB100	郑2B-XF3JF100



Dimensions		
Model	A	B
ZP2B-XF3(JB/JF)25	44	183.5
ZP2B-XF3(JB/JF)50	80	219.5
ZP2B-XF3(JB/JF)75	120	259.5
ZP2B-XF3(JB/JF)100	155	294.5

Applicable pad part no.
ZP100H☐ ZP125H☐ ZP100HB☐ ZP125HB☐ ZP2-100H☐ ZP2-125H☐

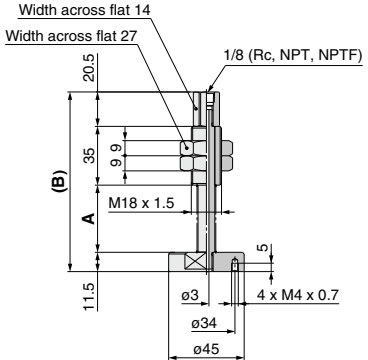
Heavy-duty Buffer Assembly Part No. (Type T)

Buffer assembly part no.		Applicable pad part no.	
Buffer body		ZP40H□	
(Material: Aluminum alloy)		ZP50H□	
ZPB-T1J25-B01		ZP40HB□	
ZPB-T1J25-N01		ZP50HB□	
ZPB-T1J25-T01		ZP2-40H□	
ZPB-T1J50-B01		ZP2-50H□	
ZPB-T1J50-N01		ZP2-3050HW□	
ZPB-T1J50-T01			
ZPB-T1J75-B01			
ZPB-T1J75-N01			
ZPB-T1J75-T01			

Dimensions		
Model	A	B
ZPB-T1J25-□01	40	107
ZPB-T1J50-□01	75	142
ZPB-T1J75-□01	111	178

* With three M3 bolts

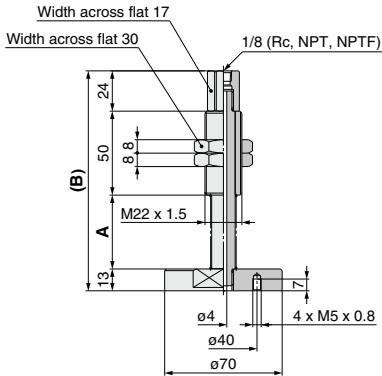
* With three M3 bolts

Buffer assembly part no.		Applicable pad part no.	
Buffer body		ZP63H□	
(Material: Aluminum alloy)		ZP80H□	
ZPB-T2J25-B01		ZP63HB□	
ZPB-T2J25-N01		ZP80HB□	
ZPB-T2J25-T01		ZP2-63H□	
ZPB-T2J50-B01		ZP2-80H□	
ZPB-T2J50-N01			
ZPB-T2J50-T01			
ZPB-T2J75-B01			
ZPB-T2J75-N01			
ZPB-T2J75-T01			

Dimensions		
Model	A	B
ZPB-T2J25-□01	40	107
ZPB-T2J50-□01	75	142
ZPB-T2J75-□01	111	178

* With four M4 bolts

* With four M4 bolts

Buffer assembly part no.		Applicable pad part no.	
Buffer body		ZP100H□	
(Material: Aluminum alloy)		ZP125H□	
ZPB-T3J25-B01		ZP100HB□	
ZPB-T3J25-N01		ZP125HB□	
ZPB-T3J25-T01		ZP2-100H□	
ZPB-T3J50-B01		ZP2-125H□	
ZPB-T3J50-N01			
ZPB-T3J50-T01			
ZPB-T3J75-B01			
ZPB-T3J75-N01			
ZPB-T3J75-T01			
ZPB-T3J100-B01			
ZPB-T3J100-N01			
ZPB-T3J100-T01			

