Vacuum Pad

New

RoHS

Flat Type With Groove

Bellows Type With Groove

ø32, ø40, ø50, ø63, ø80, ø100, ø125

Stability of suction position, Improved ease of removal

The number of mounting screws reduced (4 pcs. → 1 pc.)

Pad and metal parts can be disposed of separately.

Series ZP3E

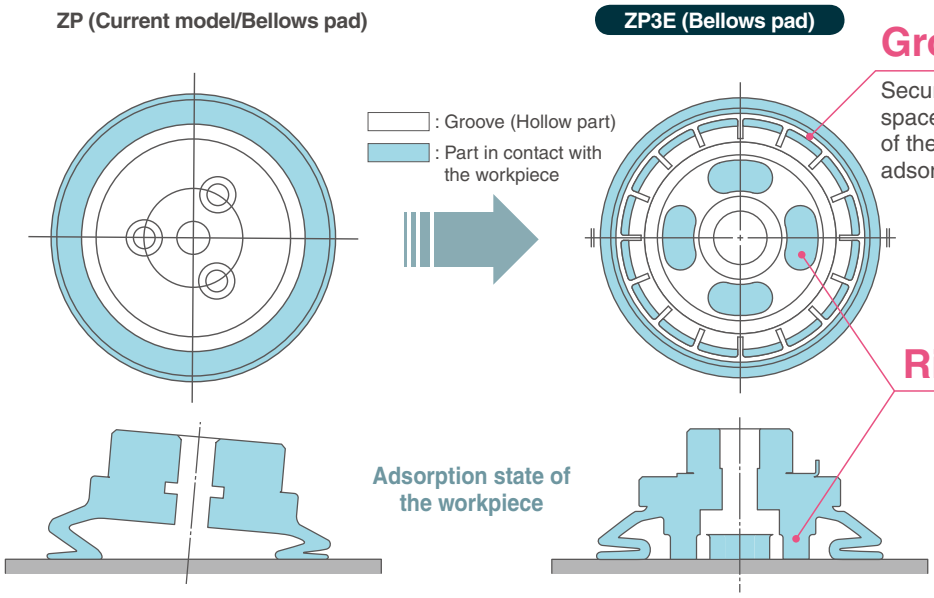
SMC

CAT.ES100-112A

Stability of suction position

Groove and rib formed to adsorb with entire surface

- **Dents and bumps on the adsorption surface expands the area which is in contact with the workpiece.**
- **Ribs reduce the inclinations during transport of workpiece.**



Improved ease of removal

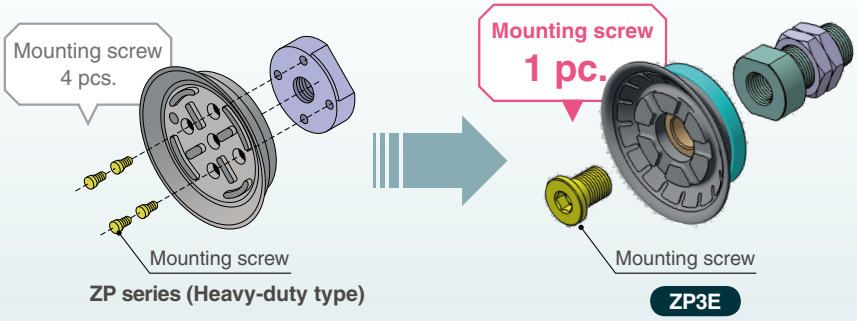
With groove

Dents and bumps on the adsorption surface prevent the workpiece from sticking to it. This facilitates easy removal.

Shot-blasted

Micro-dents and bumps are formed on the adsorption surface. Workpieces can be removed easily.

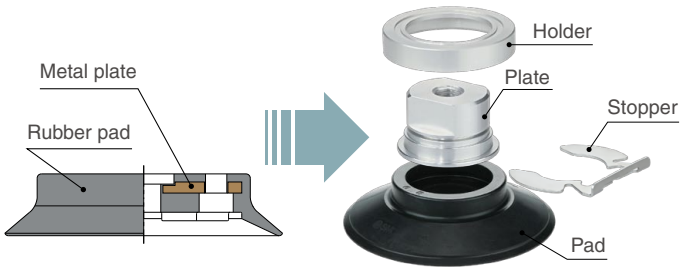
The number of mounting screws reduced



Can be disposed of separately.

The rubber pad and metal part can be separated.

The metal parts and rubber parts can be separated completely.

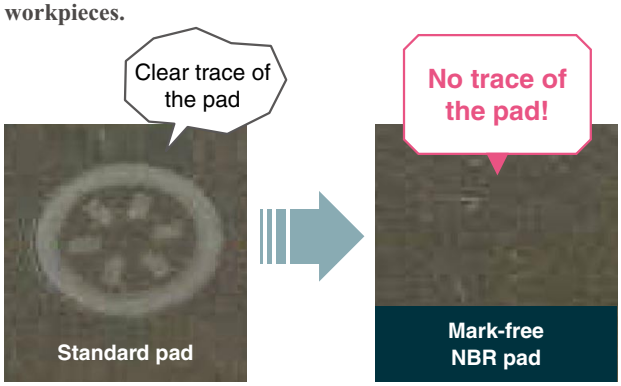


ZP series (Heavy-duty type)

ZP3E

Mark-free

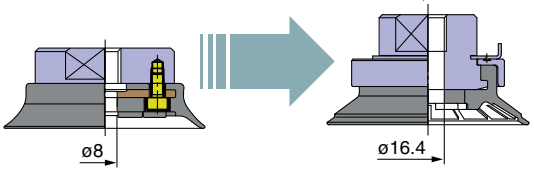
For use where adsorption marks must not be left on workpieces.



Suction flow rate increased

Applicable to workpieces with a large suction flow rate and high permeability, and vacuum blow pumps with large suction flow rates.

Double suction port size
(Pad diameter: ø63, ø80 Compared with the ZP series)



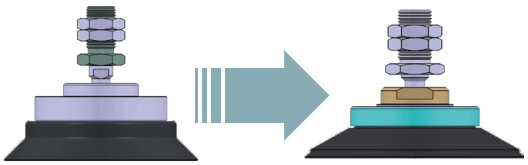
	ZP (Current model)		ZP3E	
Pad diameter	Suction port	Area [mm²]	Suction port	Area [mm²]
ø32	—	—	ø8.4	55.4
ø40	ø6	28.3		
ø50				
ø63	ø8	50.2	ø16.4	211
ø80				
ø100	ø10	78.52		
ø125				

Ball joint type pad weight reduced

Weight reduced by changing the internal structure and materials

* The pad material when weight was measured is NBR.

Weight reduced by up to 290 g

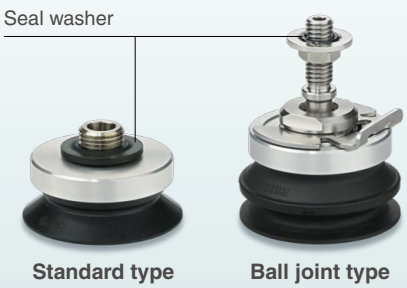


	ZP2/Flat type	ZP3E/Flat type with groove
Pad diameter	Weight [g]	Weight [g]
ø32	—	56
ø40	91	57
ø50	110	75
ø63	230	150
ø80	270	160
ø100	430	190
ø125	560	270

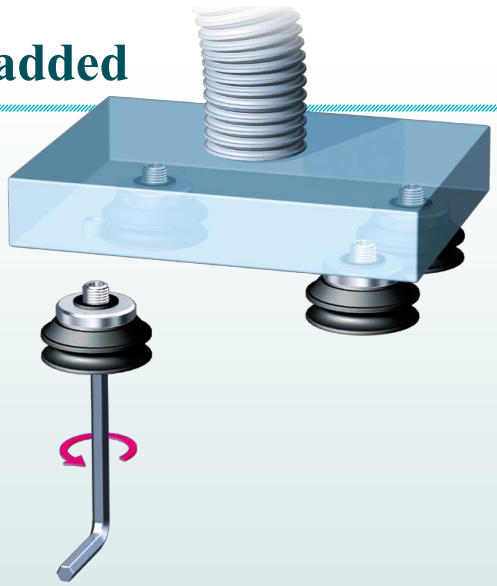
Direct mounting with male thread added

Direct mounting

- Reduced in height
- Easy mounting with tightening with a hexagonal wrench



ZP3E



Pad Unit Variations

Form	Pad diameter							Material	Page
	ø32	ø40	ø50	ø63	ø80	ø100	ø125		
 **Flat type with groove** For adsorption of general workpieces. To be used when adsorption surface of the workpiece is flat and not deformed. **ZP3E-□UM-□**	●	●	●	●	●	●	●	NBR Silicone rubber Urethane rubber FKM Mark-free NBR	29
 **Bellows type with groove** To be used when adsorption surface of the workpiece is slanted. **ZP3E-□BM-□**	●	●	●	●	●	●	●		29

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Vacuum Pad Flat Type with Groove/Bellows Type with Groove ø32, ø40, ø50, ø63, ø80, ø100, ø125

With Adapter Variations

Standard Type

Ball Joint Type

Vacuum inlet direction / Mounting	Mounting thread size	Buffer attachment	Page
Vertical Male thread/Direct mounting **ZP3E-T□□□-□** 	M10 M16	Without buffer	33
Vertical Male thread/Plate connection **ZP3E-T□□□-□** 	M14 M16		33
Vertical Female thread mounting **ZP3E-T□□□-□** 	M8 M10 M12 M18		33
Lateral Male thread mounting **ZP3E-Y□□□-□** 	M14 M16	Without buffer	45
Lateral Female thread mounting **ZP3E-Y□□□-□** 	M8 M12		45
Vertical Male thread mounting **ZP3E-T□□□JB□** 	M18 M22	With buffer Stroke · 10 mm · 30 mm · 50 mm	53
Lateral Male thread mounting **ZP3E-Y□□□JB□** 			57

Vacuum inlet direction / Mounting	Mounting thread size	Buffer attachment	Page
Vertical Male thread/Direct mounting **ZP3E-TF□□□-□** 	M6 M12	Without buffer	61
Vertical Male thread/Plate connection **ZP3E-TF□□□-□** 	M14 M16		61
Vertical Female thread mounting **ZP3E-TF□□□-□** 	M8 M12		61
Lateral Male thread mounting **ZP3E-YF□□□-□** 	M14 M16	Without buffer	74
Lateral Female thread mounting **ZP3E-YF□□□-□** 	M8 M12		74
Vertical Male thread mounting **ZP3E-TF□□□JB□** 	M18 M22	With buffer Stroke · 10 mm · 30 mm · 50 mm	83
Lateral Male thread mounting **ZP3E-YF□□□JB□** 			88

Pad Diameter List

★: New ZP3E series ☆: ZP3 series ●: ZP2 series ○: ZP series

Pad form	Symbol	0.8	1.1	1.5	2	3	3.5	4	5	6	7	8	9	10	11	13	14	15
Flat type	U	—	—	☆	○ / ☆	●	— / ☆	●Note) / ○	—	○	—	○	—	○	—	○	—	—
	MU	—	—	—	●Note)	—	●Note)	●Note)	●Note)	●Note)	—	●Note)	—	●Note)	—	—	—	●Note)
	EU	—	—	—	●Note)	—	—	●Note)	—	●Note)	—	●	—	—	—	—	—	●
	AU	—	—	—	●	●	—	●	—	●Note)	—	●	—	—	—	—	—	—
Flat type with rib	C	—	—	—	—	—	—	—	—	●	●	●	—	○	—	○	—	—
Flat type with groove	UM	—	—	—	—	—	—	☆	—	☆	—	☆	—	☆	—	☆	—	—
Bellows type with groove	BM	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Thin flat type	UT	—	—	—	—	—	—	—	●	●	—	—	—	○	●	○	●	—
Thin flat type with rib	CT	—	—	—	—	—	—	—	—	—	—	—	—	○	—	○	—	—
Bellows type	B	—	—	—	—	—	—	— / ☆	—	●Note) / ○☆	—	●Note) / ○☆	—	○ / ☆	—	○ / ☆	—	—
	J	—	—	—	—	—	—	—	—	●	—	—	●	●Note)	—	—	●	●Note)
	MB	—	—	—	—	—	—	●Note)	—	●Note)	—	●Note)	—	●Note)	—	—	—	●Note)
	ZJ	—	—	—	●	—	—	●	●	●	—	—	—	—	—	—	—	—
Deep type	D	—	—	—	—	—	—	—	—	—	—	—	—	○	—	—	—	—
Nozzle pad	AN	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Flat pad	MT	—	—	—	—	—	—	—	—	—	—	—	—	●Note)	—	—	—	●Note)
Oval type	W	—	—	—	—	—	3.5 x 7 ●	4 x 10 4 x 20 4 x 30 ●	5 x 10 5 x 20 5 x 30 ●	6 x 10 6 x 20 6 x 30 ●	—	8 x 20 8 x 30 ●	—	—	—	—	—	—
	U				2 x 4 ○		3.5 x 7 ○	4 x 10 ○	—	—		—						
Heavy-duty pad: Flat	H	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Heavy-duty pad	HT	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Heavy-duty pad: Bellows	HB	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Heavy-duty pad: Oval	HW	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mark-free pad	U	—	—	—	—	—	—	●	—	●	—	●	—	●	—	—	—	—
Mark-free pad ＊Related pad	H	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sponge pad	S	—	—	—	—	—	—	●	—	●	—	●	—	●	—	—	—	●
Resin attachment	K	—	—	—	—	—	—	—	—	●	—	●	—	●	—	●	—	—
Pad with ball spline buffer	U	—	—	—	●	—	—	●	—	●	—	●	—	—	—	—	—	—
Heavy-duty ball joint pad	H	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	HB	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

＊ Cyclone pad (Non-contact pad) *Made to Order*

Note) The ZP2 series is blast type.

＊ The ZP3 series is available from ø1.5 to ø16. If you need other sizes or shapes, choose from the ZP or ZP2 series.

Pad Diameter List

○: For details about the ZP series, refer to the SMC website or the Best Pneumatics No. 4.

SMC Vacuum Pad Search
http://www.smcworld.com

Pad diameter																	Symbol	Catalogs			
16	18	20	25	30	32	40	46	50	63	80	100	125	150	250	300	340		ZP3E	ZP3	ZP2	ZP
																			Best Pneumatics		
○	—	○	○	—	○	○	—	○	—	—	—	—	—	—	—	—	U	—	P.1122	P.1176	P.1269
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	MU	—	—	P.1177	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	EU	—	—	P.1180	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	AU	—	—	P.1183	—
○	—	○	○	—	○	○	—	○	—	—	—	—	—	—	—	—	C	—	—	P.1176	P.1269
☆	—	—	—	—	★	★	—	★	★	★	★	★	—	—	—	—	UM	P.29	P.1122	—	—
—	—	—	—	—	★	★	—	★	★	★	★	★	—	—	—	—	BM	P.29	—	—	—
○	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	UT	—	—	P.1176 P.1185	
○	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	CT	—	—	—	P.1269
○ ☆	—	○	○	—	○	○	—	○	—	—	—	—	—	—	—	—	B	—	P.1122	P.1176	
●	—	—	● Note)	● Note)	—	—	—	—	—	—	—	—	—	—	—	—	J	—	—	P.1188	—
—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	MB	—	—	P.1189	—
—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	ZJ	—	—	P.1191	—
○	—	—	○	—	—	○	—	—	—	—	—	—	—	—	—	—	D	—	—	—	P.1269
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	AN	—	—	P.1184	—
—	—	● Note)	● Note)	● Note)	—	—	—	—	—	—	—	—	—	—	—	—	MT	—	—	P.1186	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	W	—	—	P.1192	—
																	U	—	—	—	P.1269
—	—	—	—	—	●	○	—	○	○	○	○	○	—	—	●	●	H	—	—	P.1208	P.1224
—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	HT	—	—	P.1208	—
—	—	—	—	—	●	○	—	○	○	○	○	○	●	—	—	—	HB	—	—	P.1210	P.1224
—	—	—	—	30 x 50 ●	—	—	—	—	—	—	—	—	—	—	—	—	HW	—	—	P.1211	—
●	—	—	●	—	●	●	—	●	—	—	—	—	—	—	—	—	U	—	—	P.1202	
—	—	—	—	—	—	●	—	●	●	●	●	●	—	—	—	—	H	—	—	P.1203	
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	S	—	—	P.1205	
●	—	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	K	—	—	P.1204	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	U	—	—	P.1199	
—	—	—	—	—	—	●	—	●	●	●	●	●	—	—	—	—	H	—	—	P.1212	
—	—	—	—	—	—	●	—	●	●	●	●	●	—	—	—	—	HB	—	—	P.1218	

Products other than above

Best Pneumatics
Vacuum pad for transferring disks···P.1234
Vacuum pad for fixing panel···P.1235
Vacuum saving valve···P.1236

Vacuum Equipment
Model Selection

CONTENTS

1 Features and Precautions for Vacuum Adsorption

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

- Compared with the mechanical gripper and other similar products, it has a simpler construction and fewer moving parts.
- Workpieces with any shape are possible if they have an adsorption surface.
- No need for accurate positioning
- Compatible with soft and easily-deformed workpieces

However, special care is required in the following conditions.

- Be careful and do not drop the workpiece caused by the transfer conditions (acceleration, vibration, or impact).
- The piping may be clogged by liquid or particles suctioned near the workpiece.
- It is necessary to place the pad in the appropriate position to transfer heavy objects.
- The vacuum pad (rubber) may deteriorate depending on the operating environment and conditions.
- As the product life (replacement period) depends on the customer's operating conditions, it cannot be estimated beforehand.

A suction test is recommended with actual equipment before selecting the product model.

Consider the features and precautions shown above, and perform periodic maintenance and take corrective actions for the operating conditions.

2 Vacuum Pad Selection

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

● Vacuum Pad Selection Procedures

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

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

● Points for Selecting Vacuum Pads

A. Shear Force and Moment Applied to Vacuum Pad

a) Vacuum pads are susceptible to shear force (parallel force with adsorption surface) and moment.
b) Minimize the moment applied to the vacuum pad with the position of the workpiece center of gravity in mind.
c) 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.
d) Avoid lifting the workpiece by adsorbing the vertical side with a vacuum pad (vertical lifting).
   When it is unavoidable, a sufficient safety factor must be secured.

Model Selection

Lifting Force, Moment, Horizontal Force

(Refer to Fig. 1) 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. 2) Because the pads are susceptible to moments, mount the pad so as not to allow the workpiece to create a moment.
(Refer to Fig. 3) 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.

Fig. 1

Loading by acceleration and wind pressure lifting

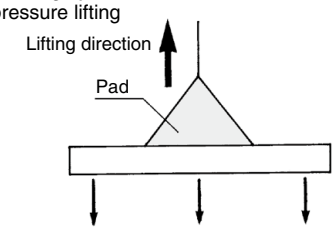


Fig. 2

Pad positioning

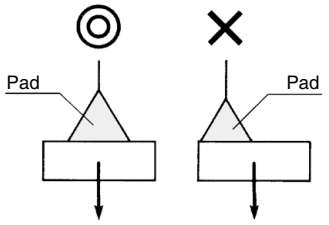
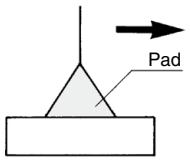


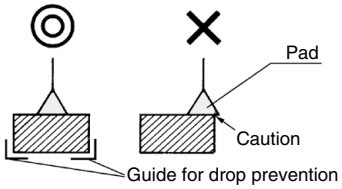
Fig. 3

Caution for friction force between pad and workpiece

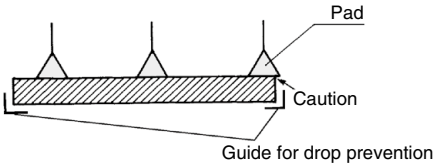


Balance of Pad and Workpiece

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



2) 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.

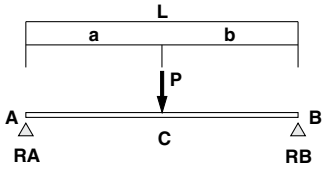
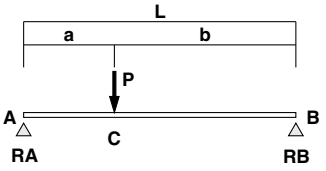
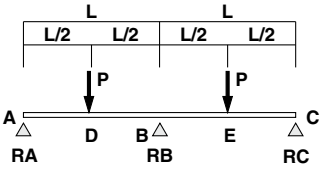


Provide an auxiliary device (example: a guide for preventing the workpieces from dropping) as necessary.

* Mount the guide for drop prevention so that no load is applied to the workpiece (it does not push the workpiece up). If a load is applied, it is applied to the pad when the guide for drop prevention is removed. This may drop the workpiece.

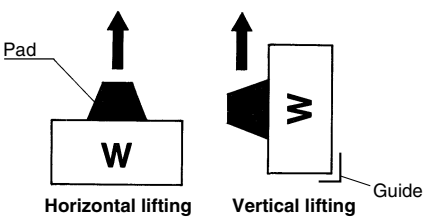
3) Consider that the load may increase at a certain place due to the suction balance.

Formula examples with beams (Reference)

Load/Shape conditions			
Formula (Reactive force: **R**, Total load: **W**)	**RA=RB=P/2 W=P**	**RA=Pb/L RB=Pa/L W=P**	**RA=RC=5Pb/16 RB=11P/8**

Mounting Position

The basic mounting method is a horizontal lift.
Do not perform a suction when tilted, vertical suction, or holding suction (the pad receives the load of the workpiece). If the unit must be installed in such a manner, be certain to guarantee guide and absolute safety.
The vacuum pad is designed for workpiece transfer while suctioned from above. When the workpiece is suctioned from below or it is held with the pad after being positioned by other components, perform a suction test to determine whether or not the transfer method is applicable.



B. Theoretical Lifting Force

- The theoretical lifting force is determined by vacuum pressure and contact area of the vacuum pad.
- Since the theoretical lifting force is the value measured at the static state, the safety factor responding to the actual operating conditions must be estimated in the actual operation.
- It is not necessarily true that higher vacuum pressure is better. Extremely high vacuum pressure may cause problems.
  - If the vacuum pressure is higher than necessary, an increase in the friction of the pad, generation of cracks, sticking of the pad and workpiece, and sticking of the pad (bellows pad) will occur easily, possibly shortening the life of the pad.
  - Doubling the vacuum pressure makes the theoretical lifting force double, while to doubling the pad diameter makes the theoretical lifting force quadruple.
  - When the vacuum pressure (set pressure) is high, it makes not only response time longer, but also the necessary energy to generate a vacuum larger.

Example) Theoretical lifting force = Pressure x Area

2 times

Pad diameter	Area [cm²]	**Vacuum pressure [–40 kPa]**	Vacuum pressure [–80 kPa]
ø6	0.28	**Theoretical lifting force 1.1 N**	Theoretical lifting force 2.2 N
ø16	2.01	**Theoretical lifting force 8.0 N**	Theoretical lifting force 16.1 N

4 times

Lifting Force and Vacuum Pad Diameter

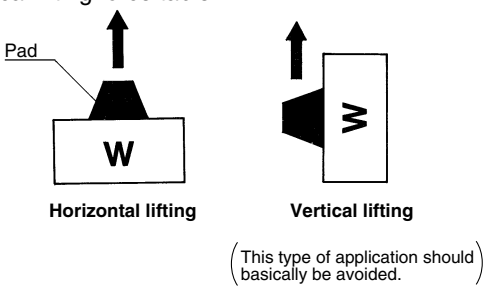
- Set the vacuum pressure below the pressure that has been stabilized after adsorption.
  However, when a workpiece is permeable or has a rough surface, note that the vacuum pressure drops since the workpiece takes air in. In this case, it is necessary to perform a suction test to check the vacuum pressure reached during suction.
- The vacuum pressure when using an ejector is approximately –40 to –60 kPa as a guide.

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

Calculation

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

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



Horizontal lifting **Vertical lifting**

(This type of application should basically be avoided.)

Theoretical Lifting Force

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

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

Theoretical Lifting Force (Theoretical lifting force = P x S x 0.1) [N]

Pad diameter [mm]		**ø32**	**ø40**	**ø50**	**ø63**	**ø80**	**ø100**	**ø125**
S: Pad area [cm²]		8.04	12.56	19.63	31.16	50.24	78.50	122.66
Vacuum pressure [kPa]	**–85**	68.3	107	167	265	427	667	1043
	–80	64.3	100	157	249	402	628	981
	–75	60.3	94.2	147	234	377	589	920
	–70	56.3	87.9	137	218	352	550	859
	–65	52.2	81.6	128	203	327	510	797
	–60	48.2	75.4	118	187	301	471	736
	–55	44.2	69.1	108	171	276	432	675
	–50	40.2	62.8	98.1	156	251	393	613
	–45	36.2	56.5	88.3	140	226	353	552
	–40	32.2	50.2	78.5	125	201	314	491

Model Selection

● Vacuum Pad Type

• Flat type with groove and bellows type with groove are available in the ZP3E series. Select the optimal form in accordance with the workpiece and operating environment.

Pad Type

Pad form	Application
Flat type with groove 	For adsorption of general workpieces. To be used when adsorption surface of the workpiece is flat and not deformed.
Bellows type with groove 	To be used when adsorption surface of the workpiece is slanted.

∗ The bellows of the bellows type pad (including groove) may become stuck due to the operating conditions (flat board, high vacuum pressure, suction time (vacuum holding), etc.). If so, consider using a flat type pad. Select the pad type after evaluating them sufficiently at the customer's site.

● 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.

● Rubber Material and Properties

General name		NBR (Nitrile rubber)	Silicone rubber	Urethane rubber	FKM (Fluoro rubber)
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
Pure gum property (specific gravity)		1.00-1.20	0.95-0.98	1.00-1.30	1.80-1.82
Physical properties of blended gum	Impact resilience	○	◎	◎	△
	Abrasion resistance	◎	× to △	◎	◎
	Tear resistance	○	× to △	◎	○
	Flex crack resistance	○	× to ○	◎	○
	Maximum operation temperature °C	120	200	60	250
	Minimum operation temperature °C	0	–30	0	0
	Volume resistivity [Ωcm]	—	—	—	—
	Heat aging	○	◎	△	◎
	Weather resistance	○	◎	◎	◎
	Ozone resistance	△	◎	◎	◎
	Gas permeability resistance	○	× to △	× to △	× to △
Chemical resistance Oil resistance	Gasoline/Gas oil	◎	× to △	◎	◎
	Benzene/Toluene	× to △	×	× to △	◎
	Alcohol	◎	◎	△	△ to ◎
	Ether	× to △	× to △	×	× to △
	Ketone (MEK)	×	○	×	×
	Ethyl acetate	× to △	△	× to △	×
Alkaline resistance Acid resistance	Water	◎	○	△	◎
	Organic acid	× to △	○	×	△ to ○
	Organic acid of high concentration	△ to ○	△	×	◎
	Organic acid of low concentration	○	○	△	◎
	Strong alkali	○	◎	×	○
	Weak alkali	○	◎	×	○

◎ = 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.

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

● Color and Identification

General name	NBR (Nitrile rubber)	Silicone rubber	Urethane rubber	FKM (Fluoro rubber)	Mark-free NBR
Color of rubber	Black	White	Brown	Black	Black
Identification (Symbol)	—	—	—	F	—
Rubber hardness (±5°)	A55	A50	A50	A60	A60

	Pad type	Material of the adsorption part (Part in contact with the workpiece)	Adsorption mark *1			Static friction ratio *5
			Condition *2 (Initial value)		Operating temperature range [°C]	
			Visual checking	Vapor method *3		
Mark-free Pad Series	1 **Mark-free NBR pad** 	Mark-free NBR (Specially treated *4)	◎	◎	5 to 40	0.15 to 0.2
Standard	**ZP series (Standard material)** 	NBR FKM Conductive NBR	×	×	—	—
		Silicone rubber Urethane rubber	○	×		

Adsorption mark characteristics [◎: Little or no influence ○: Can be used depending on the conditions. ×: Not suitable]
For NBR, FKM, and conductive rubber, black powder (rubber materials) may adhere to the the workpiece when it is adsorbed or when horizontal slippage occurs.

* 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)

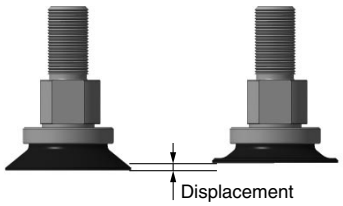
Cleaning method [Mark-free NBR pad]

• 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.)

Fine cracks may be generated on the mark-free NBR pad. However, it does not affect product operation.

Model Selection

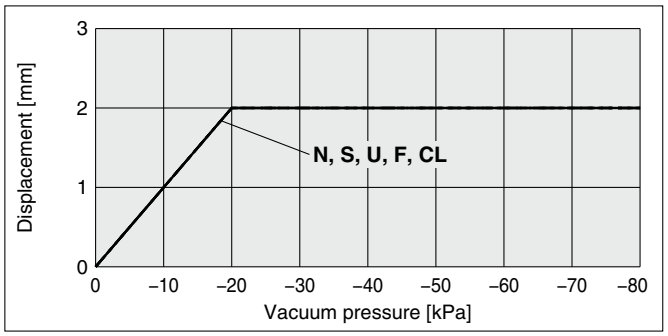
Pad Displacement to Vacuum Pressure (Flat Type with Groove)



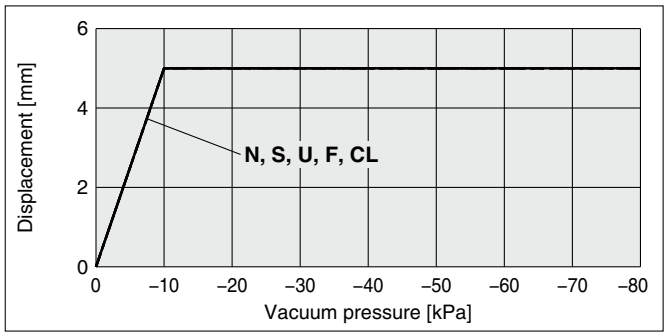
The data shown below are only for reference and are not guaranteed. These values depend on the operating environment, workpiece mass and transfer method. Therefore, thorough research and confirmation are necessary before use.

NBR (N): ——— Silicone rubber (S): ····· Urethane rubber (U): – – – – – FKM (F): —·—·— Mark-free NBR (CL): —··—··

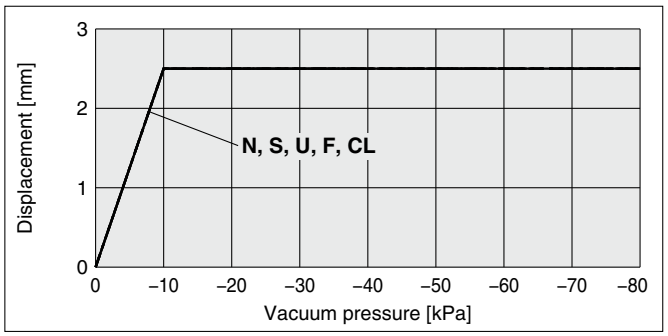
ZP3E-32UM□



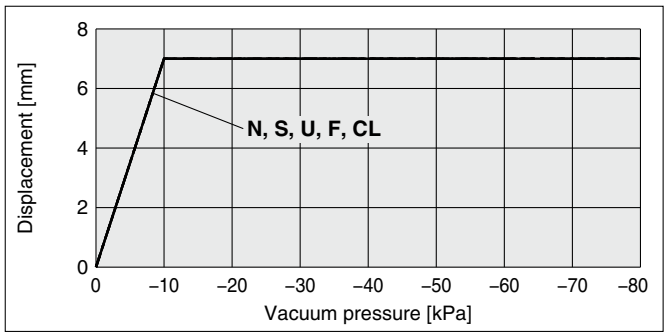
ZP3E-80UM□



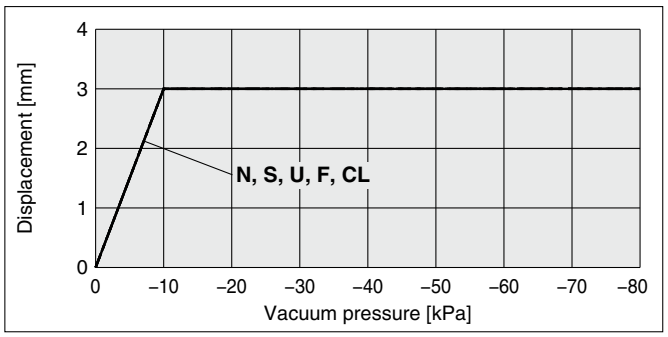
ZP3E-40UM□



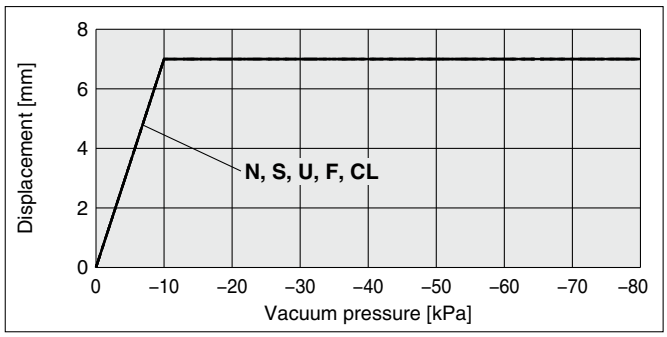
ZP3E-100UM□



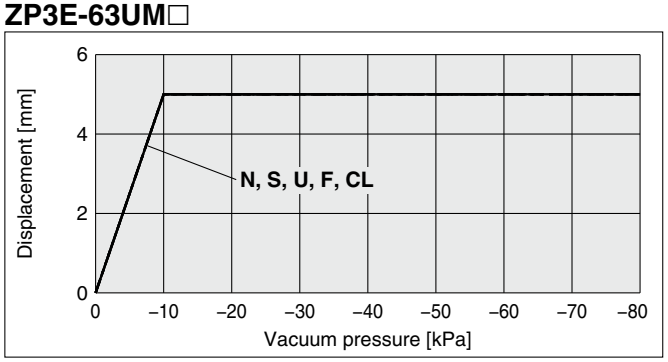
ZP3E-50UM□



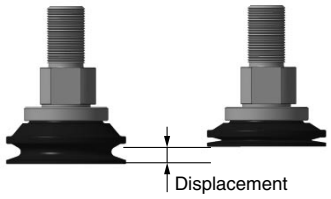
ZP3E-125UM□



ZP3E-63UM□



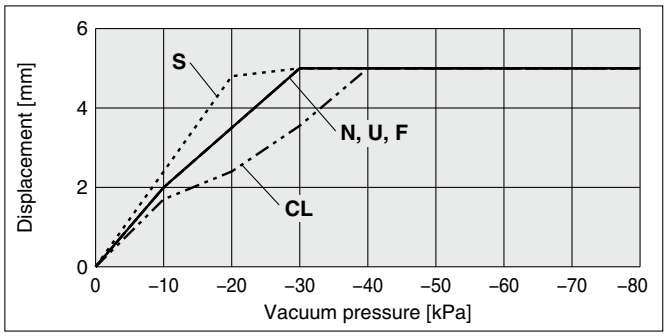
Pad Displacement to Vacuum Pressure (Bellows Type with Groove)



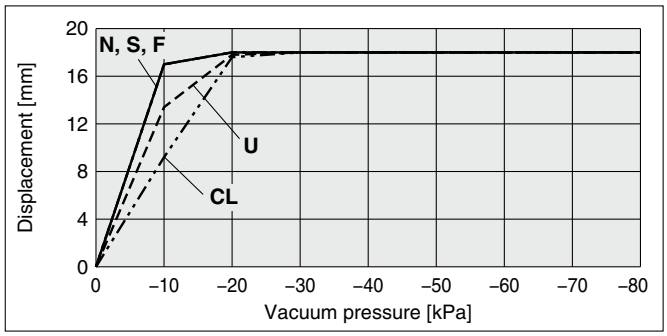
The data shown below are only for reference and are not guaranteed. These values depend on the operating environment, workpiece mass and transfer method. Therefore, thorough research and confirmation are necessary before use.

NBR (N): ——— Silicone rubber (S): ····· Urethane rubber (U): – – – – – FKM (F): —·—·— Mark-free NBR (CL): —·—·—

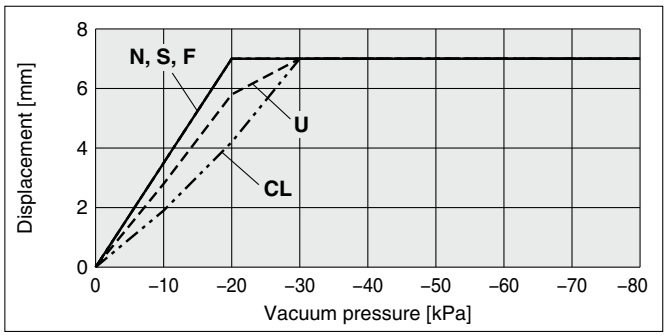
ZP3E-32BM□



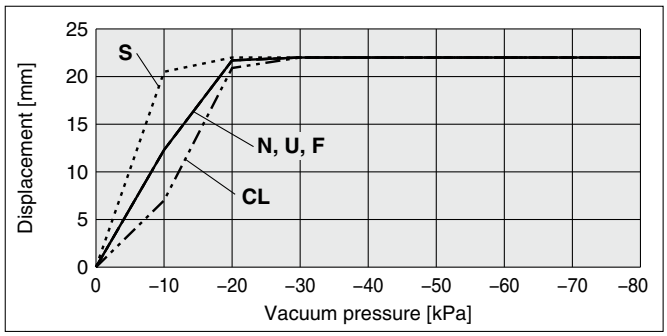
ZP3E-80BM□



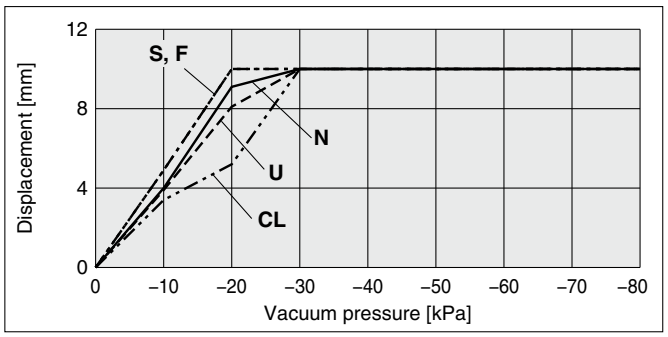
ZP3E-40BM□



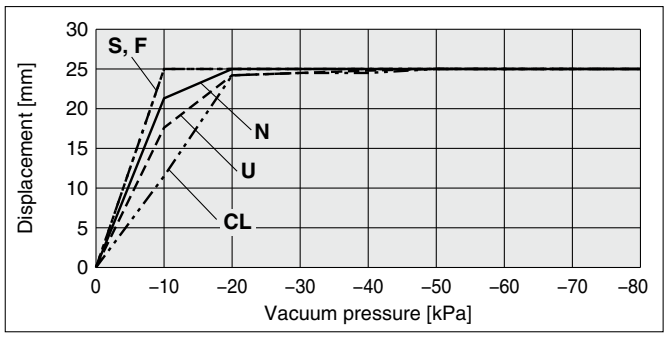
ZP3E-100BM□



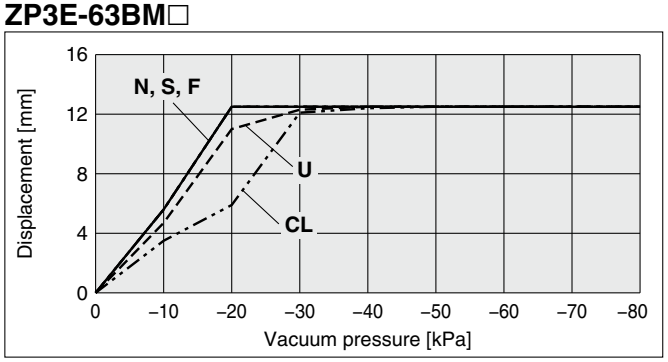
ZP3E-50BM□



ZP3E-125BM□



ZP3E-63BM□



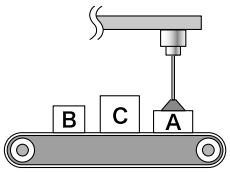
Model Selection

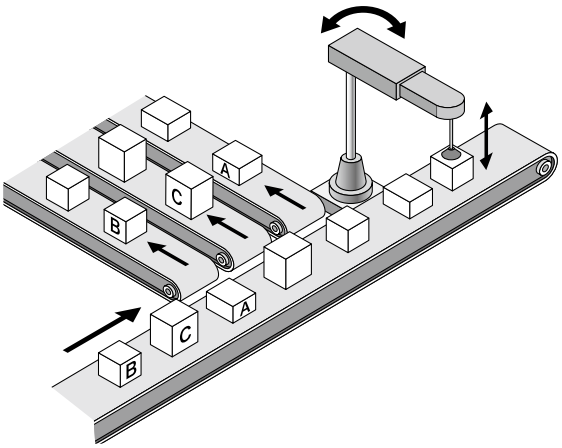
● Buffer Attachment

• 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.



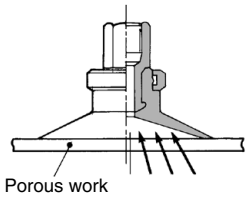


● Pad Selection by Workpiece Type

• Carefully select a pad for the following workpieces.

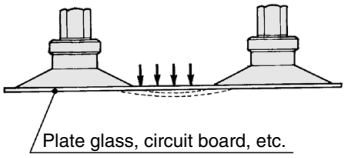
1. Porous Workpiece

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.



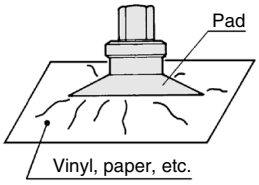
2. Flat Plate Workpiece

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.



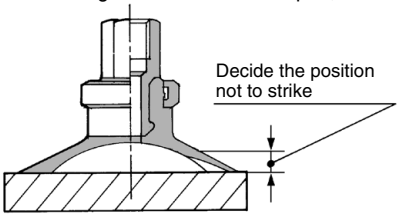
3. Soft Workpiece

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.



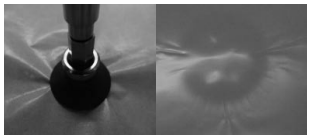
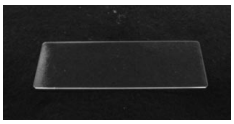
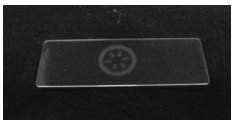
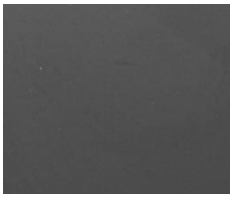
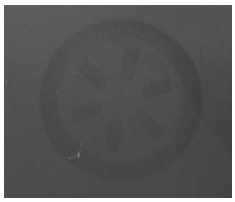
4. Impact to Pad

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.

3 Selection of Vacuum Ejector and Vacuum Switching Valve

● Calculating Vacuum Ejector and Switching Valve Size with the Formula

Average suction flow rate for achieving adsorption response time

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

$$T_2 = 3 \times T_1$$

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

Max. suction flow rate

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

<Selection Procedure>

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

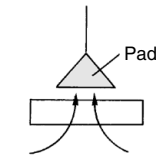
$$\text{Conductance } C = \frac{Qmax}{55.5} \text{ [dm}^3\text{/(s·bar)]}$$

∗ Select a valve (solenoid valve) having a conductance that is greater than that of the conductance **C** formula given above from the related equipment (page 1278, Best Pneumatics No.4).

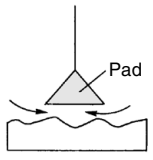
Note 1) Q_L: **0** when no leakage occurs during adsorbing a workpiece.
If there is leakage during adsorbing a workpiece, find the leakage volume based on "4. Leakage Volume during Workpiece Adsorption."
Note 2) Tube piping capacity can be found in "8. Data: Piping Capacity by Tube I.D. (Selection Graph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

4 Leakage Volume during Workpiece Adsorption

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



Ventilation workpiece



Rough workpiece surface

● Leakage Volume from Conductance of Workpiece

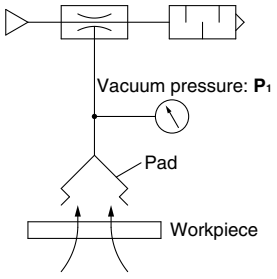
Leakage volume Q_L = 55.5 x C_L

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

● Leakage Volume from Suction Test

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

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



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

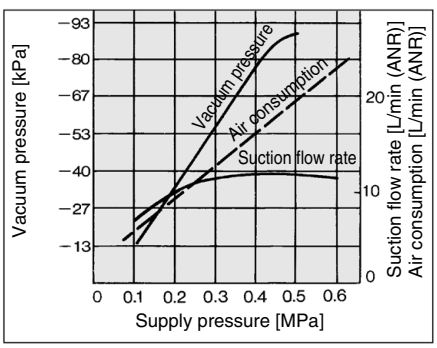
<Selection Procedure>

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

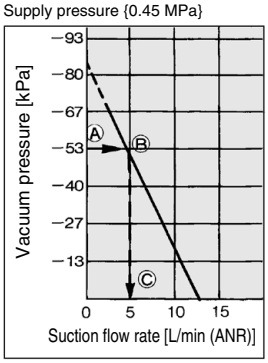
Leakage volume ≈ Suction flow rate 5 L/min (ANR)

ZH07BS, ZH07DS

Exhaust Characteristics



Flow-rate Characteristics
Supply pressure {0.45 MPa}



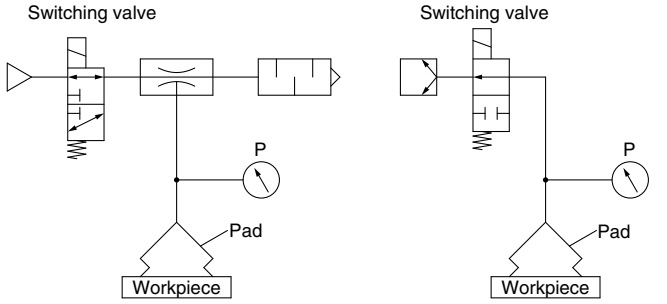
5 Adsorption Response Time

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

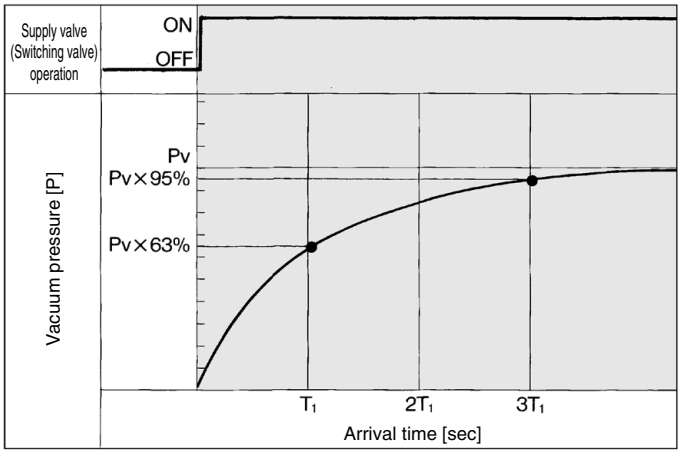
● Relationship between Vacuum Pressure and Response Time after Supply Valve (Switching Valve) is Operated

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

Vacuum System Circuit



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



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

● Calculating Adsorption Response Time with the Formula

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

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

Adsorption response time $T_2 = 3 \times T_1$

Piping capacity

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

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

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

Model Selection

● Adsorption Response Time from the Selection Graph

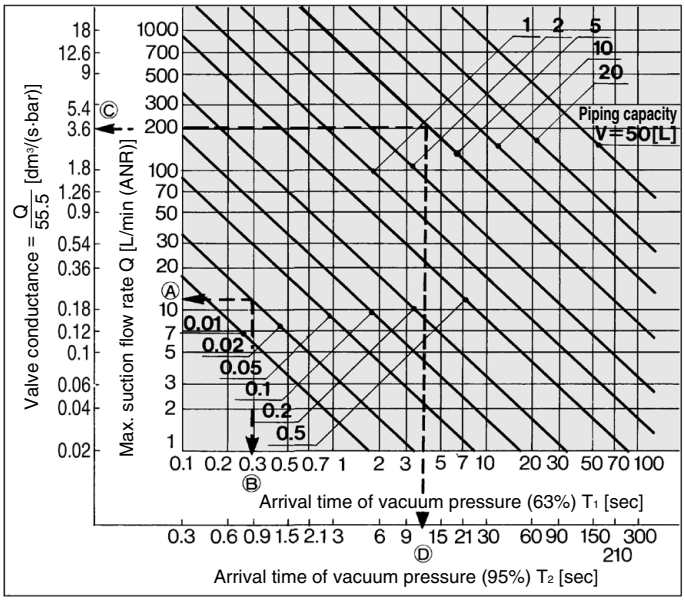
1. Tube Piping Capacity

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

2. Obtain the adsorption response times.

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

Selection Graph (1) Adsorption Response Time



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

How to read the graph

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

<Selection Procedure>

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

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

<Selection Procedure>

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

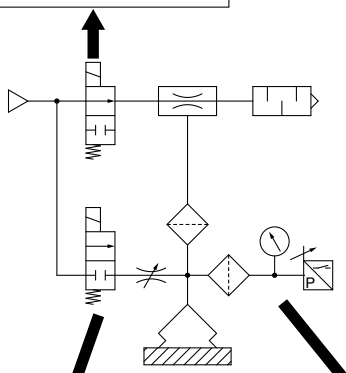
6 Precautions on Vacuum Equipment Selection and SMC's Proposal

● Safety Measures

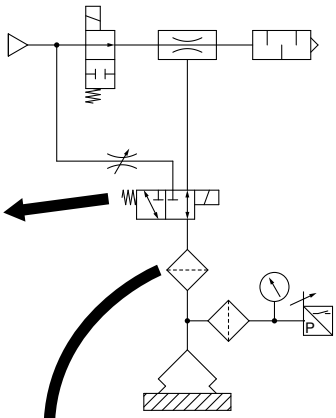
- Make sure to provide a safe design for a vacuum pressure drop due to a disruption of power supply, or a lack of supply air. Drop prevention measures must be taken in particular when dropping a workpiece presents some degree of danger.

● Precautions on Vacuum Equipment Selection

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

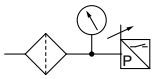


Select a vacuum switching valve that has a conductance that does not reduce the composite conductance consisting of the areas from the pad to the ejector.



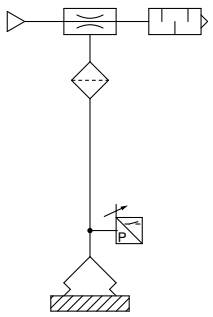
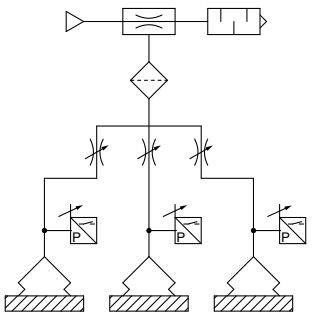
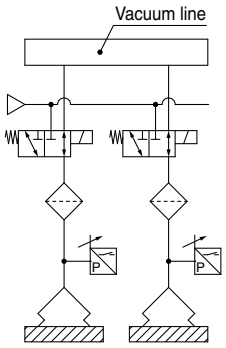
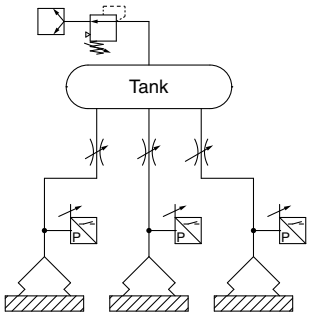
For the release valve, select a 2/3 port valve with a low vacuum specification. Also, use a needle valve to regulate the release flow rate.

- During the adsorption and transfer of a workpiece, verification of the vacuum switch is recommended.
- In addition, visually verify the vacuum gauge when handling a heavy or a hazardous item.
- The ZSP1 type is optimal for the adsorption and transfer of small parts using a suction nozzle with a small diameter.
- Install a filter (ZFA, ZFB, ZFC series) before the pressure switch if the ambient air is of low quality.