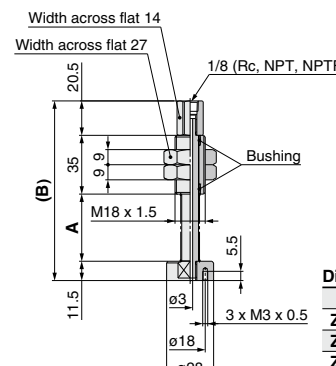
Dimensions		
Model	A	B
ZPB-T3J25-□01	44	131
ZPB-T3J50-□01	80	167
ZPB-T3J75-□01	120	207
ZPB-T3J100-□01	155	242

* With four M5 bolts

* With four M5 bolts

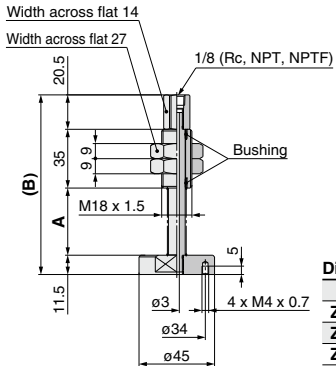
* Refer to page 526 for nut tightening torque.

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

Buffer assembly part no.			Applicable pad part no.
Buffer body (Material: Brass)	Buffer body (Material: Steel)		
ZPB-T1JB25-B01	ZPB-T1JF25-B01	Width across flat 14 Width across flat 27 20.5 35 9.9 11.5 A M18 x 1.5 1/8 (Rc, NPT, NPTF) Bushing 5.5 3 x M3 x 0.5 ø3 ø18 ø28	ZP40H□ ZP50H□ ZP40HB□ ZP50HB□ ZP2-40H□ ZP2-50H□ ZP2-3050WH□
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		

Dimensions		
Model	A	B
ZPB-T1(JB/JF)25-□01	40	107
ZPB-T1(JB/JF)50-□01	75	142
ZPB-T1(JB/JF)75-□01	111	178

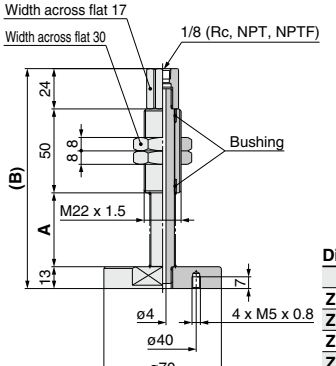
* With three M3 bolts

Buffer assembly part no.			Applicable pad part no.
Buffer body (Material: Brass)	Buffer body (Material: Steel)		
ZPB-T2JB25-B01	ZPB-T2JF25-B01	Width across flat 14 Width across flat 27 20.5 35 9.9 11.5 5.5 1/8 (Rc, NPT, NPTF) Bushing M18 x 1.5 4 x M4 x 0.7 ø3 ø34 ø45	ZP63H□ ZP80H□ ZP63HB□ ZP80HB□ ZP2-63H□ ZP2-80H□
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		

Dimensions

Model	A	B
ZPB-T2(JB/JF)25-□01	40	107
ZPB-T2(JB/JF)50-□01	75	142
ZPB-T2(JB/JF)75-□01	111	178

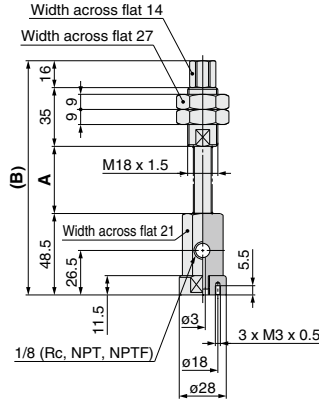
* With four M4 bolts

Buffer assembly part no.			Applicable pad part no.															
Buffer body (Material: Brass)	Buffer body (Material: Steel)																	
ZPB-T3JB25-B01	ZPB-T3JF25-B01	Width across flat 17 Width across flat 30 1/8 (Rc, NPT, NPTF) Bushing M22 x 1.5 4 x M5 x 0.8 Dimensions <table><thead><tr><th>Model</th><th>A</th><th>B</th></tr></thead><tbody><tr><td>ZPB-T3(JB/JF)25-□01</td><td>44</td><td>131</td></tr><tr><td>ZPB-T3(JB/JF)50-□01</td><td>80</td><td>167</td></tr><tr><td>ZPB-T3(JB/JF)75-□01</td><td>120</td><td>207</td></tr><tr><td>ZPB-T3(JB/JF)100-□01</td><td>155</td><td>242</td></tr></tbody></table> * With four M5 bolts	Model	A	B	ZPB-T3(JB/JF)25-□01	44	131	ZPB-T3(JB/JF)50-□01	80	167	ZPB-T3(JB/JF)75-□01	120	207	ZPB-T3(JB/JF)100-□01	155	242	ZP100H□ ZP125H□ ZP100HB□ ZP125HB□ ZP2-100H□ ZP2-125H□
Model	A		B															
ZPB-T3(JB/JF)25-□01	44		131															
ZPB-T3(JB/JF)50-□01	80		167															
ZPB-T3(JB/JF)75-□01	120		207															
ZPB-T3(JB/JF)100-□01	155		242															
ZPB-T3JB25-N01	ZPB-T3JF25-N01																	
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																	
ZPB-T3JB75-N01	ZPB-T3JF75-N01																	
ZPB-T3JB75-T01	ZPB-T3JF75-T01																	
ZPB-T3JB100-B01	ZPB-T3JF100-B01																	
ZPB-T3JB100-N01	ZPB-T3JF100-N01																	
ZPB-T3JB100-T01	ZPB-T3JF100-T01																	

* Refer to page 526 for nut tightening torque.

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

Buffer assembly part no.
Buffer body (Material: Aluminum alloy)
ZPB-X1J25-B01
ZPB-X1J25-N01
ZPB-X1J25-T01
ZPB-X1J50-B01
ZPB-X1J50-N01
ZPB-X1J50-T01
ZPB-X1J75-B01
ZPB-X1J75-N01
ZPB-X1J75-T01



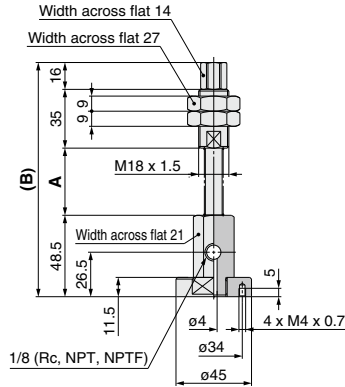
Applicable pad part no.
ZP40H□
ZP50H□
ZP40HB□
ZP50HB□
ZP2-40H□
ZP2-50H□

Dimensions

Model	A	B
ZPB-X1J25-□01	40	139.5
ZPB-X1J50-□01	75	174.5
ZPB-X1J75-□01	111	210.5

* With three M3 bolts

Buffer assembly part no.
Buffer body (Material: Aluminum alloy)
ZPB-X2J25-B01
ZPB-X2J25-N01
ZPB-X2J25-T01
ZPB-X2J50-B01
ZPB-X2J50-N01
ZPB-X2J50-T01
ZPB-X2J75-B01
ZPB-X2J75-N01
ZPB-X2J75-T01



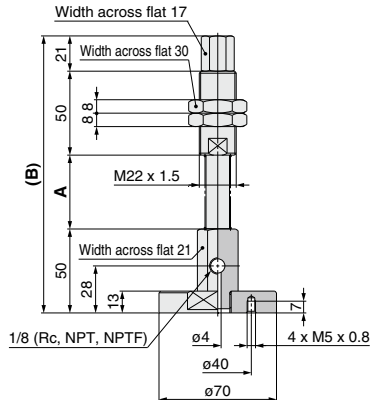
Applicable pad part no.
ZP63H□
ZP80H□
ZP63HB□
ZP80HB□
ZP2-63H□
ZP2-80H□