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

● Vacuum Ejector or Pump and Number of Vacuum Pads

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

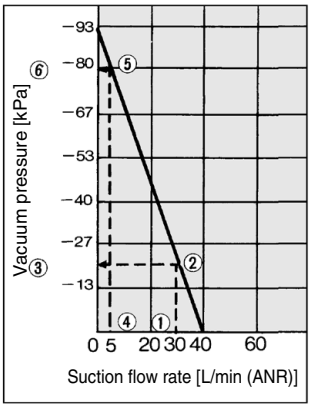
Model Selection

● Vacuum Ejector Selection and Handling Precautions

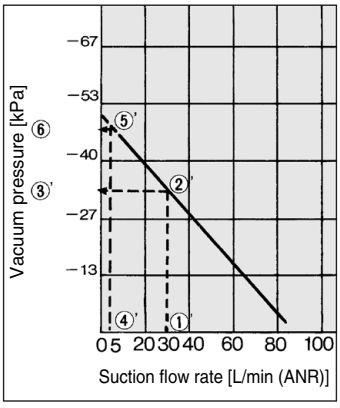
Ejector Selection

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

High Vacuum Type Flow-rate Characteristics/ ZH13□S

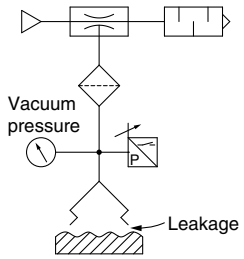


High Flow Type Flow-rate Characteristics/ ZH13□L



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

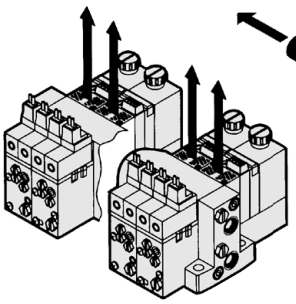
Ejector Nozzle Diameter Selection



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

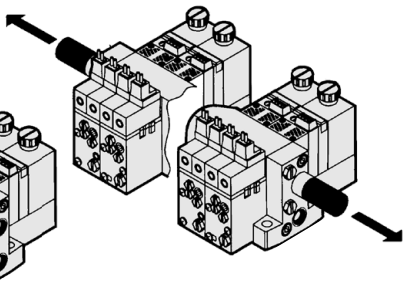
Manifold Use

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 sure that the diameter of the piping is large enough that its back pressure will not affect the operation of the ejectors.

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

● Supply Pressure of Vacuum Ejector

- Use the vacuum ejector at the standard supply pressure.
  The maximum vacuum pressure and suction flow rate can be obtained when the vacuum ejector is used at the standard supply pressure, and as a result, adsorption response time also improves. From the viewpoint of energy-saving, it is the most effective to use the ejector at the standard supply pressure. Since using it at the excessive supply pressure causes a decline in the ejector performance, do not use it at a supply pressure exceeding the standard supply.

● Timing for Vacuum Generation and Suction Verification

A. Timing for Vacuum Generation

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

B. Suction Verification

When lifting the vacuum pad after adsorbing 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 (ZS series), Vacuum Pressure Gauge (GZ series)

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

Approx. ø1 adsorption nozzle
The difference in pressure between ON and OFF becomes small depending on the capacity of the ejector and vacuum pump. In such a case, **it will be necessary to use the ZSP1 that can detect a small hysteresis or a flow switch.**

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

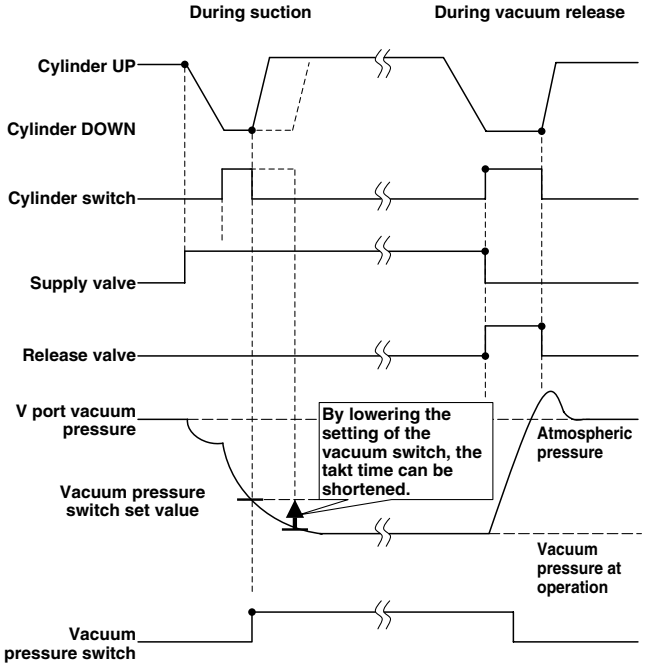
Suction verification switch
ZSP1

Flow sensor
PFMV

Vacuum pressure gauge
GZ46

Refer to the Best Pneumatics No. 6 for details.

Timing Chart Example



● Dust Handling of Vacuum Equipment

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

Air Suction Filter (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 10, check the lifting force.

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

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

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

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

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

2. Vacuum Ejector Selection

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

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

(2) Assuming that leakage (Q_L) during adsorption is 0, find the average suction flow rate to meet the adsorption response time using the formula on page 17.

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

From the formula on page 17, the maximum suction flow rate Q_{max} is

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

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

3. Adsorption Response Time Confirmation

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

(1) The maximum suction flow rate of the vacuum ejector ZX105□ is 5 L/min (ANR).
From the formula on page 18, the average suction flow rate Q_1 is as follows:

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

(2) Next, find the maximum flow rate Q_2 of the piping. The conductance **C is 0.22** from the Selection Graph (3).
From the formula on page 18, the maximum flow rate is as follows:

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

(3) Since Q_2 is smaller than Q_1, $Q = Q_1$.
Thus, from the formula on page 18, the adsorption response time is as follows:

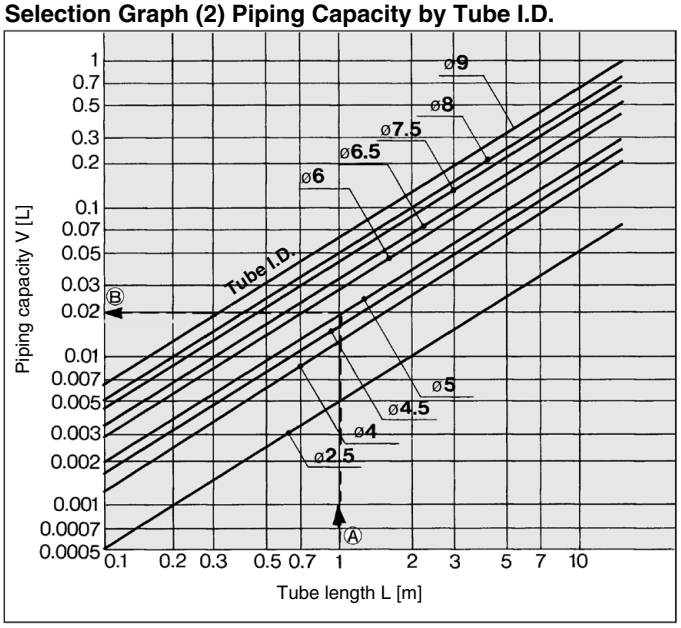
$T = (V \times 60)/Q = (0.0031 \times 60)/1.7 = 0.109$ seconds
$= 109$ msec

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

8 Data

● Selection Graph

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



How to read the graph

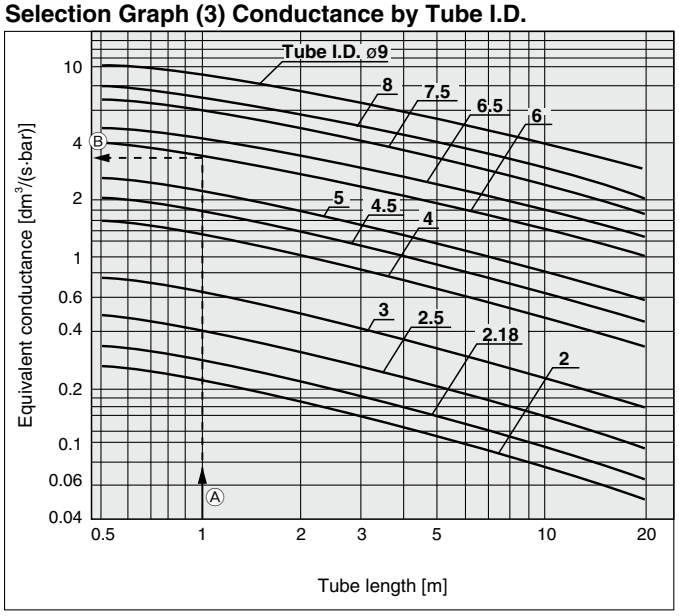
Example: For obtaining the capacity of tube I.D. ø5 and 1 meter length

<Selection Procedure>

By extending leftward from the point at which the 1 meter tube length on the horizontal axis intersects the line for a tube I.D. ø5, the piping capacity approximately 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 dm³/(s·bar) can be obtained on the vertical axis.

Equivalent conductance ≈ 3.6 dm³/(s·bar)

● Glossary of Terms

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

● Countermeasures for Vacuum Adsorption System Problems (Troubleshooting)

Condition & Description of improvement	Contributing factor	Countermeasure
Initial adsorption problem (During trial operation)	Adsorption area is small. (Lifting force is lower than the workpiece mass.)	Recheck the relationship between workpiece mass and lifting force. • Use a vacuum pad with a large adsorption area. • Increase the quantity of vacuum pads.
	Vacuum pressure is low. (Leakage from adsorption surface) (Air permeable workpiece)	Eliminate (reduce) leakage from adsorption surface. • Reconsider the shape of a vacuum pad. Check the relationship between suction flow rate and arrival pressure of vacuum ejector. • Use a vacuum ejector with a high suction flow rate. • Increase adsorption area.
	Vacuum pressure is low. (Leakage from vacuum piping)	Repair leakage point.
	Internal volume of vacuum circuit is large.	Check the relationship between internal volume of the vacuum circuit and suction flow rate of the vacuum ejector. • Reduce internal volume of the vacuum circuit. • Use a vacuum ejector with a high suction flow rate.

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

● Non-conformance Examples

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

Phenomenon	Possible causes	Countermeasure
Cracks are generated on the rubber (NBR, conductive NBR). 	• The product is operated in an ozone environment. • An ionizer is used. ∗ This phenomenon occurs earlier if pushing or the high vacuum pressure is used.	Reconsider the operating environment. Reconsider the materials to be used.
Even when a mark-free pad is used, the pad end wears out quickly. (Suction marks are generated.)	If the pad adsorbs a highly clean workpiece, slippage is minimized, and a load (impact) is applied to the pad end.	Use the following products. • Stuck fluororesin pad • Clean attachment
Even when a mark-free pad is used, suction marks are generated.	• Incorrect application (The mark was generated due to a deformation.) • Contamination (insufficient cleaning) on the pad when installing the equipment, dust in the operating environment etc.	Check the mark generated on the workpiece. 1) Mark due to deformed (lined) workpiece Reconsider the pad diameter, form, material, vacuum ejector (suction flow rate), etc. 2) Mark due to worn rubber Reconsider the pad diameter, form, material, vacuum ejector (suction flow rate), etc. 3) Mark generated by moving components If the suction mark disappears or becomes smaller after wiping with cloth or waste cloth (without using solutions), clean the pad as it may have been contaminated. Refer to "Cleaning method (Mark-free NBR pad)" on page 12 of this catalog.

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

[Possible causes]

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

[Remedy]

Tighten the nut to the recommended tightening torque.

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

Recommended Tightening Torque

Product specifications			Tightening torque [N·m]
Pad diameter	Product part no.	Mounting thread size	
ø**32** to ø**50**	ZP3E-(T/Y)(32 to 50)(UM/BM)∗∗JB■■	M18 x 1.5	28 to 32
	ZP3E-(T/Y)F(32 to 50)(UM/BM)∗∗JB■■		
ø**63** to ø**125**	ZP3E-(T/Y)(63 to 125)(UM/BM)∗∗JB■■	M22 x 1.5	45 to 50
	ZP3E-(T/Y)F(63 to 125)(UM/BM)∗∗JB■■		

● 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.

Flat Type Pad/Bellows Type Pad with Groove

Pad diameter ø32, ø40, ø50, ø63, ø80, ø100, ø125

Symbol/Form
- **UM: Flat type with groove**
- **BM: Bellows type with groove**

How to Order

Pad unit **ZP3E − 32 UM N − P**

Pad diameter

Symbol	Pad diameter
32	ø32
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

Pad form

Symbol	Form
UM	Flat type with groove
BM	Bellows type with groove

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
CL	Mark-free NBR

Plate (★)

Nil	None
P	With plate

Plate Unit Part No.

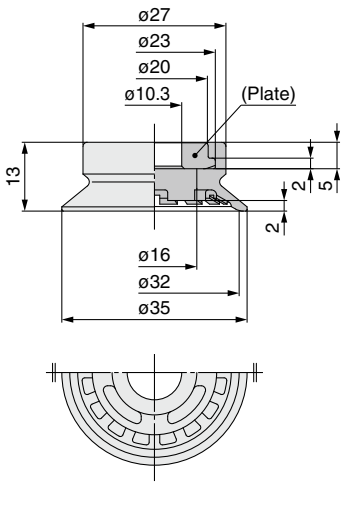
Model \ Form/Diameter	Flat type with groove (**UM**)							Bellows type with groove (**BM**)						
	32	**40**	**50**	**63**	**80**	**100**	**125**	**32**	**40**	**50**	**63**	**80**	**100**	**125**
ZP3EA-P1	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-P2	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-P3	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-P4	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-P5	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-P6	—	—	—	—	—	—	—	—	—	—	—	—	—	●

Dimensions: Pad Unit

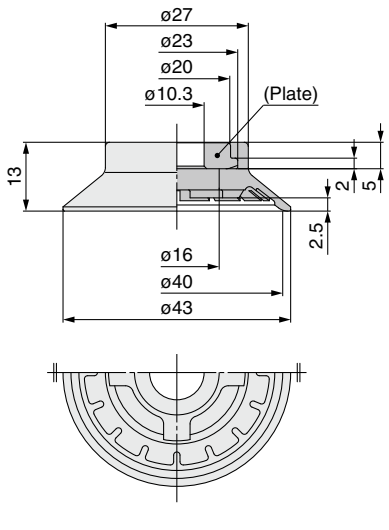
Pad diameter ø32 to ø50

Pad form Flat type with groove

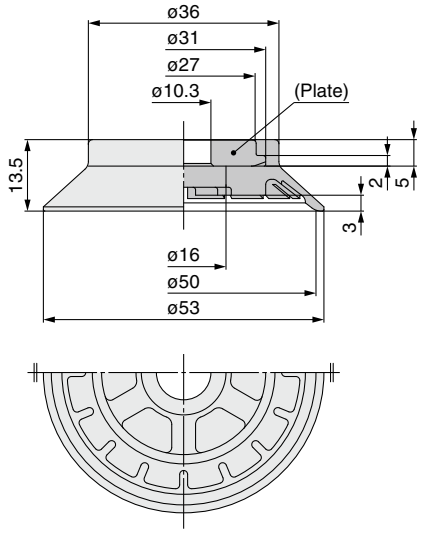
ZP3E-32UM□-★



ZP3E-40UM□-★



ZP3E-50UM□-★



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-32UM□	4.2	3.9	6.7
ZP3E-32UM□-P	7.9	7.6	10.4

Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-40UM□	5.3	4.9	8.4
ZP3E-40UM□-P	9.0	8.5	12.1

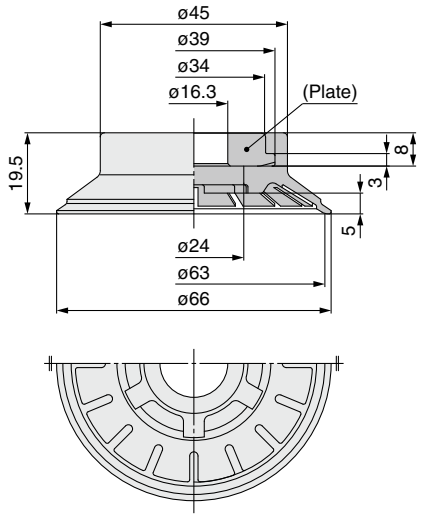
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-50UM□	9.4	8.7	14.9
ZP3E-50UM□-P	17.1	16.3	22.5

Dimensions: Pad Unit

Pad diameter ø63 to ø125
Pad form Flat type with groove

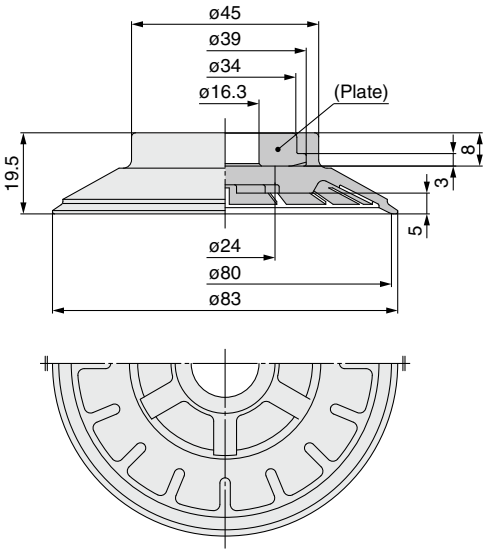
ZP3E-63UM□-★



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-63UM□	18.2	16.7	28.8
ZP3E-63UM□-P	35.9	34.4	46.5

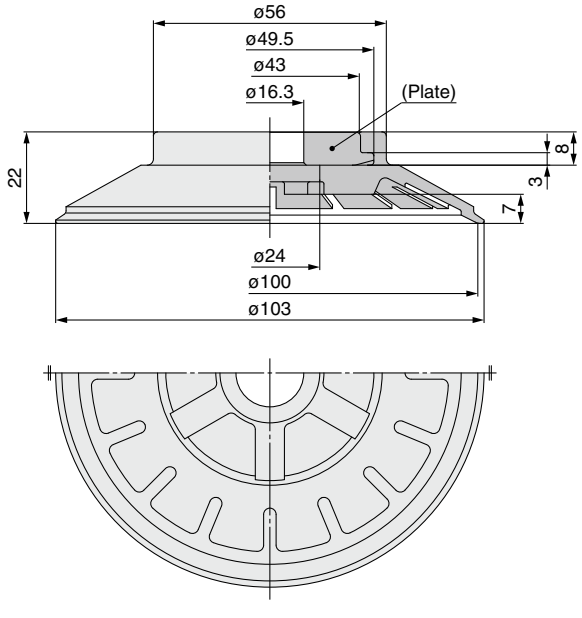
ZP3E-80UM□-★



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-80UM□	26.4	24.3	41.9
ZP3E-80UM□-P	44.1	42.0	59.6

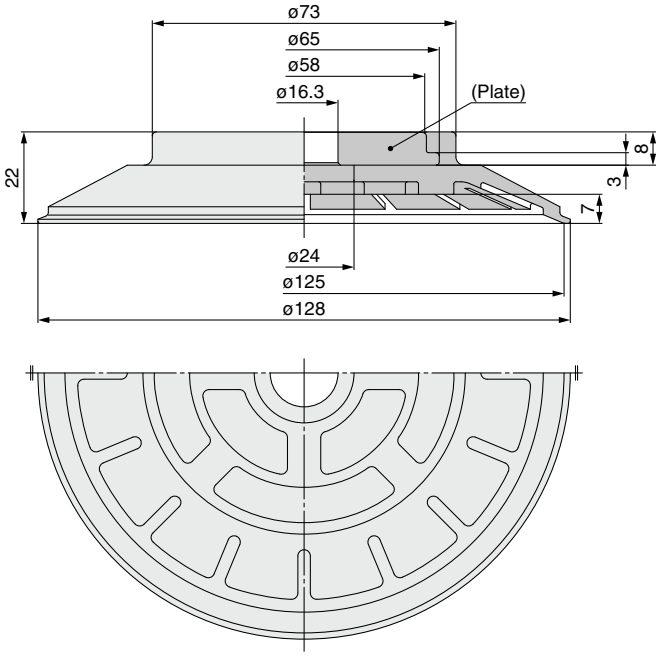
ZP3E-100UM□-★



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-100UM□	44.7	40.9	70.7
ZP3E-100UM□-P	75.8	72.0	102

ZP3E-125UM□-★



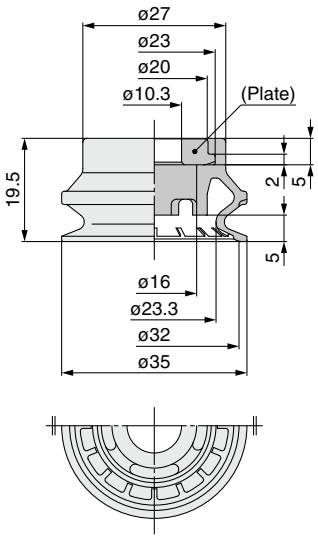
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-125UM□	79.3	72.7	126
ZP3E-125UM□-P	140	134	187

Dimensions: Pad Unit

Pad diameter ø32 to ø80
Pad form Bellows type with groove

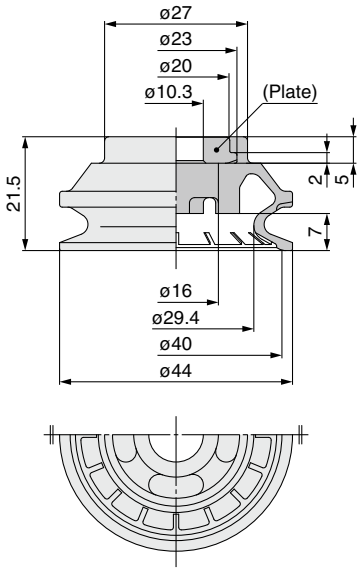
ZP3E-32BM□-★



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-32BM□	6.2	5.7	9.9
ZP3E-32BM□-P	9.9	9.4	13.6

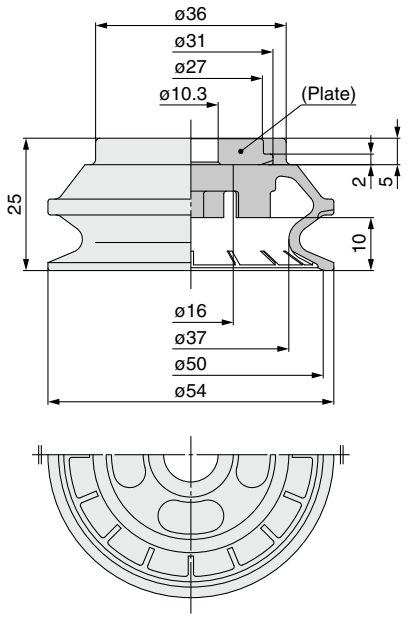
ZP3E-40BM□-★



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-40BM□	10.2	9.4	16.2
ZP3E-40BM□-P	13.9	13.0	19.9

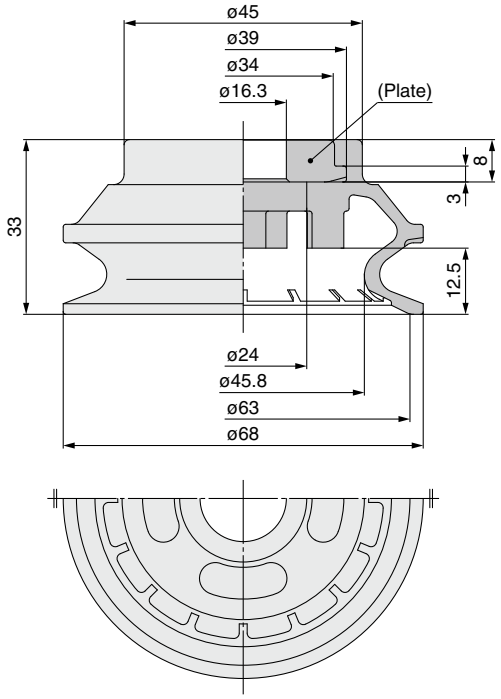
ZP3E-50BM□-★



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-50BM□	17.9	16.4	28.4
ZP3E-50BM□-P	25.5	24.0	36.0

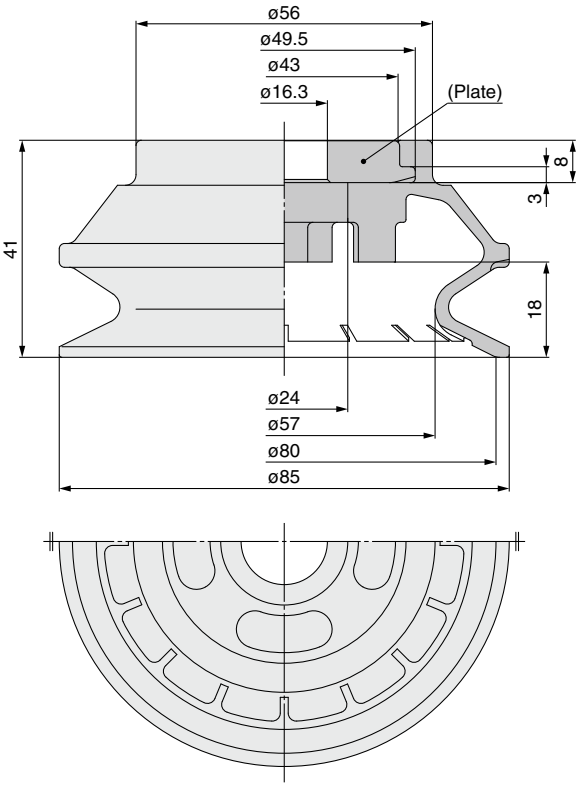
ZP3E-63BM□-★



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-63BM□	34.8	31.9	55.1
ZP3E-63BM□-P	52.5	49.6	72.8

ZP3E-80BM□-★



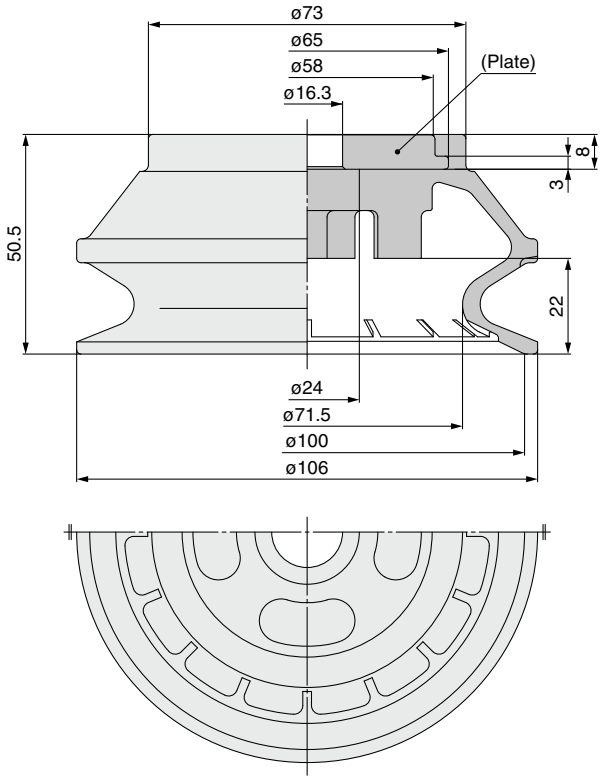
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-80BM□	60.2	55.2	95.3
ZP3E-80BM□-P	91.3	86.3	126

Dimensions: Pad Unit

Pad diameter ø100, ø125
Pad form Bellows type with groove

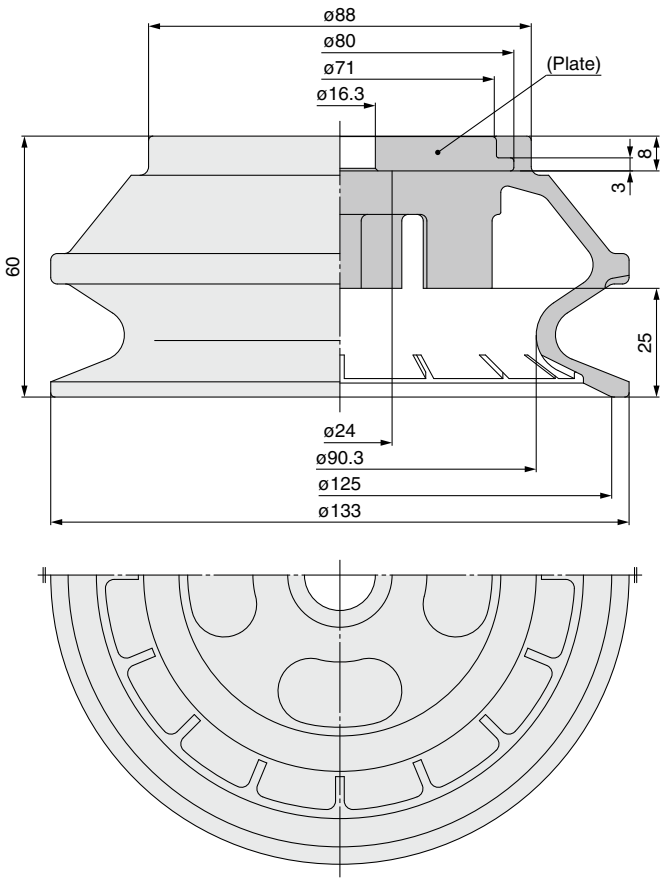
ZP3E-100BM□-★



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-100BM□	125	114	197
ZP3E-100BM□-P	186	175	258

ZP3E-125BM□-★



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-125BM□	235	216	372
ZP3E-125BM□-P	329	310	466

How to Order

Vertical vacuum inlet With adapter

ZP3E – T 32 UM N – A10

Vacuum inlet direction

Symbol	Direction
T	Vertical

Pad diameter

Symbol	Pad diameter
32	ø32
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

Pad form

Symbol	Form
UM	Flat type with groove
BM	Bellows type with groove

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
CL	Mark-free NBR

Mounting thread size

		Symbol	Mounting Thread size	ø32 to ø50	ø63 to ø125
Male thread	For direct mounting	**A10**	M10 x 1	●	—
		A16	M16 x 1.5	—	●
	For plate connection	**AL14***	M14 x 1	●	—
		AL16*	M16 x 1.5	—	●
Female thread		**B8**	M8 x 1.25	●	—
		B10	M10 x 1.5	●	—
		B12	M12 x 1.75	—	●
		B18	M18 x 1.5	—	●

* Male thread AL14/AL16 connection types have a vacuum exhaust (female thread) port separate from the mounting screw.

* Refer to pages 96 and 97 for replacement parts.

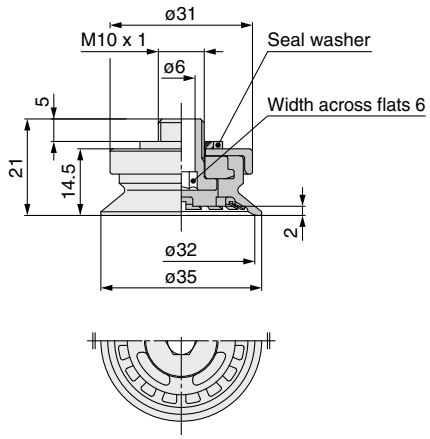
Dimensions/With Set Screw: Vacuum Inlet

Vertical

Pad diameter ø32 to ø50

Pad form Flat type with groove

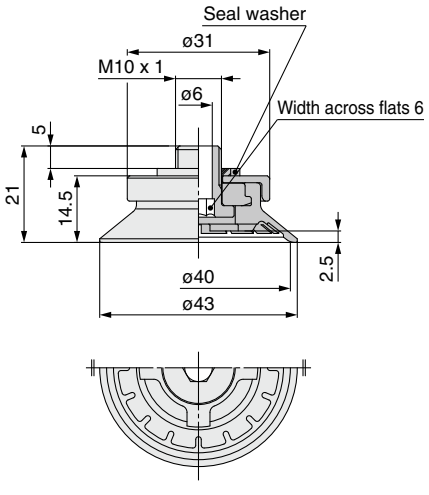
ZP3E-T32UM□-A10



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T32UM□-A10	22.1	21.8	24.6

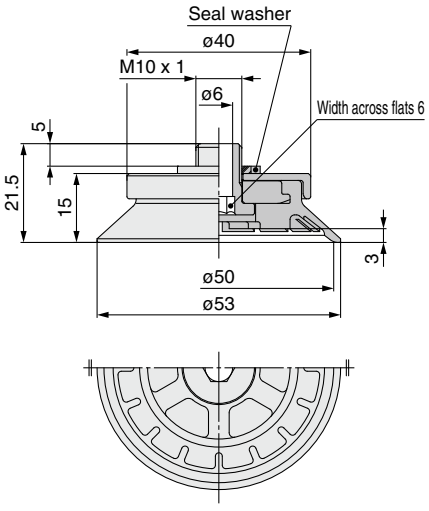
ZP3E-T40UM□-A10



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T40UM□-A10	23.2	22.7	26.2

ZP3E-T50UM□-A10



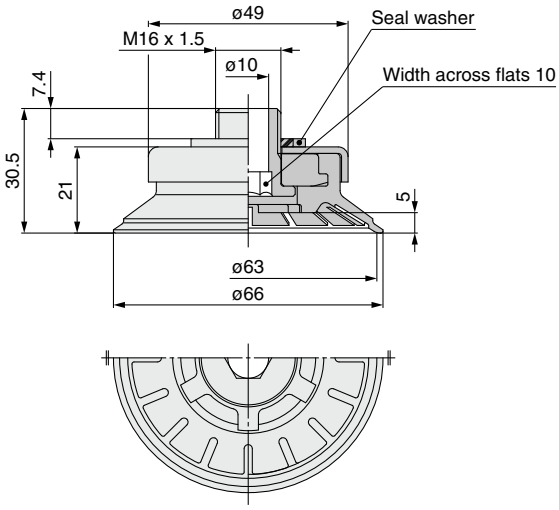
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T50UM□-A10	33.8	33.0	39.2

Dimensions/With Set Screw: Vacuum Inlet Vertical

Pad diameter ø63 to ø125
Pad form Flat type with groove

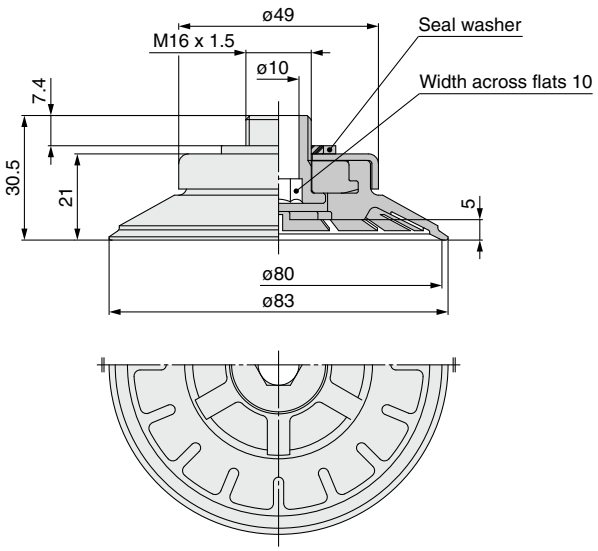
ZP3E-T63UM□-A16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T63UM□-A16	35.9	34.4	46.5

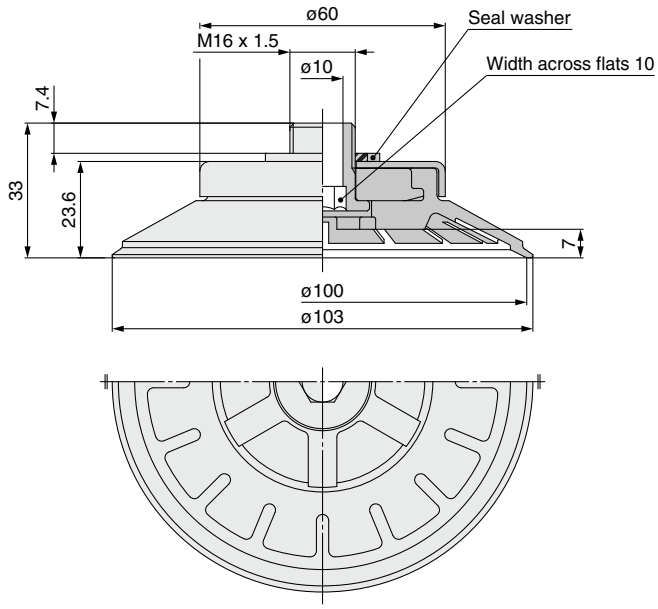
ZP3E-T80UM□-A16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T80UM□-A16	44.1	42.0	59.6

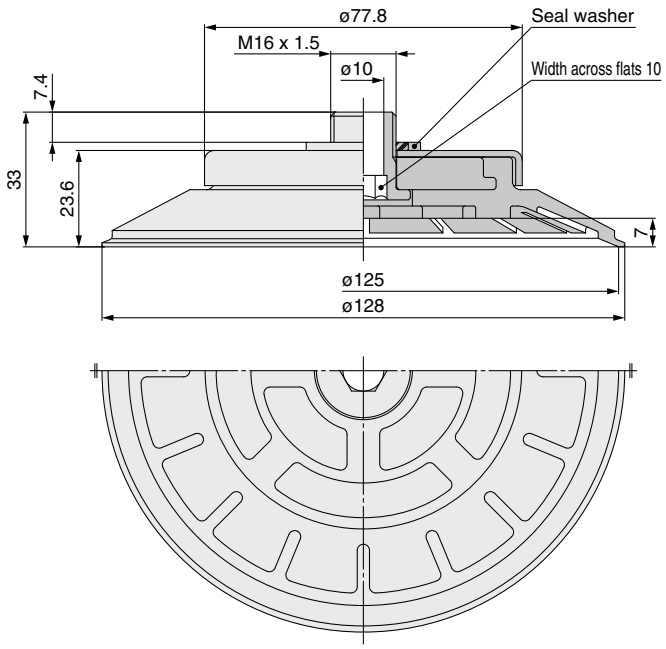
ZP3E-T100UM□-A16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T100UM□-A16	75.8	72.0	102

ZP3E-T125UM□-A16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T125UM□-A16	140	134	187

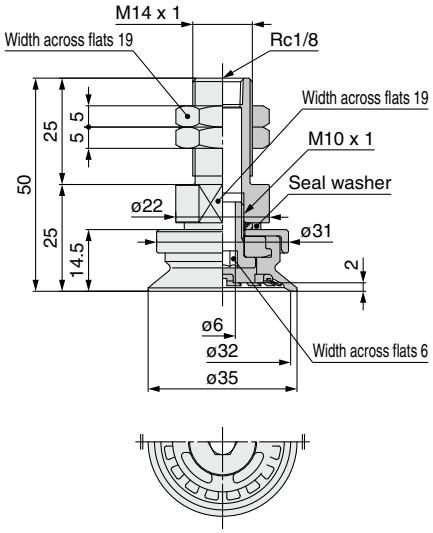
Dimensions/With Male Thread Adapter: Vacuum Inlet

Vertical

Pad diameter ø32 to ø80

Pad form Flat type with groove

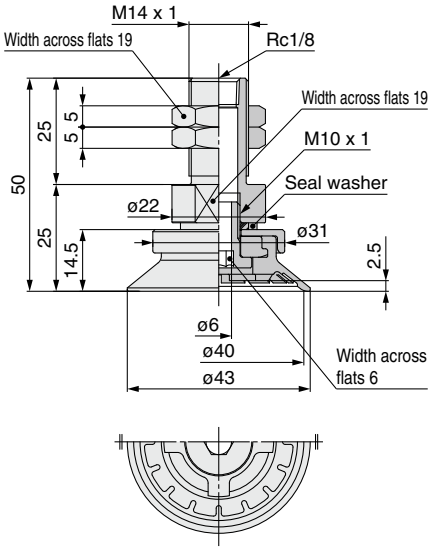
ZP3E-T32UM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T32UM□-AL14	49.1	48.8	51.6

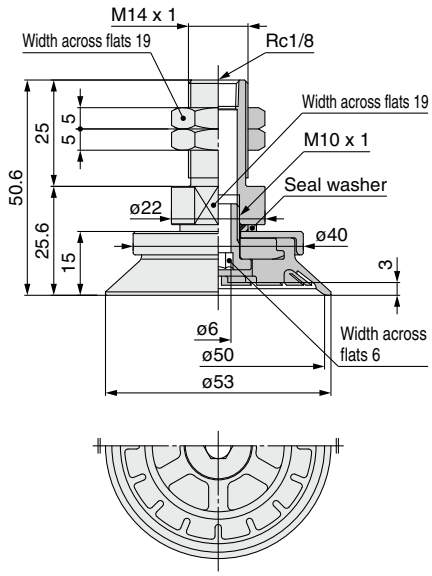
ZP3E-T40UM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T40UM□-AL14	50.2	49.7	53.2

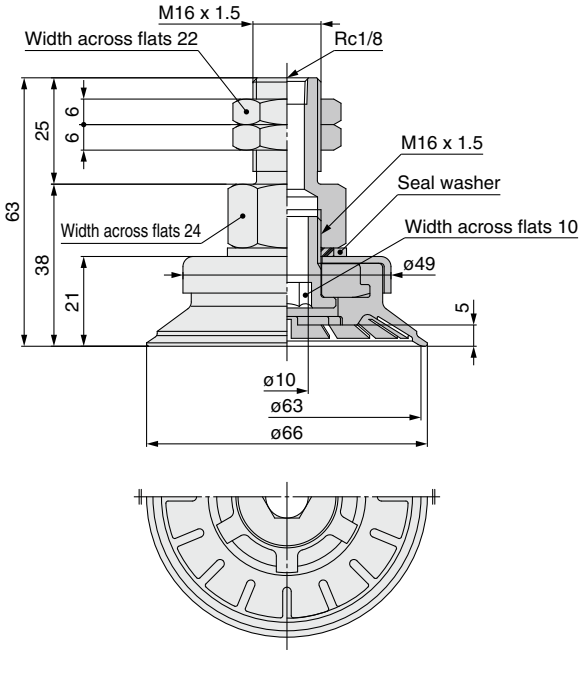
ZP3E-T50UM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T50UM□-AL14	60.8	60.0	66.2

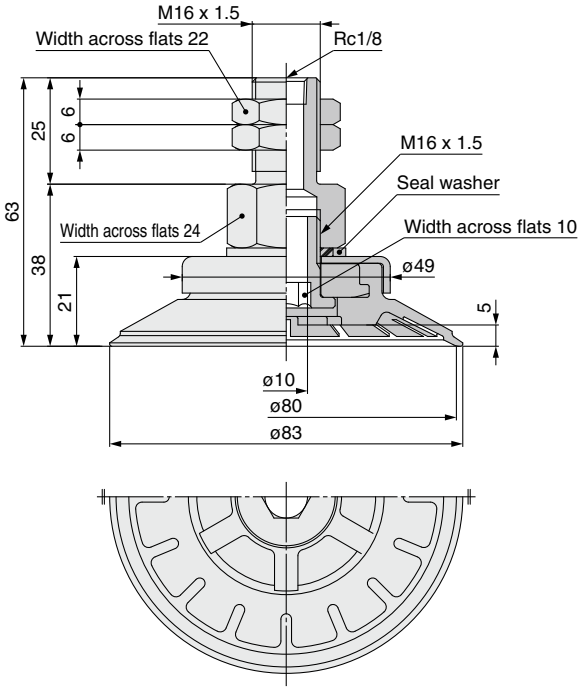
ZP3E-T63UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T63UM□-AL16	199	198	210

ZP3E-T80UM□-AL16



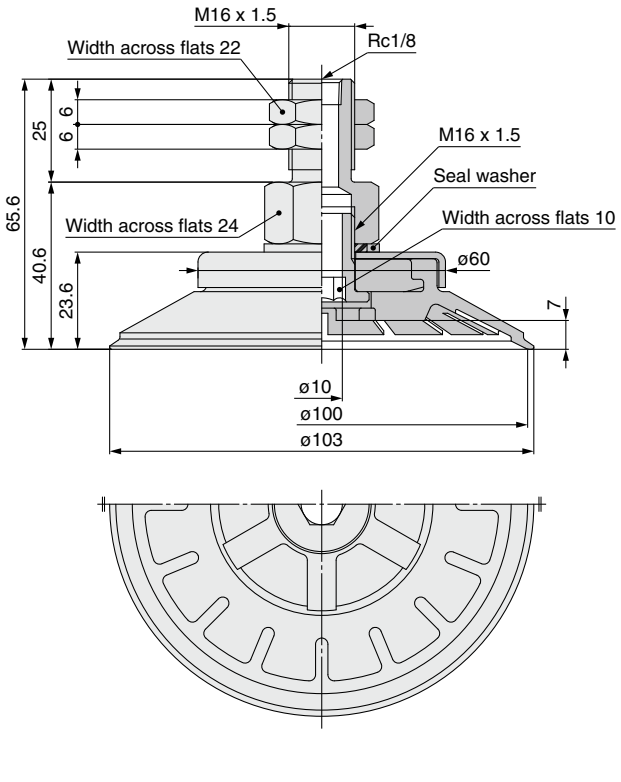
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T80UM□-AL16	208	206	223

Dimensions/With Male Thread Adapter: Vacuum Inlet Vertical

Pad diameter ø100, ø125
Pad form Flat type with groove

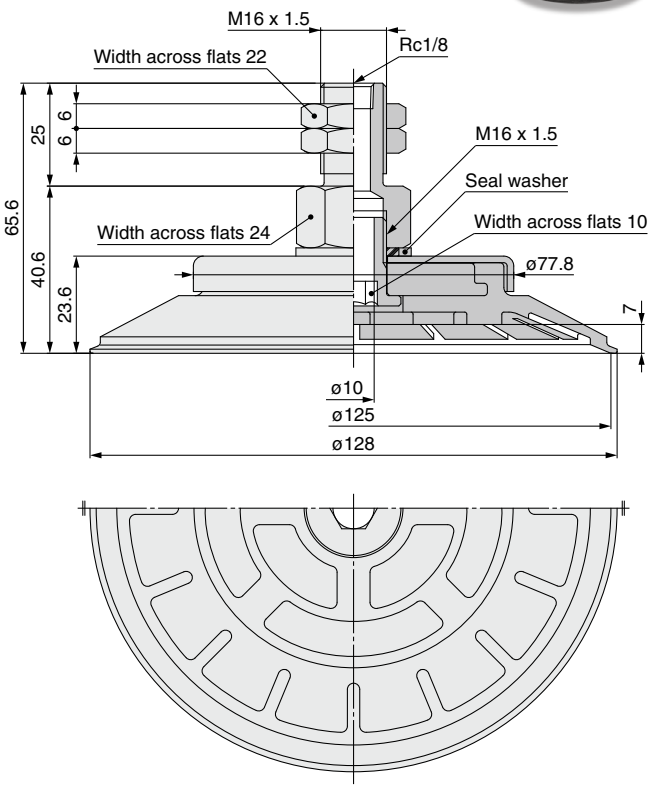
ZP3E-T100UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T100UM□-AL16	254	250	280

ZP3E-T125UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T125UM□-AL16	347	341	394

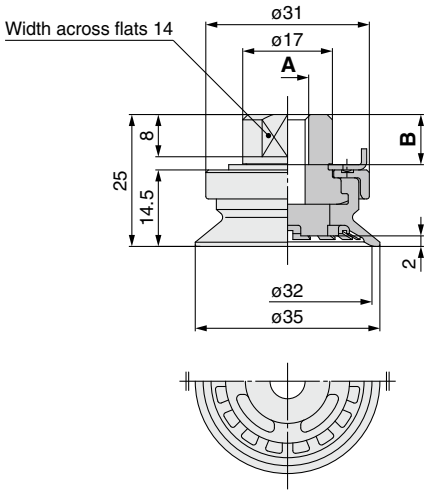
Dimensions/With Female Thread Adapter: Vacuum Inlet

Vertical

Pad diameter ø32 to ø80

Pad form Flat type with groove

ZP3E-T32UM□-B8
ZP3E-T32UM□-B10

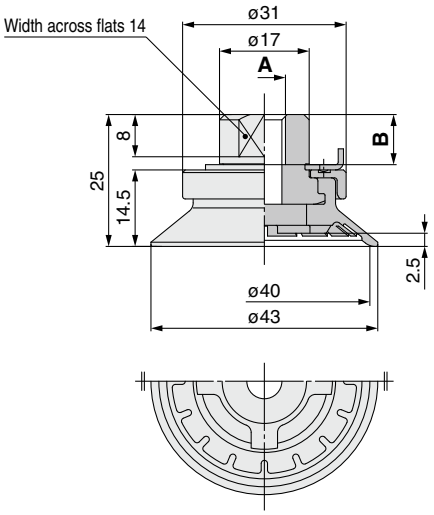


Dimensions

Model	A	B
ZP3E-T32UM□-B8	M8 x 1.25	9.5
ZP3E-T32UM□-B10	M10 x 1.5	13

Model	Weight [g]/Pad material		
	N/U/CL	**S**	**F**
ZP3E-T32UM□-B8	20.6	20.3	23.1
ZP3E-T32UM□-B10	19.2	18.9	21.7

ZP3E-T40UM□-B8
ZP3E-T40UM□-B10

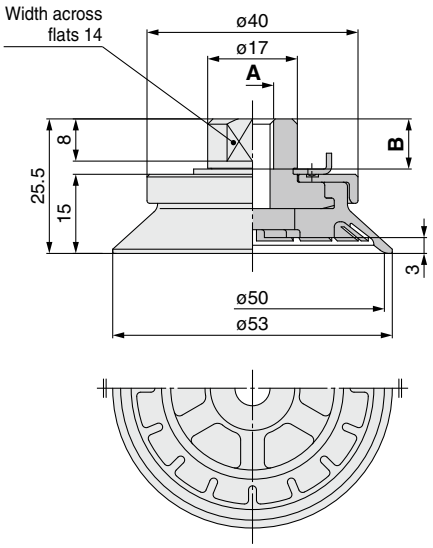


Dimensions

Model	A	B
ZP3E-T40UM□-B8	M8 x 1.25	9.5
ZP3E-T40UM□-B10	M10 x 1.5	13

Model	Weight [g]/Pad material		
	N/U/CL	**S**	**F**
ZP3E-T40UM□-B8	21.7	21.2	24.8
ZP3E-T40UM□-B10	20.3	19.8	23.4

ZP3E-T50UM□-B8
ZP3E-T50UM□-B10

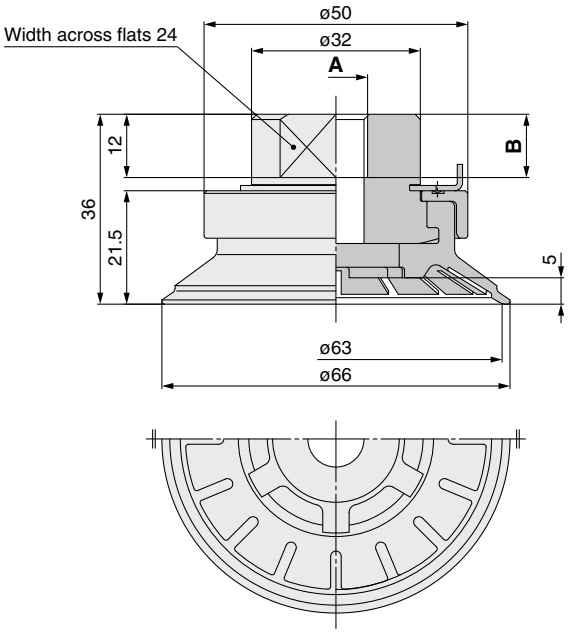


Dimensions

Model	A	B
ZP3E-T50UM□-B8	M8 x 1.25	9.5
ZP3E-T50UM□-B10	M10 x 1.5	13

Model	Weight [g]/Pad material		
	N/U/CL	**S**	**F**
ZP3E-T50UM□-B8	32.5	31.7	38.0
ZP3E-T50UM□-B10	31.1	30.3	36.6

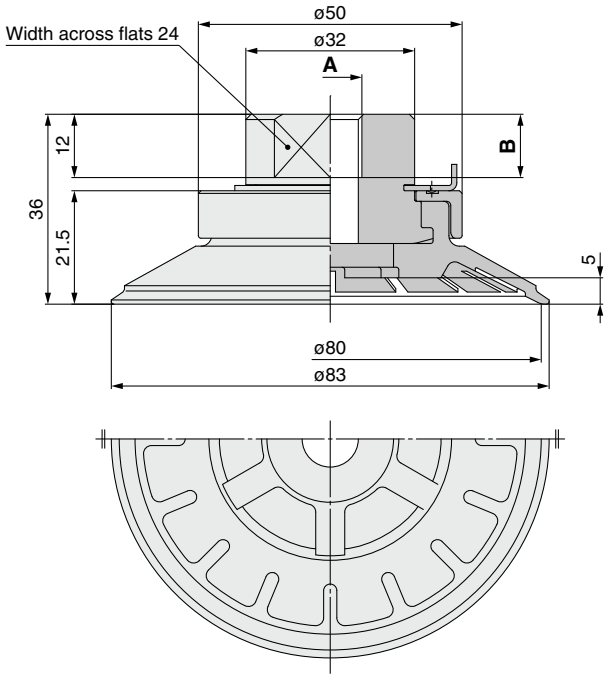
ZP3E-T63UM□-B12
ZP3E-T63UM□-B18



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	**S**	**F**
ZP3E-T63UM□-B12	M12 x 1.75	12	86.0	84.5	96.6
ZP3E-T63UM□-B18	M18 x 1.5	18	75.9	74.4	86.5