Dimensions

Model	A	B
ZPB-X2J25-□01	40	139.5
ZPB-X2J50-□01	75	174.5
ZPB-X2J75-□01	111	210.5

* With four M4 bolts

Buffer assembly part no.
Buffer body (Material: Aluminum alloy)
ZPB-X3J25-B01
ZPB-X3J25-N01
ZPB-X3J25-T01
ZPB-X3J50-B01
ZPB-X3J50-N01
ZPB-X3J50-T01
ZPB-X3J75-B01
ZPB-X3J75-N01
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ZPB-X3J100-B01
ZPB-X3J100-N01
ZPB-X3J100-T01



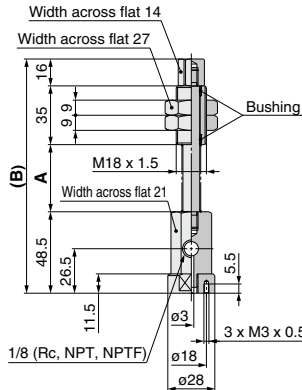
Applicable pad part no.
ZP100H□
ZP125H□
ZP100HB□
ZP125HB□
ZP2-100H□
ZP2-125H□

Dimensions

Model	A	B
ZPB-X3J25-□01	44	165
ZPB-X3J50-□01	80	201
ZPB-X3J75-□01	120	241
ZPB-X3J100-□01	155	276

* With four M5 bolts

Buffer assembly part no.	
Buffer body (Material: Brass)	Buffer body (Material: Steel)
ZPB-X1JB25-B01	ZPB-X1JF25-B01
ZPB-X1JB25-N01	ZPB-X1JF25-N01
ZPB-X1JB25-T01	ZPB-X1JF25-T01
ZPB-X1JB50-B01	ZPB-X1JF50-B01
ZPB-X1JB50-N01	ZPB-X1JF50-N01
ZPB-X1JB50-T01	ZPB-X1JF50-T01
ZPB-X1JB75-B01	ZPB-X1JF75-B01
ZPB-X1JB75-N01	ZPB-X1JF75-N01
ZPB-X1JB75-T01	ZPB-X1JF75-T01

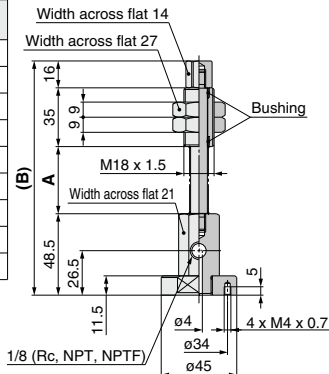


Model	A	B
ZPB-X1(JB/JF)25-□01	40	139.5
ZPB-X1(JB/JF)50-□01	75	174.5
ZPB-X1(JB/JF)75-□01	111	210.5

* With three M3 bolts

ZP40H□
ZP50H□
ZP40HB□
ZP50HB□
ZP2-40H□
ZP2-50H□

Buffer assembly part no.	
Buffer body (Material: Brass)	Buffer body (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

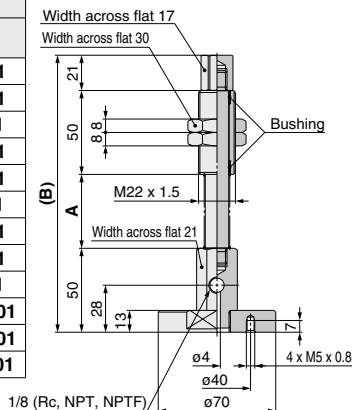


Model	A	B
ZPB-X2(JB/JF)25-□01	40	139.5
ZPB-X2(JB/JF)50-□01	75	174.5
ZPB-X2(JB/JF)75-□01	111	210.5

* With four M4 bolts

ZP63H☐
ZP80H☐
ZP63HB☐
ZP80HB☐
ZP2-63H☐
ZP2-80H☐

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



Model	A	B
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

ZP100H ☐
ZP125H ☐
ZP100HB ☐
ZP125HB ☐
ZP2-100H ☐
ZP2-125H ☐