ZP3E-T80UM□-B12
ZP3E-T80UM□-B18



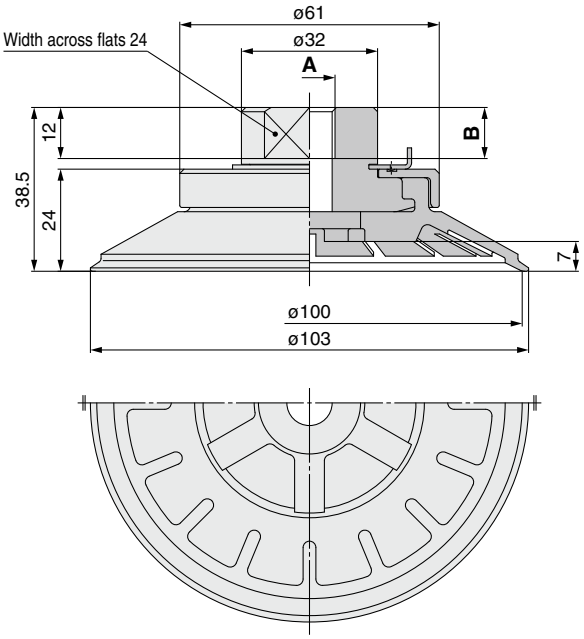
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	**S**	**F**
ZP3E-T80UM□-B12	M12 x 1.75	12	94.2	92.1	110
ZP3E-T80UM□-B18	M18 x 1.5	18	84.1	82.0	99.6

Dimensions/With Female Thread Adapter: Vacuum Inlet Vertical

Pad diameter ø100, ø125
Pad form Flat type with groove

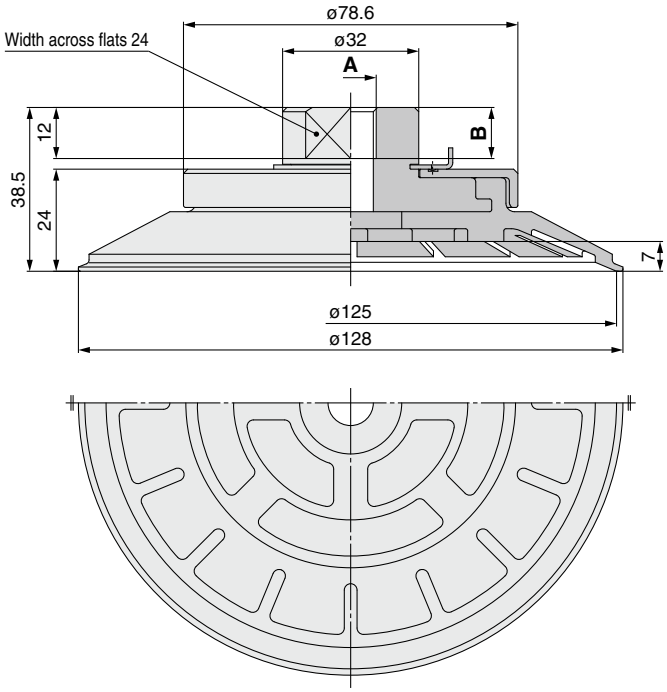
ZP3E-T100UM□-B12
ZP3E-T100UM□-B18



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T100UM□-B12	M12 x 1.75	12	132	128	158
ZP3E-T100UM□-B18	M18 x 1.5	18	122	118	148

ZP3E-T125UM□-B12
ZP3E-T125UM□-B18



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T125UM□-B12	M12 x 1.75	12	210	203	256
ZP3E-T125UM□-B18	M18 x 1.5	18	200	193	246

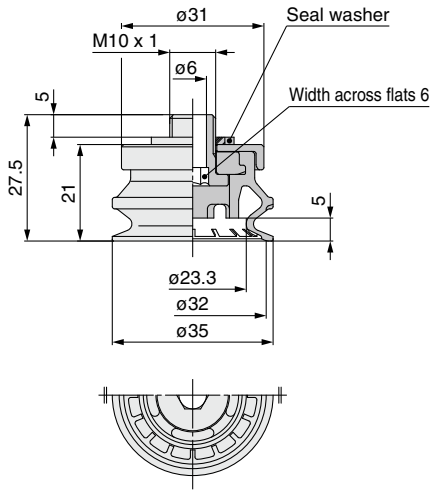
Dimensions/With Set Screw: Vacuum Inlet

Vertical

Pad diameter ø32 to ø80

Pad form Bellows type with groove

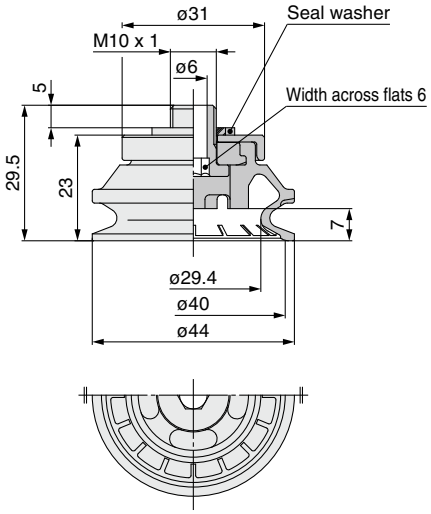
ZP3E-T32BM□-A10



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T32BM□-A10	24.1	23.6	27.7

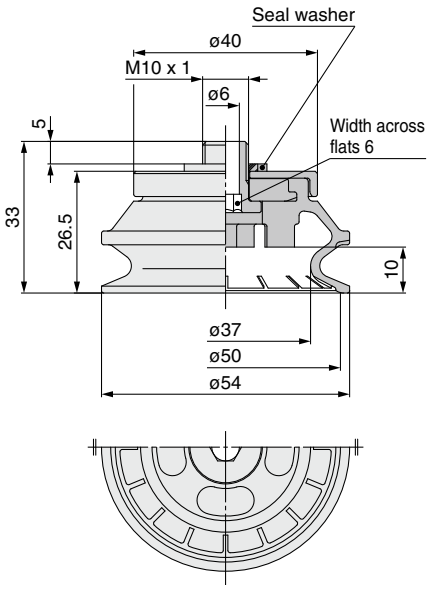
ZP3E-T40BM□-A10



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T40BM□-A10	28.1	27.2	34.1

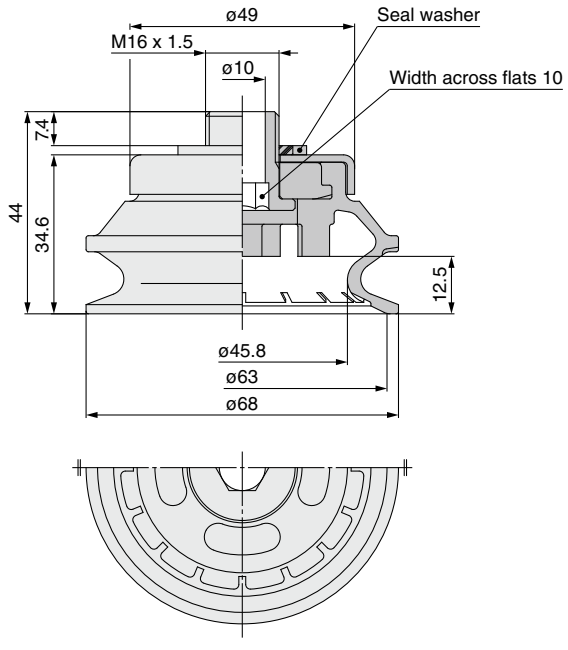
ZP3E-T50BM□-A10



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T50BM□-A10	42.2	40.7	52.7

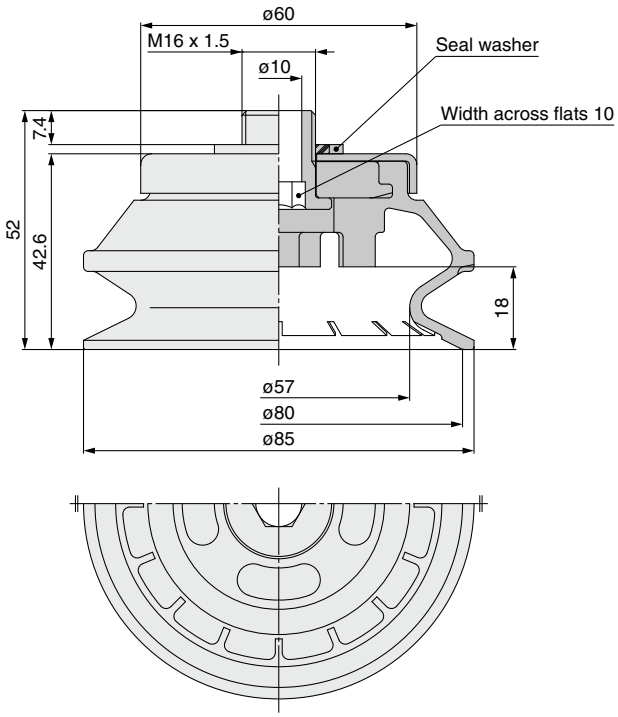
ZP3E-T63BM□-A16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T63BM□-A16	116	113	137

ZP3E-T80BM□-A16



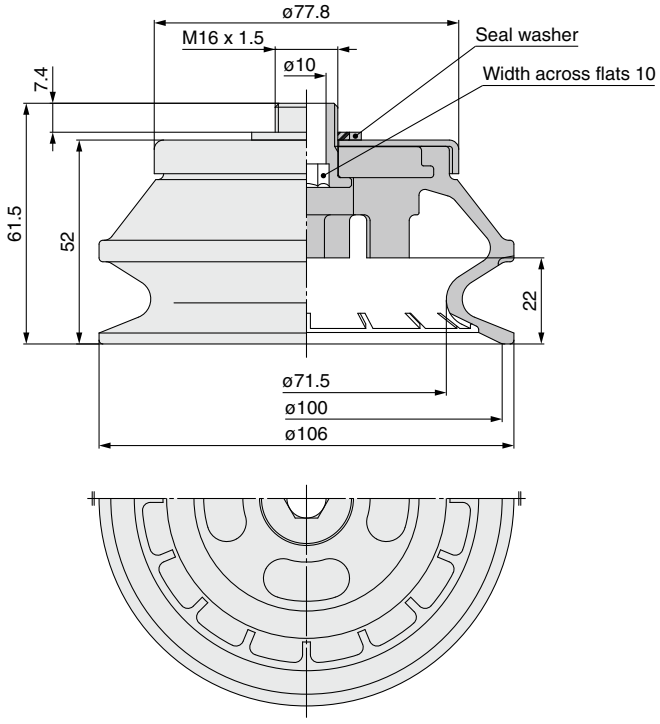
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T80BM□-A16	170	165	205

Dimensions/With Set Screw: Vacuum Inlet Vertical

Pad diameter ø100, ø125
Pad form Bellows type with groove

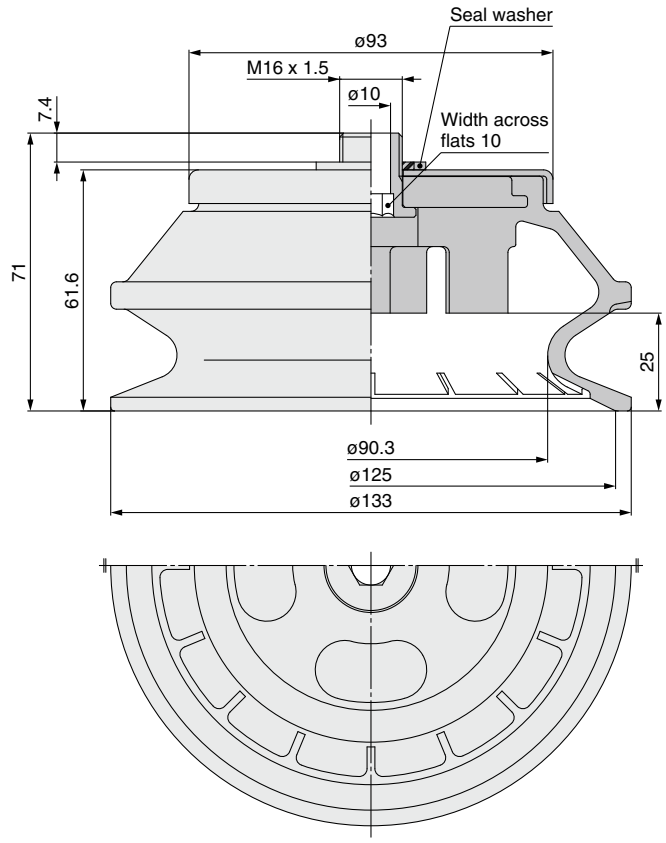
ZP3E-T100BM□-A16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T100BM□-A16	293	282	365

ZP3E-T125BM□-A16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T125BM□-A16	466	447	603

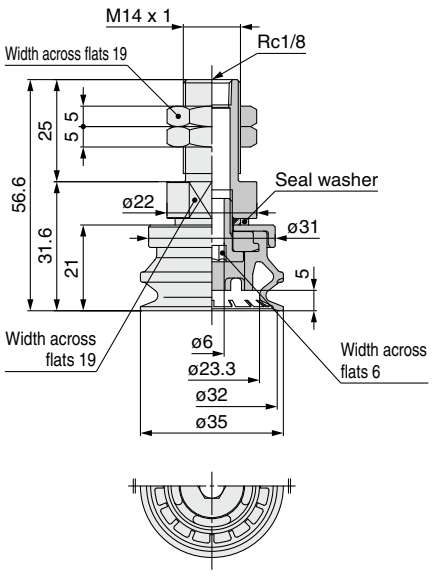
Dimensions/With Male Thread Adapter: Vacuum Inlet

Vertical

Pad diameter ø32 to ø80

Pad form Bellows type with groove

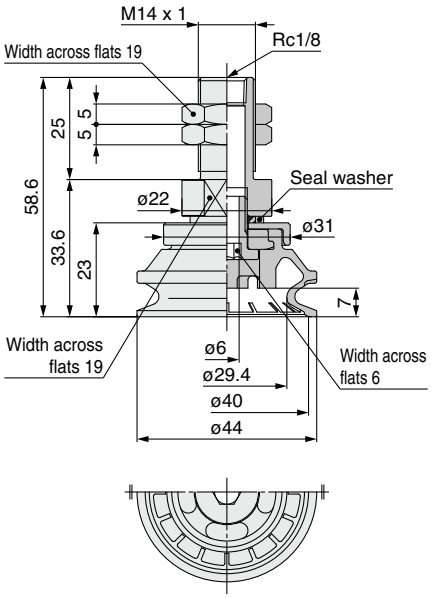
ZP3E-T32BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T32BM□-AL14	51.1	50.6	54.7

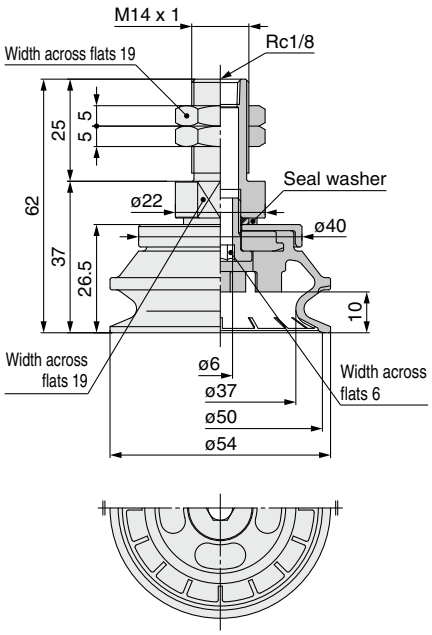
ZP3E-T40BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T40BM□-AL14	55.1	54.2	61.1

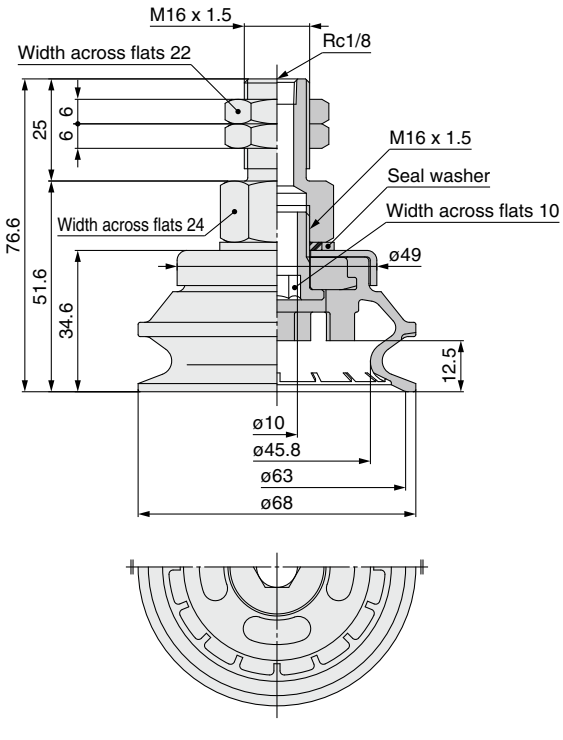
ZP3E-T50BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T50BM□-AL14	69.2	67.7	79.7

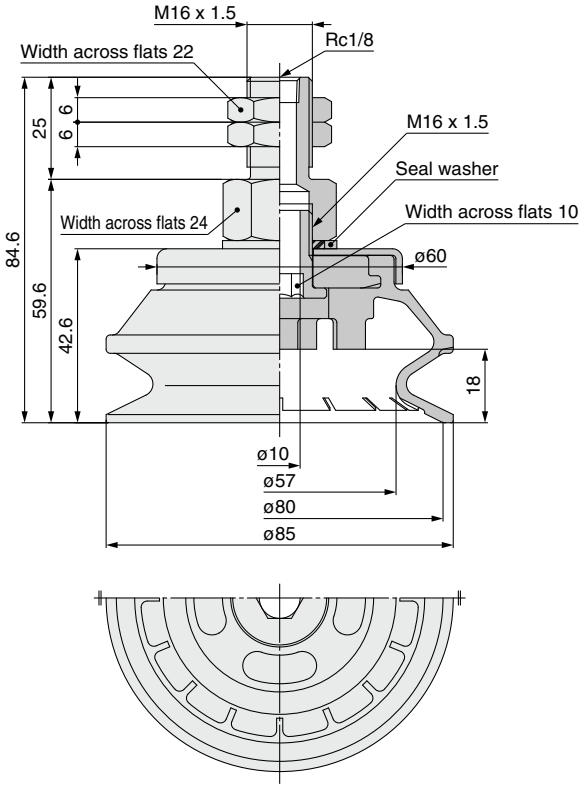
ZP3E-T63BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T63BM□-AL16	216	213	236

ZP3E-T80BM□-AL16



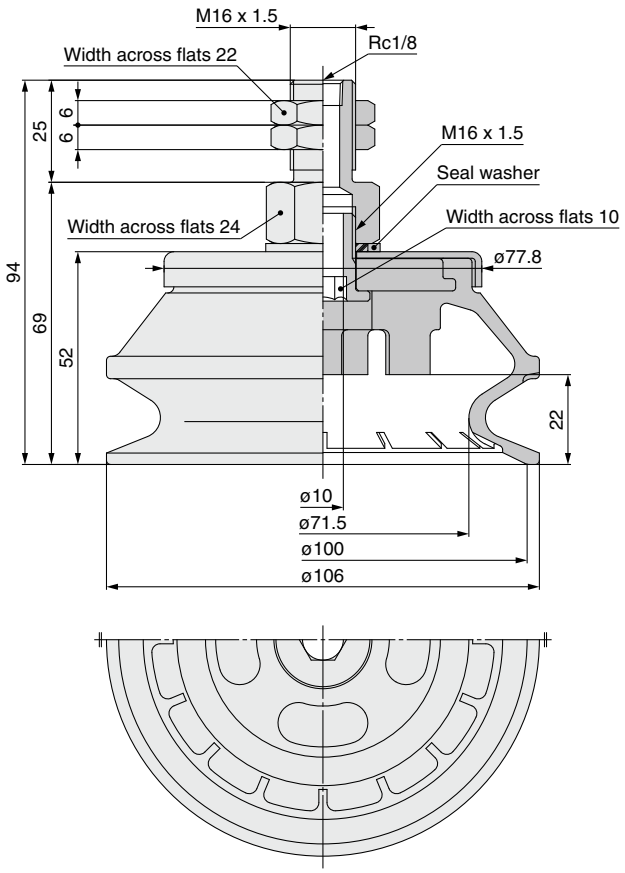
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T80BM□-AL16	270	265	305

Dimensions/With Male Thread Adapter: Vacuum Inlet Vertical

Pad diameter ø100, ø125
Pad form Bellows type with groove

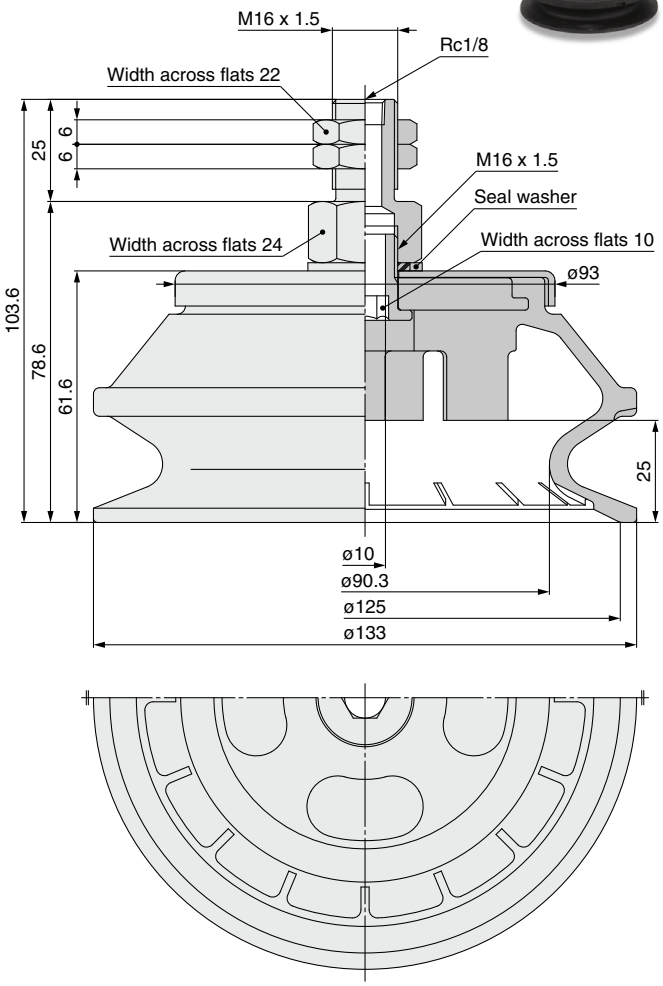
ZP3E-T100BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T100BM□-AL16	393	382	465

ZP3E-T125BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-T125BM□-AL16	565	546	702

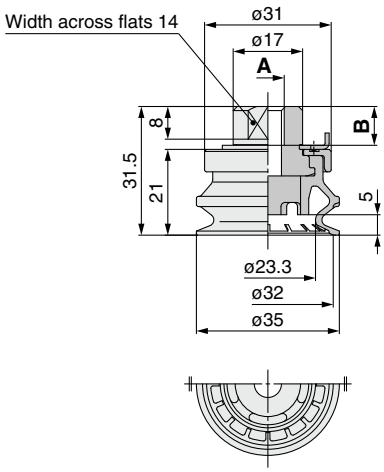
Dimensions/With Female Thread Adapter: Vacuum Inlet

Vertical

Pad diameter ø32 to ø80

Pad form Bellows type with groove

ZP3E-T32BM□-B8
ZP3E-T32BM□-B10

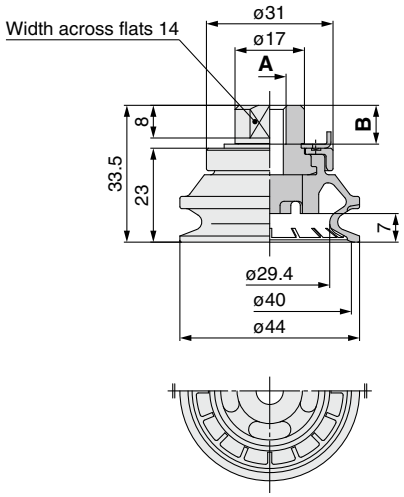


Dimensions

Model	A	B
ZP3E-T32BM□-B8	M8 x 1.25	9.5
ZP3E-T32BM□-B10	M10 x 1.5	13

Model	Weight [g]/Pad material		
	N/U/CL	S	F
ZP3E-T32BM□-B8	22.6	22.1	26.3
ZP3E-T32BM□-B10	21.2	20.7	24.9

ZP3E-T40BM□-B8
ZP3E-T40BM□-B10

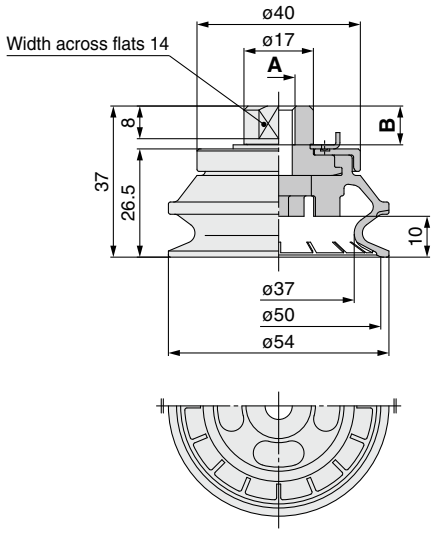


Dimensions

Model	A	B
ZP3E-T40BM□-B8	M8 x 1.25	9.5
ZP3E-T40BM□-B10	M10 x 1.5	13

Model	Weight [g]/Pad material		
	N/U/CL	S	F
ZP3E-T40BM□-B8	26.6	25.7	32.6
ZP3E-T40BM□-B10	25.2	24.3	31.2

ZP3E-T50BM□-B8
ZP3E-T50BM□-B10

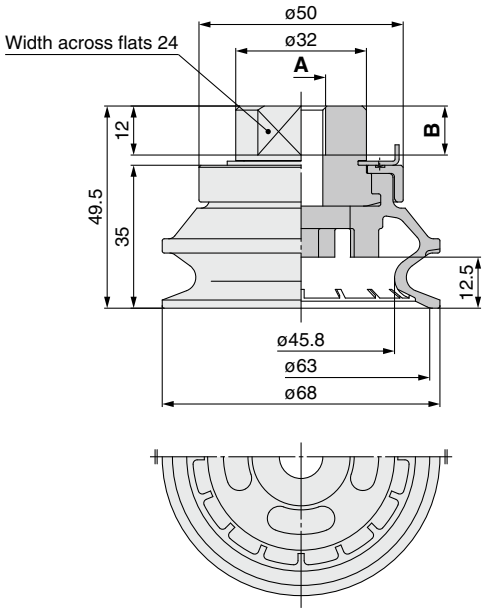


Dimensions

Model	A	B
ZP3E-T50BM□-B8	M8 x 1.25	9.5
ZP3E-T50BM□-B10	M10 x 1.5	13

Model	Weight [g]/Pad material		
	N/U/CL	S	F
ZP3E-T50BM□-B8	41.0	39.5	51.5
ZP3E-T50BM□-B10	39.6	38.1	50.1

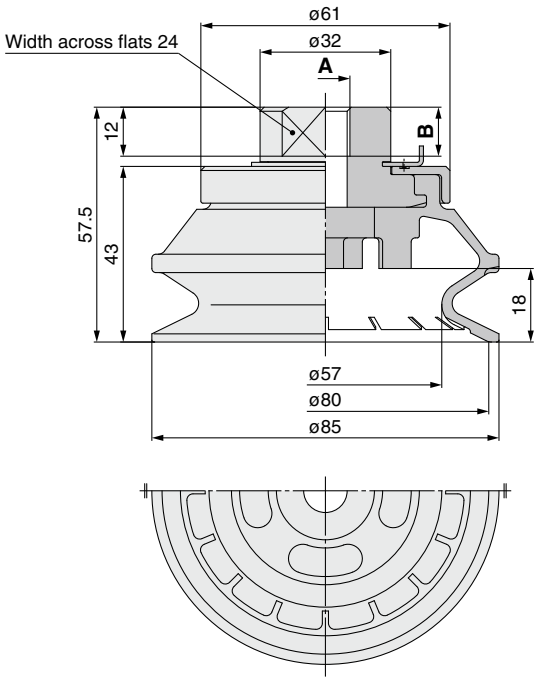
ZP3E-T63BM□-B12
ZP3E-T63BM□-B18



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T63BM□-B12	M12 x 1.75	12	103	100	123
ZP3E-T63BM□-B18	M18 x 1.5	18	92.5	89.6	113

ZP3E-T80BM□-B12
ZP3E-T80BM□-B18



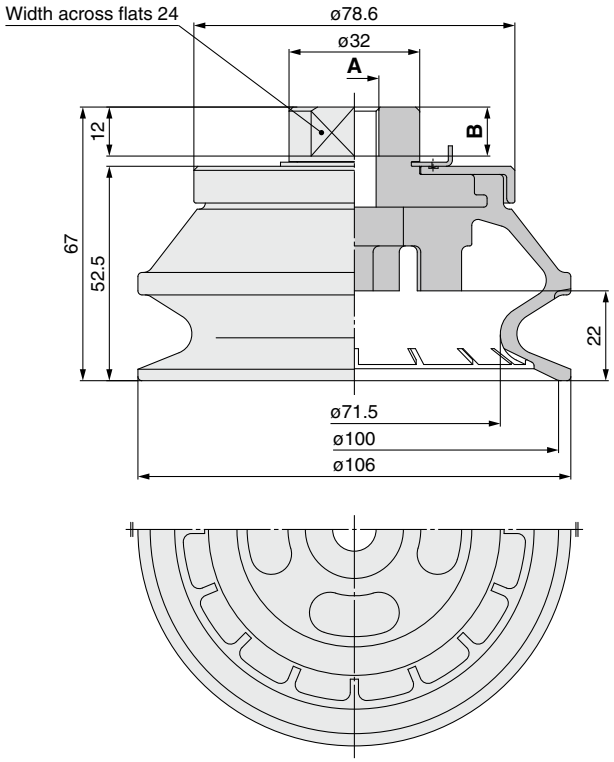
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T80BM□-B12	M12 x 1.75	12	148	143	183
ZP3E-T80BM□-B18	M18 x 1.5	18	138	133	173

Pad diameter ø100, ø125
Pad form Bellows type with groove

Dimensions/With Female Thread Adapter: Vacuum Inlet Vertical

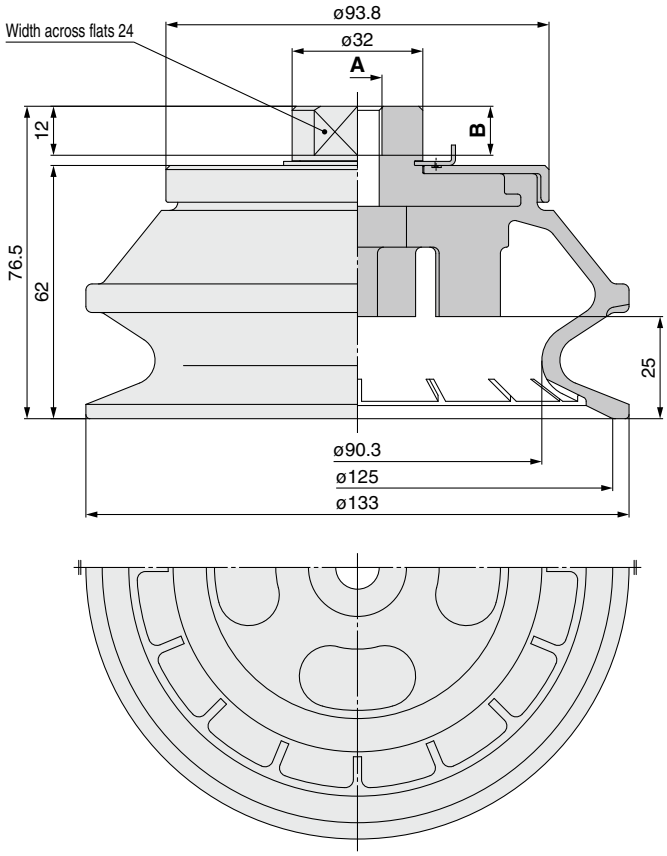
ZP3E-T100BM□-B12
ZP3E-T100BM□-B18



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T100BM□-B12	M12 x 1.75	12	255	244	327
ZP3E-T100BM□-B18	M18 x 1.5	18	245	234	317

ZP3E-T125BM□-B12
ZP3E-T125BM□-B18



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T125BM□-B12	M12 x 1.75	12	412	393	549
ZP3E-T125BM□-B18	M18 x 1.5	18	402	383	539

How to Order

Lateral vacuum inlet With adapter

ZP3E − Y 32 UM N − AL14

Vacuum inlet direction

Symbol	Direction
Y	Lateral

Pad diameter

Symbol	Pad diameter
32	ø32
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

Pad form

Symbol	Form
UM	Flat type with groove
BM	Bellows type with groove

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
CL	Mark-free NBR

Mounting thread size

	Symbol	Mounting Thread size	ø32 to ø50	ø63 to ø125
Male thread	**AL14**	M14 x 1.5	●	—
	AL16	M16 x 1.5	—	●
Female thread	**B8**	M8 x 1.25	●	—
	B12	M12 x 1.75	—	●

∗ Male thread AL14/AL16 connection types have a vacuum exhaust (female thread) port separate from the mounting screw.

∗ Refer to page 98 for replacement parts.

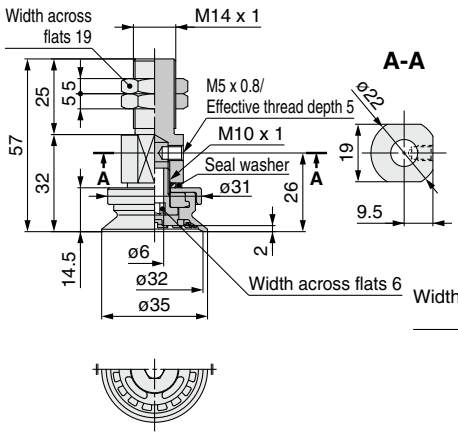
Dimensions/With Male Thread Adapter: Vacuum Inlet

Lateral

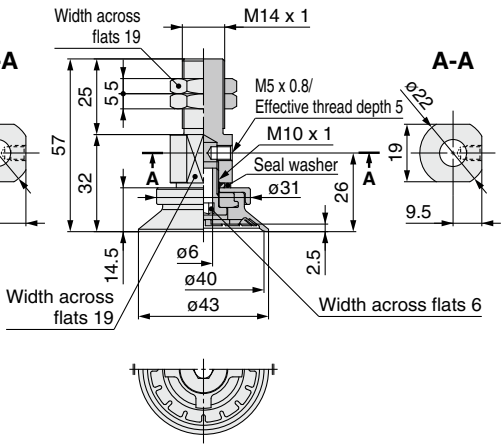
Pad diameter ø32 to ø50

Pad form Flat type with groove

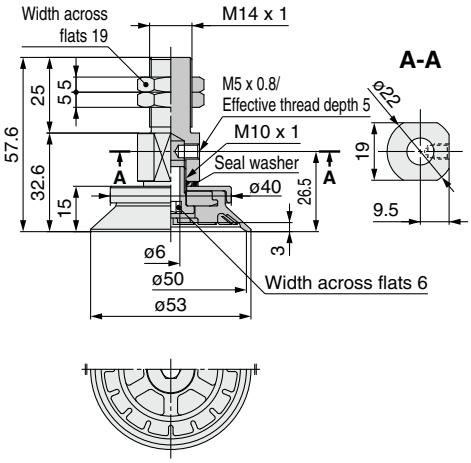
ZP3E-Y32UM□-AL14



ZP3E-Y40UM□-AL14



ZP3E-Y50UM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y32UM□-AL14	58.4	58.1	60.9

Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y40UM□-AL14	59.5	59.0	62.5

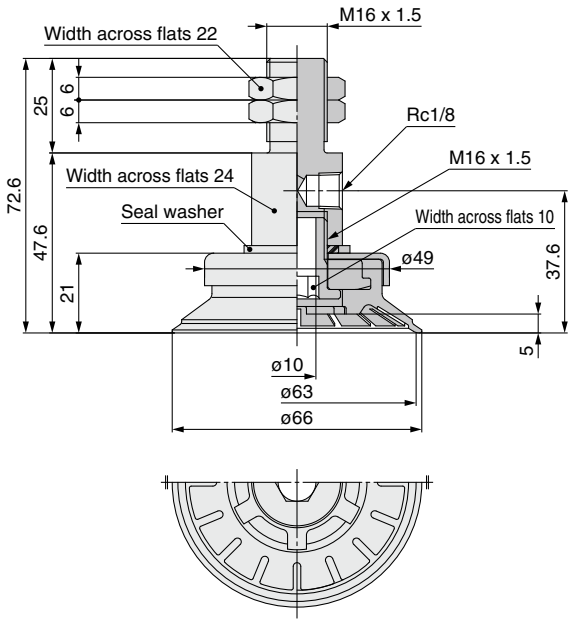
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y50UM□-AL14	70.1	69.3	75.5

Pad diameter ø63 to ø125
Pad form Flat type with groove

Dimensions/With Male Thread Adapter: Vacuum Inlet Lateral

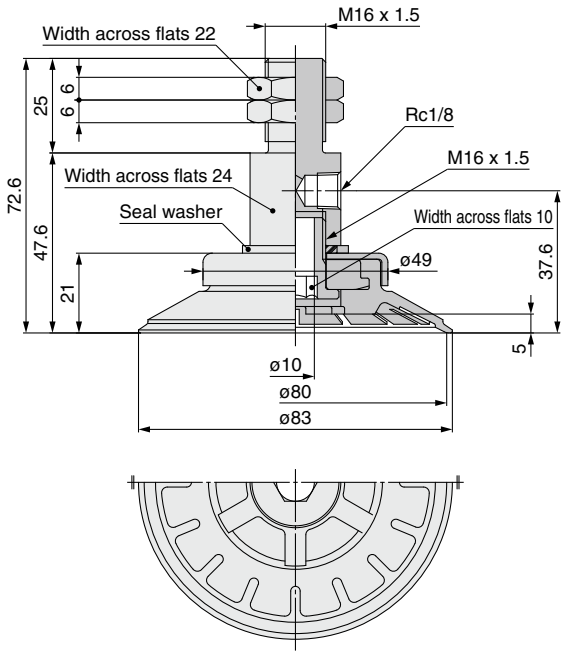
ZP3E-Y63UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y63UM□-AL16	216	215	227

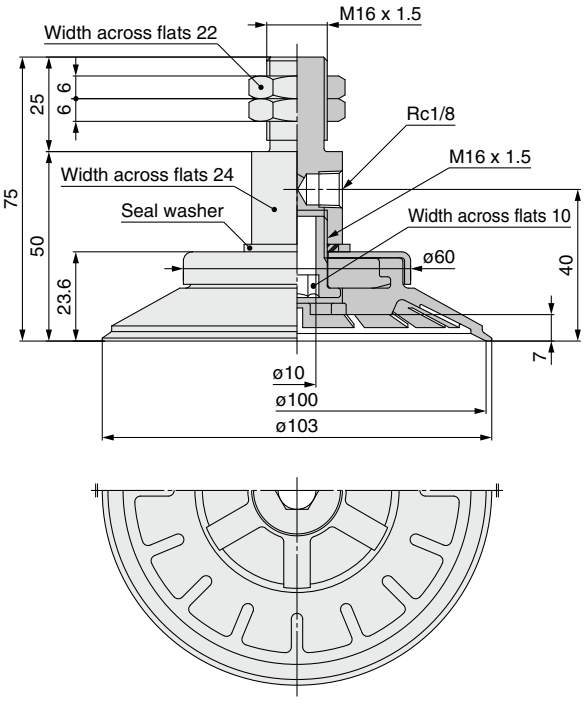
ZP3E-Y80UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y80UM□-AL16	224	222	240

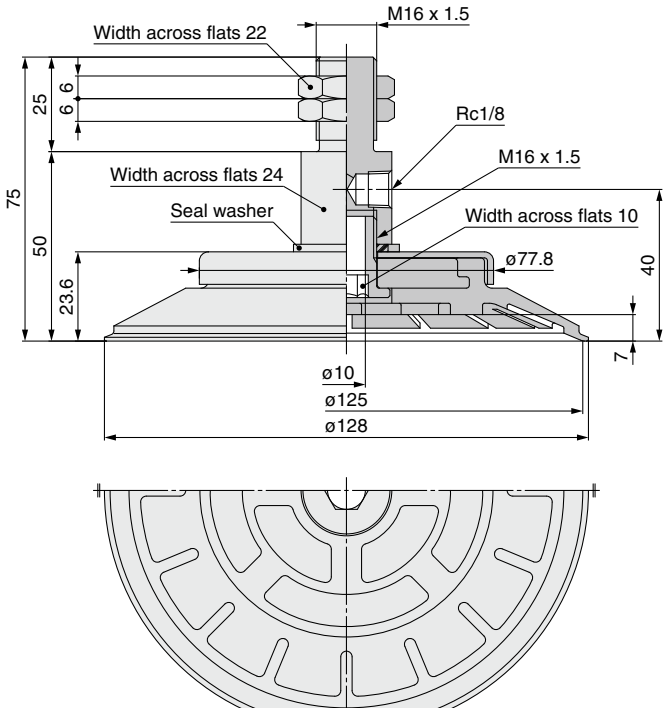
ZP3E-Y100UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y100UM□-AL16	271	267	297

ZP3E-Y125UM□-AL16



Weights [g]

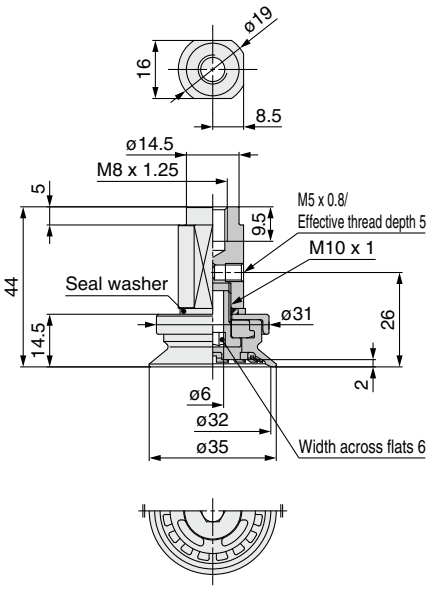
Model \ Pad material	N/U/CL	S	F
ZP3E-Y125UM□-AL16	364	357	411

Dimensions/With Female Thread Adapter: Vacuum Inlet

Lateral

Pad diameter ø32 to ø80
Pad form Flat type with groove

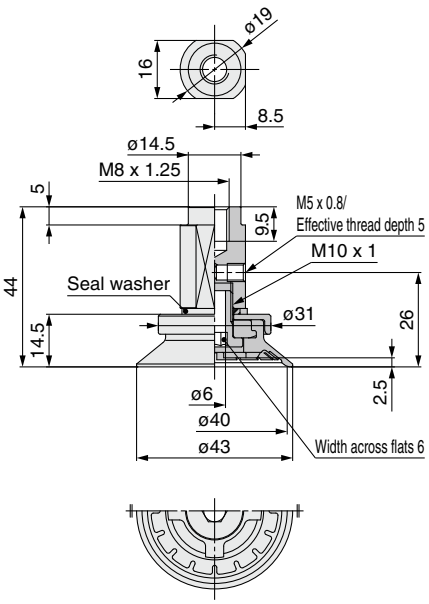
ZP3E-Y32UM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y32UM□-B8	36.8	36.5	39.3

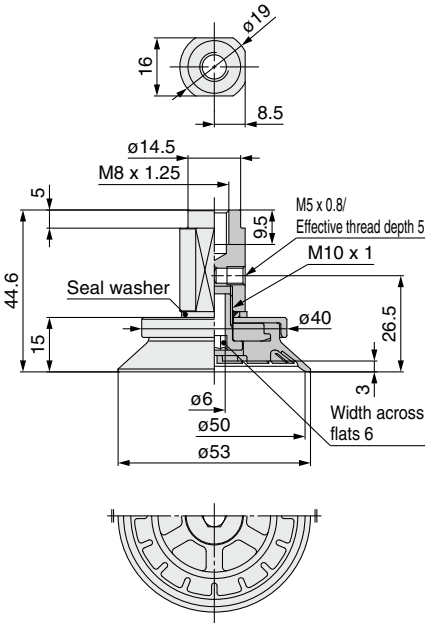
ZP3E-Y40UM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y40UM□-B8	37.9	37.4	40.9

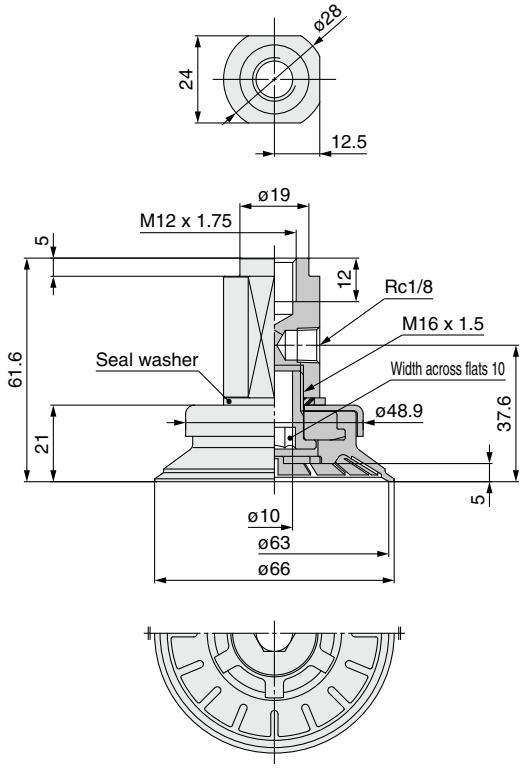
ZP3E-Y50UM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y50UM□-B8	48.5	47.7	53.9

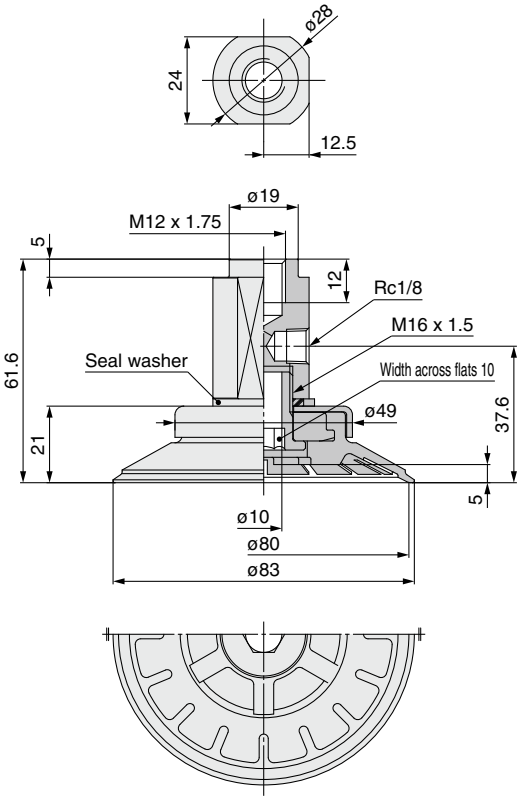
ZP3E-Y63UM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y63UM□-B12	142	140	153

ZP3E-Y80UM□-B12



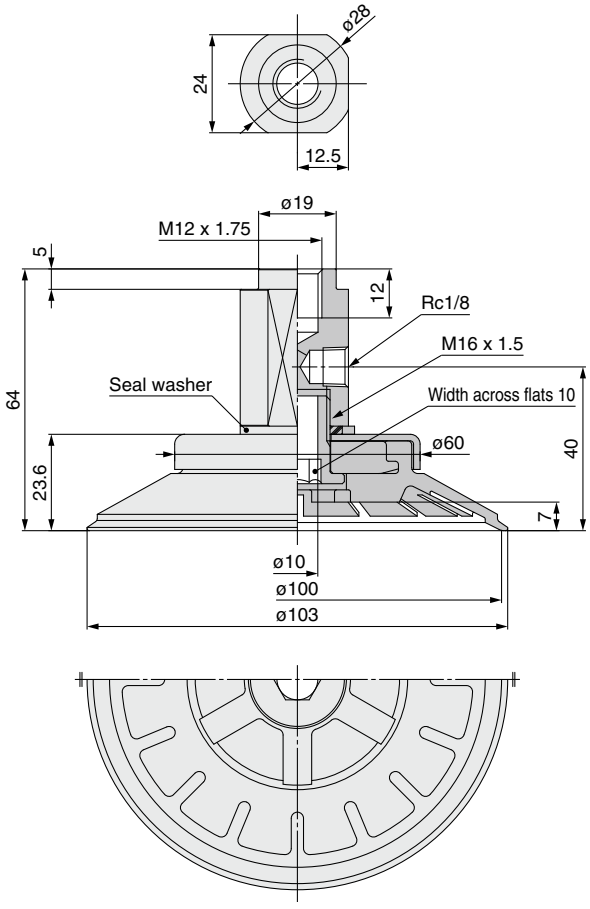
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y80UM□-B12	150	148	166

Pad diameter ø100, ø125
Pad form Flat type with groove

Dimensions/With Female Thread Adapter: Vacuum Inlet Lateral

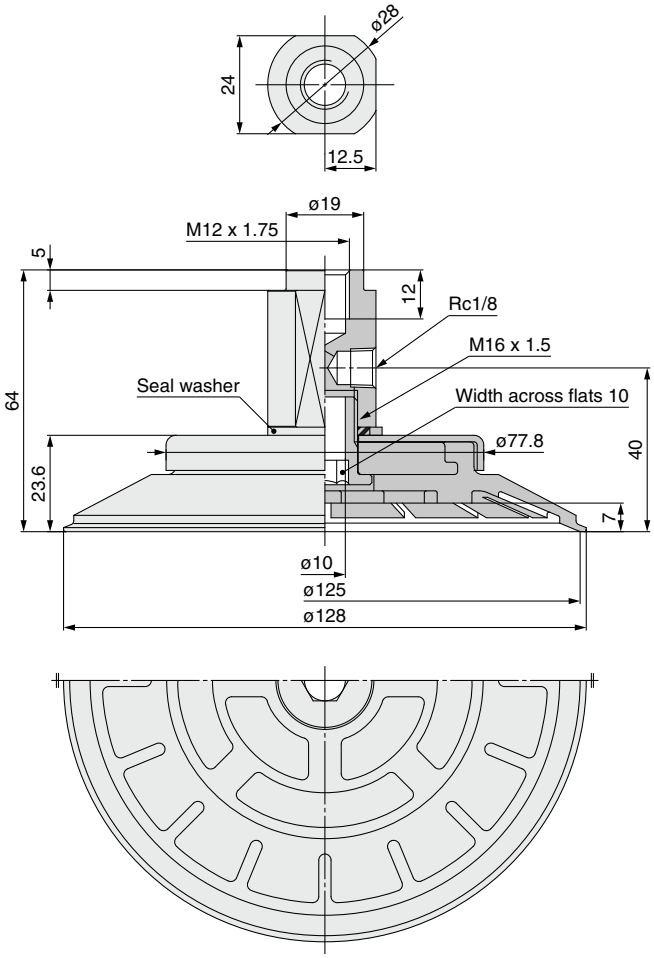
ZP3E-Y100UM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y100UM□-B12	271	267	297

ZP3E-Y125UM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y125UM□-B12	364	357	411

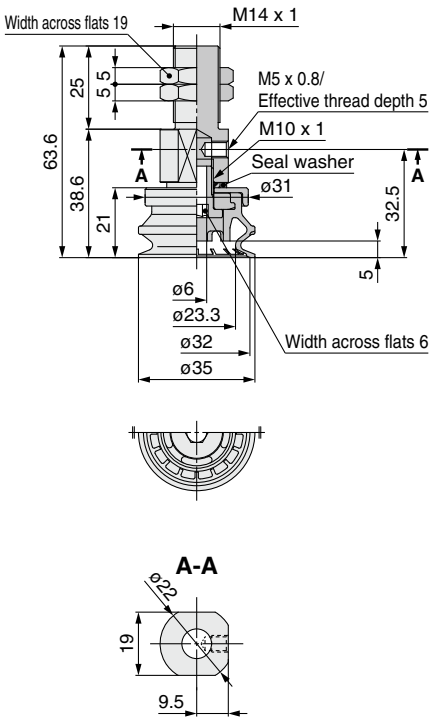
Dimensions/With Male Thread Adapter: Vacuum Inlet

Lateral

Pad diameter ø32 to ø80

Pad form Bellows type with groove

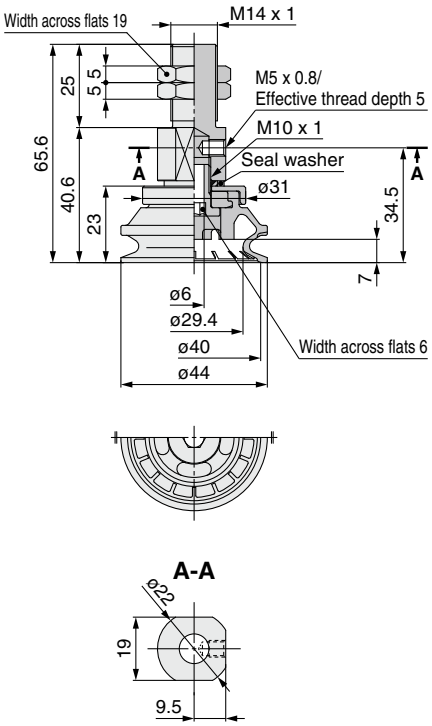
ZP3E-Y32BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y32BM□-AL14	60.4	59.9	64.0

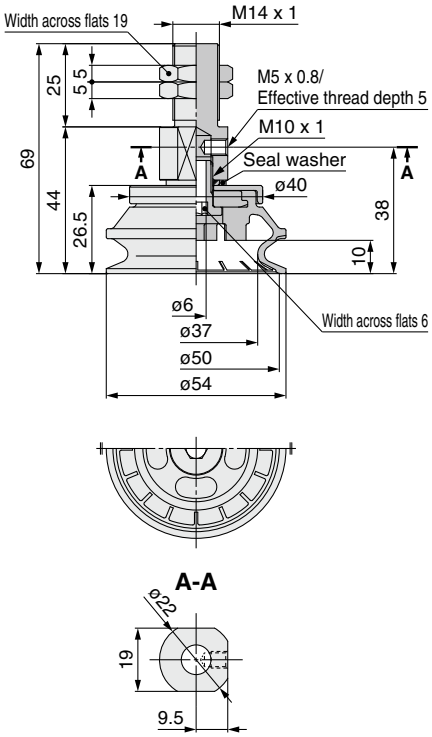
ZP3E-Y40BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y40BM□-AL14	64.4	63.5	70.4

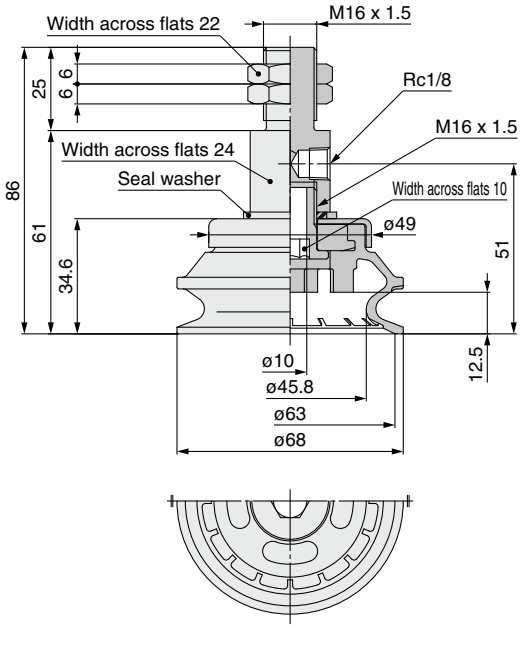
ZP3E-Y50BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y50BM□-AL14	78.5	77.0	89.0

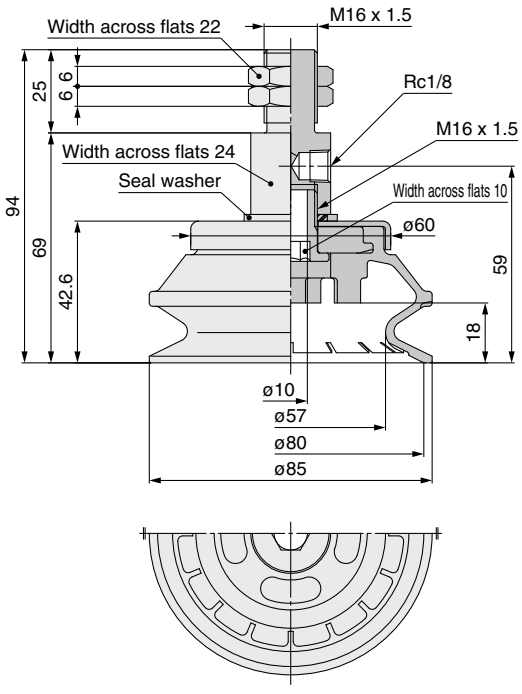
ZP3E-Y63BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y63BM□-AL16	233	230	253

ZP3E-Y80BM□-AL16



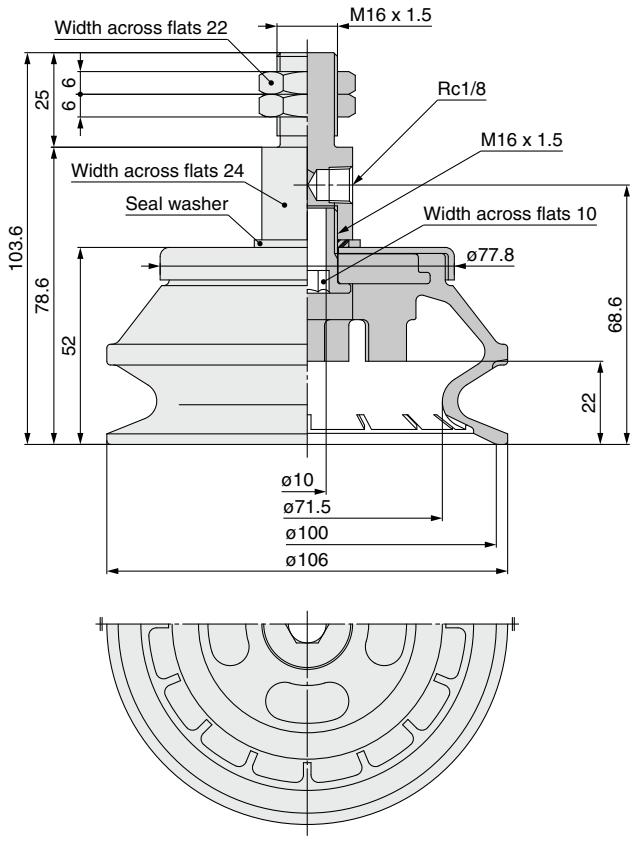
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y80BM□-AL16	286	281	322

Dimensions/With Male Thread Adapter: Vacuum Inlet Lateral

Pad diameter ø100, ø125
Pad form Bellows type with groove

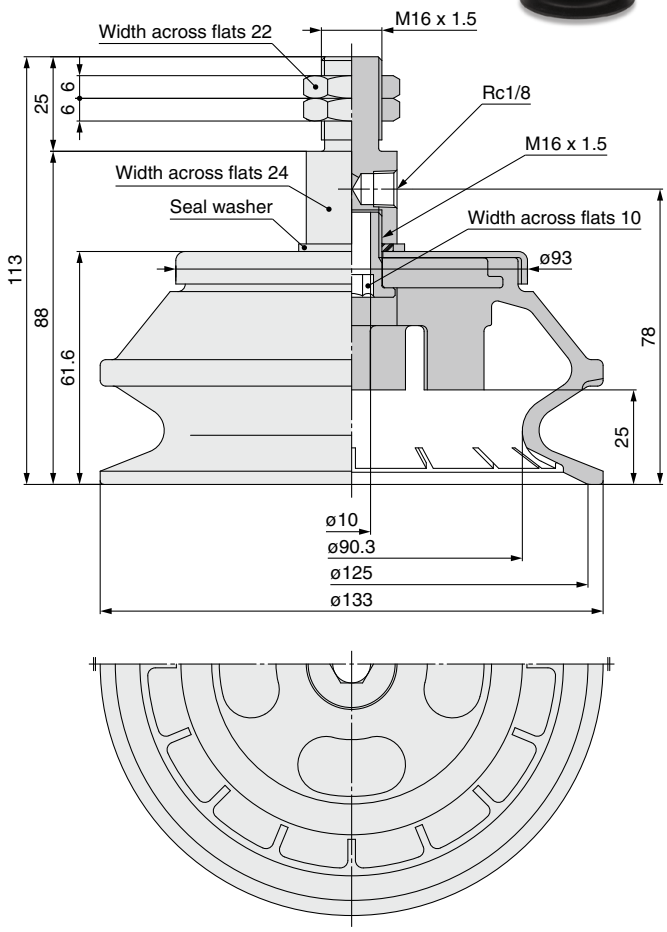
ZP3E-Y100BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y100BM□-AL16	410	399	482

ZP3E-Y125BM□-AL16



Weights [g]

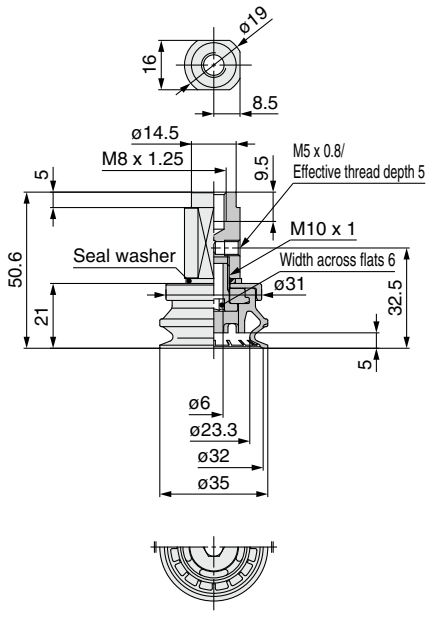
Model \ Pad material	N/U/CL	S	F
ZP3E-Y125BM□-AL16	582	563	719

Dimensions/With Female Thread Adapter: Vacuum Inlet

Lateral

Pad diameter ø32 to ø80
Pad form Bellows type with groove

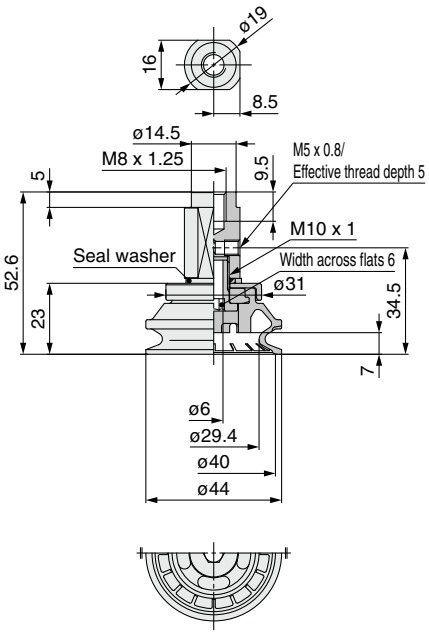
ZP3E-Y32BM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y32BM□-AL14	38.8	38.3	42.4

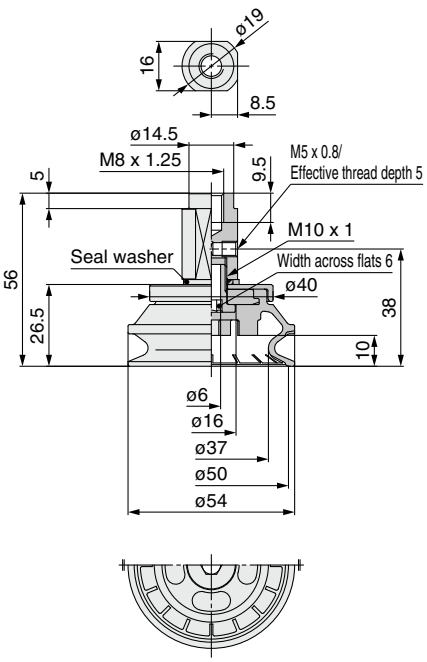
ZP3E-Y40BM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y40BM□-AL14	42.8	41.9	48.8

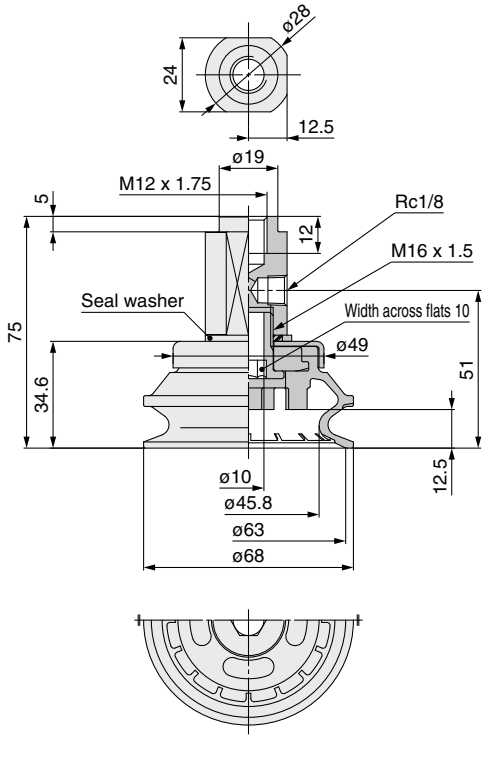
ZP3E-Y50BM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y50BM□-AL14	56.9	55.4	67.4

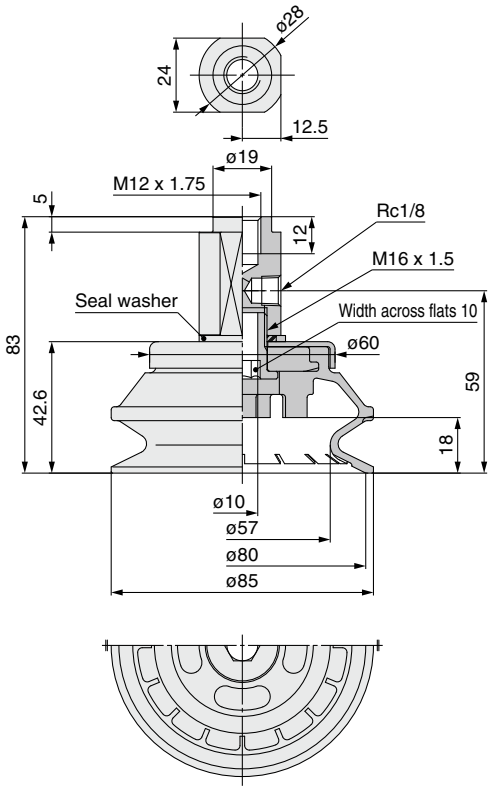
ZP3E-Y63BM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y63BM□-AL16	159	156	179

ZP3E-Y80BM□-B12



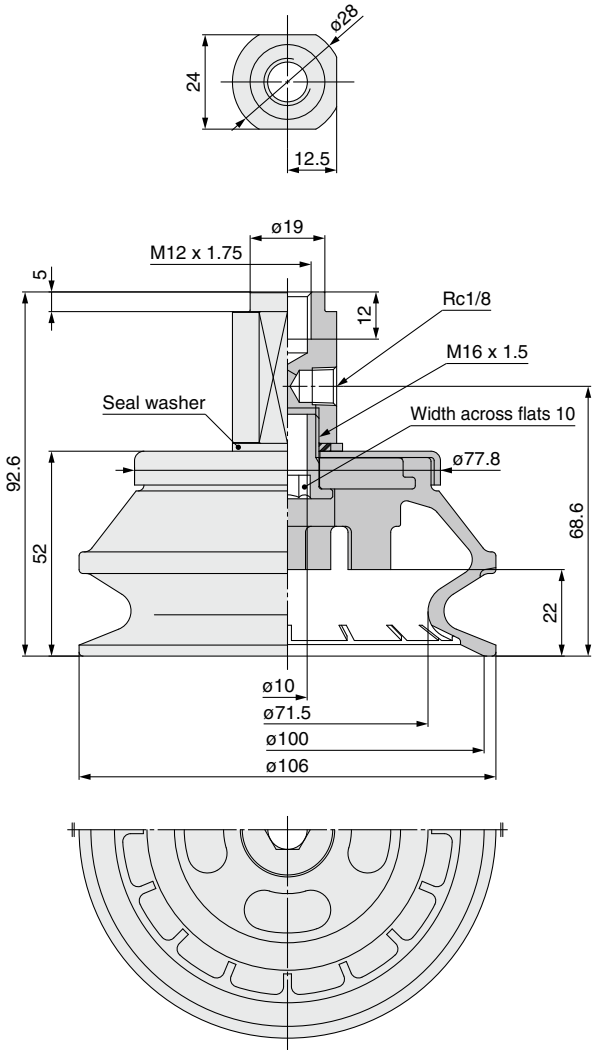
Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y80BM□-AL16	212	207	247

Pad diameter ø100, ø125
Pad form Bellows type with groove

Dimensions/With Female Thread Adapter: Vacuum Inlet Lateral

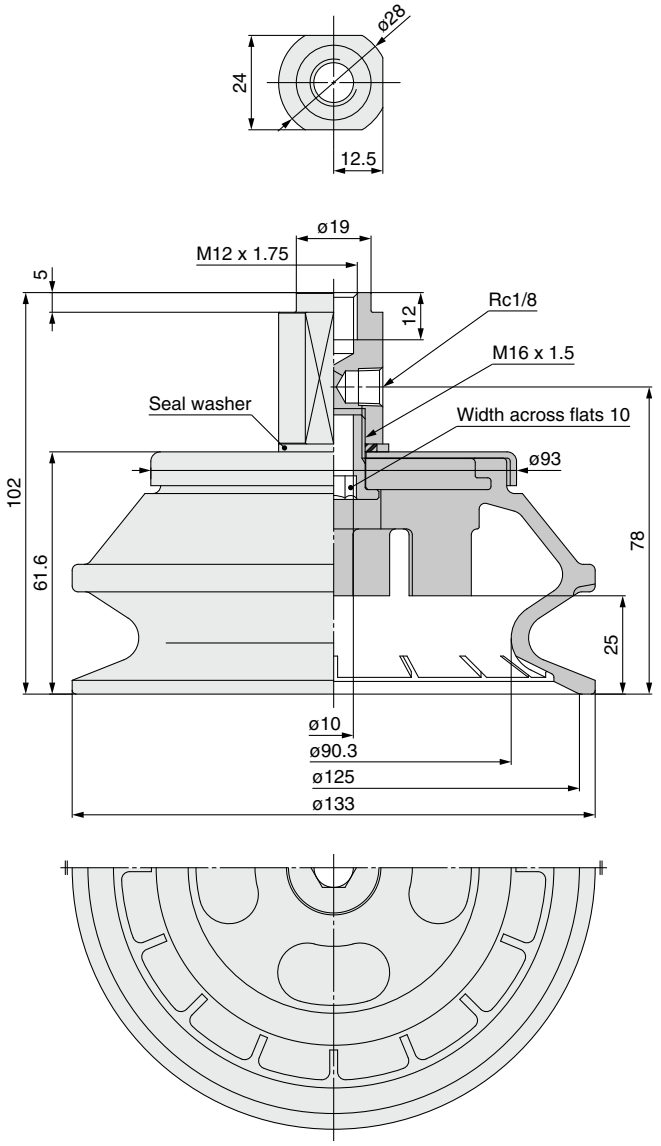
ZP3E-Y100BM□-B12



Weights [g]

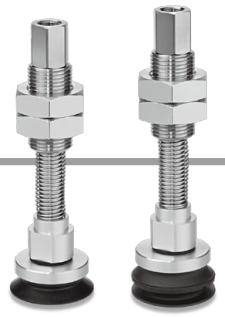
Model \ Pad material	N/U/CL	S	F
ZP3E-Y100BM□-AL16	335	324	407

ZP3E-Y125BM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-Y125BM□-AL16	508	489	645



How to Order

With buffer **ZP3E − T 32 UM N JB 10**

Vacuum inlet direction

Symbol	Direction
T	Vertical

Pad diameter

Symbol	Pad diameter
32	ø32
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

Pad form

Symbol	Form
UM	Flat type with groove
BM	Bellows type with groove

Buffer specification

JB	Rotating, With bushing

Stroke (■)

Symbol	Stroke
10	10 mm
30	30 mm
50	50 mm

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
CL	Mark-free NBR

∗ Refer to page 99 for replacement parts.

Specifications

Buffer specification	Pad diameter	Mounting	Tightening torque [N·m]	Stroke [mm]	Spring reactive force [N]	
					At 0 stroke	At full stroke
Rotating	ø32 to ø50	M18 x 1.5	28 to 32	10	5	6.5
				30	5	8.5
				50	5	10.5
	ø63 to ø125	M22 x 1.5	48 to 52	10	10	11.5
				30	10	13.5
				50	10	15.5

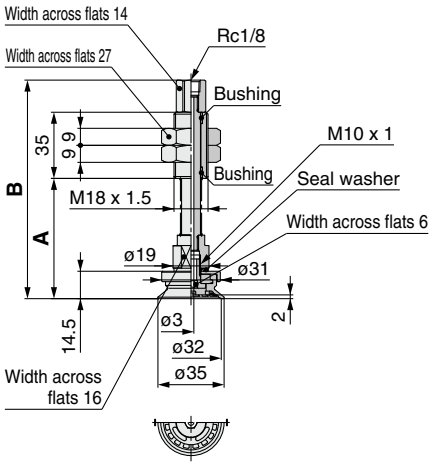
Dimensions/With Buffer: Vacuum Inlet

Vertical

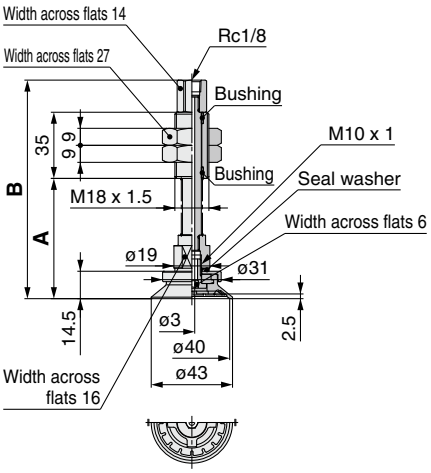
Pad diameter ø32 to ø50

Pad form Flat type with groove

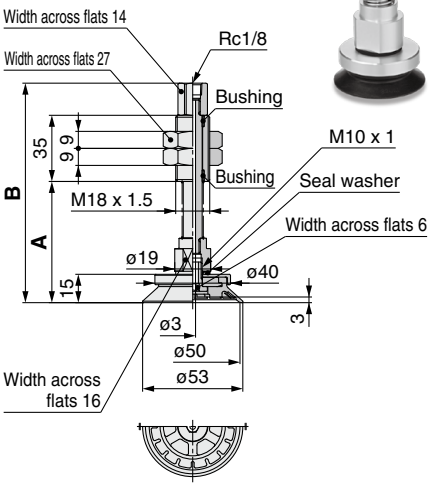
ZP3E-T32UM□JB■



ZP3E-T40UM□JB■



ZP3E-T50UM□JB■



Dimensions

Model	A	B
ZP3E-T32UM□JB10	63.6	115.6
ZP3E-T32UM□JB30	88.6	140.6
ZP3E-T32UM□JB50	108.6	160.6

Model	Weight [g]/Pad material		
	N/U/CL	**S**	**F**
ZP3E-T32UM□JB10	194	194	197
ZP3E-T32UM□JB30	209	208	211
ZP3E-T32UM□JB50	220	220	223

Dimensions

Model	A	B
ZP3E-T40UM□JB10	63.6	115.6
ZP3E-T40UM□JB30	88.6	140.6
ZP3E-T40UM□JB50	108.6	160.6

Model	Weight [g]/Pad material		
	N/U/CL	**S**	**F**
ZP3E-T40UM□JB10	195	195	198
ZP3E-T40UM□JB30	210	209	213
ZP3E-T40UM□JB50	221	221	224

Dimensions

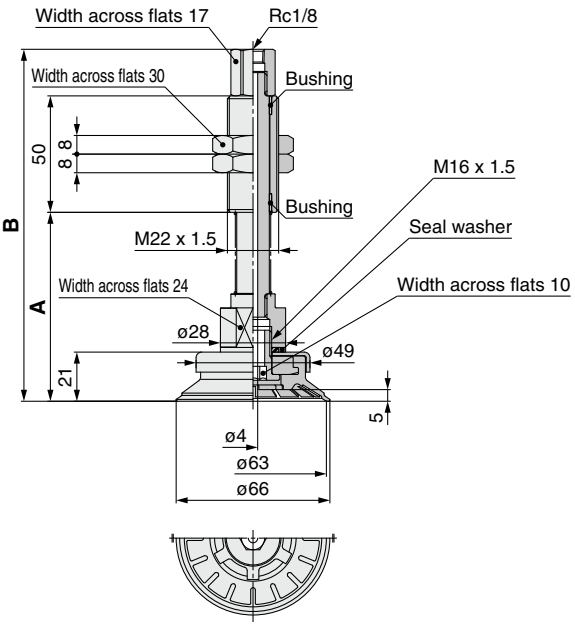
Model	A	B
ZP3E-T50UM□JB10	64	116
ZP3E-T50UM□JB30	89	141
ZP3E-T50UM□JB50	109	161

Model	Weight [g]/Pad material		
	N/U/CL	**S**	**F**
ZP3E-T50UM□JB10	206	205	211
ZP3E-T50UM□JB30	220	220	226
ZP3E-T50UM□JB50	232	231	237

Pad diameter ø63 to ø125
Pad form Flat type with groove

Dimensions/With Buffer: Vacuum Inlet Vertical

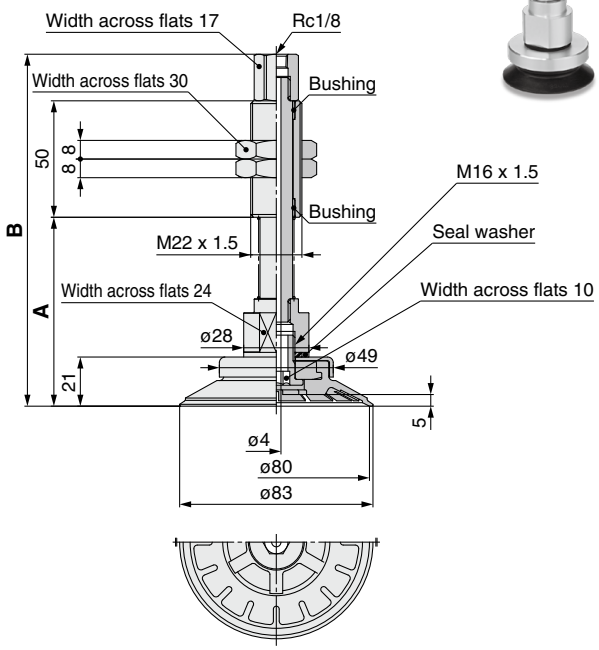
ZP3E-T63UM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T63UM□JB10	81	151	408	406	418
ZP3E-T63UM□JB30	106	176	437	435	447
ZP3E-T63UM□JB50	126	196	460	458	470

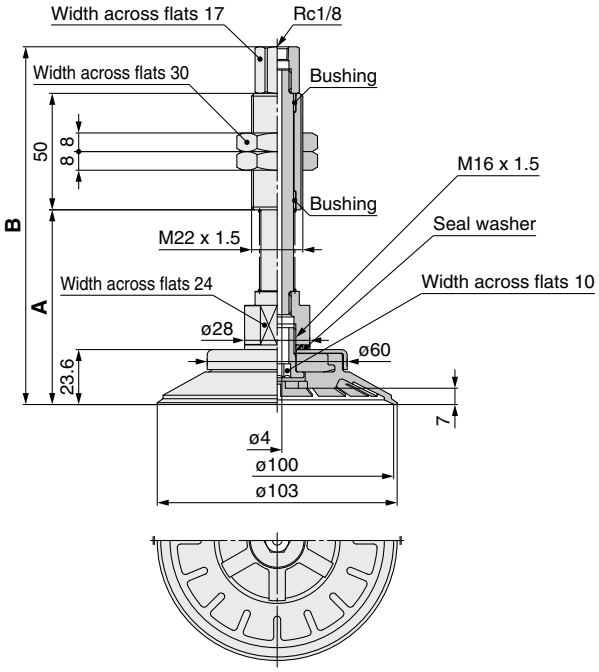
ZP3E-T80UM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T80UM□JB10	81	151	416	414	431
ZP3E-T80UM□JB30	106	176	445	443	461
ZP3E-T80UM□JB50	126	196	468	466	483

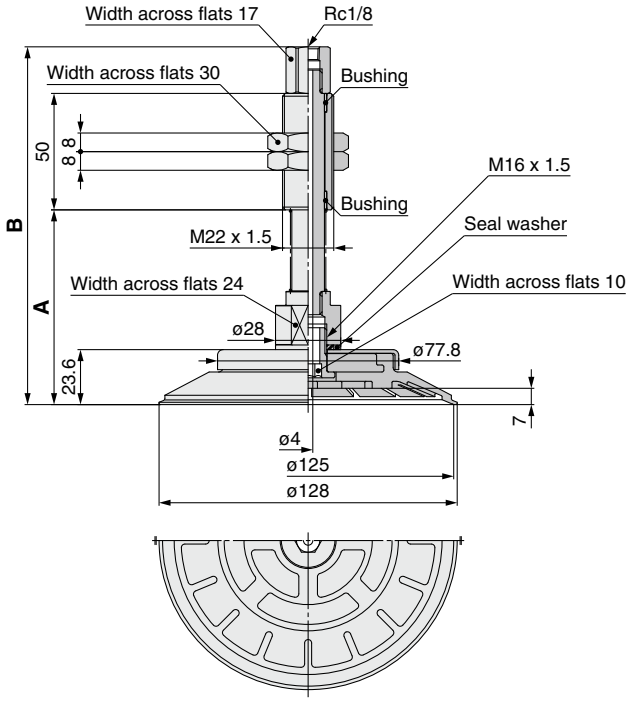
ZP3E-T100UM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T100UM□JB10	83.6	153.6	462	459	488
ZP3E-T100UM□JB30	108.6	178.6	492	488	518
ZP3E-T100UM□JB50	128.6	198.6	514	511	540

ZP3E-T125UM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T125UM□JB10	83.6	153.6	555	549	602
ZP3E-T125UM□JB30	108.6	178.6	585	578	631
ZP3E-T125UM□JB50	128.6	198.6	608	601	654

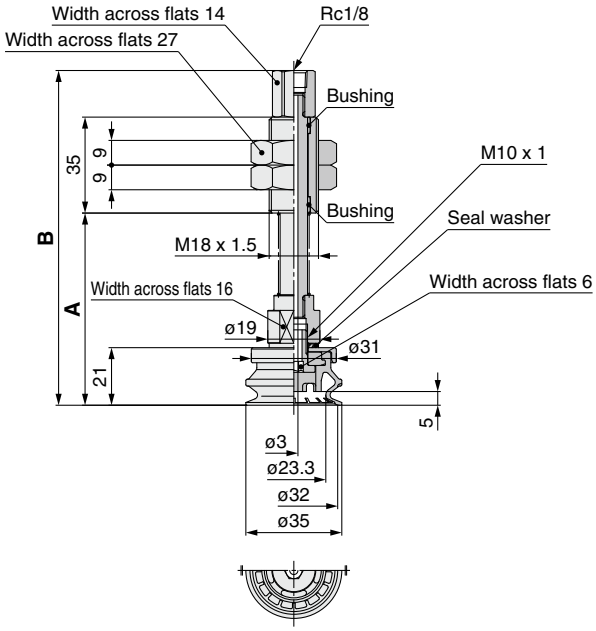
Dimensions/With Buffer: Vacuum Inlet

Vertical

Pad diameter ø32 to ø63

Pad form Bellows type with groove

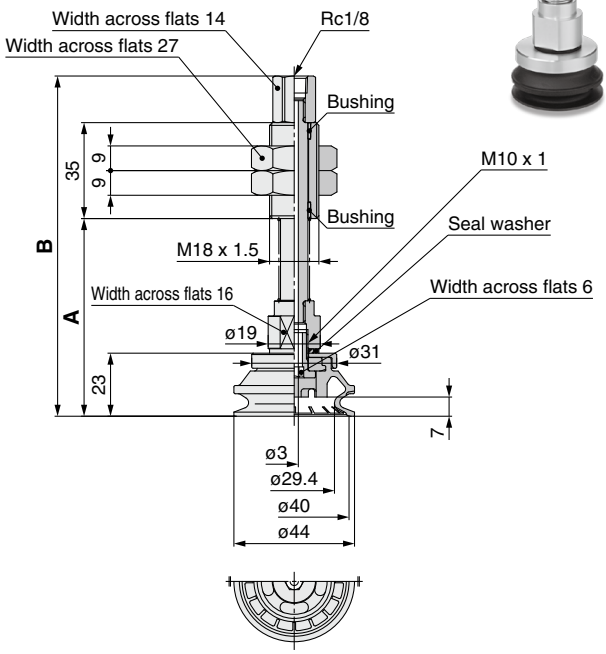
ZP3E-T32BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T32BM□JB10	70	122	204	204	207
ZP3E-T32BM□JB30	95	147	219	218	221
ZP3E-T32BM□JB50	115	167	230	230	233

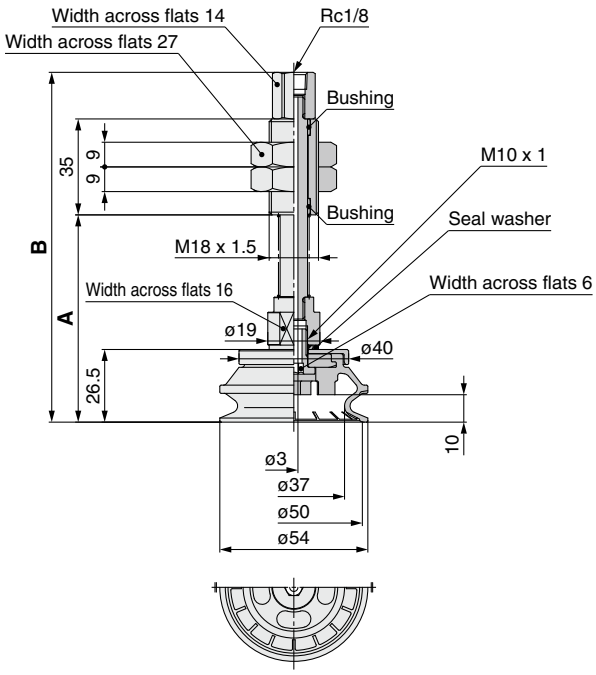
ZP3E-T40BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T40BM□JB10	72	124	205	205	208
ZP3E-T40BM□JB30	97	149	220	219	223
ZP3E-T40BM□JB50	117	169	231	231	234

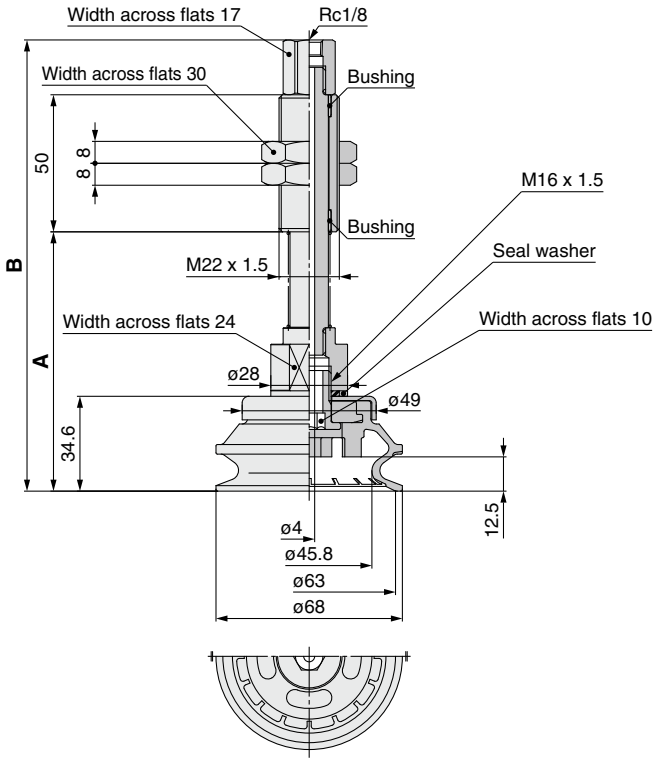
ZP3E-T50BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T50BM□JB10	75.6	127.6	223	222	229
ZP3E-T50BM□JB30	100.6	152.6	238	237	243
ZP3E-T50BM□JB50	120.6	172.6	249	249	255

ZP3E-T63BM□JB■



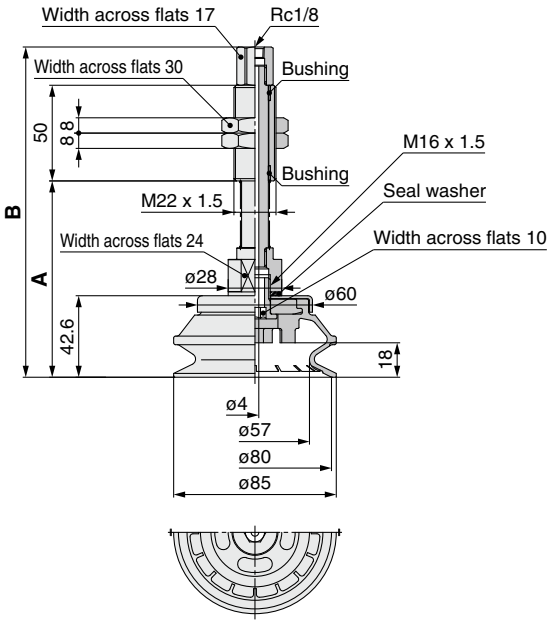
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T63BM□JB10	94.6	164.6	434	433	445
ZP3E-T63BM□JB30	119.6	189.6	464	462	474
ZP3E-T63BM□JB50	139.6	209.6	487	485	497

Pad diameter ø80 to ø125
Pad form Bellows type with groove

Dimensions/With Buffer: Vacuum Inlet Vertical

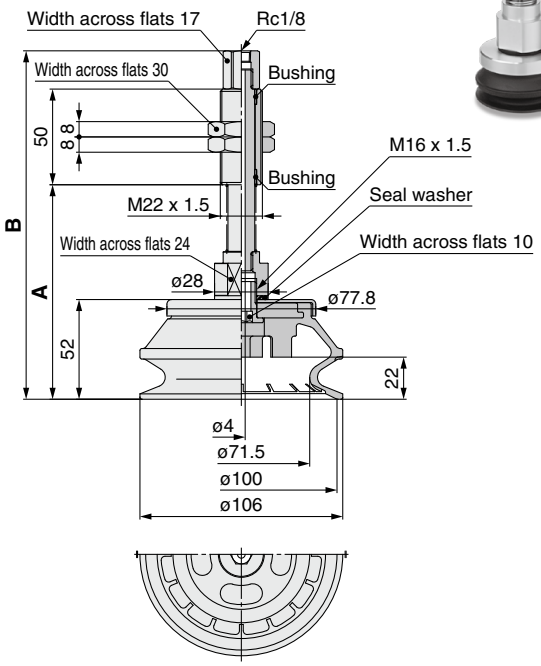
ZP3E-T80BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T80BM□JB10	102.6	172.6	443	441	458
ZP3E-T80BM□JB30	127.6	197.6	472	470	487
ZP3E-T80BM□JB50	147.6	217.6	495	493	510

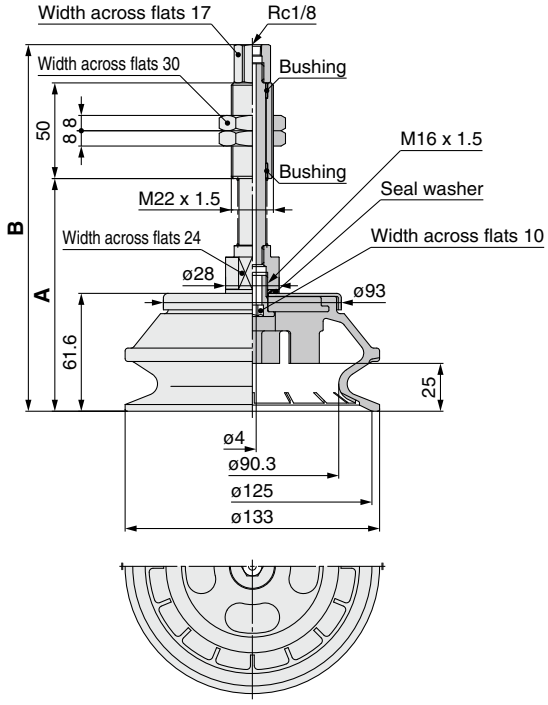
ZP3E-T100BM□JB■



Dimensions

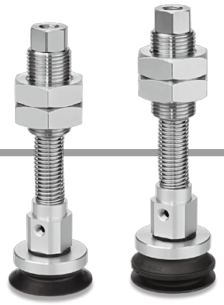
Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T100BM□JB10	112	182	481	477	507
ZP3E-T100BM□JB30	137	207	510	506	536
ZP3E-T100BM□JB50	157	227	533	529	559

ZP3E-T125BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-T125BM□JB10	121.6	191.6	558	552	605
ZP3E-T125BM□JB30	146.6	216.6	588	581	634
ZP3E-T125BM□JB50	166.6	236.6	610	604	657



How to Order

With buffer **ZP3E − Y 32 UM N JB 10**

Vacuum inlet direction

Symbol	Direction
Y	Lateral

Pad diameter

Symbol	Pad diameter
32	ø32
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

Pad form

Symbol	Form
UM	Flat type with groove
BM	Bellows type with groove

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
CL	Mark-free NBR

Stroke (■)

Symbol	Stroke
10	10 mm
30	30 mm
50	50 mm

Buffer specification

JB	Rotating, With bushing

∗ Refer to page 99 for replacement parts.

Specifications

Buffer specification	Pad diameter	Mounting	Tightening torque [N·m]	Stroke [mm]	Spring reactive force [N]	
					At 0 stroke	At full stroke
Rotating	ø32 to ø50	M18 x 1.5	28 to 32	10	5	6.5
				30	5	8.5
				50	5	10.5
	ø63 to ø125	M22 x 1.5	48 to 52	10	10	11.5
				30	10	13.5
				50	10	15.5

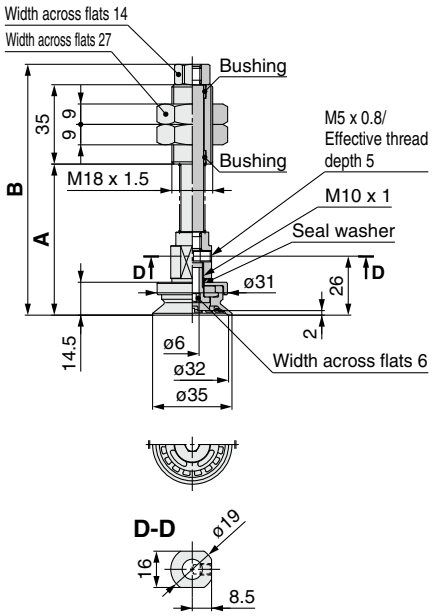
Dimensions/With Buffer: Vacuum Inlet

Lateral

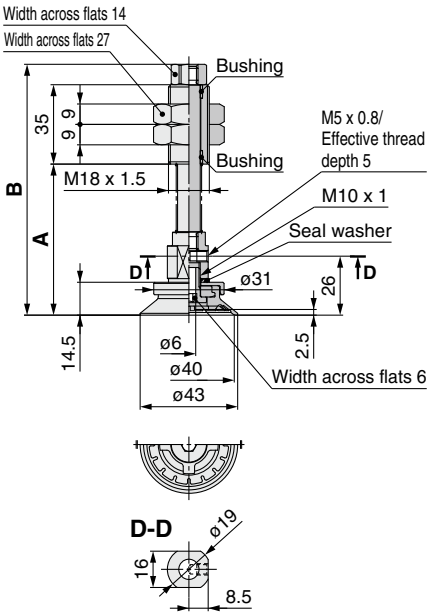
Pad diameter ø32 to ø50

Pad form Flat type with groove

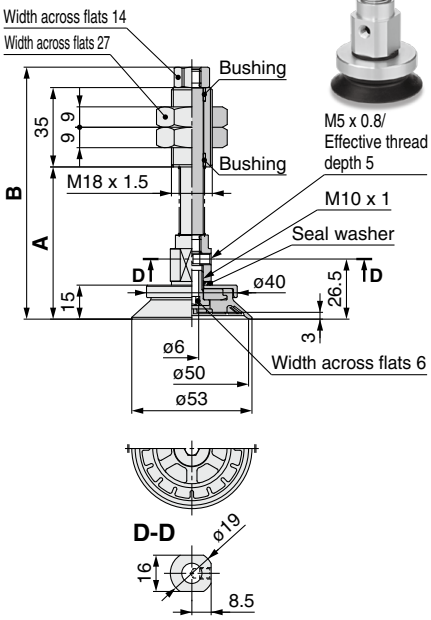
ZP3E-Y32UM□JB■



ZP3E-Y40UM□JB■



ZP3E-Y50UM□JB■



Dimensions

Model	A	B
ZP3E-Y32UM□JB10	66.6	110.6
ZP3E-Y32UM□JB30	91.6	135.6
ZP3E-Y32UM□JB50	111.6	155.6

Model	Weight [g]/Pad material		
	N/U/CL	S	F
ZP3E-Y32UM□JB10	196	196	200
ZP3E-Y32UM□JB30	211	210	214
ZP3E-Y32UM□JB50	222	222	226

Dimensions

Model	A	B
ZP3E-Y40UM□JB10	66.6	110.6
ZP3E-Y40UM□JB30	91.6	135.6
ZP3E-Y40UM□JB50	111.6	155.6

Model	Weight [g]/Pad material		
	N/U/CL	S	F
ZP3E-Y40UM□JB10	200	199	206
ZP3E-Y40UM□JB30	215	214	221
ZP3E-Y40UM□JB50	226	225	232

Dimensions

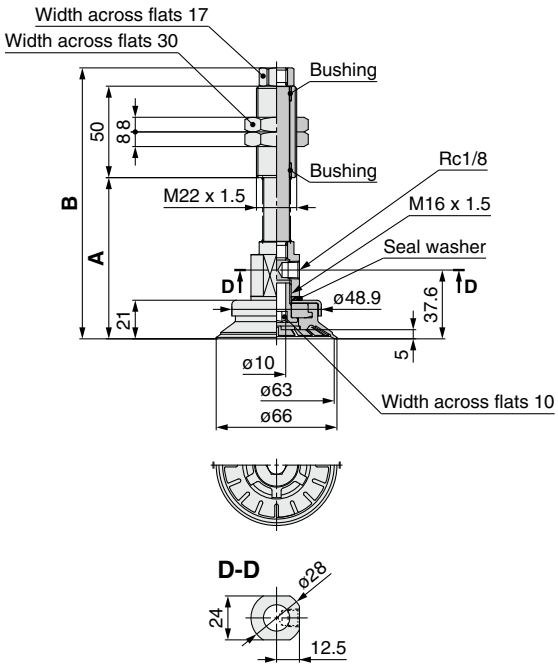
Model	A	B
ZP3E-Y50UM□JB10	67	111
ZP3E-Y50UM□JB30	92	136
ZP3E-Y50UM□JB50	112	156

Model	Weight [g]/Pad material		
	N/U/CL	S	F
ZP3E-Y50UM□JB10	214	213	225
ZP3E-Y50UM□JB30	229	227	239
ZP3E-Y50UM□JB50	240	239	251

Pad diameter ø63 to ø125
Pad form Flat type with groove

Dimensions/With Buffer: Vacuum Inlet Lateral

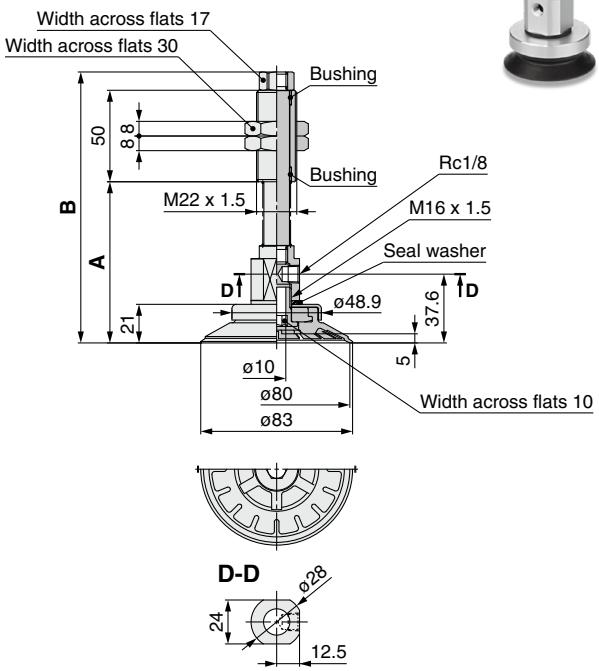
ZP3E-Y63UM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y63UM□JB10	88	148	424	421	445
ZP3E-Y63UM□JB30	113	173	453	451	474
ZP3E-Y63UM□JB50	133	193	476	473	497

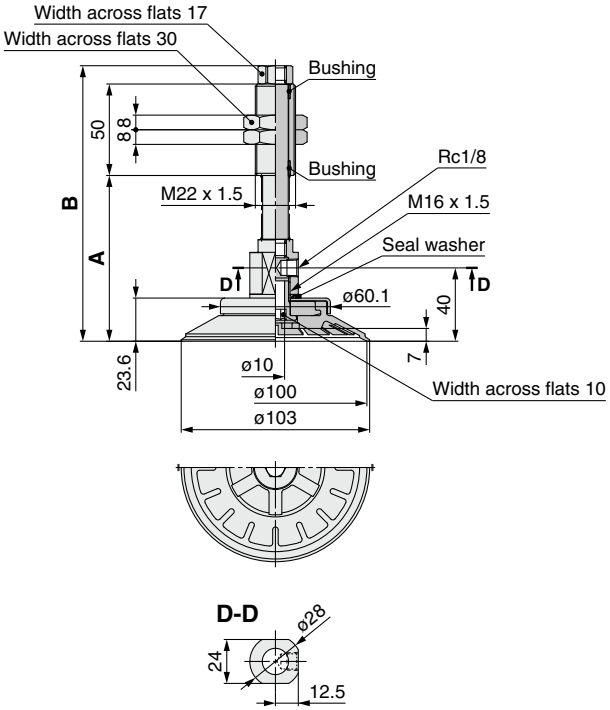
ZP3E-Y80UM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y80UM□JB10	88	148	478	473	513
ZP3E-Y80UM□JB30	113	173	507	502	542
ZP3E-Y80UM□JB50	133	193	530	525	565

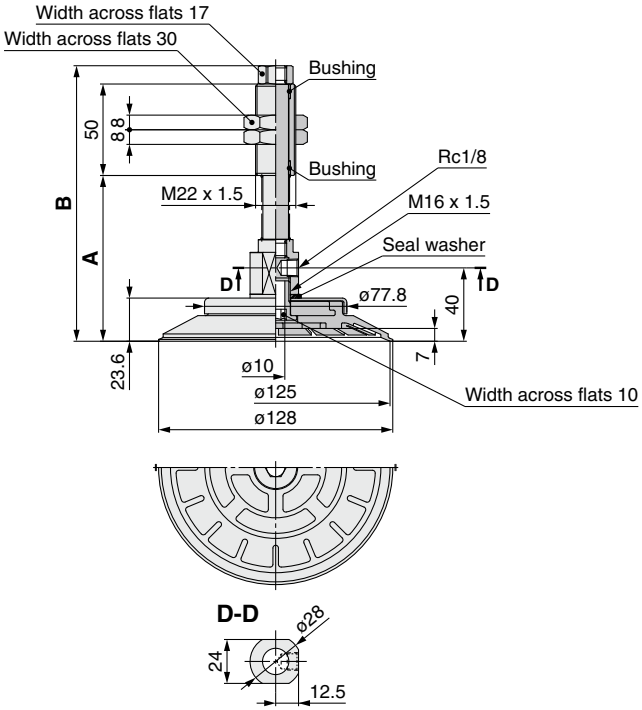
ZP3E-Y100UM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y100UM□JB10	90.6	150.6	601	590	673
ZP3E-Y100UM□JB30	115.6	175.6	630	619	702
ZP3E-Y100UM□JB50	135.6	195.6	653	642	725

ZP3E-Y125UM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y125UM□JB10	90.6	150.6	773	754	910
ZP3E-Y125UM□JB30	115.6	175.6	803	784	940
ZP3E-Y125UM□JB50	135.6	195.6	826	807	963

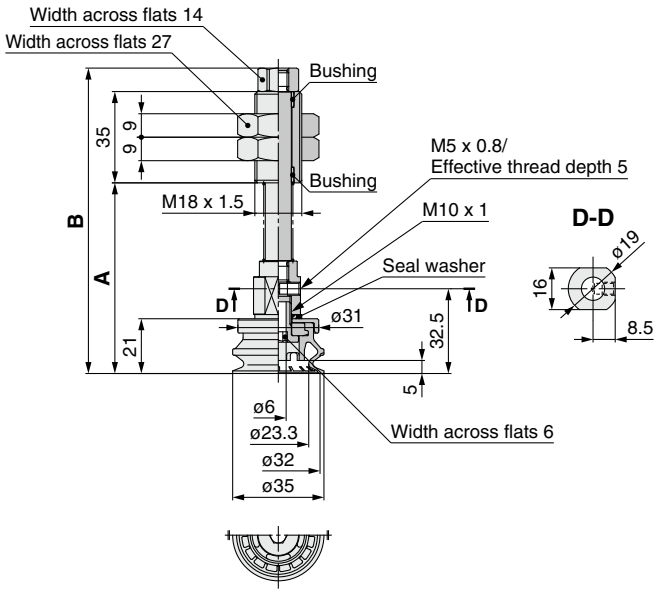
Dimensions/With Buffer: Vacuum Inlet

Lateral

Pad diameter ø32 to ø63

Pad form Bellows type with groove

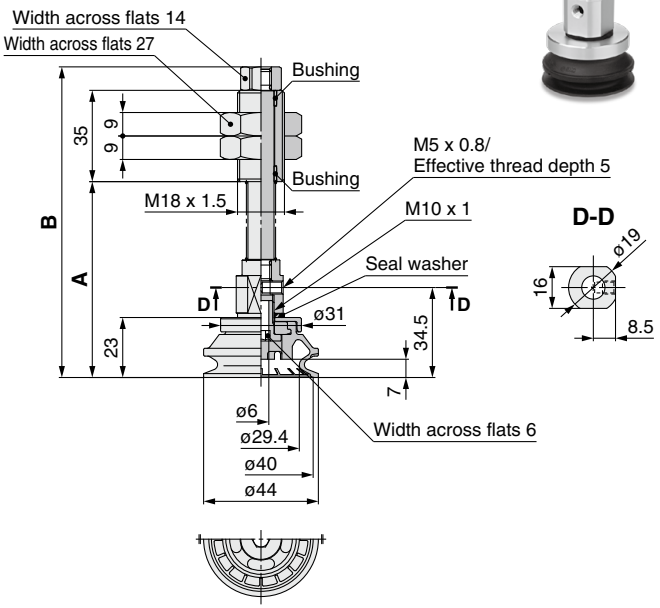
ZP3E-Y32BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y32BM□JB10	73	117	194	194	198
ZP3E-Y32BM□JB30	98	142	210	210	214
ZP3E-Y32BM□JB50	118	162	223	223	227

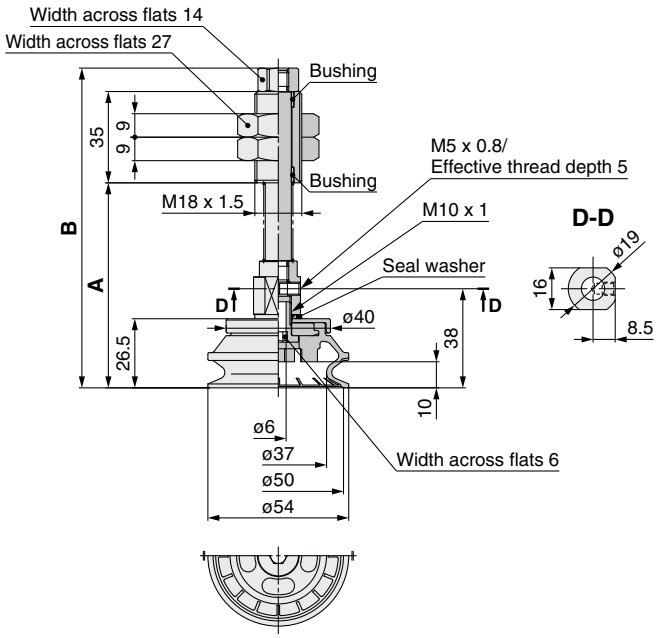
ZP3E-Y40BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y40BM□JB10	75	119	198	197	206
ZP3E-Y40BM□JB30	100	144	214	213	220
ZP3E-Y40BM□JB50	120	164	227	226	233

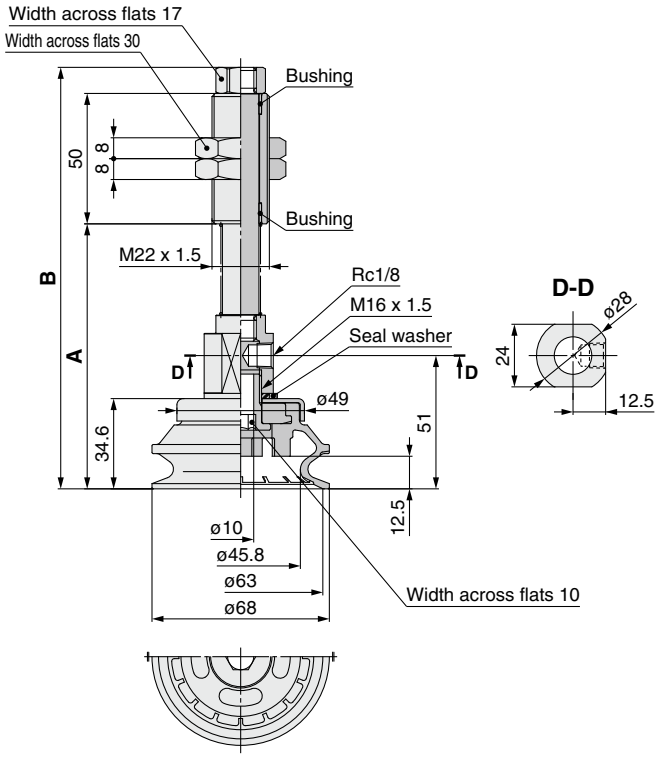
ZP3E-Y50BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y50BM□JB10	78.6	122.6	212	211	223
ZP3E-Y50BM□JB30	103.6	147.6	228	227	239
ZP3E-Y50BM□JB50	123.6	167.6	241	240	252

ZP3E-Y63BM□JB■



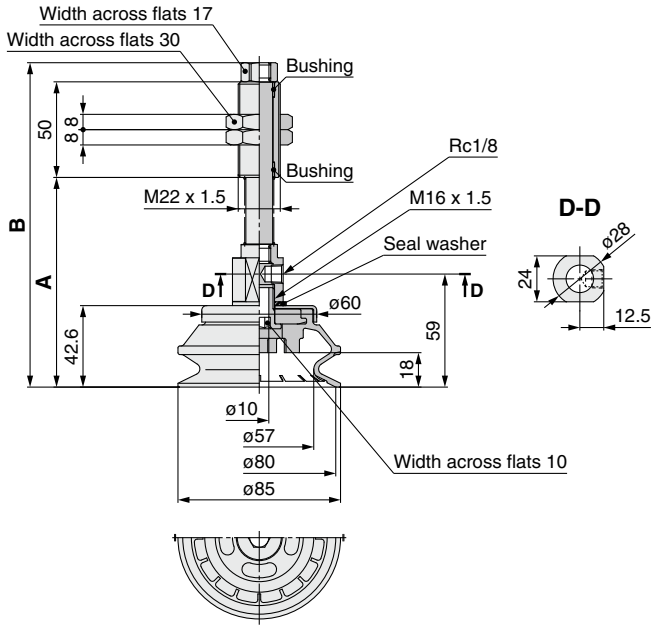
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y63BM□JB10	101.6	161.6	422	419	442
ZP3E-Y63BM□JB30	126.6	186.6	453	450	474
ZP3E-Y63BM□JB50	146.6	206.6	478	475	499

Pad diameter ø80 to ø125
Pad form Bellows type with groove

Dimensions/With Buffer: Vacuum Inlet Lateral

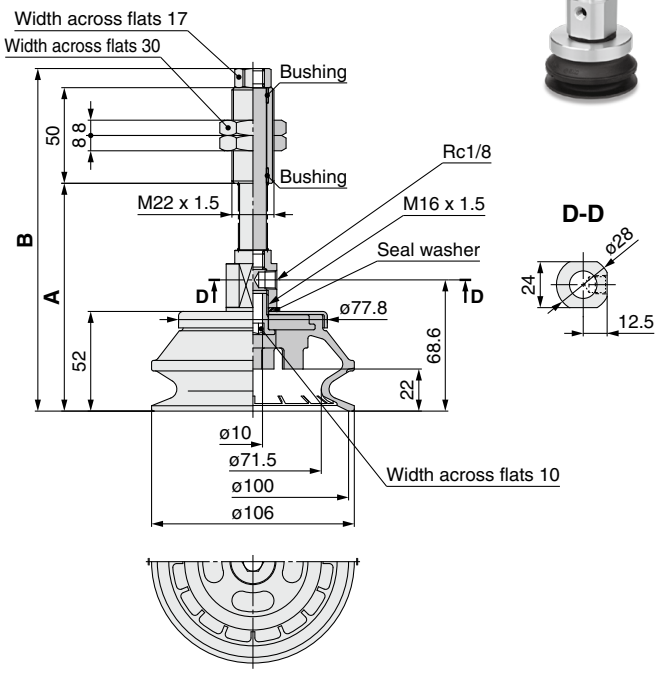
ZP3E-Y80BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y80BM□JB10	109.6	169.6	461	456	511
ZP3E-Y80BM□JB30	134.6	194.6	507	502	542
ZP3E-Y80BM□JB50	154.6	214.6	532	527	567

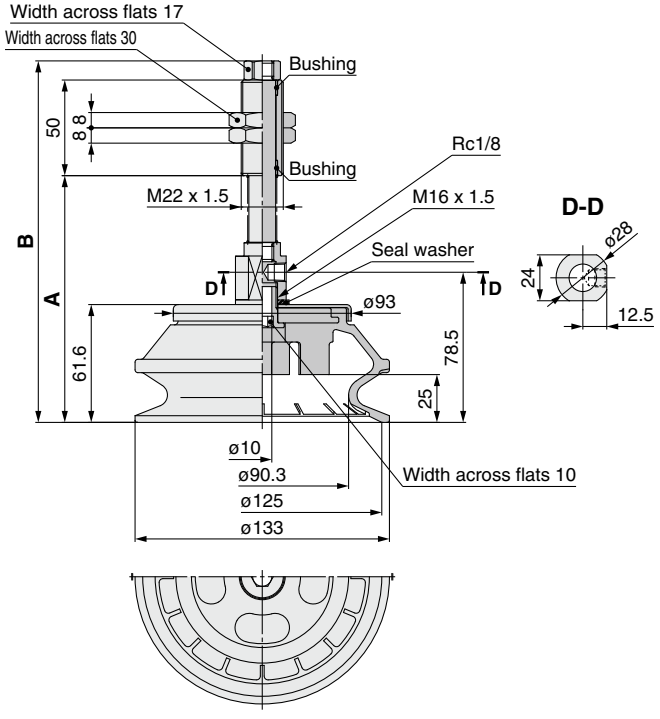
ZP3E-Y100BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y100BM□JB10	119	179	599	588	671
ZP3E-Y100BM□JB30	144	204	630	619	702
ZP3E-Y100BM□JB50	164	224	655	644	727

ZP3E-Y125BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-Y125BM□JB10	128.6	188.6	771	752	908
ZP3E-Y125BM□JB30	153.6	213.6	803	784	940
ZP3E-Y125BM□JB50	173.6	233.6	827	808	964

How to Order

Vertical vacuum inlet With ball joint adapter

ZP3E – T F 32 UM N – AL6

Vacuum inlet direction

Symbol	Direction
T	Vertical

Specification (mechanism)

Symbol	Specification
F	Ball joint

Pad diameter

Symbol	Pad diameter
32	ø32
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

Pad form

Symbol	Form
UM	Flat type with groove
BM	Bellows type with groove

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
CL	Mark-free NBR

Mounting thread size

		Symbol	Mounting Thread size	ø32 to ø50	ø63 to ø125
Male thread	For direct mounting	**AL6**	M6 x 1	●	—
		AL12	M12 x 1.25	—	●
	For plate connection	**AL14**	M14 x 1	●	—
		AL16	M16 x 1.5	—	●
Female thread		**B8**	M8 x 1.25	●	—
		B12	M12 x 1.75	—	●

∗ Refer to pages 100 and 101 for replacement parts.

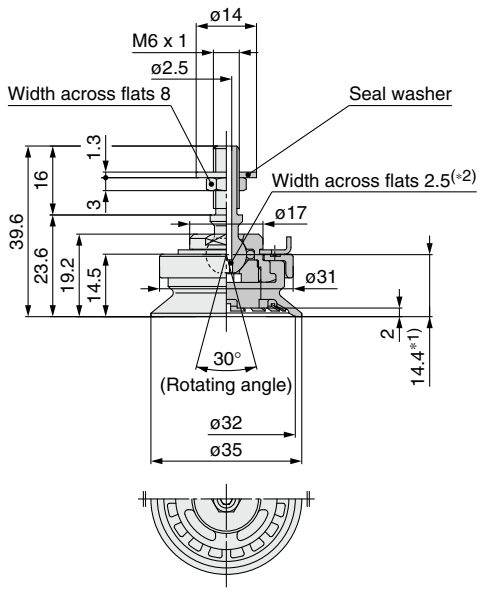
Dimensions/With Ball Joint Adapter: Vacuum Inlet

Vertical

Pad diameter ø32, ø40

Pad form Flat type with groove

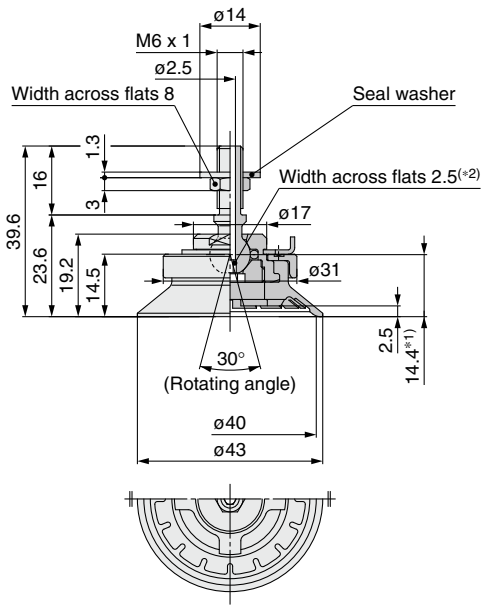
ZP3E-TF32UM□-AL6



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF32UM□-AL6	38.0	37.7	40.5

ZP3E-TF40UM□-AL6



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF40UM□-AL6	39.1	38.6	42.2

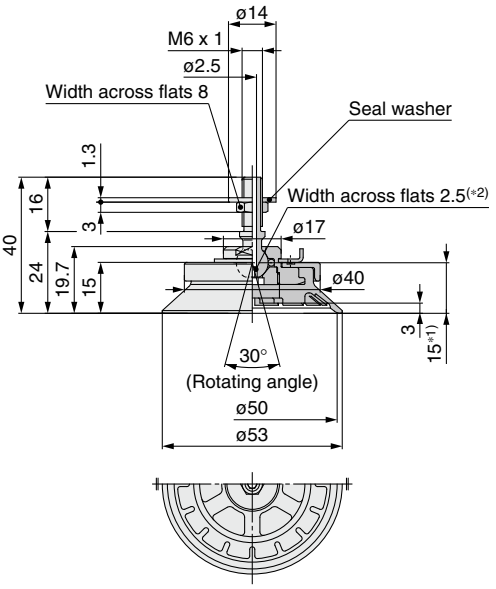
∗1) Center of the rotating angle
∗2) Position of the adapter mounting tool

Note) When mounting and removing this product, use a hexagon wrench at the position of the adapter mounting tool shown in the figure (∗2).

Dimensions/With Ball Joint Adapter: Vacuum Inlet Vertical

Pad diameter ø50 to ø100
Pad form Flat type with groove

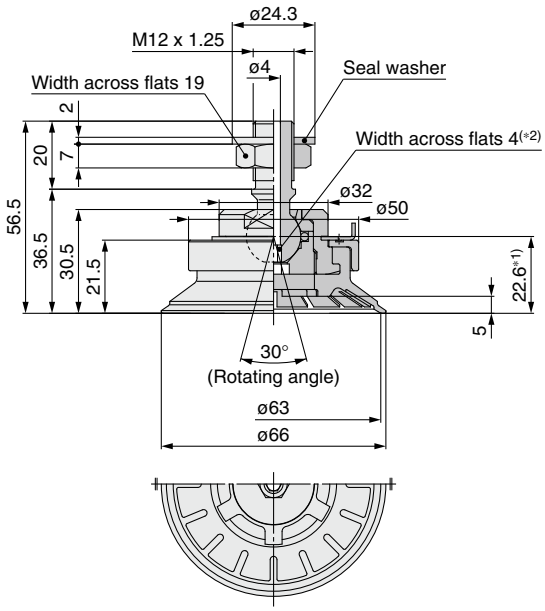
ZP3E-TF50UM□-AL6



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF50UM□-AL6	57.2	56.4	62.2

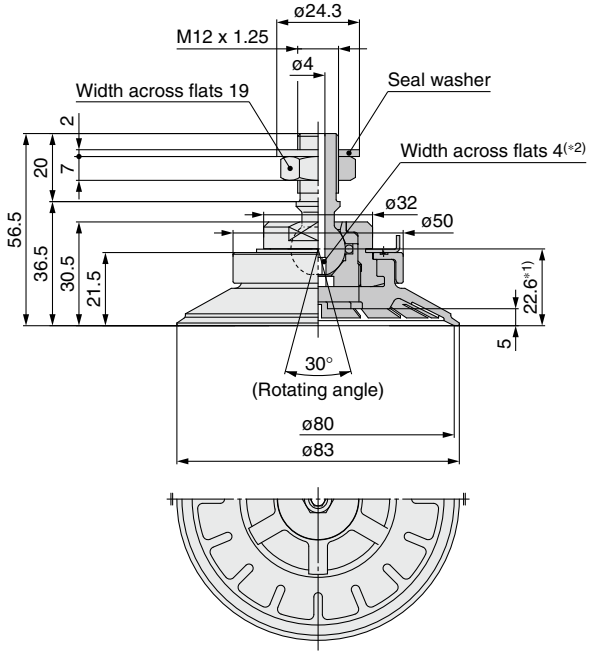
ZP3E-TF63UM□-AL12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF63UM□-AL12	146	145	157

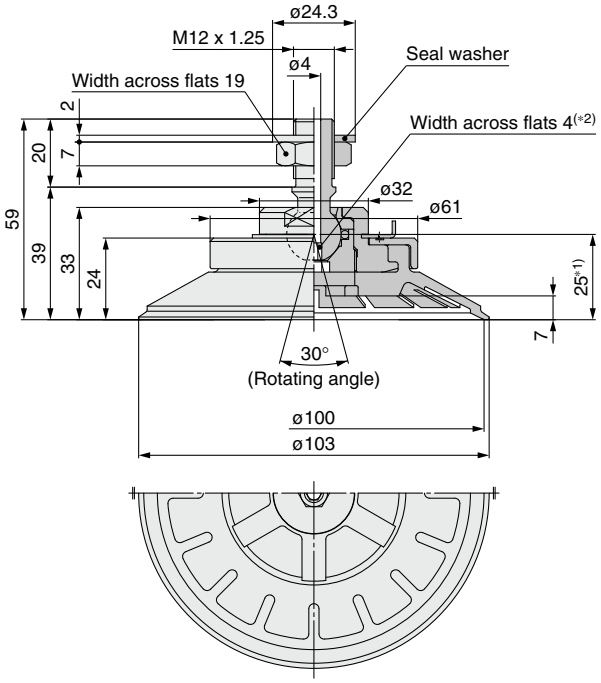
ZP3E-TF80UM□-AL12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF80UM□-AL12	154	152	170

ZP3E-TF100UM□-AL12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF100UM□-AL12	192	189	218

∗1) Center of the rotating angle
∗2) Position of the adapter mounting tool

Note) When mounting and removing this product, use a hexagon wrench at the position of the adapter mounting tool shown in the figure (∗2).

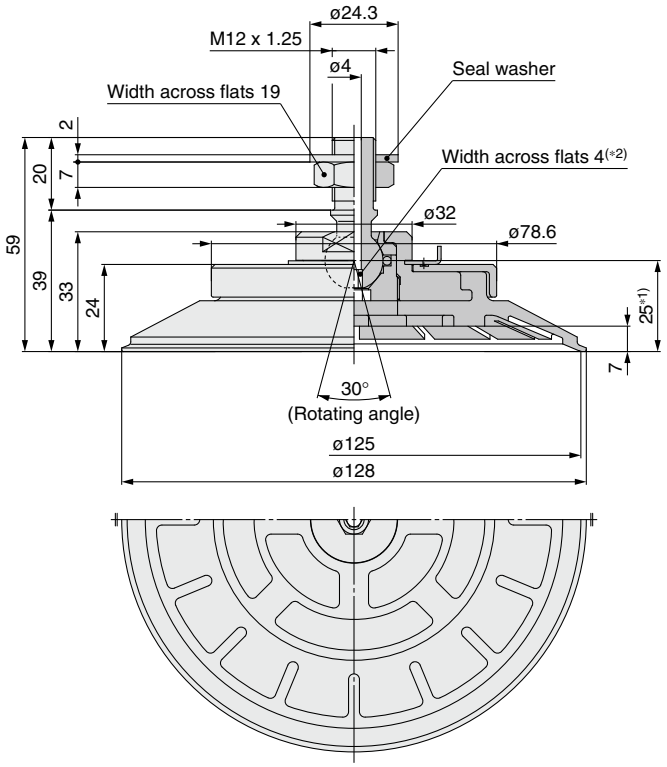
Dimensions/With Ball Joint Adapter: Vacuum Inlet

Vertical

Pad diameter ø125

Pad form Flat type with groove

ZP3E-TF125UM□-AL12



Weights

[g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF125UM□-AL12	270	263	317

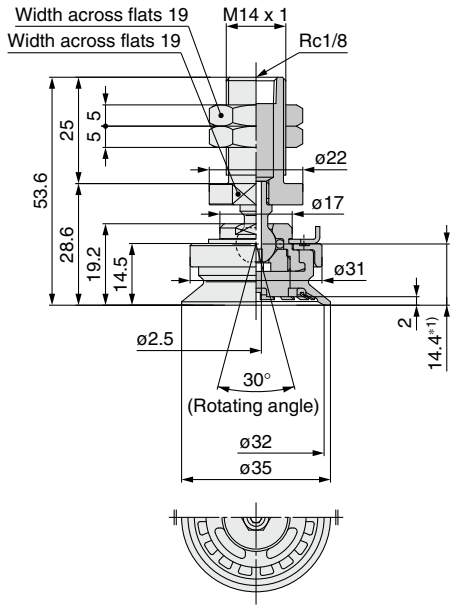
∗1) Center of the rotating angle
∗2) Position of the adapter mounting tool

Note) When mounting and removing this product, use a hexagon wrench at the position of the adapter mounting tool shown in the figure (∗2).

Pad diameter ø32 to ø63
Pad form Flat type with groove

Dimensions/With Ball Joint Male Thread Adapter: Vacuum Inlet Vertical

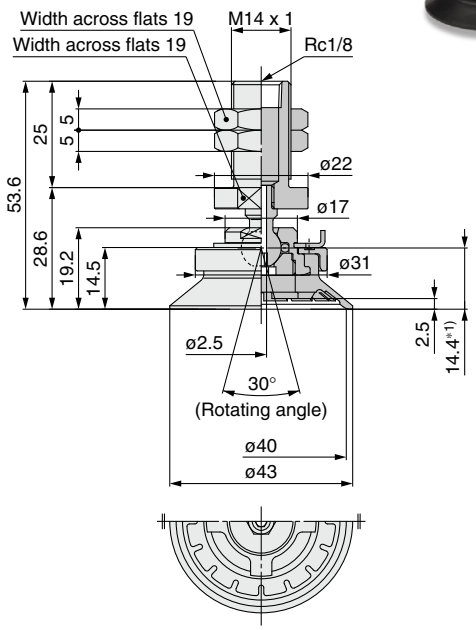
ZP3E-TF32UM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF32UM□-AL14	59.0	58.6	61.4

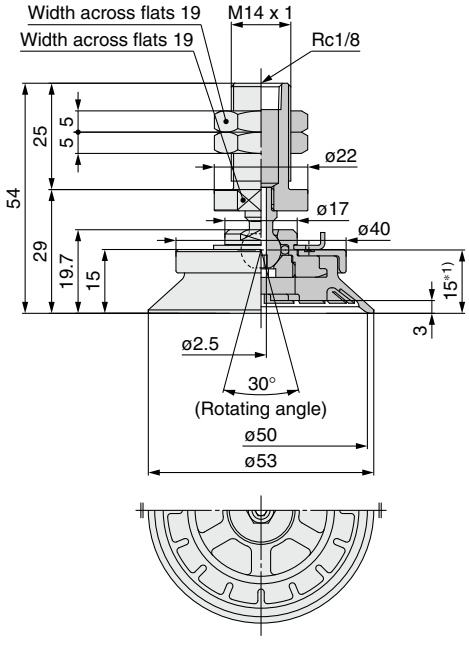
ZP3E-TF40UM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF40UM□-AL14	60.0	59.6	63.1

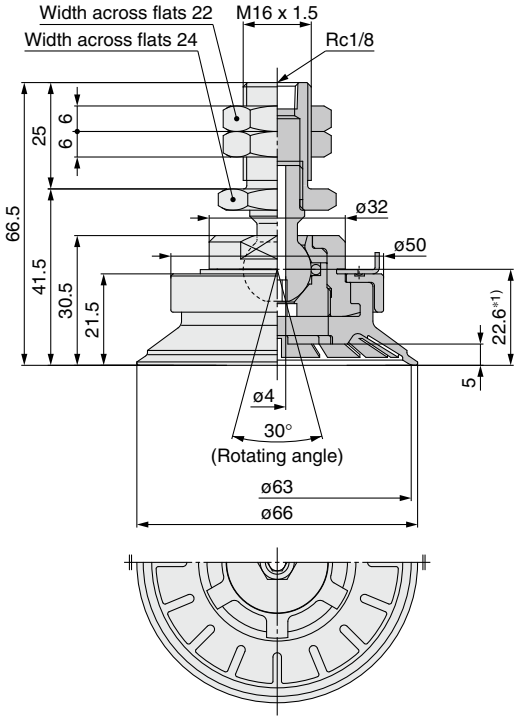
ZP3E-TF50UM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF50UM□-AL14	78.1	77.3	83.6

ZP3E-TF63UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF63UM□-AL16	184	183	195

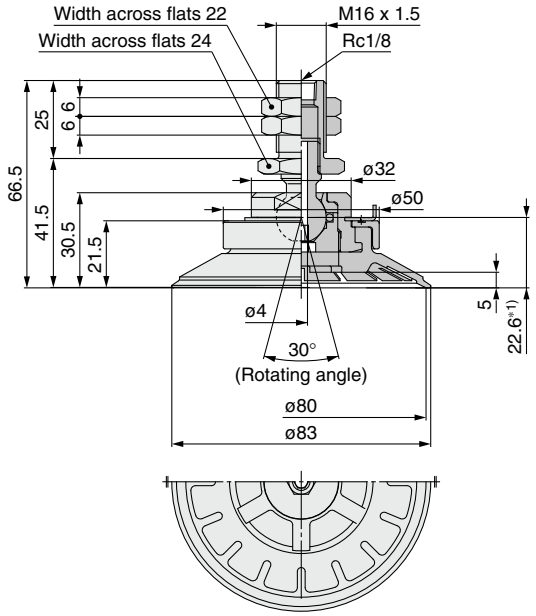
∗1) Center of the rotating angle

Dimensions/With Ball Joint Male Thread Adapter: Vacuum Inlet

Vertical

Pad diameter ø80 to ø125
Pad form Flat type with groove

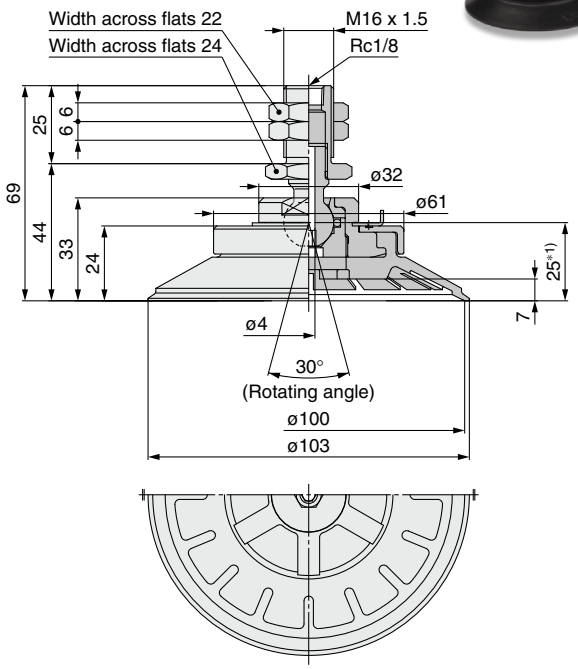
ZP3E-TF80UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF80UM□-AL16	192	190	208

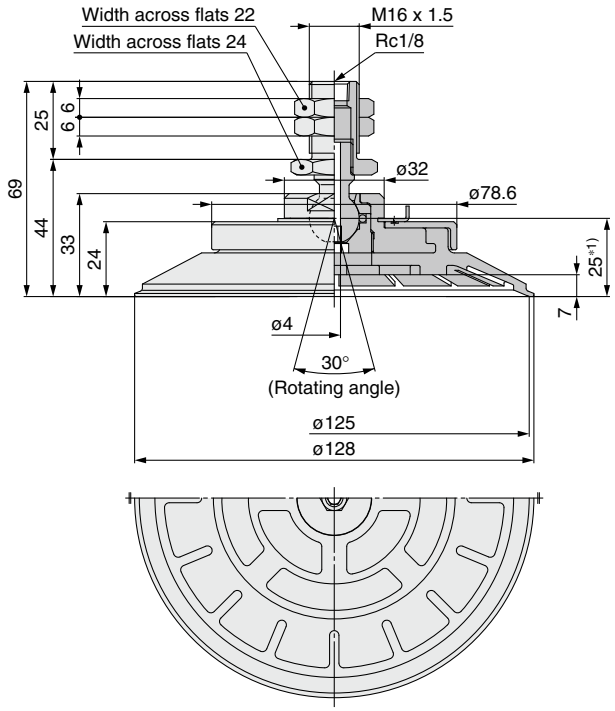
ZP3E-TF100UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF100UM□-AL16	230	227	256

ZP3E-TF125UM□-AL16



Weights [g]

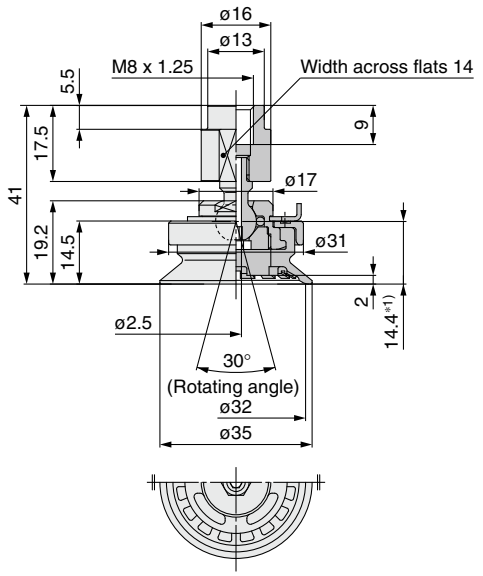
Model \ Pad material	N/U/CL	S	F
ZP3E-TF125UM□-AL16	308	301	355

∗1) Center of the rotating angle

Pad diameter ø32 to ø63
Pad form Flat type with groove

Dimensions/With Ball Joint Female Thread Adapter: Vacuum Inlet Vertical

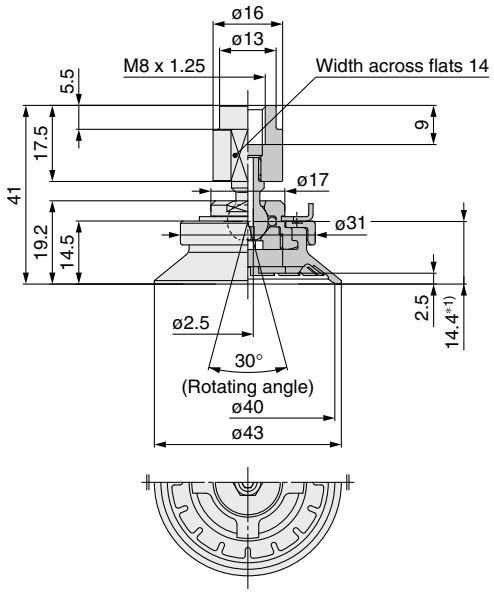
ZP3E-TF32UM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF32UM□-B8	40.9	40.5	43.4

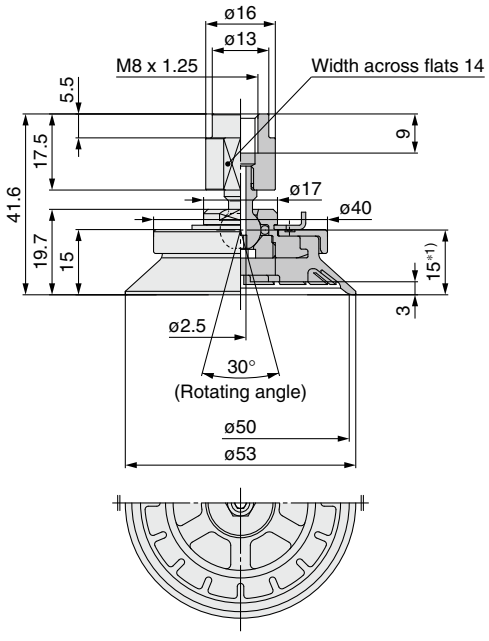
ZP3E-TF40UM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF40UM□-B8	41.9	41.5	45.0

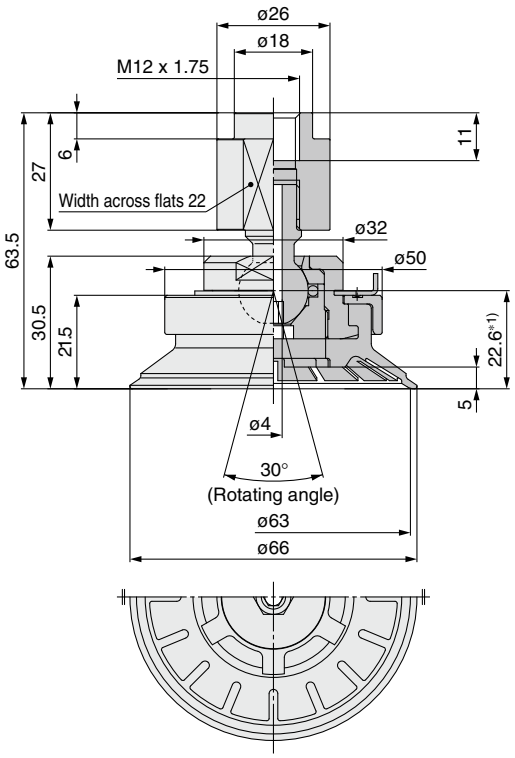
ZP3E-TF50UM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF50UM□-B8	60.0	59.2	65.5

ZP3E-TF63UM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF63UM□-B12	151	150	162

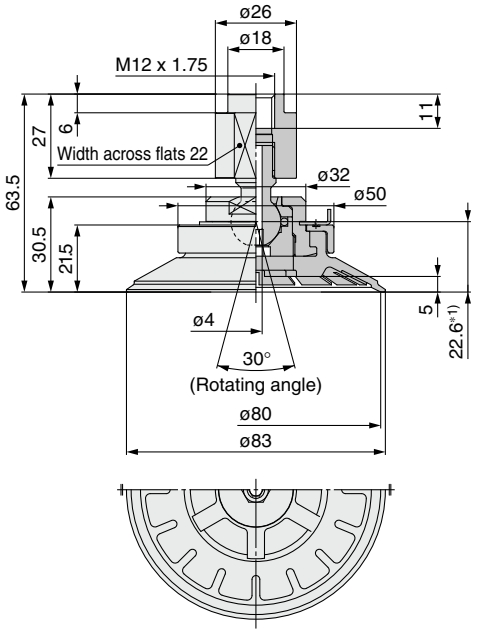
∗1) Center of the rotating angle

Dimensions/With Ball Joint Female Thread Adapter: Vacuum Inlet

Vertical

Pad diameter ø80 to ø125
Pad form Flat type with groove

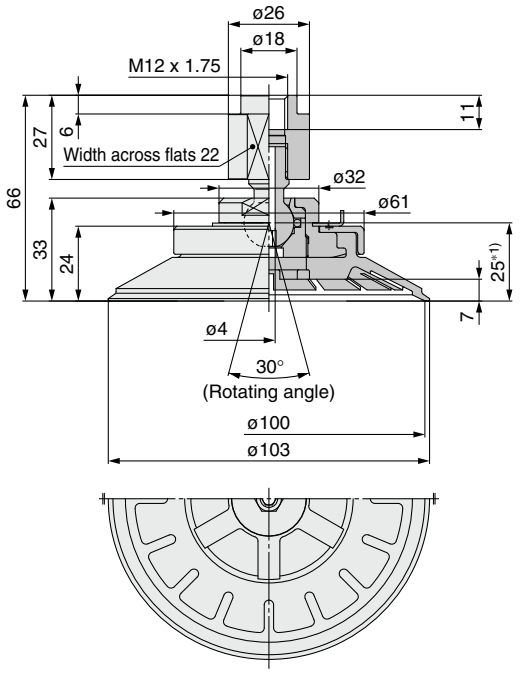
ZP3E-TF80UM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF80UM□-B12	160	157	175

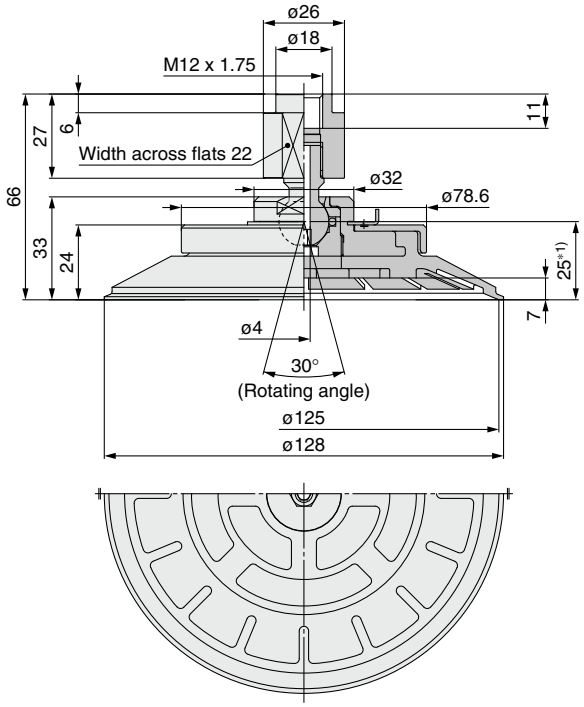
ZP3E-TF100UM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF100UM□-B12	198	194	224

ZP3E-TF125UM□-B12



Weights [g]

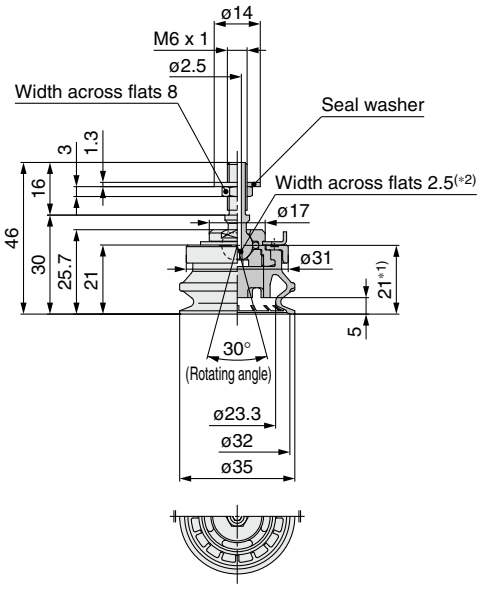
Model \ Pad material	N/U/CL	S	F
ZP3E-TF125UM□-B12	275	269	322

∗1) Center of the rotating angle

Dimensions/With Ball Joint Adapter: Vacuum Inlet Vertical

Pad diameter ø32 to ø63
Pad form Bellows type with groove

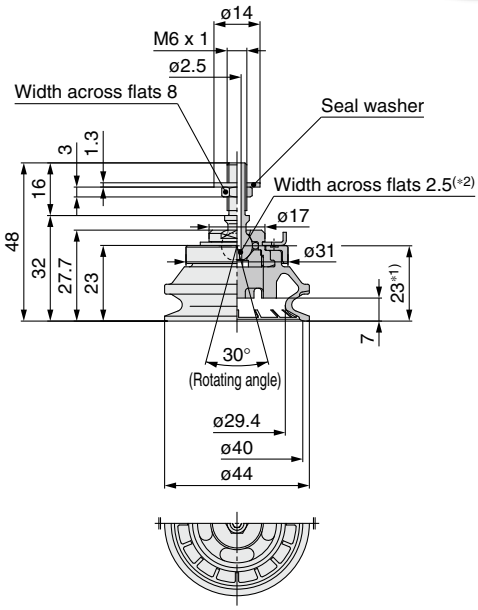
ZP3E-TF32BM□-AL6



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF32BM□-AL6	40.0	39.5	43.6

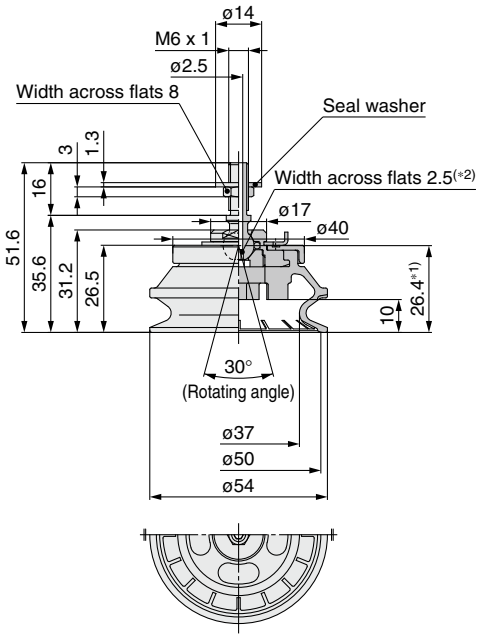
ZP3E-TF40BM□-AL6



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF40BM□-AL6	44.0	43.1	50.0

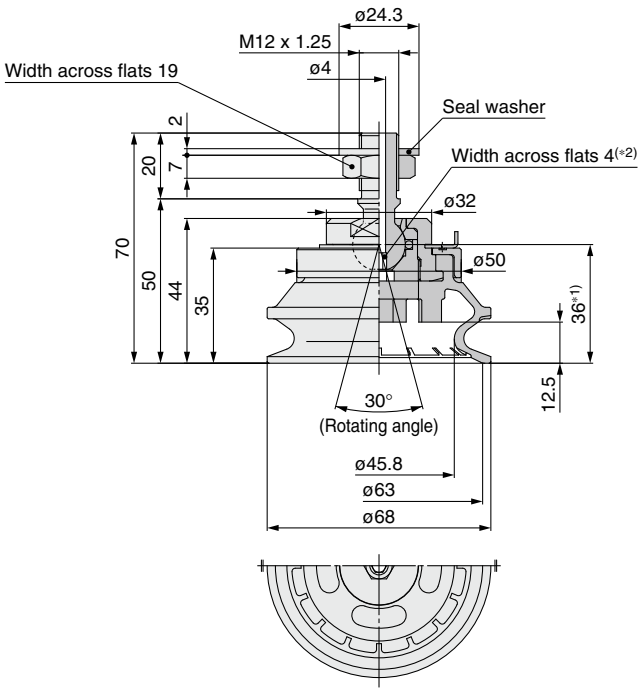
ZP3E-TF50BM□-AL6



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF50BM□-AL6	65.6	64.1	76.1

ZP3E-TF63BM□-AL12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF63BM□-AL12	163	160	183

∗1) Center of the rotating angle
∗2) Position of the adapter mounting tool

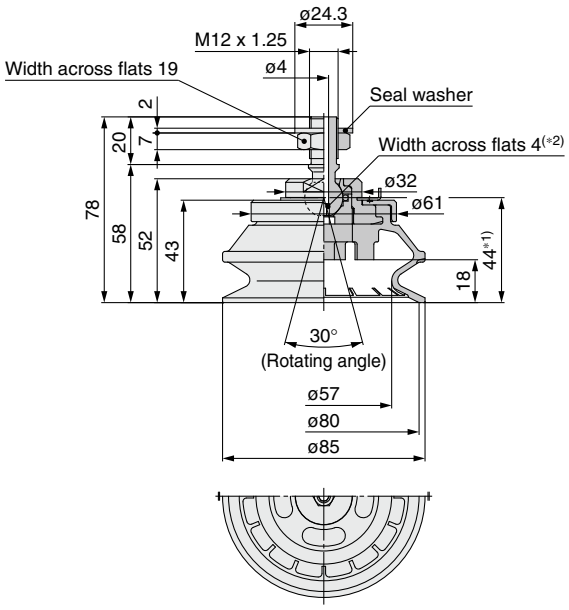
Note) When mounting and removing this product, use a hexagon wrench at the position of the adapter mounting tool shown in the figure (∗2).

Dimensions/With Ball Joint Adapter: Vacuum Inlet

Vertical

Pad diameter ø80 to ø125
Pad form Bellows type with groove

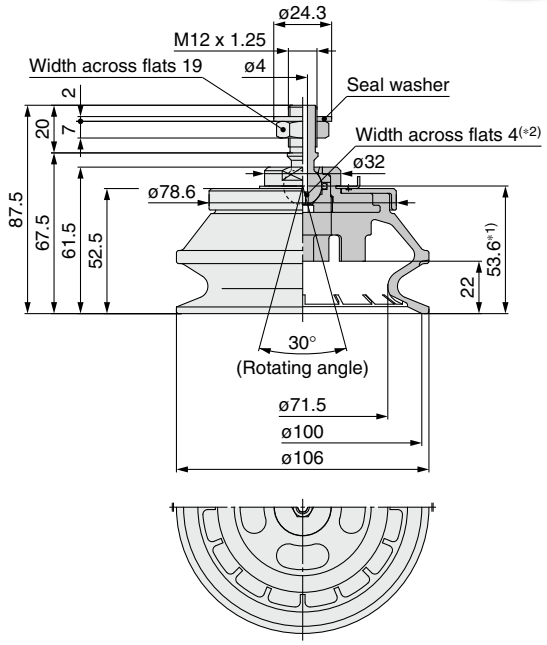
ZP3E-TF80BM□-AL12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF80BM□-AL12	208	203	243

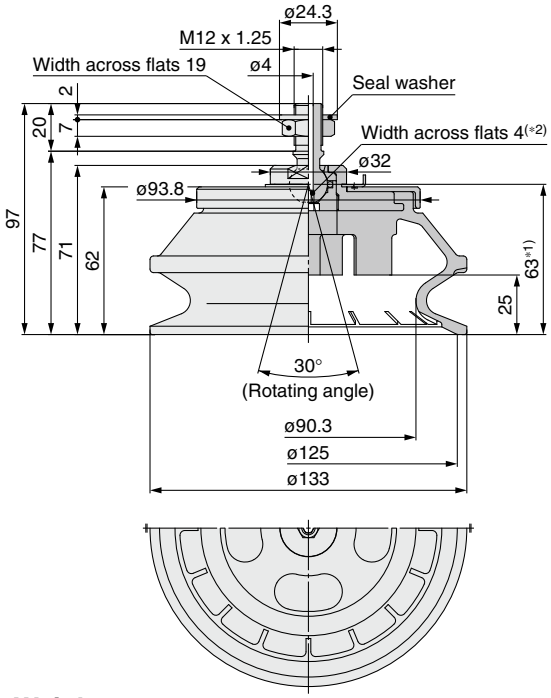
ZP3E-TF100BM□-AL12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF100BM□-AL12	316	305	388

ZP3E-TF125BM□-AL12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF125BM□-AL12	473	454	610

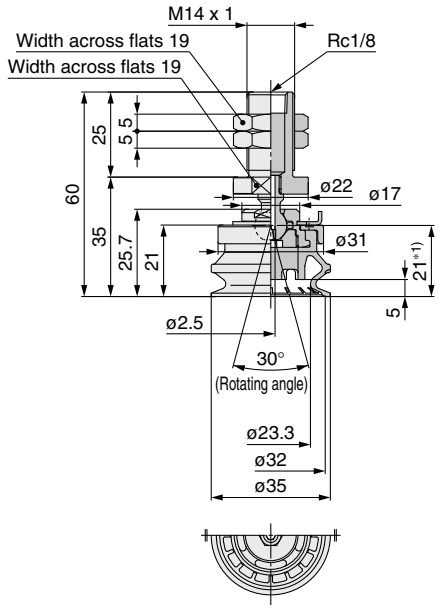
∗1) Center of the rotating angle
∗2) Position of the adapter mounting tool

Note) When mounting and removing this product, use a hexagon wrench at the position of the adapter mounting tool shown in the figure (∗2).

Pad diameter ø32 to ø63
Pad form Bellows type with groove

Dimensions/With Ball Joint Male Thread Adapter: Vacuum Inlet Vertical

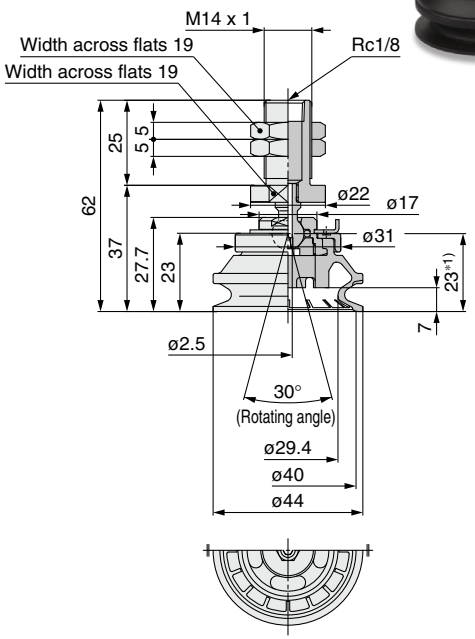
ZP3E-TF32BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF32BM□-AL14	60.9	60.4	64.6

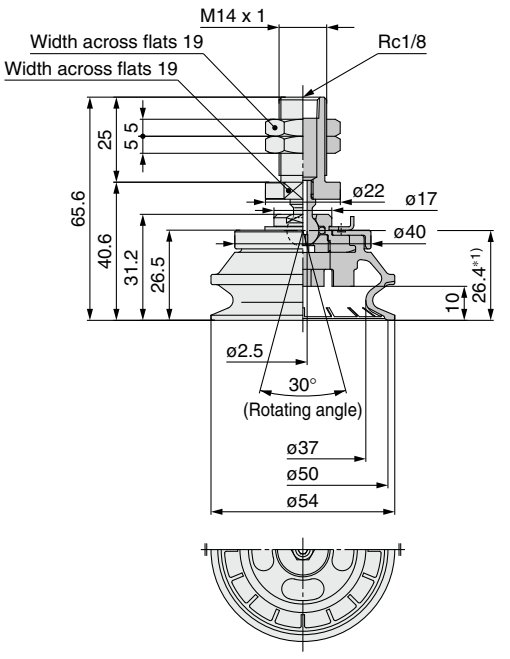
ZP3E-TF40BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF40BM□-AL14	64.9	64.1	70.9

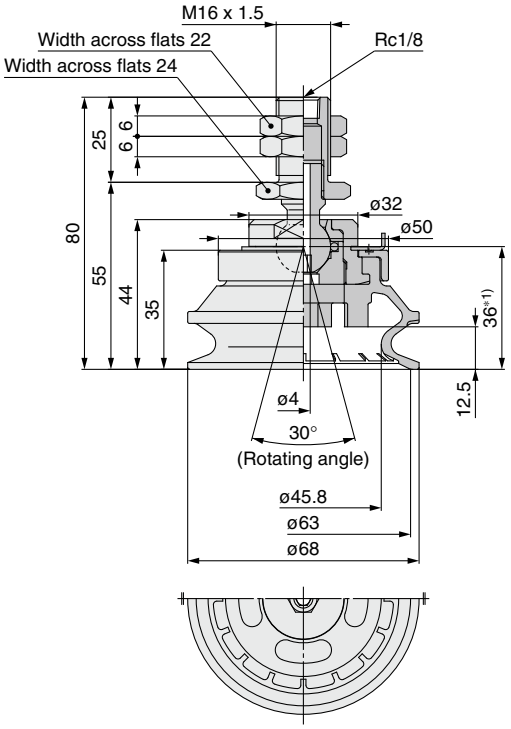
ZP3E-TF50BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF50BM□-AL14	86.6	85.1	97.1

ZP3E-TF63BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF63BM□-AL16	201	198	221

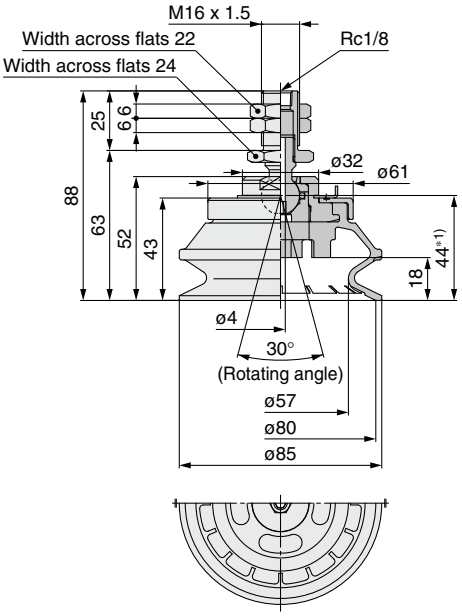
∗1) Center of the rotating angle

Dimensions/With Ball Joint Male Thread Adapter: Vacuum Inlet

Vertical

Pad diameter ø80 to ø125
Pad form Bellows type with groove

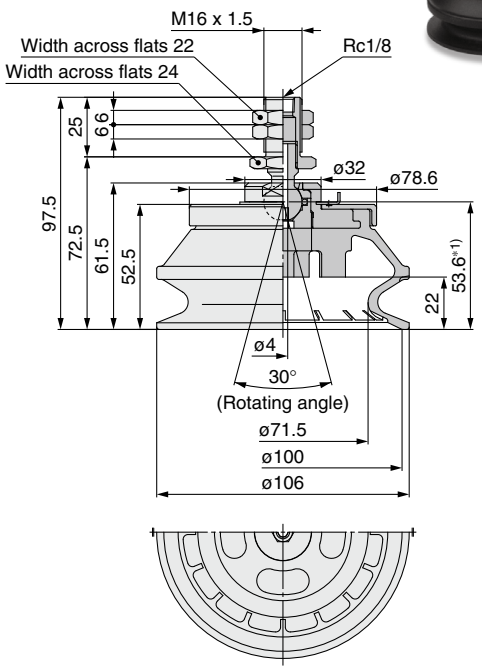
ZP3E-TF80BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF80BM□-AL16	246	241	281

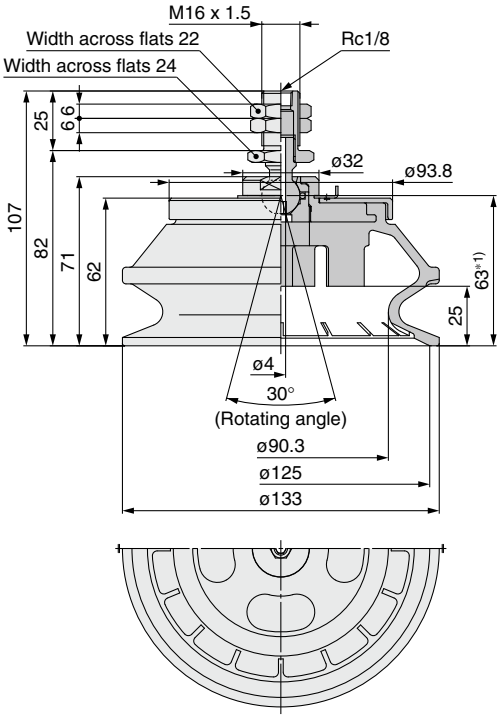
ZP3E-TF100BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF100BM□-AL16	354	343	426

ZP3E-TF125BM□-AL16



Weights [g]

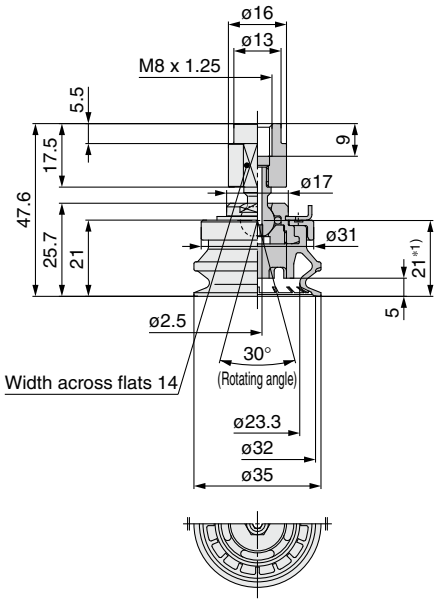
Model \ Pad material	N/U/CL	S	F
ZP3E-TF125BM□-AL16	511	492	648

∗1) Center of the rotating angle

Pad diameter ø32 to ø63
Pad form Bellows type with groove

Dimensions/With Ball Joint Female Thread Adapter: Vacuum Inlet Vertical

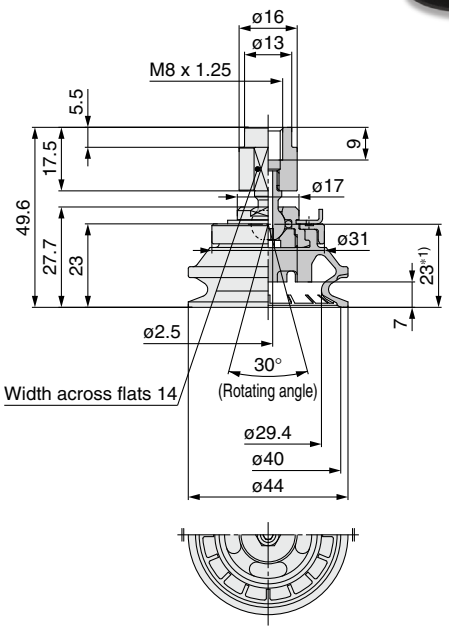
ZP3E-TF32BM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF32BM□-B8	42.9	42.4	46.5

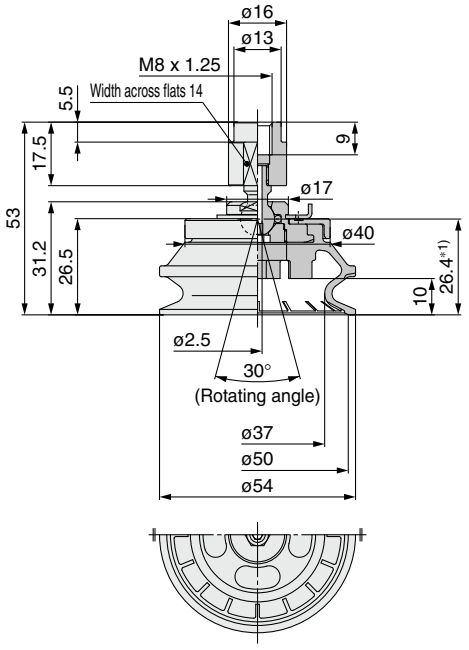
ZP3E-TF40BM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF40BM□-B8	46.9	46.0	52.9

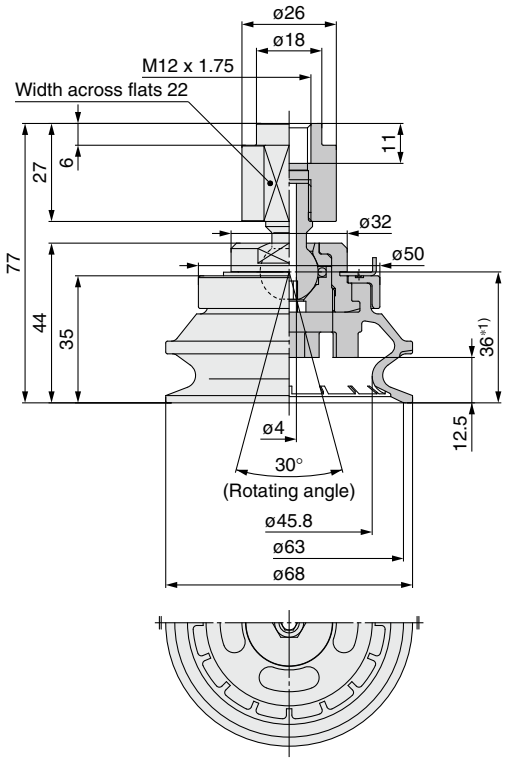
ZP3E-TF50BM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF50BM□-B8	68.5	67.0	79.0

ZP3E-TF63BM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF63BM□-B12	168	165	188

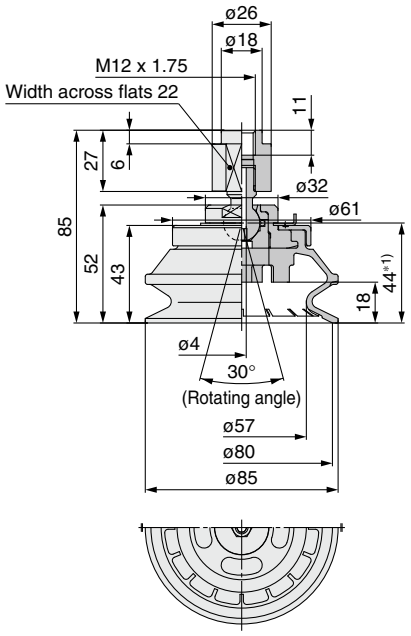
*1) Center of the rotating angle

Dimensions/With Ball Joint Female Thread Adapter: Vacuum Inlet

Vertical

Pad diameter ø80 to ø125
Pad form Bellows type with groove

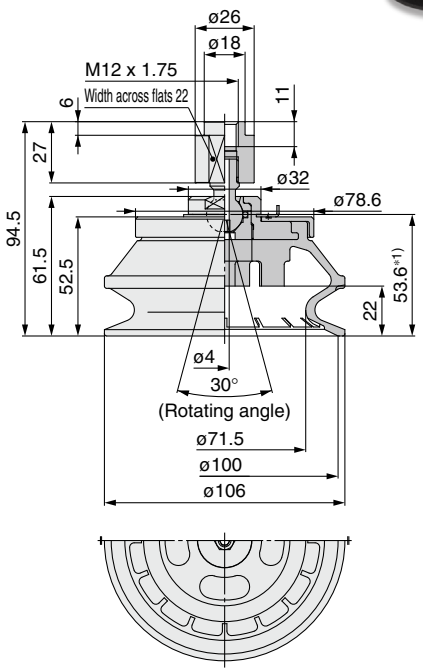
ZP3E-TF80BM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF80BM□-B12	213	208	248

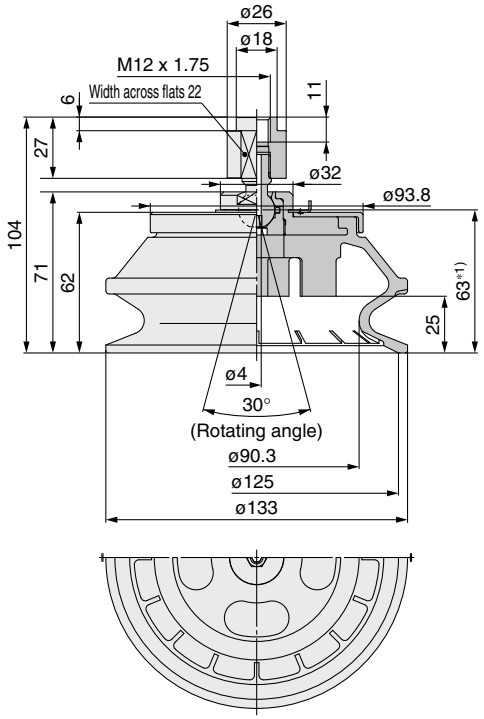
ZP3E-TF100BM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF100BM□-B12	321	310	393

ZP3E-TF125BM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-TF125BM□-B12	478	459	615

∗1) Center of the rotating angle

How to Order

Lateral vacuum inlet With ball joint adapter

ZP3E − Y F 32 UM N − AL14

Vacuum inlet direction

Symbol	Direction
Y	Lateral

Specification (mechanism)

Symbol	Specification
F	Ball joint

Pad diameter

Symbol	Pad diameter
32	ø32
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

Pad form

Symbol	Form
UM	Flat type with groove
BM	Bellows type with groove

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
CL	Mark-free NBR

Mounting thread size

	Symbol	Mounting Thread size	ø32 to ø50	ø63 to ø125
Male thread	**AL14**	M14 x 1	●	—
	AL16	M16 x 1.5	—	●
Female thread	**B8**	M8 x 1.25	●	—
	B12	M12 x 1.75	—	●

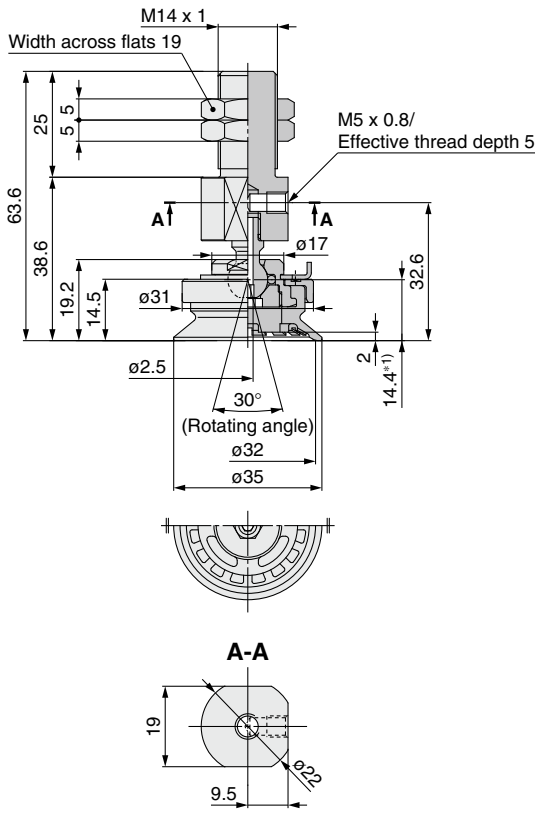
∗ Refer to page 102 for replacement parts.

Dimensions/With Ball Joint Male Thread Adapter: Vacuum Inlet Lateral

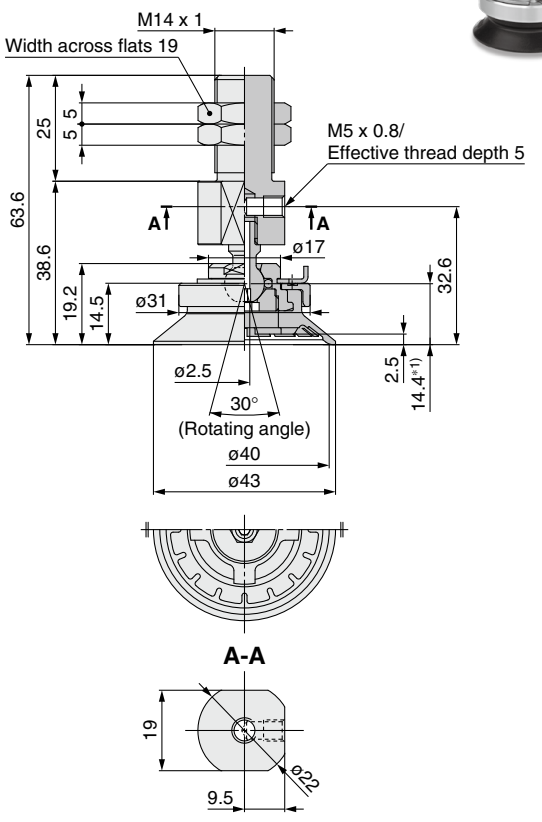
Pad diameter ø32, ø40

Pad form Flat type with groove

ZP3E-YF32UM□-AL14



ZP3E-YF40UM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF32UM□-AL14	71.7	71.3	74.1

Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF40UM□-AL14	72.7	72.3	75.8

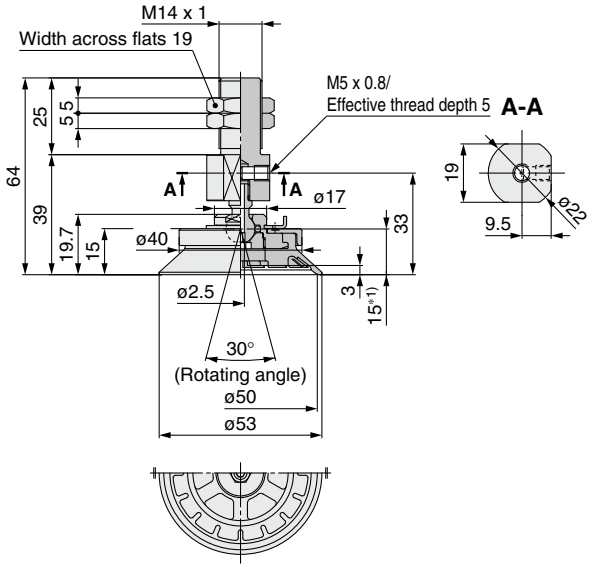
∗1) Center of the rotating angle

Dimensions/With Ball Joint Male Thread Adapter: Vacuum Inlet

Lateral

Pad diameter ø50 to ø100
Pad form Flat type with groove

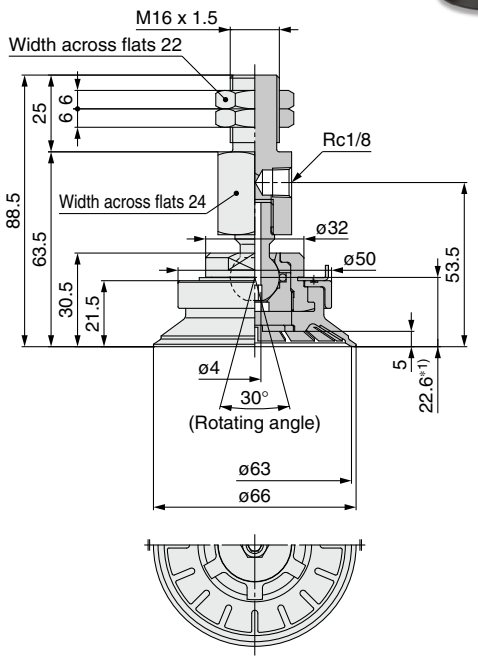
ZP3E-YF50UM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF50UM□-AL14	90.8	90.0	96.3

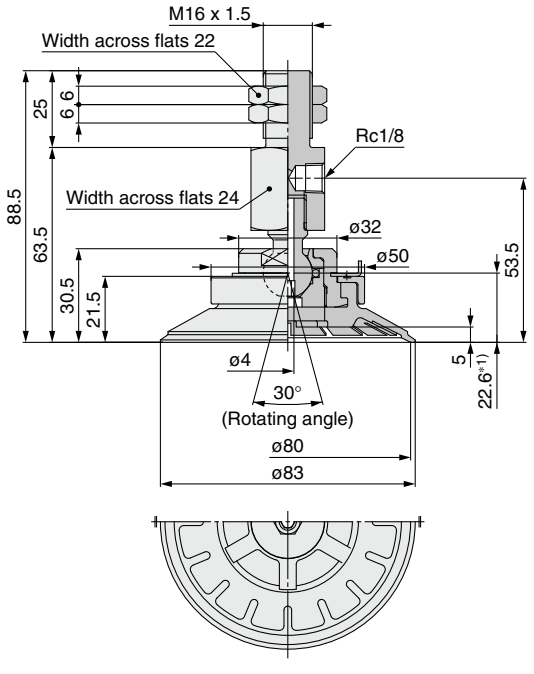
ZP3E-YF63UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF63UM□-AL16	291	290	302

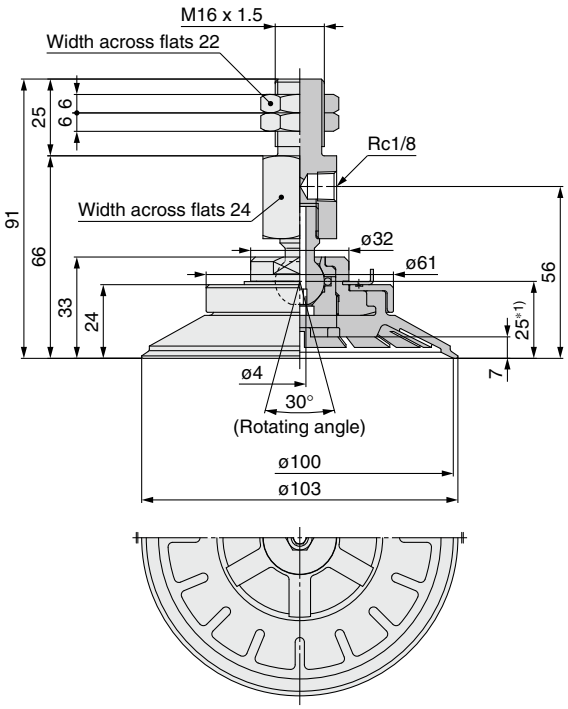
ZP3E-YF80UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF80UM□-AL16	300	297	315

ZP3E-YF100UM□-AL16



Weights [g]

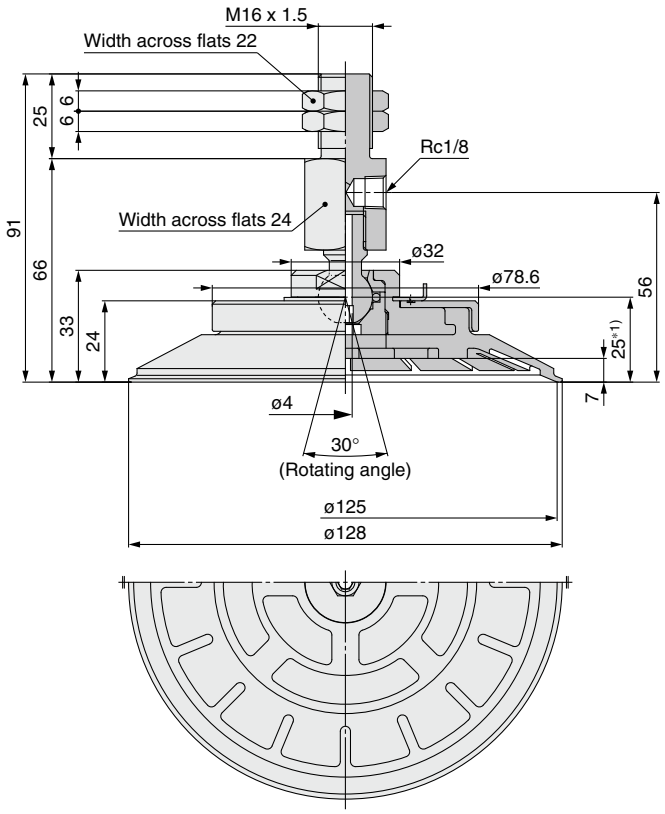
Model \ Pad material	N/U/CL	S	F
ZP3E-YF100UM□-AL16	338	334	364

∗1) Center of the rotating angle

Pad diameter ø125
Pad form Flat type with groove

Dimensions/With Ball Joint Male Thread Adapter: Vacuum Inlet Lateral

ZP3E-YF125UM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF125UM□-AL16	415	409	462

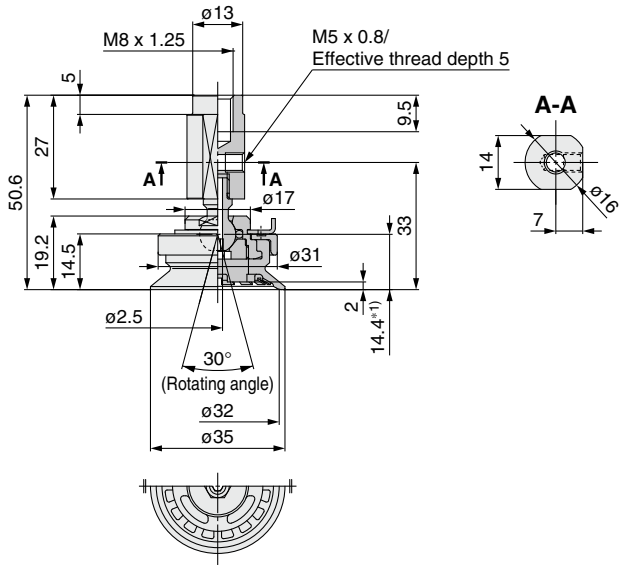
*1) Center of the rotating angle

Dimensions/With Ball Joint Female Thread Adapter: Vacuum Inlet

Lateral

Pad diameter ø32 to ø63
Pad form Flat type with groove

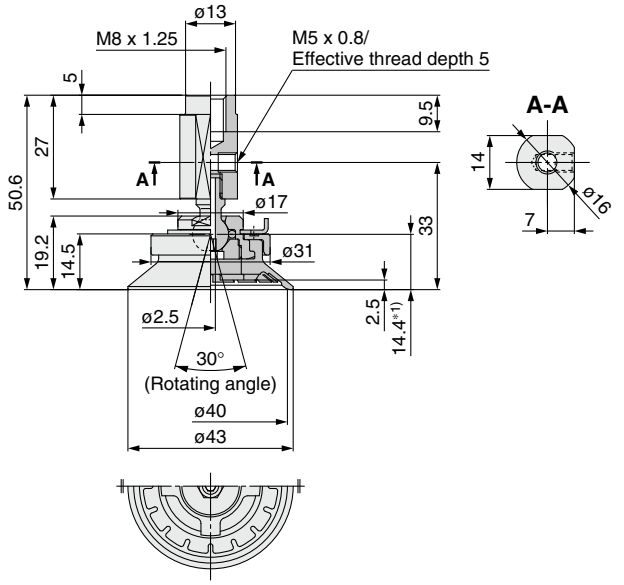
ZP3E-YF32UM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF32UM□-B8	45.1	44.7	47.5

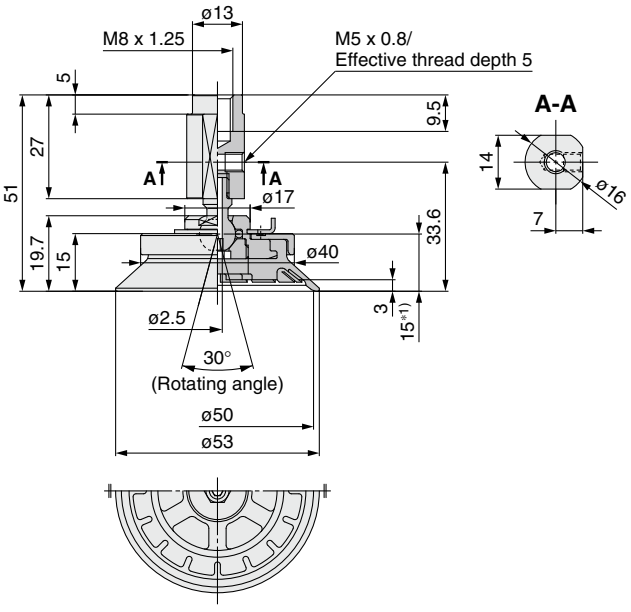
ZP3E-YF40UM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF40UM□-B8	46.1	45.7	49.2

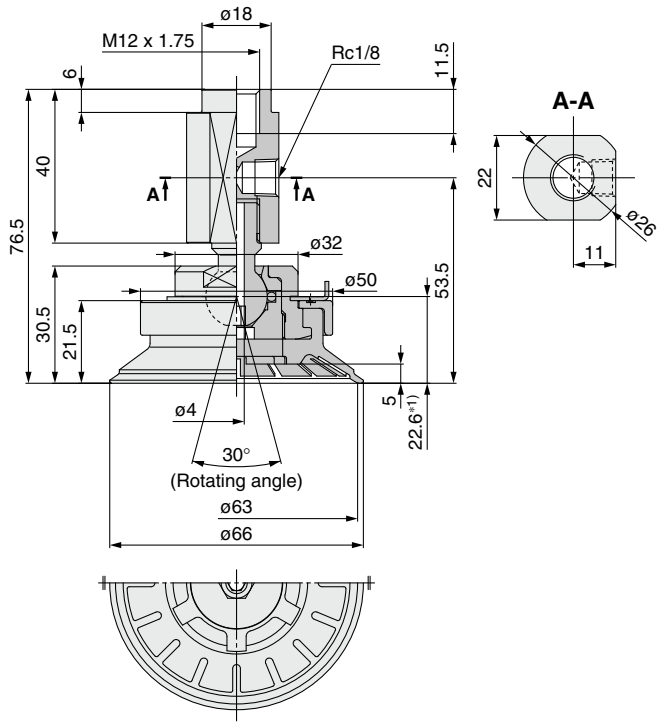
ZP3E-YF50UM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF50UM□-B8	64.2	63.4	69.7

ZP3E-YF63UM□-B12



Weights [g]

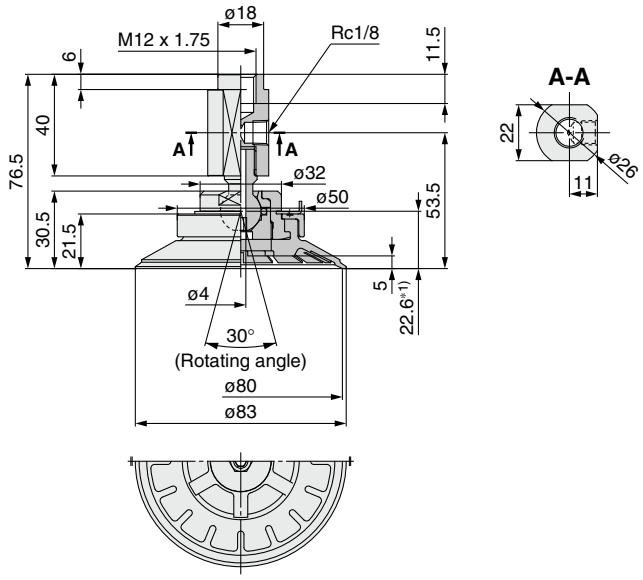
Model \ Pad material	N/U/CL	S	F
ZP3E-YF63UM□-B12	164	163	175

*1) Center of the rotating angle

Pad diameter ø80 to ø125
Pad form Flat type with groove

Dimensions/With Ball Joint Female Thread Adapter: Vacuum Inlet Lateral

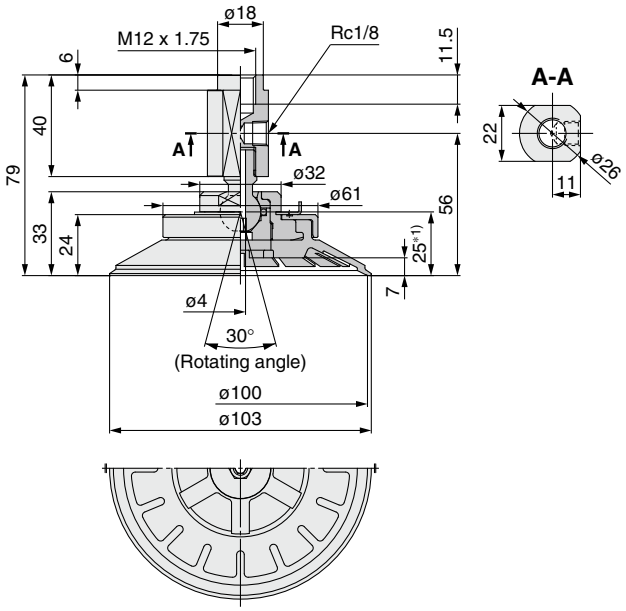
ZP3E-YF80UM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF80UM□-B12	172	170	188

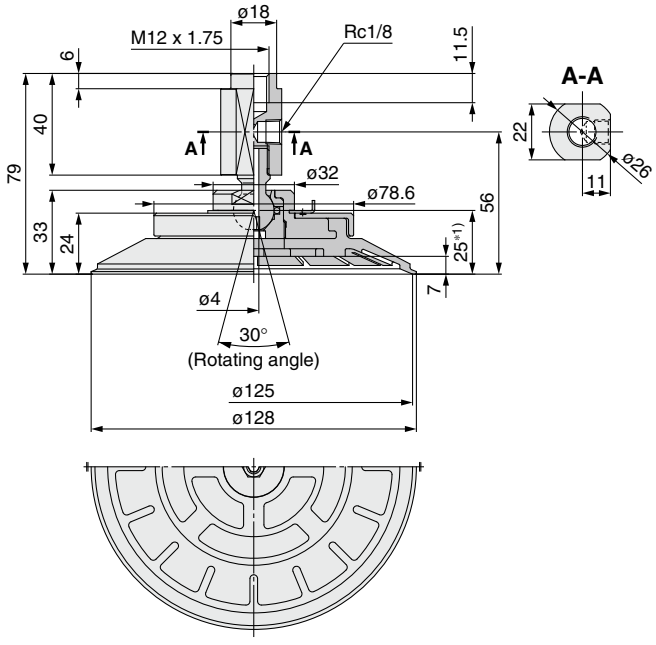
ZP3E-YF100UM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF100UM□-B12	210	207	236

ZP3E-YF125UM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF125UM□-B12	288	281	335

∗1) Center of the rotating angle

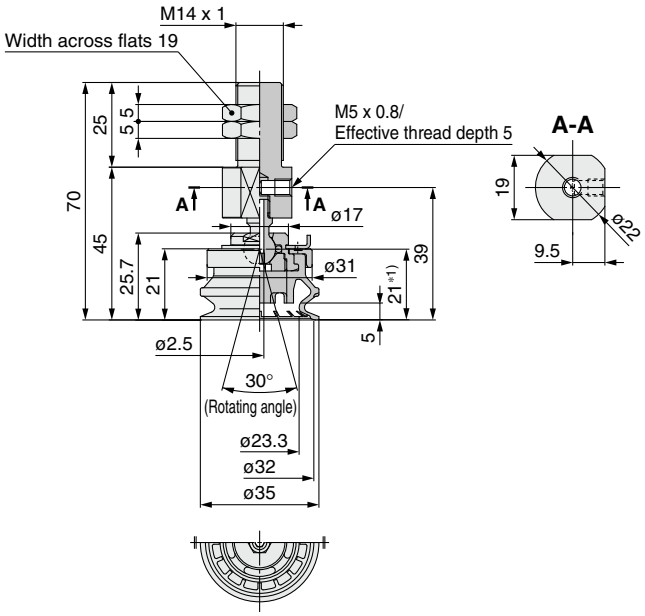
Dimensions/With Ball Joint Male Thread Adapter: Vacuum Inlet

Lateral

Pad diameter ø32 to ø63

Pad form Bellows type with groove

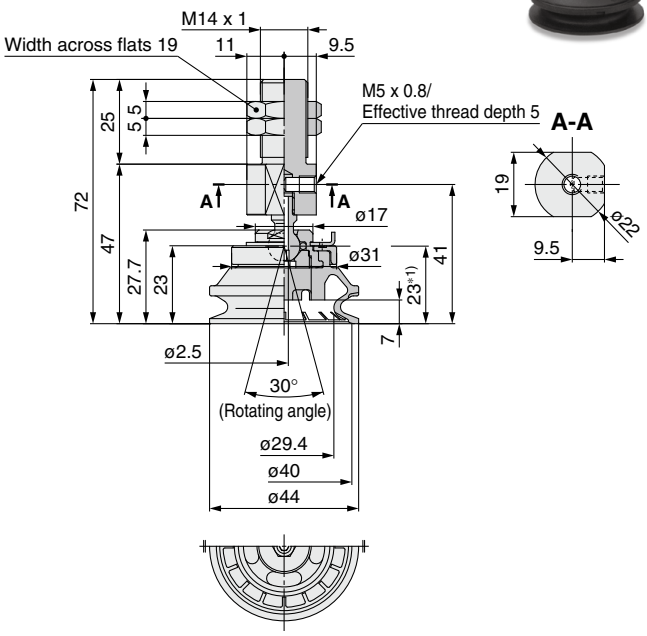
ZP3E-YF32BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF32BM□-AL14	60.9	60.4	64.6

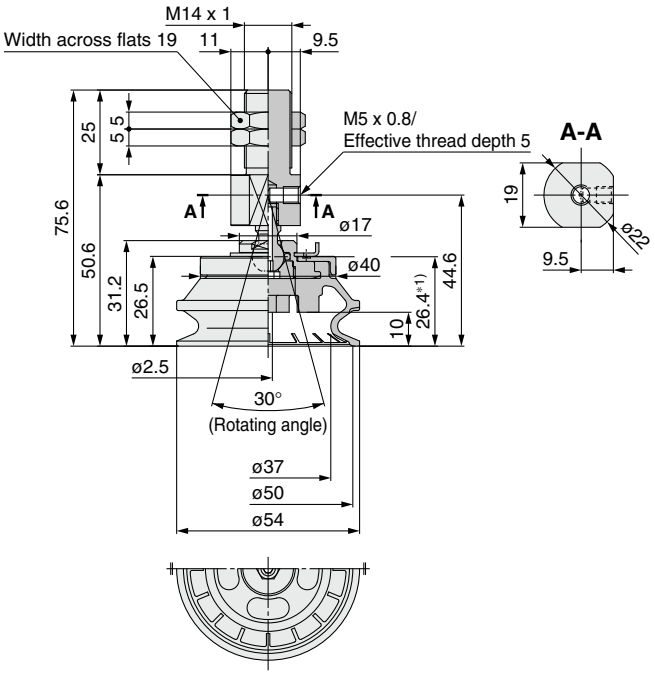
ZP3E-YF40BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF40BM□-AL14	64.9	64.1	70.9

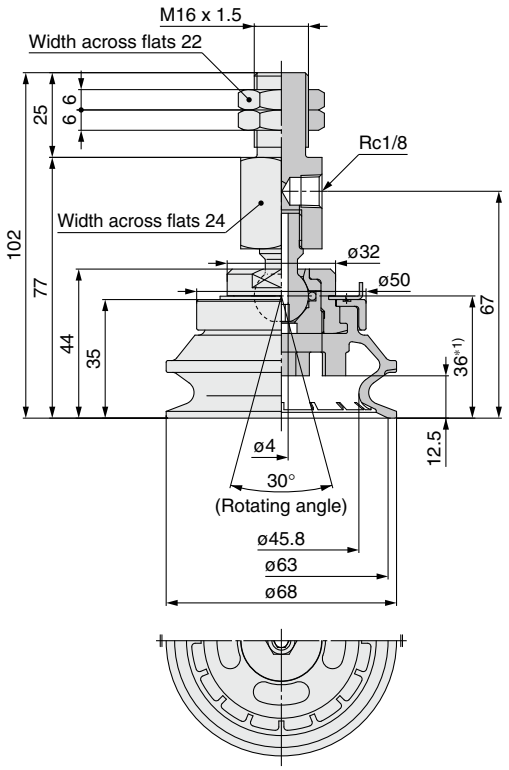
ZP3E-YF50BM□-AL14



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF50BM□-AL14	86.6	85.1	97.1

ZP3E-YF63BM□-AL16



Weights [g]

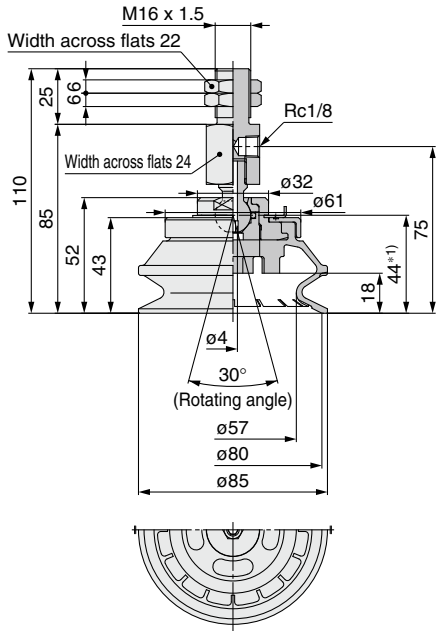
Model \ Pad material	N/U/CL	S	F
ZP3E-YF63BM□-AL16	201	198	221

∗1) Center of the rotating angle

Pad diameter ø80 to ø125
Pad form Bellows type with groove

Dimensions/With Ball Joint Male Thread Adapter: Vacuum Inlet Lateral

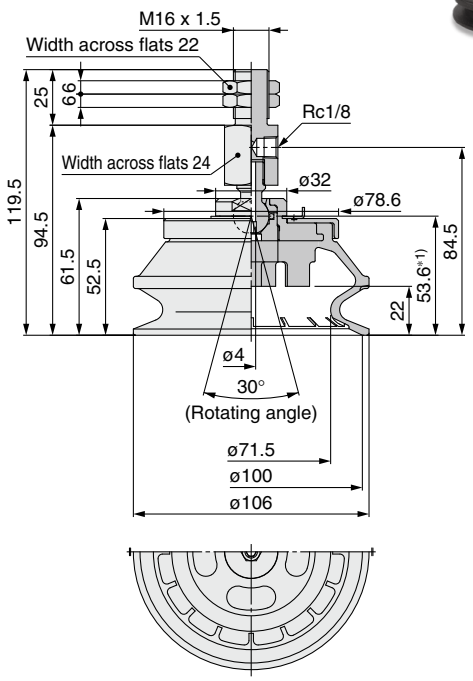
ZP3E-YF80BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF80BM□-AL16	246	241	281

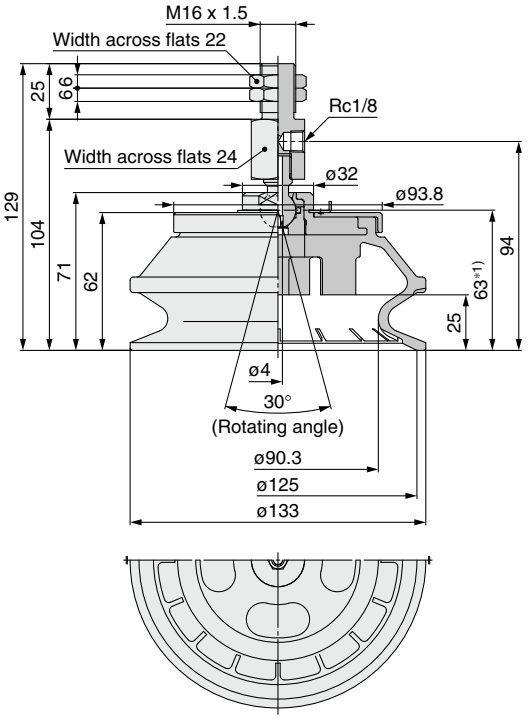
ZP3E-YF100BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF100BM□-AL16	354	343	426

ZP3E-YF125BM□-AL16



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF125BM□-AL16	511	492	648

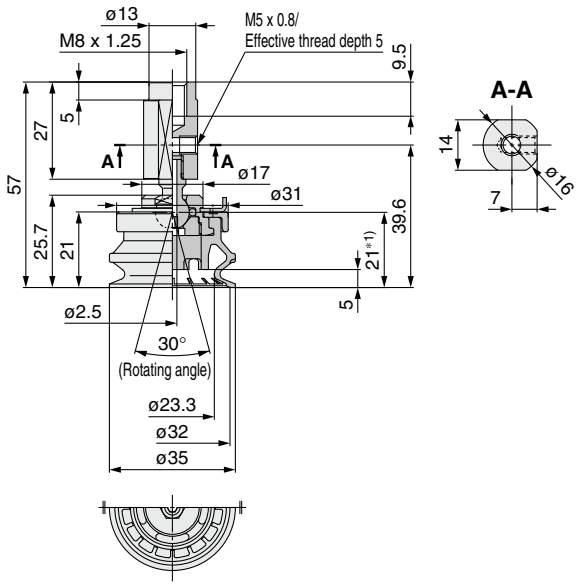
∗1) Center of the rotating angle

Dimensions/With Ball Joint Female Thread Adapter: Vacuum Inlet

Lateral

Pad diameter ø32 to ø63
Pad form Bellows type with groove

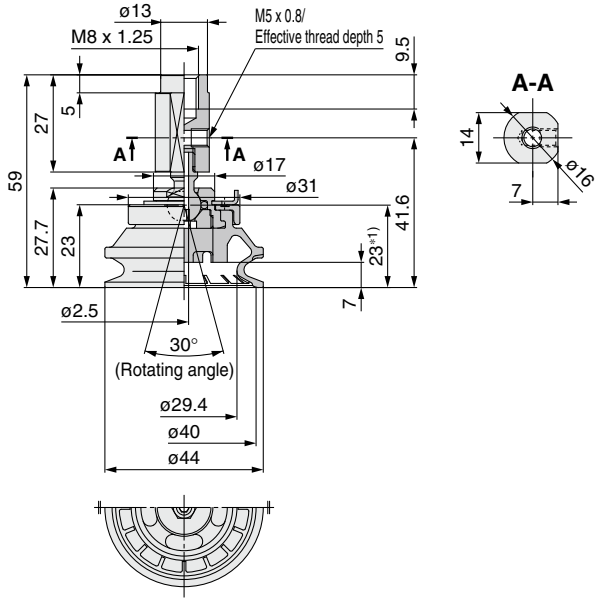
ZP3E-YF32BM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF32BM□-B8	42.9	42.4	46.5

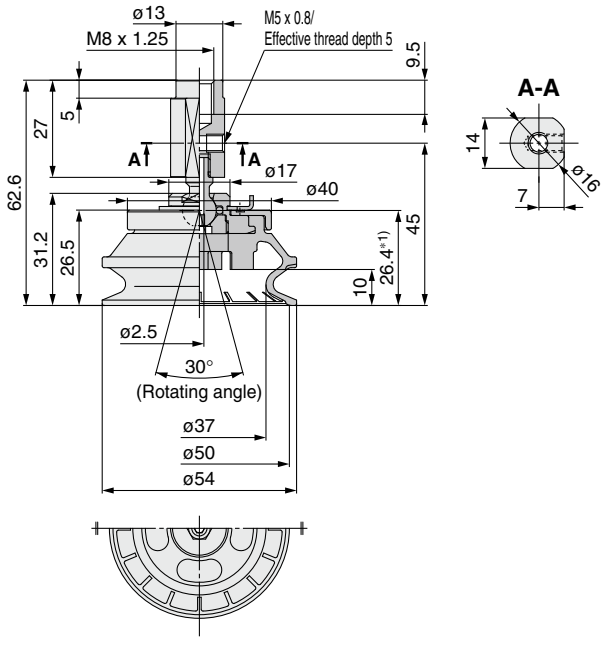
ZP3E-YF40BM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF40BM□-B8	46.9	46.0	52.9

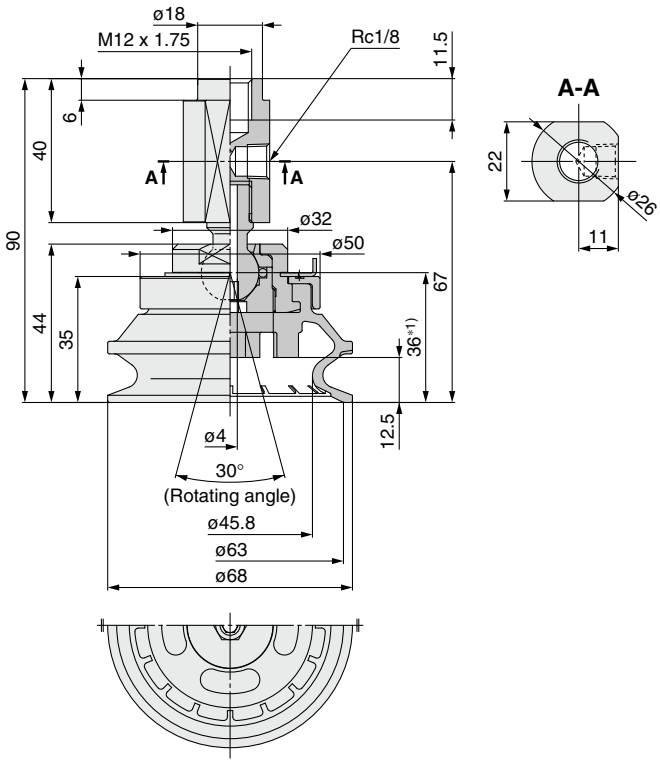
ZP3E-YF50BM□-B8



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF50BM□-B8	68.5	67.0	79.0

ZP3E-YF63BM□-B12



Weights [g]

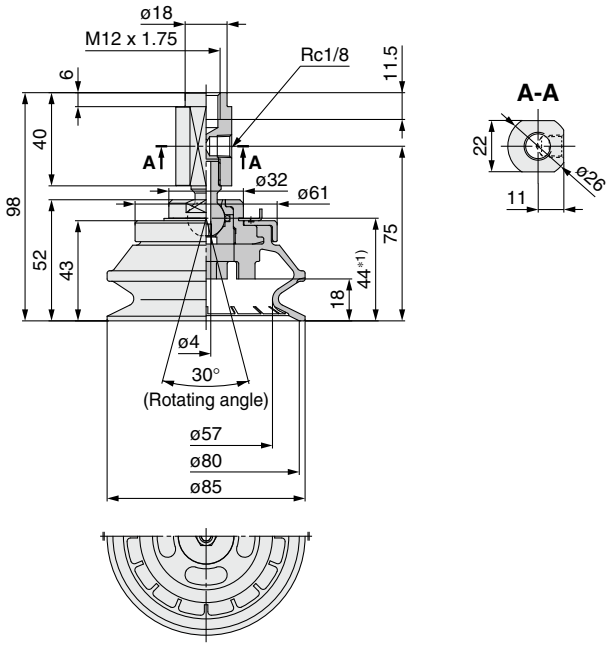
Model \ Pad material	N/U/CL	S	F
ZP3E-YF63BM□-B12	168	165	188

*1) Center of the rotating angle

Dimensions/With Ball Joint Female Thread Adapter: Vacuum Inlet Lateral

Pad diameter ø80 to ø125
Pad form Bellows type with groove

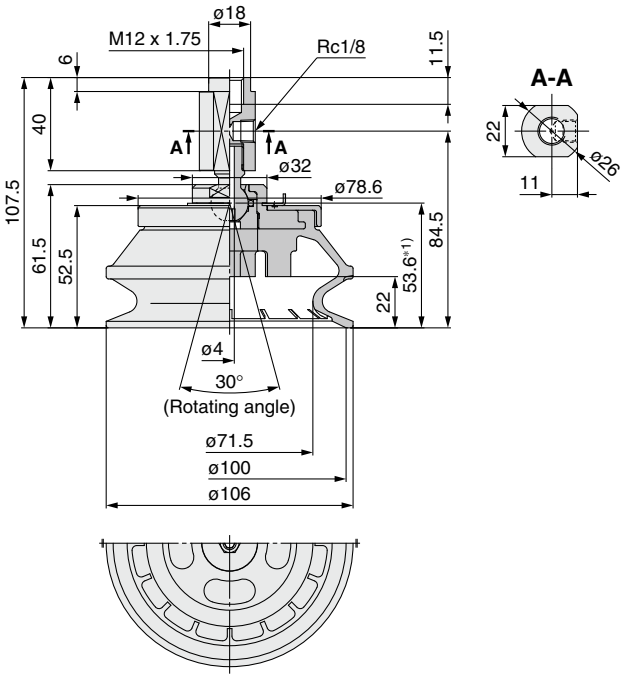
ZP3E-YF80BM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF80BM□-B12	213	208	248

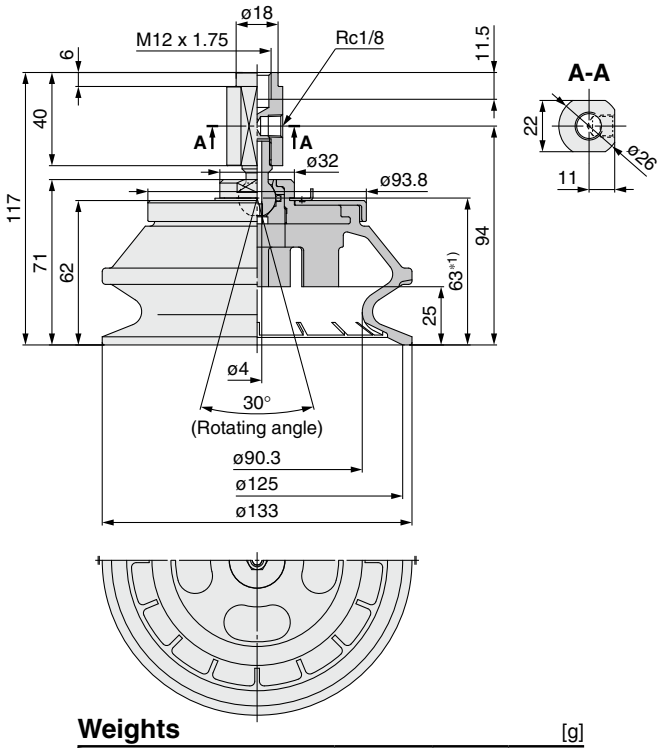
ZP3E-YF100BM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF100BM□-B12	354	343	426

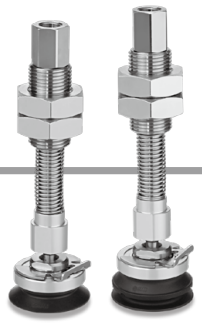
ZP3E-YF125BM□-B12



Weights [g]

Model \ Pad material	N/U/CL	S	F
ZP3E-YF125BM□-B12	511	492	648

*1) Center of the rotating angle



How to Order

With ball joint buffer **ZP3E – T F 32 UM N JB 10**

Vacuum inlet direction

Symbol	Direction
T	Vertical

Specification (mechanism)

Symbol	Specification
F	Ball joint

Pad diameter

Symbol	Pad diameter
32	ø32
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

Pad form

Symbol	Form
UM	Flat type with groove
BM	Bellows type with groove

Buffer specification

JB	Rotating, With bushing

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
CL	Mark-free NBR

Stroke (■)

Symbol	Stroke
10	10 mm
30	30 mm
50	50 mm

∗ Refer to page 103 for replacement parts.

Specifications

Buffer specification	Pad diameter	Mounting	Tightening torque [N·m]	Stroke [mm]	Spring reactive force [N]	
					At 0 stroke	At full stroke
Rotating	ø32 to ø50	M18 x 1.5	28 to 32	10	5	6.5
				30	5	8.5
				50	5	10.5
	ø63 to ø125	M22 x 1.5	45 to 50	10	10	11.5
				30	10	13.5
				50	10	15.5

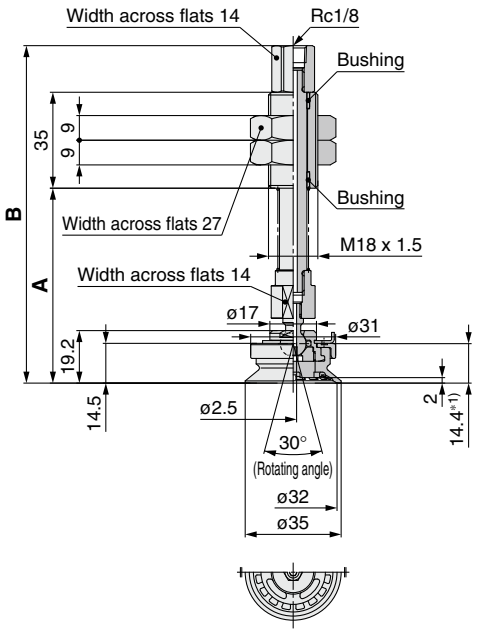
Dimensions/With Ball Joint Buffer: Vacuum Inlet

Vertical

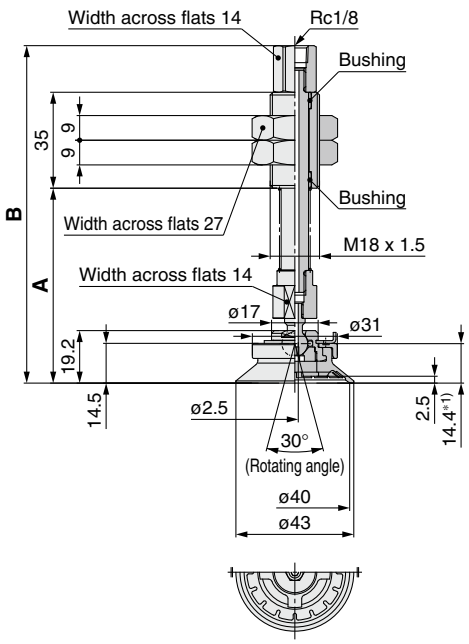
Pad diameter ø32, ø40

Pad form Flat type with groove

ZP3E-TF32UM□JB■



ZP3E-TF40UM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF32UM□JB10	71	123	204	204	207
ZP3E-TF32UM□JB30	96	148	219	218	221
ZP3E-TF32UM□JB50	116	168	230	230	233

Dimensions

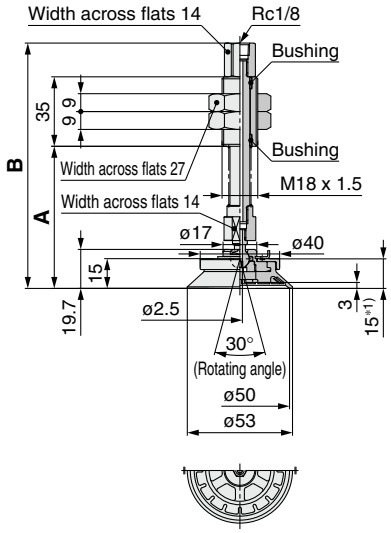
Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF40UM□JB10	71	123	205	205	208
ZP3E-TF40UM□JB30	96	148	220	219	223
ZP3E-TF40UM□JB50	116	168	231	231	234

∗1) Center of the rotating angle

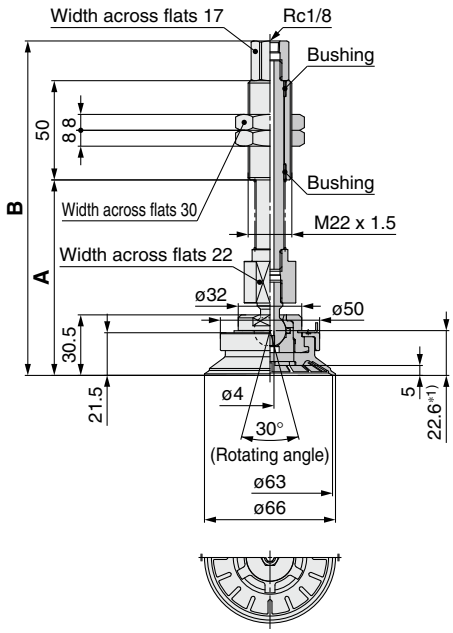
Dimensions/With Ball Joint Buffer: Vacuum Inlet Vertical

Pad diameter ø50 to ø100
Pad form Flat type with groove

ZP3E-TF50UM□JB■



ZP3E-TF63UM□JB■



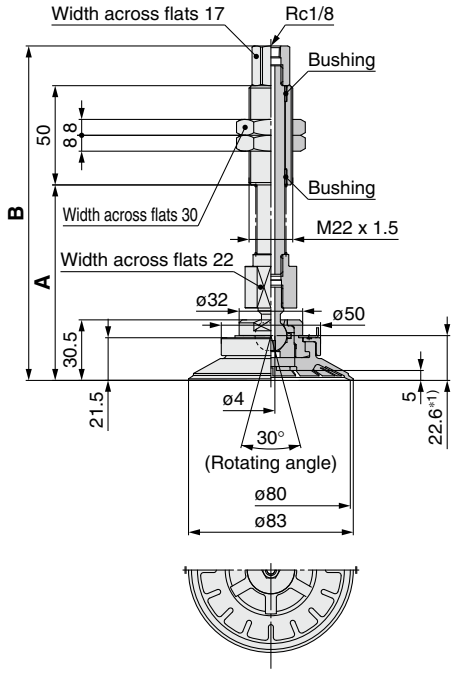
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF50UM□JB10	71.5	123.6	223	222	229
ZP3E-TF50UM□JB30	96.5	148.6	238	237	243
ZP3E-TF50UM□JB50	116.5	168.6	249	249	255

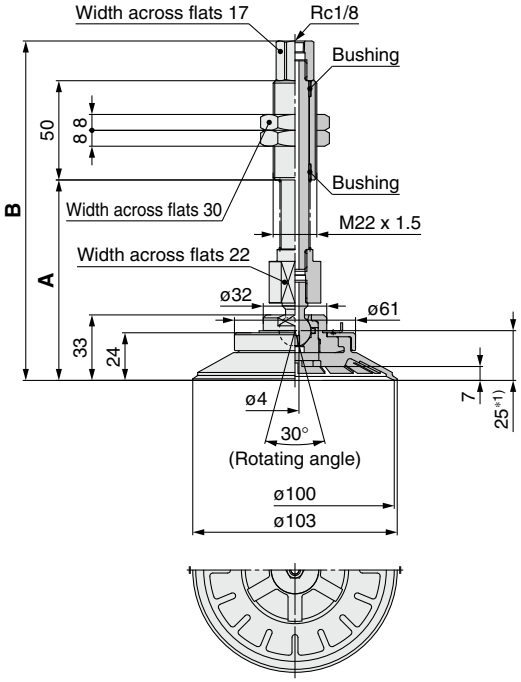
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF63UM□JB10	98.5	168.5	434	433	445
ZP3E-TF63UM□JB30	123.5	193.5	464	462	474
ZP3E-TF63UM□JB50	143.5	213.5	487	485	497

ZP3E-TF80UM□JB■



ZP3E-TF100UM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF80UM□JB10	98.5	168.5	443	441	458
ZP3E-TF80UM□JB30	123.5	193.5	472	470	487
ZP3E-TF80UM□JB50	143.5	213.5	495	493	510

Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF100UM□JB10	101	171	481	477	507
ZP3E-TF100UM□JB30	126	196	510	506	536
ZP3E-TF100UM□JB50	146	216	533	529	559

∗1) Center of the rotating angle

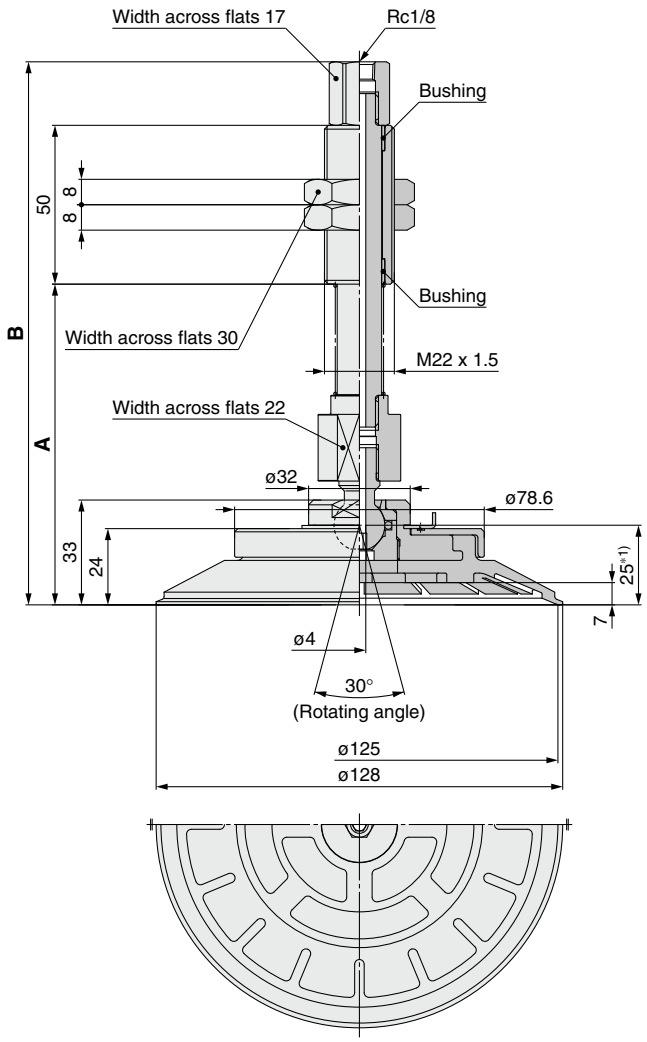
Dimensions/With Ball Joint Buffer: Vacuum Inlet

Vertical

Pad diameter ø125

Pad form Flat type with groove

ZP3E-TF125UM□JB■



Dimensions

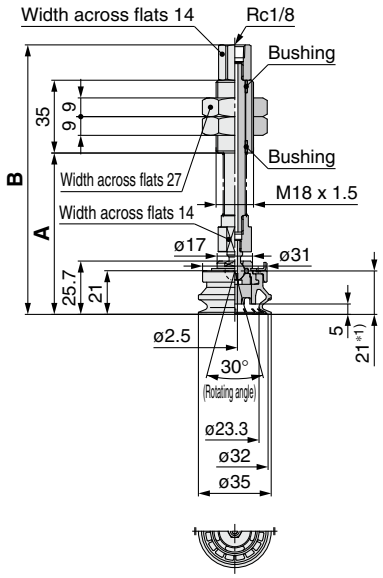
Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF125UM□JB10	101	171	558	552	605
ZP3E-TF125UM□JB30	126	196	588	581	634
ZP3E-TF125UM□JB50	146	216	610	604	657

*1) Center of the rotating angle

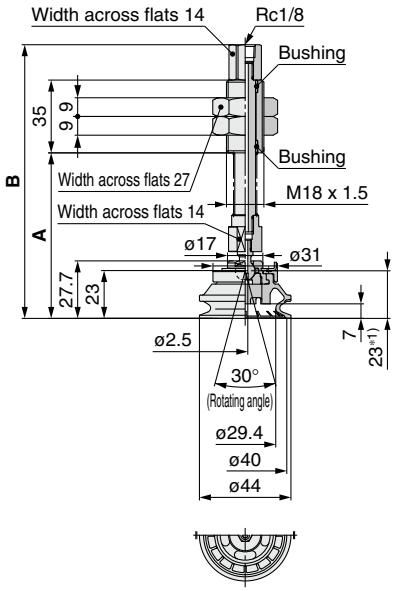
Dimensions/With Ball Joint Buffer: Vacuum Inlet Vertical

Pad diameter ø32 to ø63
Pad form Bellows type with groove

ZP3E-TF32BM□JB■



ZP3E-TF40BM□JB■



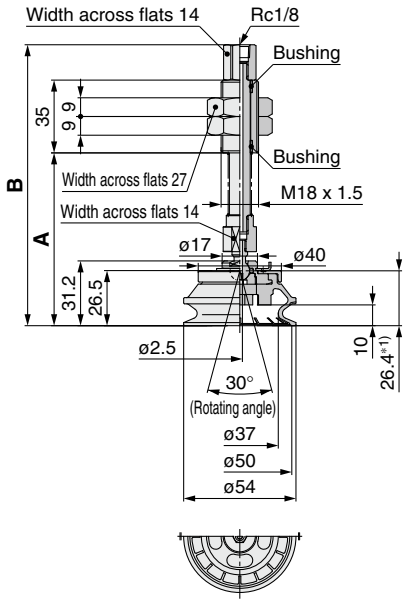
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF32BM□JB10	77.6	129.6	206	206	210
ZP3E-TF32BM□JB30	102.6	154.6	221	220	224
ZP3E-TF32BM□JB50	122.6	174.6	232	232	236

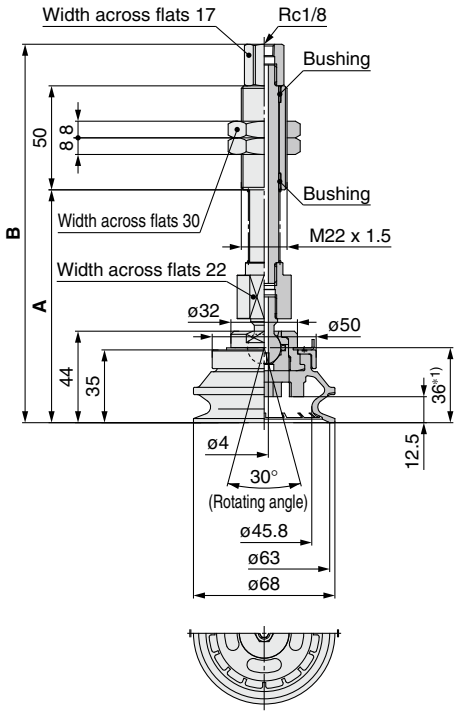
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF40BM□JB10	79.6	131.6	210	209	216
ZP3E-TF40BM□JB30	104.6	156.6	225	224	231
ZP3E-TF40BM□JB50	124.6	176.6	236	235	242

ZP3E-TF50BM□JB■



ZP3E-TF63BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF50BM□JB10	83	135	232	230	242
ZP3E-TF50BM□JB30	108	160	246	245	257
ZP3E-TF50BM□JB50	128	180	258	256	268

Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF63BM□JB10	112	182	451	448	471
ZP3E-TF63BM□JB30	137	207	480	477	501
ZP3E-TF63BM□JB50	157	227	503	500	523

∗1) Center of the rotating angle

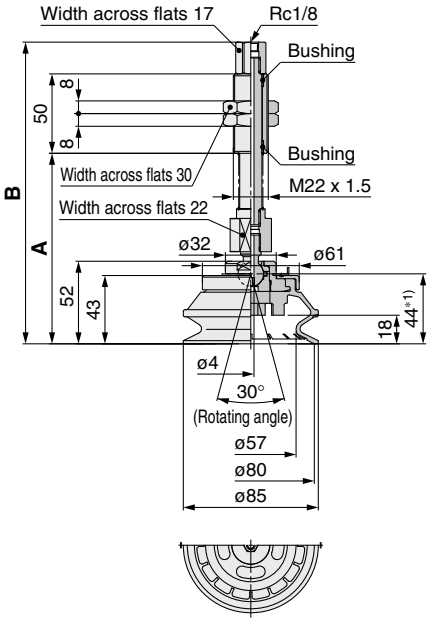
Dimensions/With Ball Joint Buffer: Vacuum Inlet

Vertical

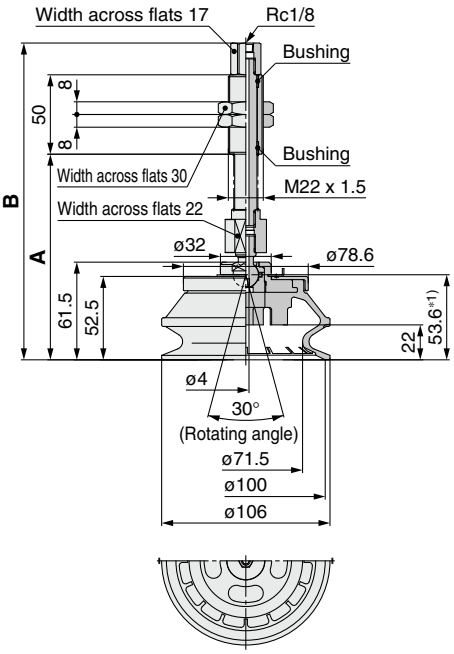
Pad diameter ø80 to ø125

Pad form Bellows type with groove

ZP3E-TF80BM□JB■



ZP3E-TF100BM□JB■



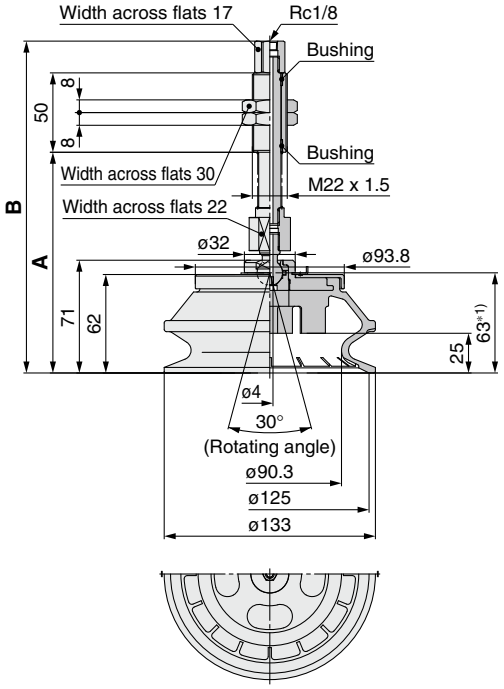
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF80BM□JB10	120	190	496	491	531
ZP3E-TF80BM□JB30	145	215	525	520	561
ZP3E-TF80BM□JB50	165	235	548	543	583

Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF100BM□JB10	129.5	199.5	604	593	676
ZP3E-TF100BM□JB30	154.5	224.5	633	622	705
ZP3E-TF100BM□JB50	174.5	244.5	656	645	728

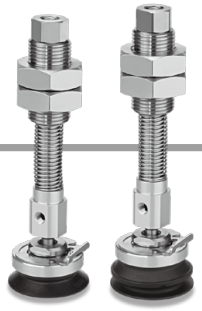
ZP3E-TF125BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-TF125BM□JB10	139	209	761	742	898
ZP3E-TF125BM□JB30	164	234	790	771	927
ZP3E-TF125BM□JB50	184	254	813	794	950

∗1) Center of the rotating angle



How to Order

With ball joint buffer **ZP3E − Y F 32 UM N JB 10**

Vacuum inlet direction

Symbol	Direction
Y	Lateral

Specification (mechanism)

Symbol	Specification
F	Ball joint

Pad diameter

Symbol	Pad diameter
32	ø32
40	ø40
50	ø50
63	ø63
80	ø80
100	ø100
125	ø125

Pad form

Symbol	Form
UM	Flat type with groove
BM	Bellows type with groove

Pad material

Symbol	Material
N	NBR
S	Silicone rubber
U	Urethane rubber
F	FKM
CL	Mark-free NBR

Buffer specification

JB	Rotating, With bushing

Stroke (■)

Symbol	Stroke
10	10 mm
30	30 mm
50	50 mm

∗ Refer to page 103 for replacement parts.

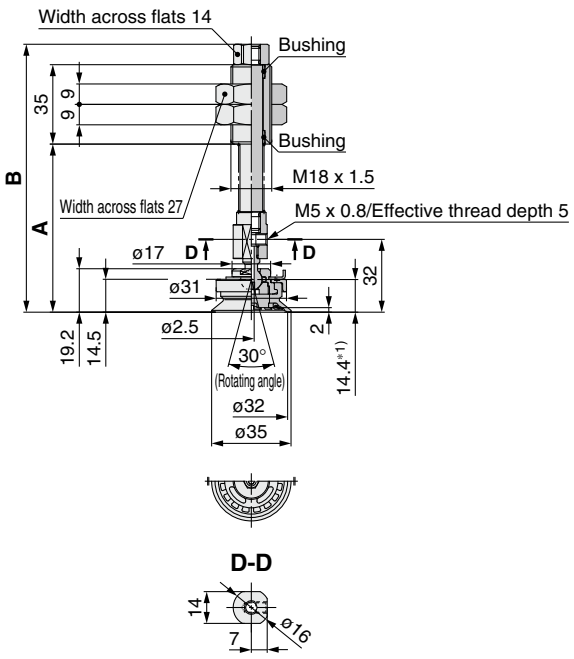
Specifications

Buffer specification	Pad diameter	Mounting	Tightening torque [N·m]	Stroke [mm]	Spring reactive force [N]	
					At 0 stroke	At full stroke
Rotating	ø32 to ø50	M18 x 1.5	28 to 32	10	5	6.5
				30	5	8.5
				50	5	10.5
	ø63 to ø125	M22 x 1.5	45 to 50	10	10	11.5
				30	10	13.5
				50	10	15.5

Dimensions/With Ball Joint Buffer: Vacuum Inlet Lateral

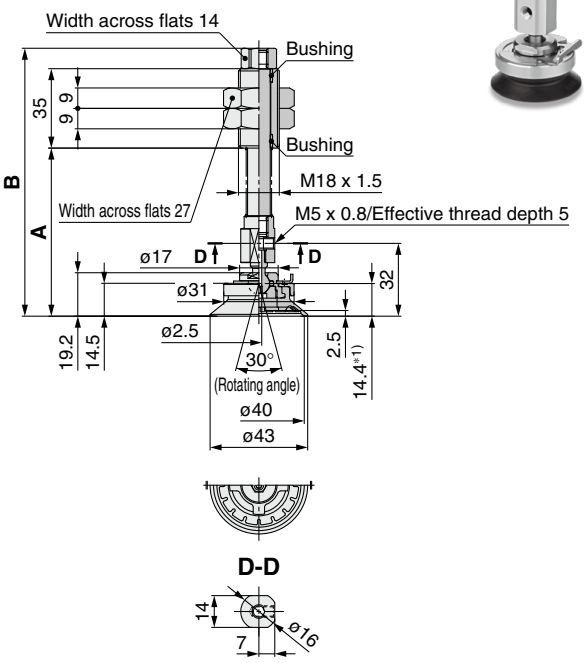
Pad diameter ø32, ø40
Pad form Flat type with groove

ZP3E-YF32UM□JB■



D-D

ZP3E-YF40UM□JB■



D-D

Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF32UM□JB10	74	118	202	202	204
ZP3E-YF32UM□JB30	99	143	218	218	221
ZP3E-YF32UM□JB50	119	163	231	230	233

Dimensions

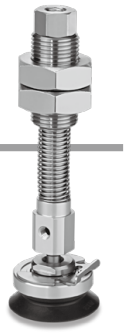
Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF40UM□JB10	74	118	203	203	206
ZP3E-YF40UM□JB30	99	143	219	219	222
ZP3E-YF40UM□JB50	119	163	232	231	235

∗1) Center of the rotating angle

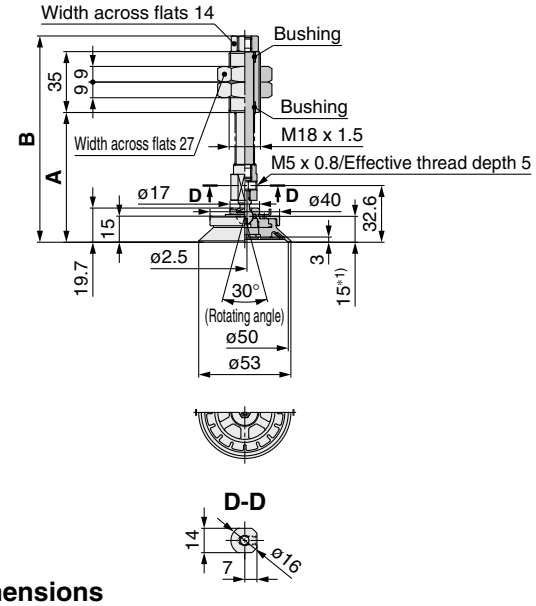
Dimensions/With Ball Joint Buffer: Vacuum Inlet

Lateral

Pad diameter ø50 to ø100
Pad form Flat type with groove



ZP3E-YF50UM□JB■

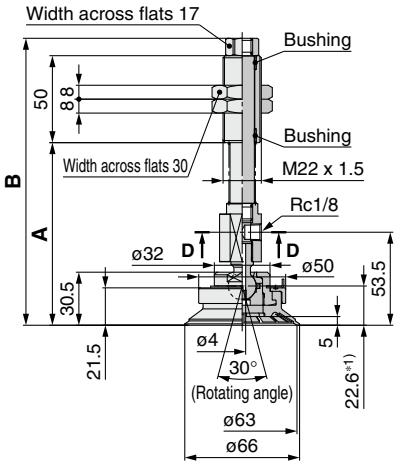


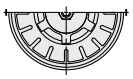
D-D

Dimensions

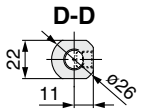
Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF50UM□JB10	74.6	118.6	221	220	227
ZP3E-YF50UM□JB30	99.6	143.6	237	236	243
ZP3E-YF50UM□JB50	119.6	163.6	250	249	255

ZP3E-YF63UM□JB■





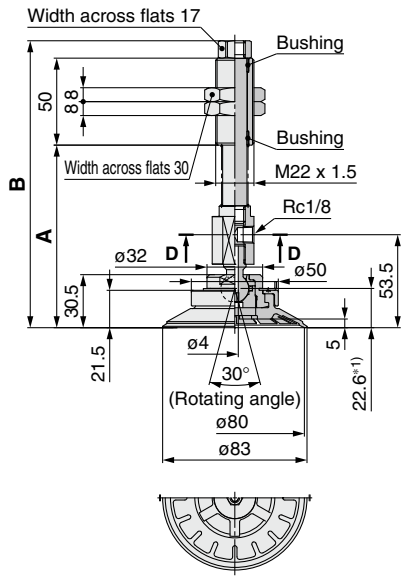
D-D



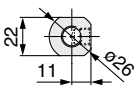
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF63UM□JB10	105	165	436	434	446
ZP3E-YF63UM□JB30	130	190	467	465	477
ZP3E-YF63UM□JB50	150	210	492	490	502

ZP3E-YF80UM□JB■



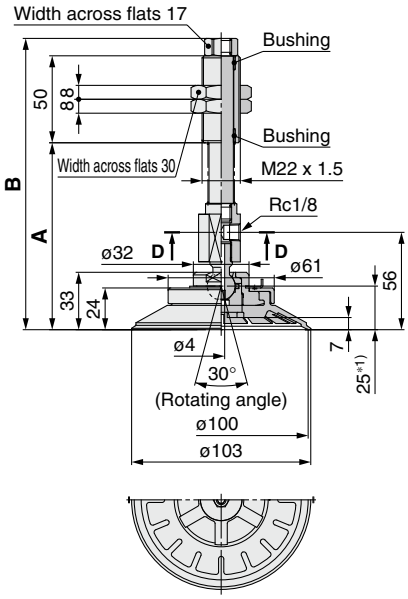
D-D



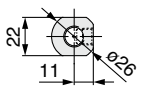
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF80UM□JB10	105	165	444	442	459
ZP3E-YF80UM□JB30	130	190	475	473	490
ZP3E-YF80UM□JB50	150	210	500	498	515

ZP3E-YF100UM□JB■



D-D



Dimensions

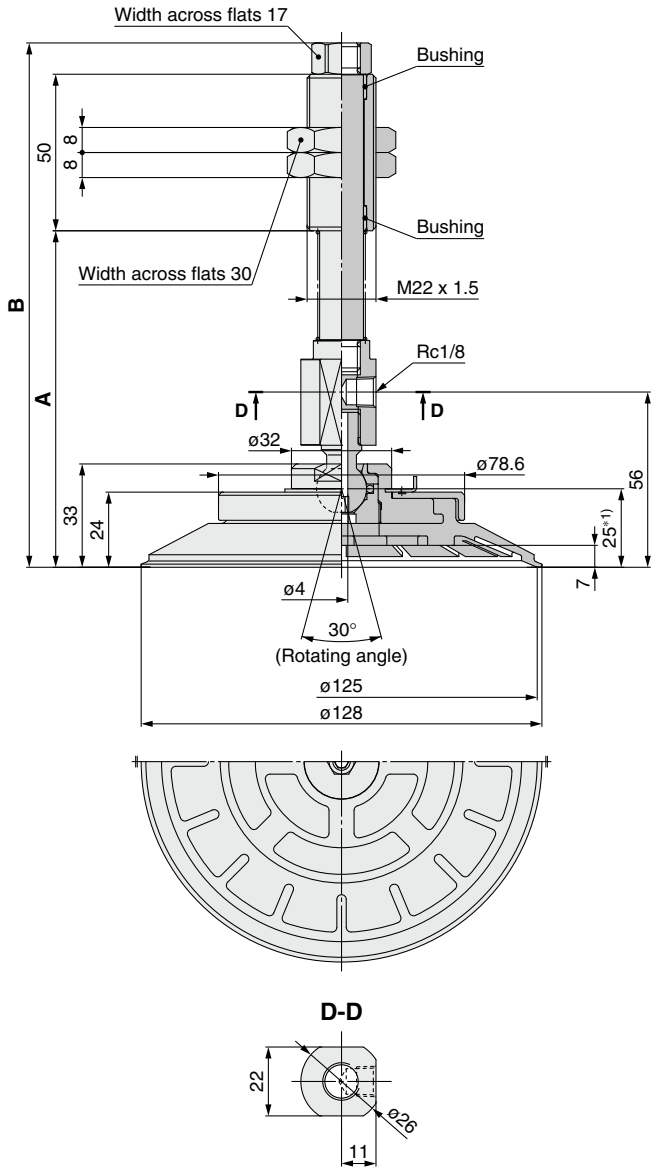
Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF100UM□JB10	107.5	167.5	482	478	508
ZP3E-YF100UM□JB30	132.5	192.5	513	509	539
ZP3E-YF100UM□JB50	152.5	212.5	538	534	564

∗1) Center of the rotating angle

Dimensions/With Ball Joint Buffer: Vacuum Inlet Lateral

Pad diameter ø125
Pad form Flat type with groove

ZP3E-YF125UM□JB■



D-D

Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF125UM□JB10	107.5	167.5	559	553	606
ZP3E-YF125UM□JB30	132.5	192.5	591	584	637
ZP3E-YF125UM□JB50	152.5	212.5	616	609	662

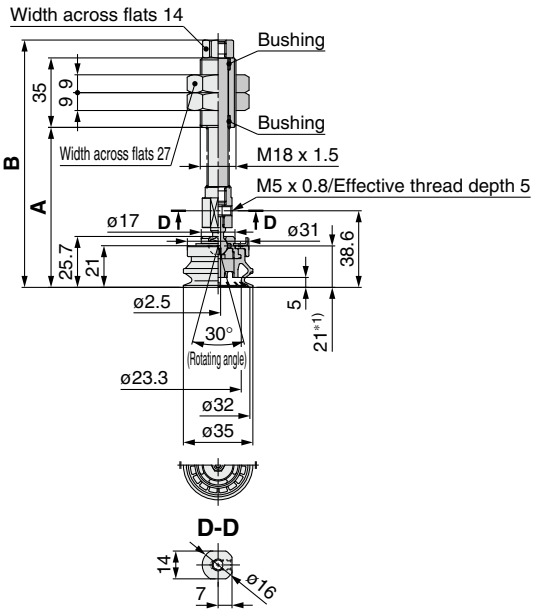
*1) Center of the rotating angle

Dimensions/With Ball Joint Buffer: Vacuum Inlet

Lateral

Pad diameter ø32 to ø63
Pad form Bellows type with groove

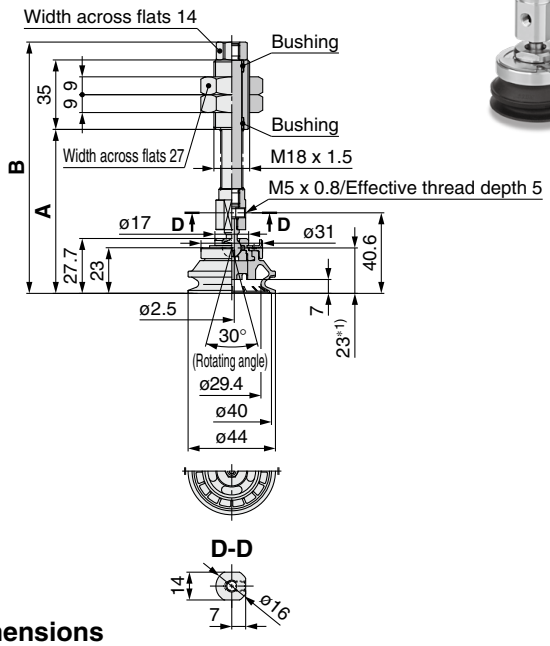
ZP3E-YF32BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF32BM□JB10	80.6	124.6	204	203	208
ZP3E-YF32BM□JB30	105.6	149.6	220	220	224
ZP3E-YF32BM□JB50	125.6	169.6	233	232	236

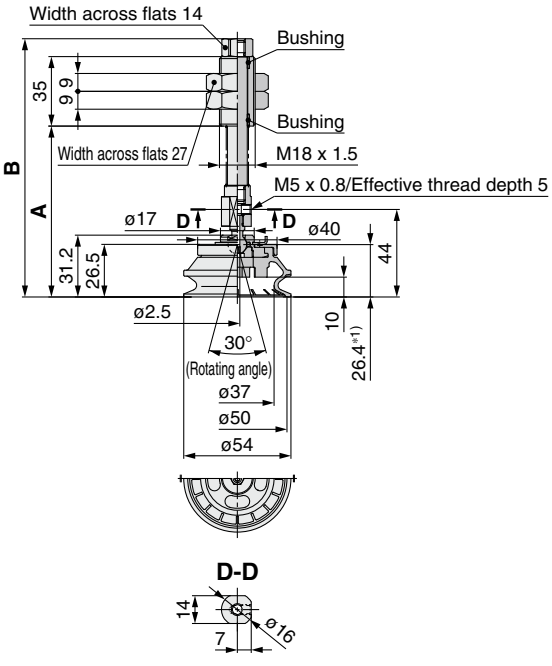
ZP3E-YF40BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF40BM□JB10	82.6	126.6	208	207	214
ZP3E-YF40BM□JB30	107.6	151.6	224	223	230
ZP3E-YF40BM□JB50	127.6	171.6	237	236	243

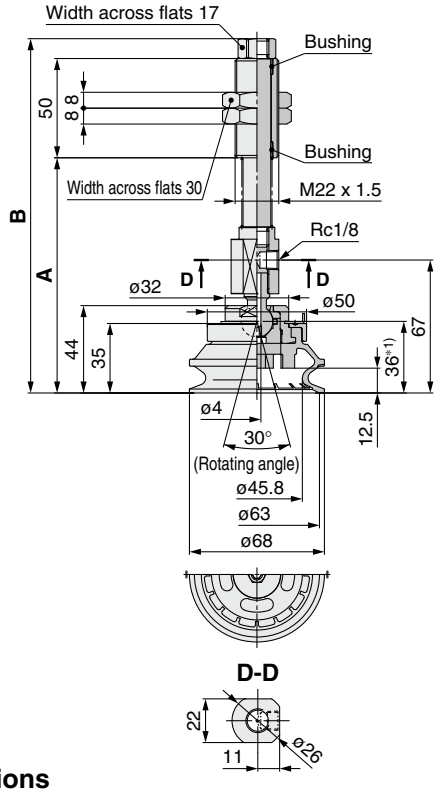
ZP3E-YF50BM□JB■



Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF50BM□JB10	86	130	230	228	240
ZP3E-YF50BM□JB30	111	155	246	244	256
ZP3E-YF50BM□JB50	131	175	258	257	269

ZP3E-YF63BM□JB■



Dimensions

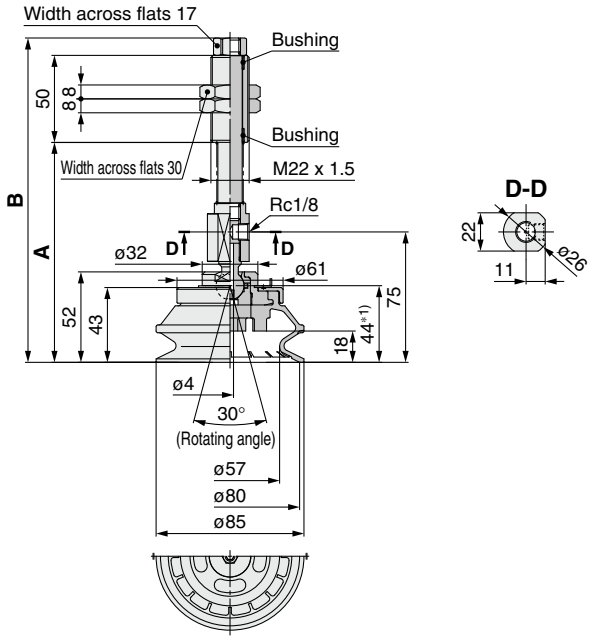
Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF63BM□JB10	118.5	178.5	452	449	472
ZP3E-YF63BM□JB30	143.5	203.5	483	480	504
ZP3E-YF63BM□JB50	163.5	223.5	508	505	529

∗1) Center of the rotating angle

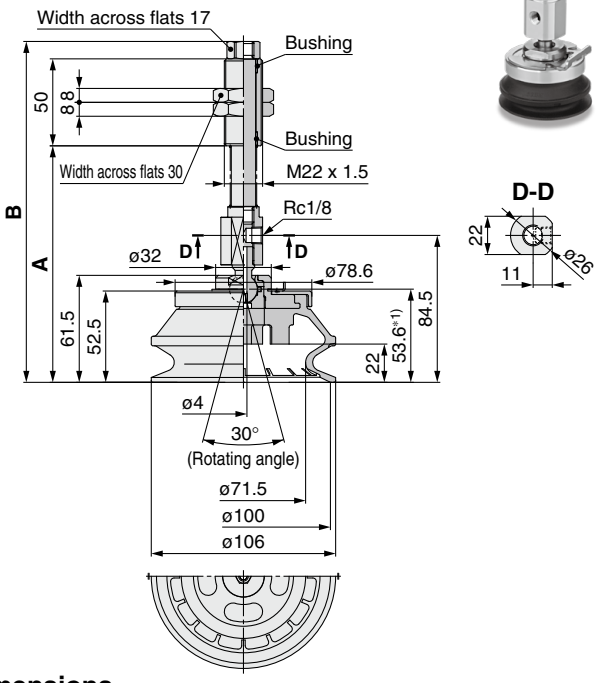
Dimensions/With Ball Joint Buffer: Vacuum Inlet Lateral

Pad diameter ø80 to ø125
Pad form Bellows type with groove

ZP3E-YF80BM□JB■



ZP3E-YF100BM□JB■



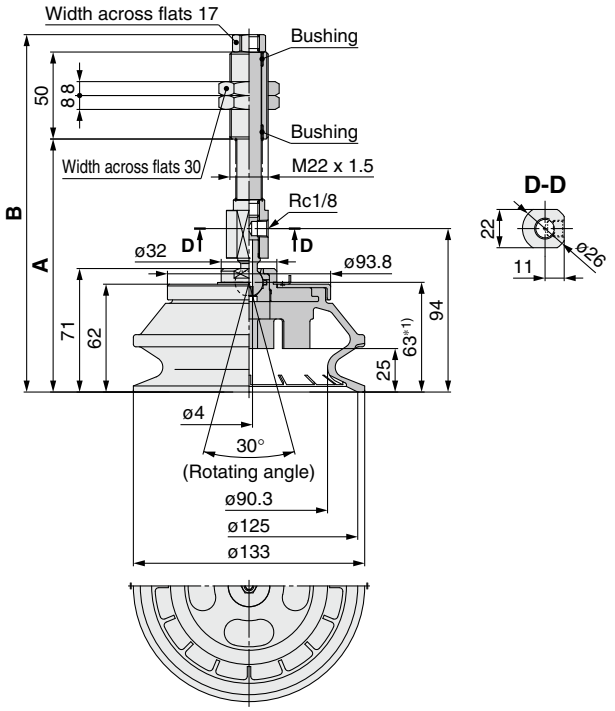
Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF80BM□JB10	126.5	186.5	497	492	532
ZP3E-YF80BM□JB30	151.5	211.5	529	524	564
ZP3E-YF80BM□JB50	171.5	231.5	553	548	589

Dimensions

Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF100BM□JB10	136	196	605	594	677
ZP3E-YF100BM□JB30	161	221	636	625	708
ZP3E-YF100BM□JB50	181	241	661	650	733

ZP3E-YF125UM□JB■



Dimensions

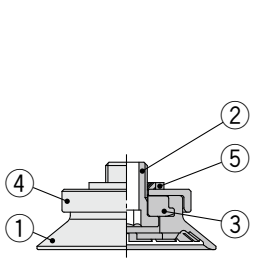
Model	A	B	Weight [g]/Pad material		
			N/U/CL	S	F
ZP3E-YF125BM□JB10	145.5	205.5	762	743	899
ZP3E-YF125BM□JB30	170.5	230.5	793	774	930
ZP3E-YF125BM□JB50	190.5	250.5	818	799	955

∗1) Center of the rotating angle

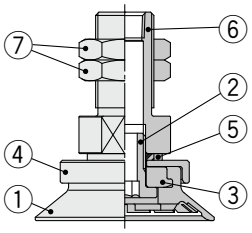
Construction

Pad with Adapter

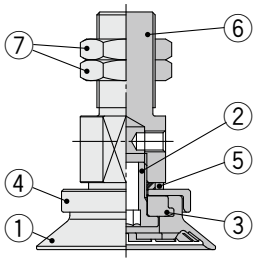
Male thread



With set screw

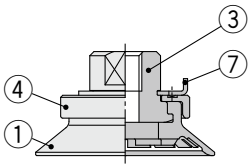


With male thread adapter
(Vacuum inlet: Vertical)

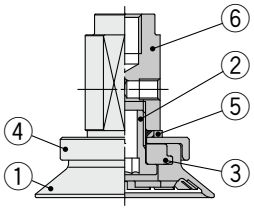


With male thread adapter
(Vacuum inlet: Lateral)

Female thread



With female thread plate
(Vacuum inlet: Vertical)



With female thread adapter
(Vacuum inlet: Lateral)

Component Parts (Male thread)

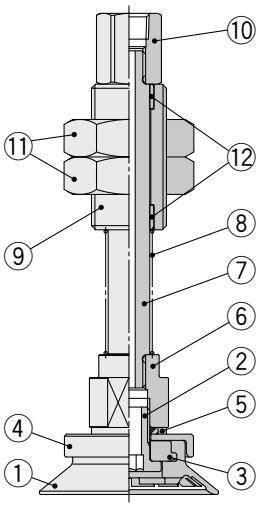
No.	Description	Material (Surface treatment)	Note
1	**Vacuum pad**	NBR, Silicone rubber, Urethane rubber, FKM, Mark-free NBR	Pad form: Flat type with groove, Bellows type with groove
2	**Set screw**	Brass (Electroless nickel plating)	
3	**Plate**	Aluminum alloy (Clear anodized)	
4	**Holder**	Aluminum alloy (Clear anodized)	Pad diameter: ø32 to ø50
		Structural steel (Electroless nickel plating)	Pad diameter: ø63 to ø125
5	**Seal washer**	Steel strip/NBR	
6	**Adapter**	Aluminum alloy (Clear anodized)	Pad diameter: ø32 to ø50
		Brass (Electroless nickel plating)	Pad diameter: ø63 to ø125
7	**Nut**	Brass (Electroless nickel plating)	Pad diameter: ø32 to ø50
		Structural steel (Nickel plating)	Pad diameter: ø63 to ø125

∗ ② to ⑦ are used for both the flat type with groove and the bellows type with groove.

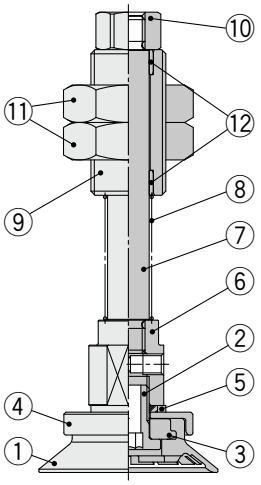
Component Parts (Female thread)

No.	Description	Material (Surface treatment)	Note
1	**Vacuum pad**	NBR, Silicone rubber, Urethane rubber, FKM, Mark-free NBR	Pad form: Flat type with groove, Bellows type with groove
2	**Set screw**	Brass (Electroless nickel plating)	
3	**Plate**	Aluminum alloy (Clear anodized)	
4	**Holder**	Aluminum alloy (Clear anodized)	• With female thread plate: Pad diameter: ø32 to ø125 • With female thread adapter: Pad diameter: ø32 to ø50
		Structural steel (Electroless nickel plating)	• With female thread adapter: Pad diameter: ø63 to ø125
5	**Seal washer**	Steel strip/NBR	
6	**Adapter**	Aluminum alloy (Clear anodized)	
7	**Stopper**	Stainless steel	

Pad with Buffer



With buffer
(Vacuum inlet: Vertical)



With buffer
(Vacuum inlet: Lateral)

Component Parts

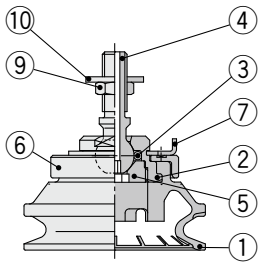
No.	Description	Material (Surface treatment)	Note
1	**Vacuum pad**	NBR, Silicone rubber, Urethane rubber, FKM, Mark-free NBR	Pad form: Flat type with groove, Bellows type with groove
2	**Set screw**	Brass (Electroless nickel plating)	
3	**Plate**	Aluminum alloy (Clear anodized)	
4	**Holder**	Aluminum alloy (Clear anodized)	Pad diameter: ø32 to ø50
		Structural steel (Electroless nickel plating)	Pad diameter: ø63 to ø125
5	**Seal washer**	Soft iron/NBR (Zinc chromated)	
6	**Adapter**	Aluminum alloy (Clear anodized)	
7	**Piston rod**	Structural steel (Hard chrome plating)	
8	**Return spring**	Stainless steel	
9	**Buffer body**	Brass (Electroless nickel plating)	
10	**Buffer adapter**	Brass (Electroless nickel plating)	
11	**Nut**	Structural steel (Nickel plating)	
12	**Bushing**	—	

∗ ② to ⑫ are used for both the flat type with groove and the bellows type with groove.

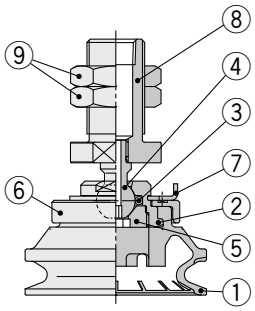
Pad with Ball Joint Adapter

ø32 to ø50

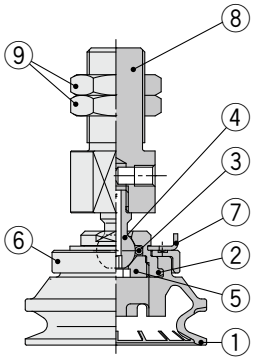
Male thread



Male thread (for direct mounting)

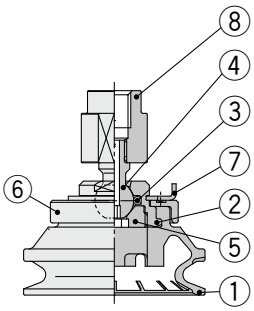


With male thread adapter (Vacuum inlet: Vertical)

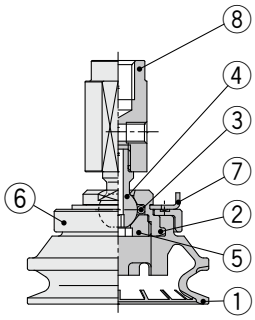


With male thread adapter (Vacuum inlet: Lateral)

Female thread



With female thread adapter (Vacuum inlet: Vertical)



With female thread adapter (Vacuum inlet: Lateral)

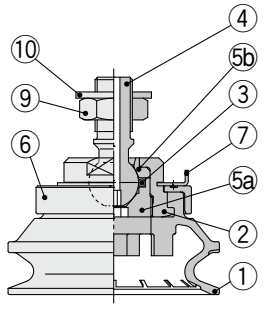
Component Parts

No.	Description	Material (Surface treatment)	Note
1	**Vacuum pad**	NBR, Silicone rubber, Urethane rubber, FKM, Mark-free NBR	Pad form: Flat type with groove, Bellows type with groove
2	**Plate**	Stainless steel	
3	**O-ring**	FKM	
4	**Shaft**	Stainless steel	
5	**Shaft ring**	Stainless steel	
6	**Holder**	Aluminum alloy (Clear anodized)	
7	**Stopper**	Stainless steel	
8	**Adapter**	Aluminum alloy (Clear anodized)	
9	**Nut**	Brass (Electroless nickel plating)	
10	**Seal washer**	Soft iron/NBR (Zinc chromated)	

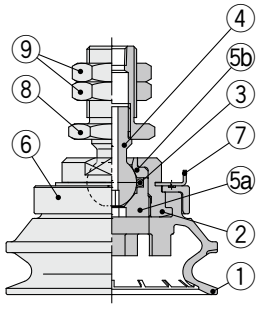
∗ ② to ⑩ are used for both the flat type with groove and the bellows type with groove.

ø63 to ø125

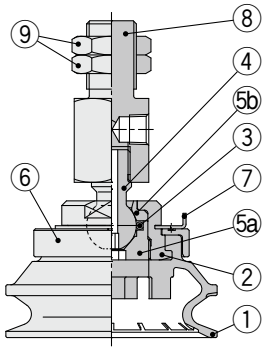
Male thread



Male thread (for direct mounting)

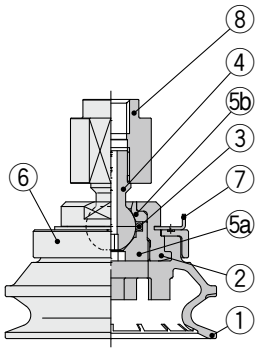


With male thread adapter (Vacuum inlet: Vertical)

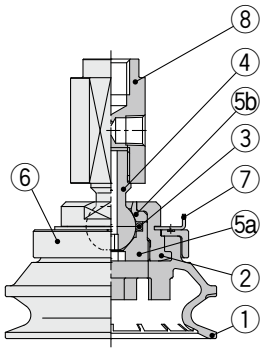


With male thread adapter (Vacuum inlet: Lateral)

Female thread



With female thread adapter (Vacuum inlet: Vertical)



With female thread adapter (Vacuum inlet: Lateral)

Component Parts (Male thread)

No.	Description	Material (Surface treatment)	Note
1	**Vacuum pad**	NBR, Silicone rubber, Urethane rubber, FKM, Mark-free NBR	Pad form: Flat type with groove, Bellows type with groove
2	**Plate**	Aluminum alloy (Clear anodized)	
3	**O-ring**	FKM	
4	**Shaft**	Stainless steel	
5a	**Shaft ring A**	Stainless steel	
5b	**Shaft ring B**	Stainless steel	
6	**Holder**	Aluminum alloy (Clear anodized)	
7	**Stopper**	Stainless steel	
8	**Adapter**	Brass (Electroless nickel plating)	
9	**Nut**	Structural steel (Nickel plating)	Male thread adapter
		Structural steel (Zinc chromated)	Male thread (for direct mounting) adapter
10	**Seal washer**	Soft iron/NBR (Zinc chromated)	

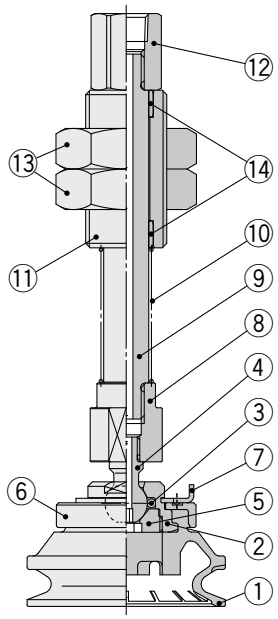
∗ ② to ⑩ are used for both the flat type with groove and the bellows type with groove.

Component Parts (Female thread)

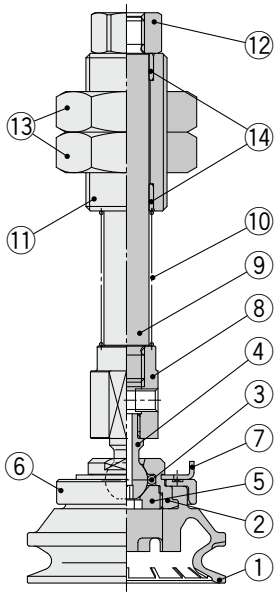
No.	Description	Material (Surface treatment)	Note
1	**Vacuum pad**	NBR, Silicone rubber, Urethane rubber, FKM, Mark-free NBR	Pad form: Flat type with groove, Bellows type with groove
2	**Plate**	Aluminum alloy (Clear anodized)	
3	**O-ring**	FKM	
4	**Shaft**	Stainless steel	
5a	**Shaft ring A**	Stainless steel	
5b	**Shaft ring B**	Stainless steel	
6	**Holder**	Aluminum alloy (Clear anodized)	
7	**Stopper**	Stainless steel	
8	**Adapter**	Aluminum alloy (Clear anodized)	

Pad with Ball Joint Buffer

ø32 to ø50



With ball joint buffer (Vacuum inlet: Vertical)



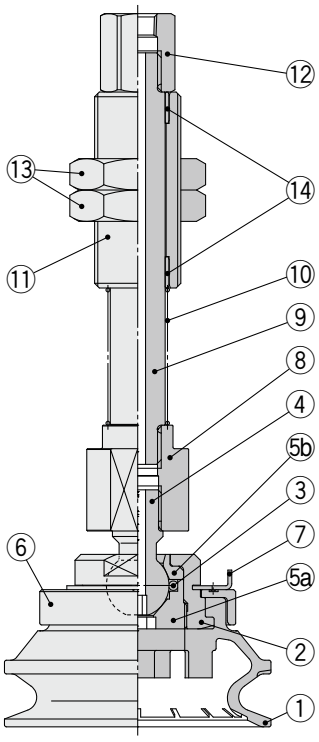
With ball joint buffer (Vacuum inlet: Lateral)

Component Parts

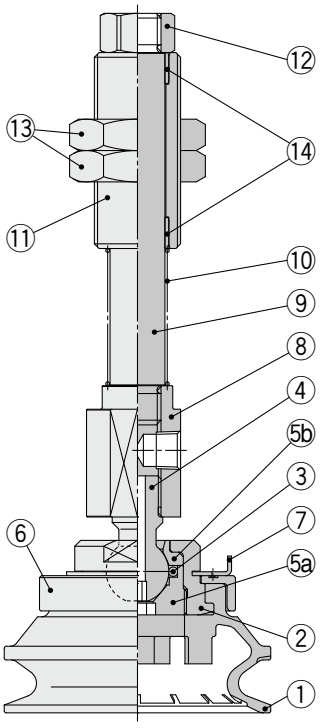
No.	Description	Material (Surface treatment)	Note
1	**Vacuum pad**	NBR, Silicone rubber, Urethane rubber, FKM, Mark-free NBR	Pad form: Flat type with groove, Bellows type with groove
2	**Plate**	Stainless steel	
3	**O-ring**	FKM	
4	**Shaft**	Stainless steel	
5	**Shaft ring**	Stainless steel	
6	**Holder**	Aluminum alloy (Clear anodized)	
7	**Stopper**	Stainless steel	
8	**Adapter**	Aluminum alloy (Clear anodized)	
9	**Piston rod**	Structural steel (Hard chrome plating)	
10	**Return spring**	Stainless steel	
11	**Buffer body**	Brass (Electroless nickel plating)	
12	**Buffer adapter**	Brass (Electroless nickel plating)	
13	**Nut**	Structural steel (Nickel plating)	
14	**Bushing**	—	

∗ ② to ⑭ are used for both the flat type with groove and the bellows type with groove.

ø63 to ø125



With ball joint buffer (Vacuum inlet: Vertical)



With ball joint buffer (Vacuum inlet: Lateral)

Component Parts

No.	Description	Material (Surface treatment)	Note
1	**Vacuum pad**	NBR, Silicone rubber, Urethane rubber, FKM, Mark-free NBR	Pad form: Flat type with groove, Bellows type with groove
2	**Plate**	Aluminum alloy (Clear anodized)	
3	**O-ring**	FKM	
4	**Shaft**	Stainless steel	
5a	**Shaft ring A**	Stainless steel	
5b	**Shaft ring B**	Stainless steel	
6	**Holder**	Aluminum alloy (Clear anodized)	
7	**Stopper**	Stainless steel	
8	**Adapter**	Aluminum alloy (Clear anodized)	
9	**Piston rod**	Structural steel (Hard chromated)	
10	**Return spring**	Stainless steel	
11	**Buffer body**	Brass (Electroless nickel plating)	
12	**Buffer adapter**	Brass (Electroless nickel plating)	
13	**Nut**	Structural steel (Nickel plating)	
14	**Bushing**	—	

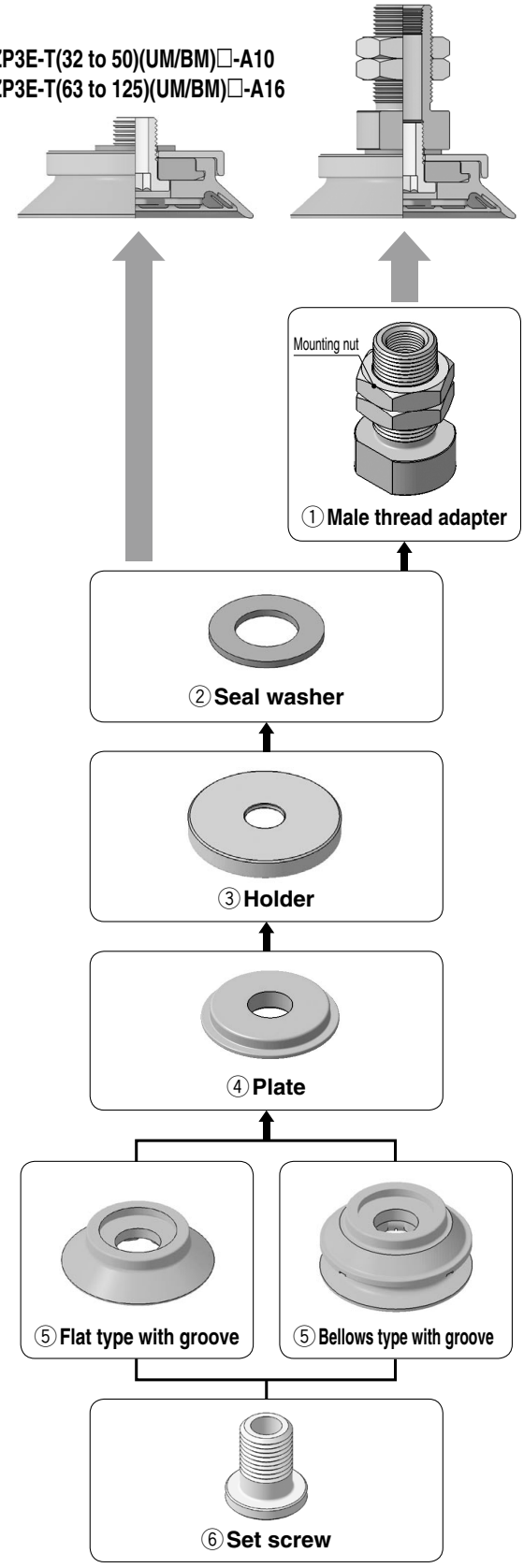
∗ ② to ⑭ are used for both the flat type with groove and the bellows type with groove.

Component Part No.

With Set Screw/With Male Thread Adapter: Vacuum Inlet Vertical

ZP3E-T(32 to 50)(UM/BM)□-AL14
ZP3E-T(63 to 125)(UM/BM)□-AL16

ZP3E-T(32 to 50)(UM/BM)□-A10
ZP3E-T(63 to 125)(UM/BM)□-A16



① Male thread adapter (With 2 mounting nuts)

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-TAL14	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EA-TAL16	—	—	—	●	●	●	●	—	—	—	●	●	●	●

② Seal washer (Sales unit: 5 pcs.)

Part no.	Mounting thread size	Applicable set screw (⑥)
ZP3EA-SW10	M10 x 1	ZP3EA-A10
ZP3EA-SW16	M16 x 1.5	ZP3EA-A16

③ Holder

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-H1A	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-H2A	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-H3A	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-H4A	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-H5A	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-H6A	—	—	—	—	—	—	—	—	—	—	—	—	—	●

④ Plate

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-P1	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-P2	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-P3	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-P4	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-P5	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-P6	—	—	—	—	—	—	—	—	—	—	—	—	—	●

⑤ Pad

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3E-▲UM□	●	●	●	●	●	●	●	—	—	—	—	—	—	—
ZP3E-▲BM□	—	—	—	—	—	—	—	●	●	●	●	●	●	●

Note 1) ▲ in the table indicates the pad diameter.
Note 2) □ in the table indicates the pad material.

⑥ Set screw

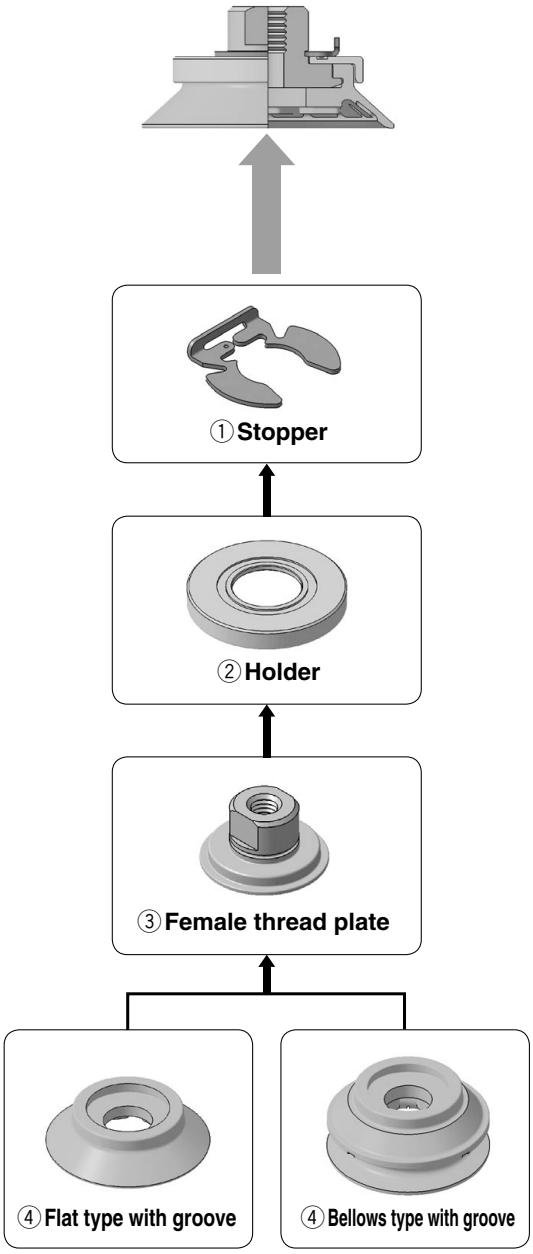
Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-A10	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EA-A16	—	—	—	●	●	●	●	—	—	—	●	●	●	●

Mounting nut (Sales unit: 10 pcs.)

Part no.	Mounting thread size	Applicable male thread adapter (①)
ZPNA-M14	M14 x 1	ZP3EA-TAL14
ZPNA-M16	M16 x 1.5	ZP3EA-TAL16

With Female Thread Adapter: Vacuum Inlet Vertical

ZP3E-T(32 to 50)(UM/BM)□-B8
ZP3E-T(63 to 125)(UM/BM)□-B12



①Stopper

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-S1	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EA-S2	—	—	—	●	●	●	●	—	—	—	●	●	●	●

②Holder

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-H1B	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-H2B	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-H3B	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-H4B	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-H5B	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-H6B	—	—	—	—	—	—	—	—	—	—	—	—	—	●

③Female thread plate

Part no.	Mounting thread size	Pad form/diameter												
		Flat type with groove (UM)							Bellows type with groove (BM)					
		32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-PT1-B8	M8	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-PT1-B10	M10	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-PT2-B8	M8	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-PT2-B10	M10	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-PT3-B12	M12	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-PT3-B18	M18	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-PT4-B12	M12	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-PT4-B18	M18	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-PT5-B12	M12	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-PT5-B18	M18	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-PT6-B12	M12	—	—	—	—	—	—	—	—	—	—	—	—	—	●
ZP3EA-PT6-B18	M18	—	—	—	—	—	—	—	—	—	—	—	—	—	●

④Pad

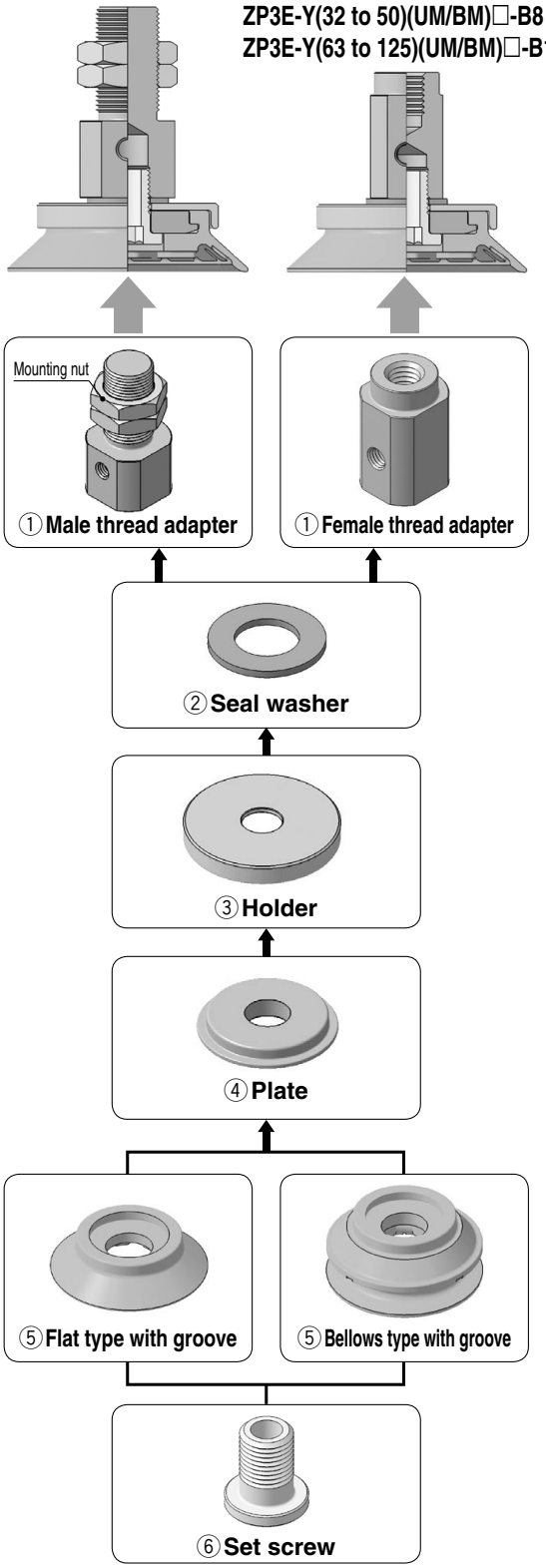
Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3E-▲UM□	●	●	●	●	●	●	●	—	—	—	—	—	—	—
ZP3E-▲BM□	—	—	—	—	—	—	—	●	●	●	●	●	●	●

Note 1) ▲ in the table indicates the pad diameter.
Note 2) □ in the table indicates the pad material.

With Male Thread Adapter/With Female Thread Adapter: Vacuum Inlet Lateral

ZP3E-Y(32 to 50)(UM/BM)□-AL14
ZP3E-Y(63 to 125)(UM/BM)□-AL16

ZP3E-Y(32 to 50)(UM/BM)□-B8
ZP3E-Y(63 to 125)(UM/BM)□-B12



① Male thread adapter (With 2 mounting nuts)

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-YAL14	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EA-YAL16	—	—	—	●	●	●	●	—	—	—	●	●	●	●

① Female thread adapter

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-YB8	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EA-YB12	—	—	—	●	●	●	●	—	—	—	●	●	●	●

② Seal washer (Sales unit: 5 pcs.)

Part no.	Mounting thread size	Applicable set screw (⑥)
ZP3EA-SW10	M10 x 1	ZP3EA-A10
ZP3EA-SW16	M16 x 1.5	ZP3EA-A16

③ Holder

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-H1A	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-H2A	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-H3A	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-H4A	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-H5A	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-H6A	—	—	—	—	—	—	—	—	—	—	—	—	—	●

④ Plate

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-P1	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-P2	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-P3	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-P4	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-P5	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-P6	—	—	—	—	—	—	—	—	—	—	—	—	—	●

⑤ Pad

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3E-▲UM□	●	●	●	●	●	●	●	—	—	—	—	—	—	—
ZP3E-▲BM□	—	—	—	—	—	—	—	●	●	●	●	●	●	●

Note 1) ▲ in the table indicates the pad diameter.
Note 2) □ in the table indicates the pad material.

⑥ Set screw

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-A10	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EA-A16	—	—	—	●	●	●	●	—	—	—	●	●	●	●

Refer to page 96 for the products that contain ② to ⑥.

Mounting nut (Sales unit: 10 pcs.)

Part no.	Mounting thread size	Applicable male thread adapter (①)
ZPNA-M14	M14 x 1	ZP3EA-YAL14
ZPNA-M16	M16 x 1.5	ZP3EA-YAL16

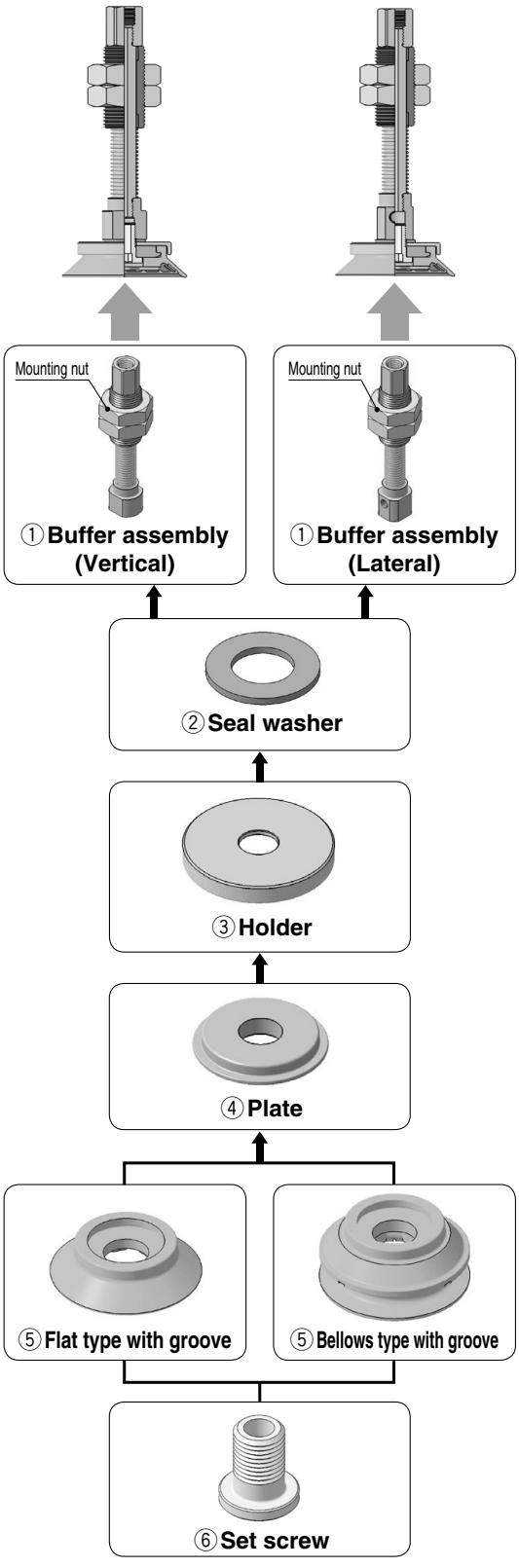
With Buffer: Vacuum Inlet Vertical / Lateral

Vacuum inlet: Vertical

ZP3E-T(32 to 125)(UM/BM)□JB (10/30/50)

Vacuum inlet: Lateral

ZP3E-Y(32 to 125)(UM/BM)□JB (10/30/50)



① Buffer assembly (With 2 mounting nuts)

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EB-(T/Y)1JB10	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EB (T/Y)1JB30	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EB-(T/Y)1JB50	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EB-(T/Y)2JB10	—	—	—	●	●	●	●	—	—	—	●	●	●	●
ZP3EB-(T/Y)2JB30	—	—	—	●	●	●	●	—	—	—	●	●	●	●
ZP3EB-(T/Y)2JB50	—	—	—	●	●	●	●	—	—	—	●	●	●	●

∗ Select "T" when selecting a T type buffer assembly.
Example) ZP3EB-T1JB10

② Seal washer (Sales unit: 5 pcs.)

Part no.	Mounting thread size	Applicable set screw (⑥)
ZP3EA-SW10	M10 x 1	ZP3EA-A10
ZP3EA-SW16	M16 x 1.5	ZP3EA-A16

③ Holder

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-H1A	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-H2A	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-H3A	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-H4A	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-H5A	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-H6A	—	—	—	—	—	—	—	—	—	—	—	—	—	●

④ Plate

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-P1	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-P2	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-P3	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-P4	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-P5	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-P6	—	—	—	—	—	—	—	—	—	—	—	—	—	●

⑤ Pad

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3E-▲UM□	●	●	●	●	●	●	●	—	—	—	—	—	—	—
ZP3E-▲BM□	—	—	—	—	—	—	—	●	●	●	●	●	●	●

Note 1) ▲ in the table indicates the pad diameter.
Note 2) □ in the table indicates the pad material.

⑥ Set screw

Part no. \ Form/Diameter	Applicable buffer assembly (①)
ZP3EA-A10	ZP3EB-(T/Y)1JB (10/30/50)
ZP3EA-A16	ZP3EB-(T/Y)2JB (10/30/50)

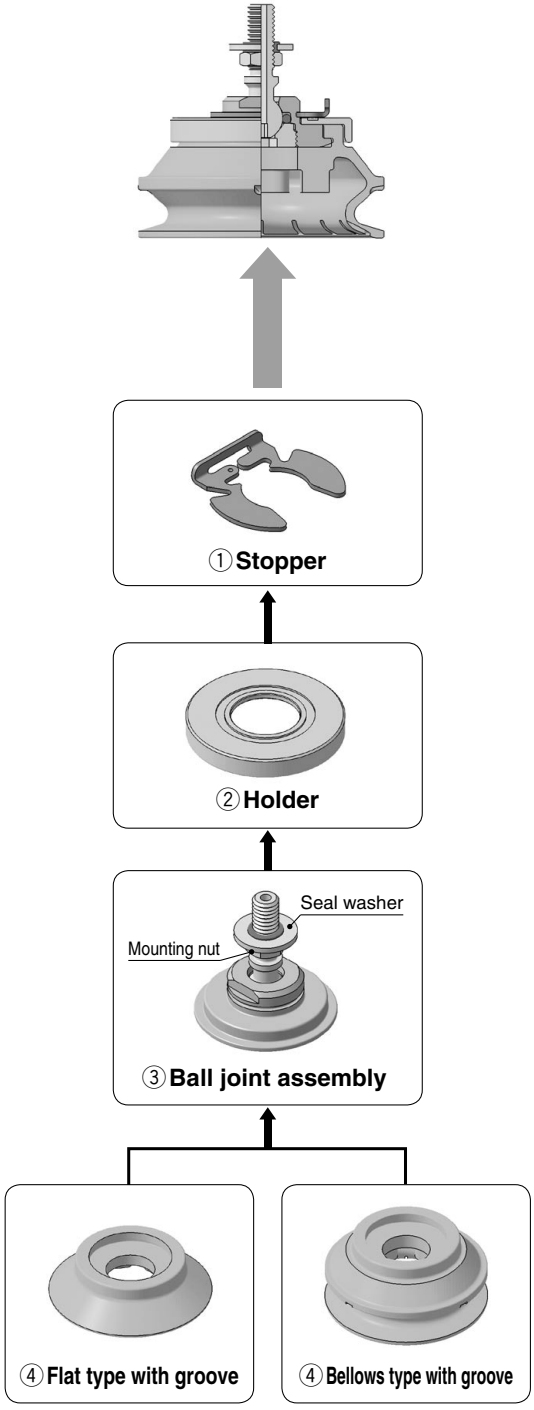
Refer to page 96 for the products that contain ② to ⑥.

Mounting nut (Sales unit: 10 pcs.)

Part no.	Mounting thread size	Applicable buffer assembly (①)
ZPNA-M18	M18 x 1.5	ZP3EB-(T/Y)1JB (10/30/50)
ZPNA-M22	M22 x 1.5	ZP3EB-(T/Y)2JB (10/30/50)

With Ball Joint Adapter (for Direct Mounting): Vacuum Inlet Vertical

ZP3E-TF(32 to 125)(UM/BM)□-(AL6/AL12)



①Stopper

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-S1	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EA-S2	—	—	—	●	●	●	●	—	—	—	●	●	●	●

②Holder

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-H1B	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-H2B	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-H3B	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-H4B	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-H5B	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-H6B	—	—	—	—	—	—	—	—	—	—	—	—	—	●

③Ball joint assembly (Seal washer and mounting nut: 1 pc. each)

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-F1-AL6	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EA-F2-AL6	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EA-F3-AL12	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EA-F4-AL12	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EA-F5-AL12	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EA-F6-AL12	—	—	—	—	—	—	—	—	—	—	—	—	—	●

④Pad

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3E-▲UM□	●	●	●	●	●	●	●	—	—	—	—	—	—	—
ZP3E-▲BM□	—	—	—	—	—	—	—	●	●	●	●	●	●	●

Note 1) ▲ in the table indicates the pad diameter.
Note 2) □ in the table indicates the pad material.

Seal washer (Sales unit: 5 pcs.)

Part no.	Mounting thread size	Applicable ball joint assembly (③)
ZP3EA-SW6	M6 x 1	ZP3EA-F(1/2)-AL6
ZP3EA-SW12	M12 x 1.25	ZP3EA-F(3/4/5/6)-AL12

Mounting nut (Sales unit: 10 pcs.)

Part no.	Mounting thread size	Applicable ball joint assembly (③)
ZPNA-M6	M6 x 1	ZP3EA-F(1/2)-AL6
ZPNA-M12	M12 x 1.25	ZP3EA-F(3/4/5/6)-AL12

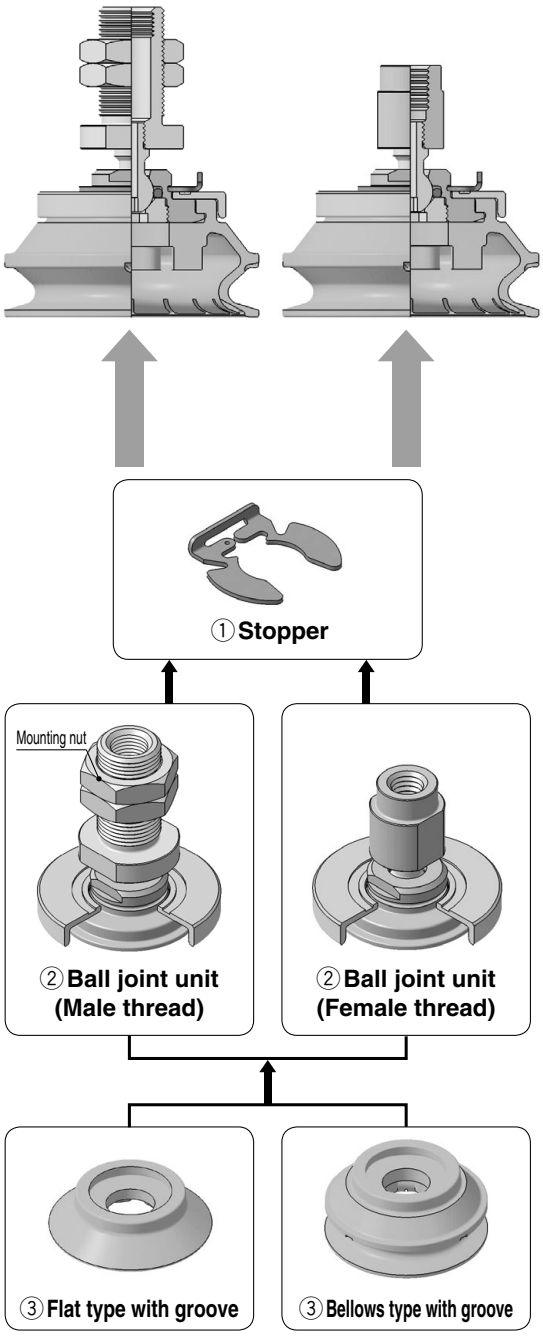
With Ball Joint Female Thread Adapter: Vacuum Inlet Vertical

Male thread type

ZP3E-TF(32 to 125)(UM/BM)□-(AL14/AL16)

Female thread type

ZP3E-TF(32 to 125)(UM/BM)□-(B8/B12)



① Stopper

Form/Diameter / Part no.	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-S1	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EA-S2	—	—	—	●	●	●	●	—	—	—	●	●	●	●

② Ball joint unit (Male thread) (With 2 mounting nuts)

Form/Diameter / Part no.	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EU-F1-TAL14	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EU-F2-TAL14	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EU-F3-TAL16	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EU-F4-TAL16	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EU-F5-TAL16	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EU-F6-TAL16	—	—	—	—	—	—	—	—	—	—	—	—	—	●

② Ball joint unit (Female thread)

Form/Diameter / Part no.	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EU-F1-TB8	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EU-F2-TB8	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EU-F3-TB12	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EU-F4-TB12	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EU-F5-TB12	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EU-F6-TB12	—	—	—	—	—	—	—	—	—	—	—	—	—	●

③ Pad

Form/Diameter / Part no.	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3E-▲UM□	●	●	●	●	●	●	●	—	—	—	—	—	—	—
ZP3E-▲BM□	—	—	—	—	—	—	—	●	●	●	●	●	●	●

Note 1) ▲ in the table indicates the pad diameter.
Note 2) □ in the table indicates the pad material.

Mounting nut (Sales unit: 10 pcs.)

Part no.	Mounting thread size	Applicable ball joint unit (Male thread) (②)
ZPNA-M14	M14 x 1	ZP3EU-F(1/2)-TAL14
ZPNA-M16	M16 x 1.5	ZP3EU-F(3/4/5/6)-TAL16

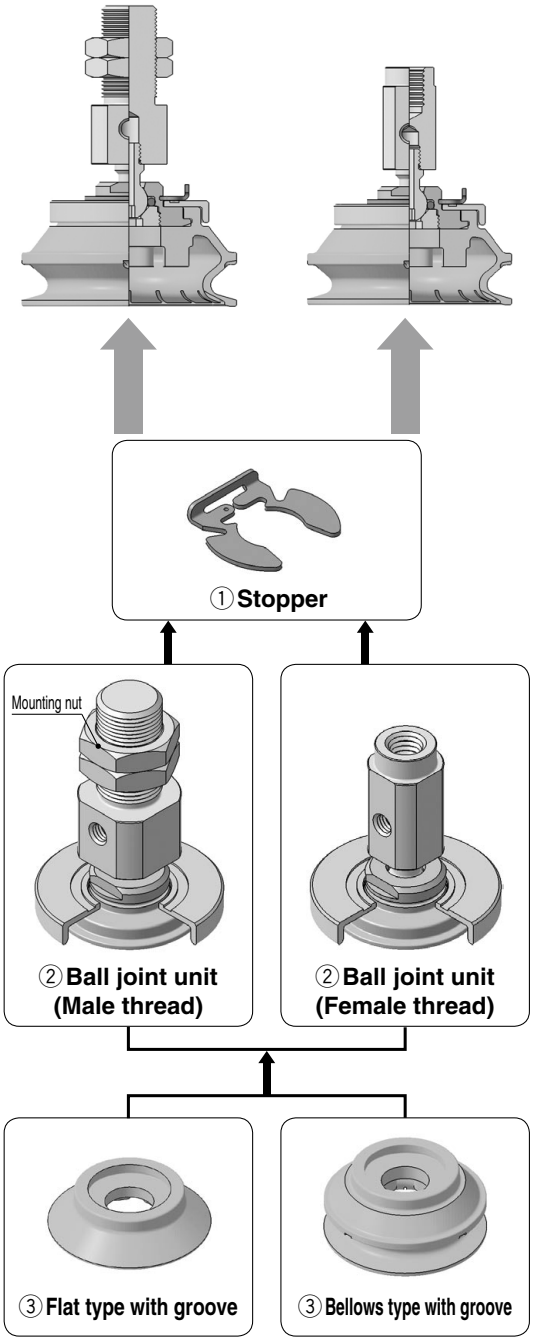
With Ball Joint Male Thread Adapter/Female Thread Adapter: Vacuum Inlet Lateral

Male thread type

ZP3E-YF(32 to 125)(UM/BM)□-(AL14/AL16)

Female thread type

ZP3E-YF(32 to 125)(UM/BM)□-(B8/B12)



①Stopper

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EA-S1	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EA-S2	—	—	—	●	●	●	●	—	—	—	●	●	●	●

②Ball joint unit (Male thread) (With 2 mounting nuts)

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EU-F1-YAL14	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EU-F2-YAL14	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EU-F3-YAL16	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EU-F4-YAL16	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EU-F5-YAL16	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EU-F6-YAL16	—	—	—	—	—	—	—	—	—	—	—	—	—	●

②Ball joint unit (Female thread)

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3EU-F1-YB8	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EU-F2-YB8	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EU-F3-YB12	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EU-F4-YB12	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EU-F5-YB12	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EU-F6-YB12	—	—	—	—	—	—	—	—	—	—	—	—	—	●

③Pad

Part no. \ Form/Diameter	Flat type with groove (UM)							Bellows type with groove (BM)						
	32	40	50	63	80	100	125	32	40	50	63	80	100	125
ZP3E-▲UM□	●	●	●	●	●	●	●	—	—	—	—	—	—	—
ZP3E-▲BM□	—	—	—	—	—	—	—	●	●	●	●	●	●	●

Note 1) ▲ in the table indicates the pad diameter.
Note 2) □ in the table indicates the pad material.

Mounting nut (Sales unit: 10 pcs.)

Part no.	Mounting thread size	Applicable ball joint unit (Male thread) (②)
ZPNA-M14	M14 x 1	ZP3EU-F(1/2)-YAL14
ZPNA-M16	M16 x 1.5	ZP3EU-F(3/4/5/6)-YAL14

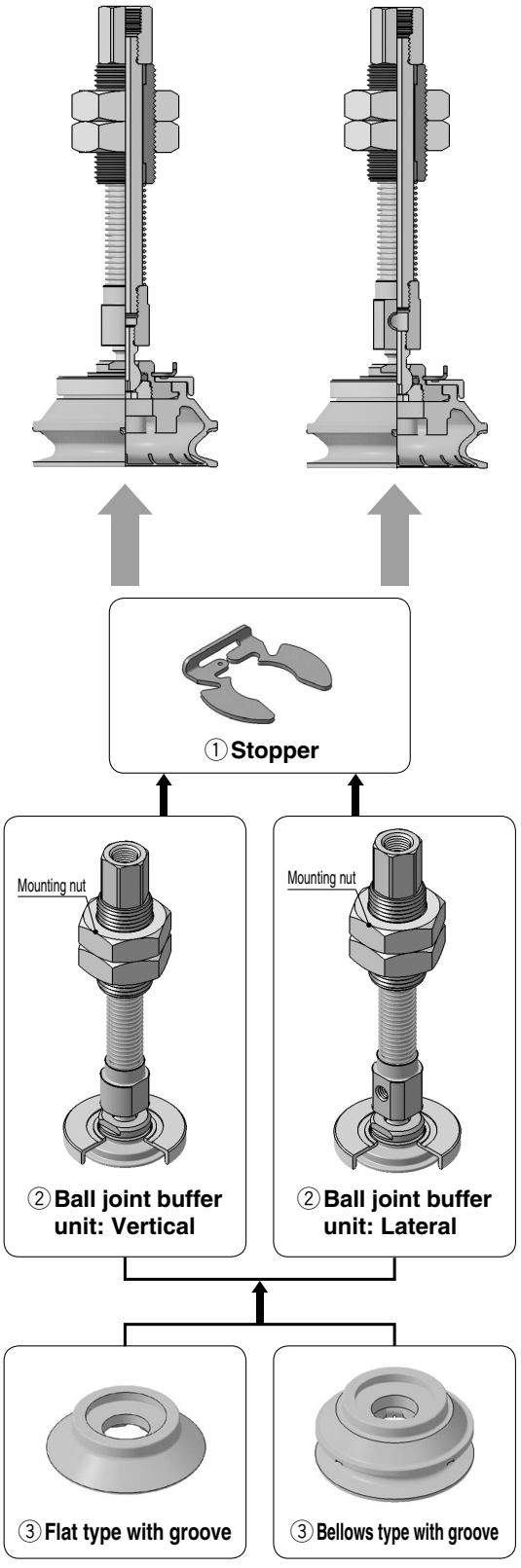
With Ball Joint Buffer: Vacuum Inlet Vertical / Lateral

Vacuum inlet: Vertical Type T

ZP3E-TF(32 to 125)(UM/BM)□JB (10/30/50)

Vacuum inlet: Lateral Type Y

ZP3E-YF(32 to 125)(UM/BM)□JB (10/30/50)



①Stopper

Part no. \ Form/Diameter	Flat type with groove (**UM**)							Bellows type with groove (**BM**)						
	32	**40**	**50**	**63**	**80**	**100**	**125**	**32**	**40**	**50**	**63**	**80**	**100**	**125**
ZP3EA-S1	●	●	●	—	—	—	—	●	●	●	—	—	—	—
ZP3EA-S2	—	—	—	●	●	●	●	—	—	—	●	●	●	●

②Ball joint buffer unit (With 2 mounting nuts)

Part no.	Stroke	Pad form/diameter: Flat type with groove (**UM**) **32**	**40**	**50**	**63**	**80**	**100**	**125**	Bellows type with groove (**BM**) **32**	**40**	**50**	**63**	**80**	**100**	**125**
ZP3EU-(T/Y)F1JB10	**10**														
ZP3EU-(T/Y)F1JB30	**30**	●	●	—	—	—	—	—	●	●	—	—	—	—	—
ZP3EU-(T/Y)F1JB50	**50**														
ZP3EU-(T/Y)F2JB10	**10**														
ZP3EU-(T/Y)F2JB30	**30**	—	—	●	—	—	—	—	—	—	●	—	—	—	—
ZP3EU-(T/Y)F2JB50	**50**														
ZP3EU-(T/Y)F3JB10	**10**														
ZP3EU-(T/Y)F3JB30	**30**	—	—	—	●	●	—	—	—	—	—	●	—	—	—
ZP3EU-(T/Y)F3JB50	**50**														
ZP3EU-(T/Y)F4JB10	**10**														
ZP3EU-(T/Y)F4JB30	**30**	—	—	—	—	—	●	—	—	—	—	—	●	—	—
ZP3EU-(T/Y)F4JB50	**50**														
ZP3EU-(T/Y)F5JB10	**10**														
ZP3EU-(T/Y)F5JB30	**30**	—	—	—	—	—	—	●	—	—	—	—	—	●	—
ZP3EU-(T/Y)F5JB50	**50**														
ZP3EU-(T/Y)F6JB10	**10**														
ZP3EU-(T/Y)F6JB30	**30**	—	—	—	—	—	—	—	—	—	—	—	—	—	●
ZP3EU-(T/Y)F6JB50	**50**														

∗ Select "T" when selecting a T type buffer unit.
Example) ZP3EU-TF1JB10

③Pad

Part no. \ Form/Diameter	Flat type with groove (**UM**)							Bellows type with groove (**BM**)						
	32	**40**	**50**	**63**	**80**	**100**	**125**	**32**	**40**	**50**	**63**	**80**	**100**	**125**
ZP3E-▲UM□	●	●	●	●	●	●	●	—	—	—	—	—	—	—
ZP3E-▲BM□	—	—	—	—	—	—	—	●	●	●	●	●	●	●

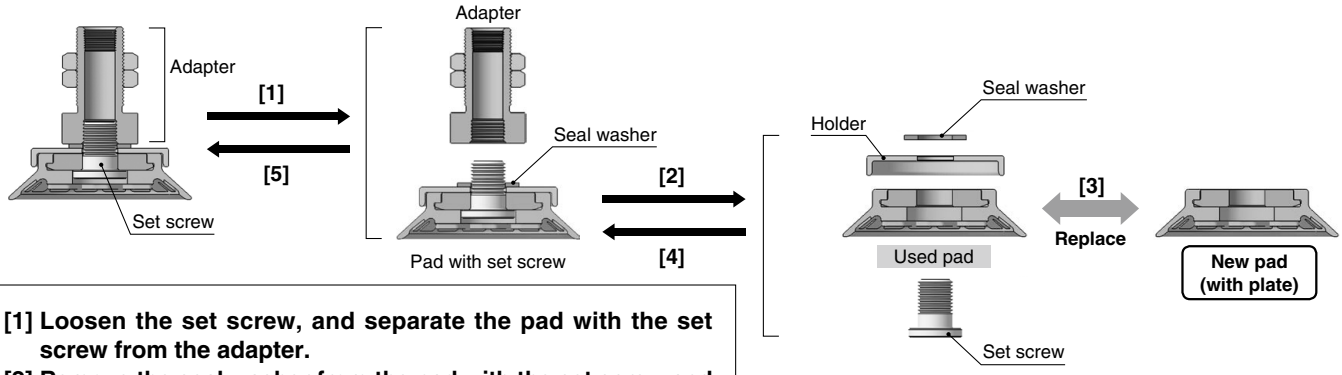
Note 1) ▲ in the table indicates the pad diameter.
Note 2) □ in the table indicates the pad material.

Mounting nut (Sales unit: 10 pcs.)

Part no.	Mounting thread size	Applicable ball joint buffer unit (②)
ZPNA-M18	M18 x 1.5	ZP3EU-(T/Y)F(1/2)JB(10/30/50)
ZPNA-M22	M22 x 1.5	ZP3EU-(T/Y)F(3/4/5/6)JB(10/30/50)

Series ZP3E
How to Replace the Pad

With Set Screw



[1] Loosen the set screw, and separate the pad with the set screw from the adapter.
[2] Remove the seal washer from the pad with the set screw and separate it into seal washer, holder, pad and set screw. Note 1)
[3] Replace the pad (with plate) with a new one.
[4] Insert the set screw from the suction surface side of the new pad, and mount the holder and seal washer in order.
[5] Mount the adapter onto the set screw. Note 2)

Note 1) When mounting and removing the seal washer, rotate the set screw while the seal washer is being held.

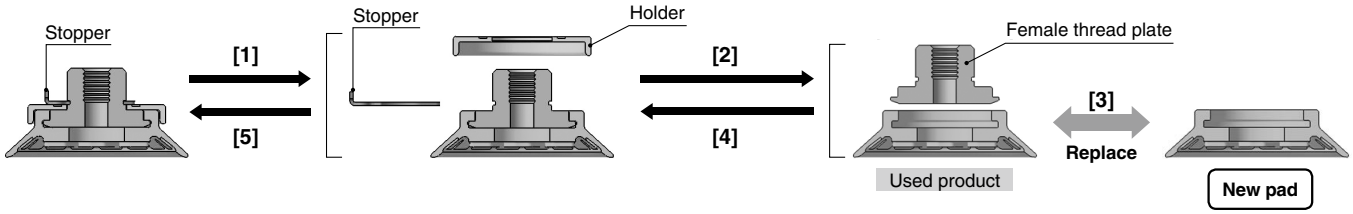
Note 2) Refer to the tightening torque shown in Table 1 for adapter mounting.

Table 1: Recommended Set Screw Tightening Torque

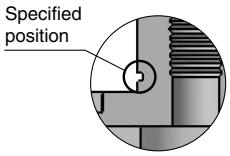
Product specifications			Tightening torque [N·m]
Pad diameter	Product part no.	Mounting thread size	
ø32 to ø50	**ZP3E-(32 to 50)UM□□**	M10 x 1	8 to 10
	ZP3E-(32 to 50)BM□□		
ø63 to ø125	**ZP3E-(63 to 125)UM□□**	M16 x 1.5	13 to 15
	ZP3E-(63 to 125)BM□□		

∗ Refer to "Pad Unit with Plate" shown below for the replacement method for pads with plate.

With Stopper (with Female Thread Plate/with Ball Joint Unit)

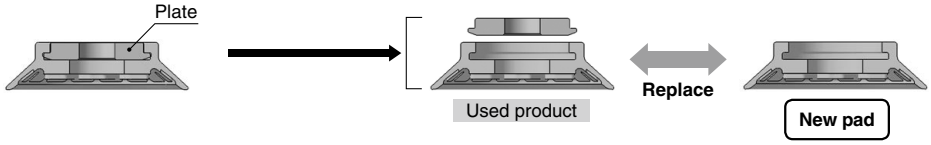


[1] Pull out the stopper horizontally and remove the holder from the product.
[2] Remove the female plate.
[3] Replace the pad with a new one.
[4] Insert the female thread plate into the new pad.
[5] Mount the holder and insert the stopper into the specified position.



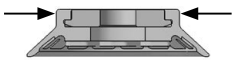
∗ Refer to "Pad Unit with Plate" shown below for the replacement method for pads with plate.

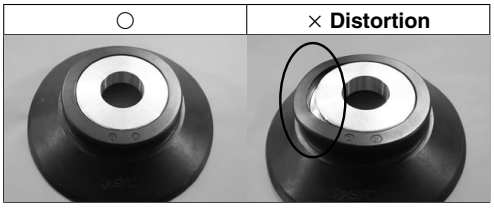
Pad Unit (with Plate)



Remove the plate and replace the pad with a new one. Reassemble the product.

∗ Press the outer circumference of the plate insertion area by hand to eliminate distortion.



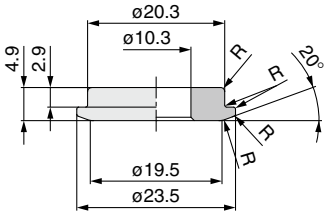


∗ The same replacement method is applicable to the replacement of the pad unit with a female thread plate or ball joint unit.

Component Parts: Dimensions

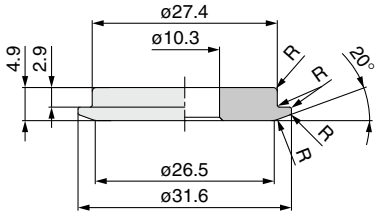
Plate

Part no.	**ZP3EA-P1** [Weight: 3.7 g]



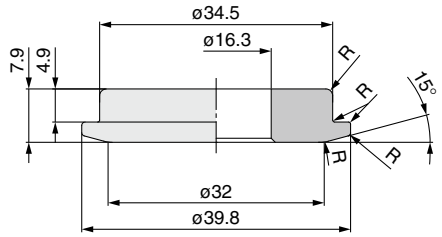
Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-32BM□
ZP3E-40BM□

Part no.	**ZP3EA-P2** [Weight: 7.6 g]



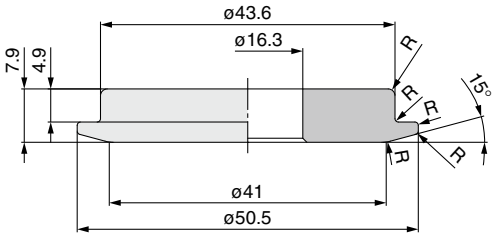
Applicable pad part no.
ZP3E-50UM□
ZP3E-50BM□

Part no.	**ZP3EA-P3** [Weight: 17.7 g]



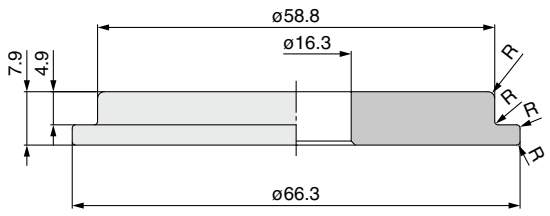
Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-80BM□

Part no.	**ZP3EA-P4** [Weight: 31.1 g]



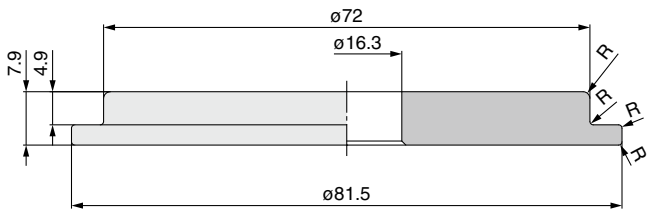
Applicable pad part no.
ZP3E-100UM□
ZP3E-80BM□

Part no.	**ZP3EA-P5** [Weight: 61.1 g]



Applicable pad part no.
ZP3E-125UM□
ZP3E-100BM□

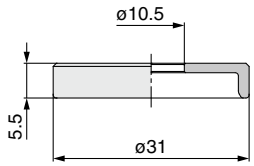
Part no.	**ZP3EA-P6** [Weight: 94.4 g]



Applicable pad part no.
ZP3E-125BM□

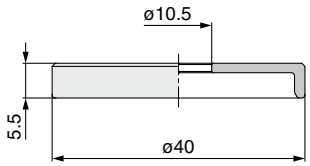
Holder

Part no.	**ZP3EA-H1A** [Weight: 4.5 g]



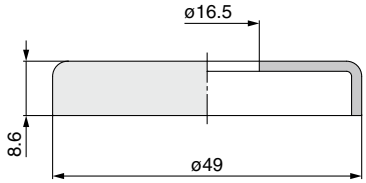
Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-32BM□
ZP3E-40BM□

Part no.	**ZP3EA-H2A** [Weight: 7 g]



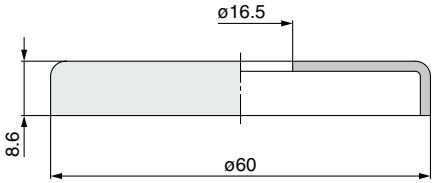
Applicable pad part no.
ZP3E-50UM□
ZP3E-50BM□

Part no.	**ZP3EA-H3A** [Weight: 32.7 g]



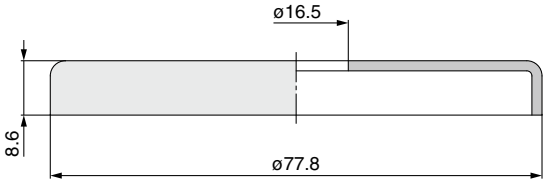
Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-80BM□

Part no.	**ZP3EA-H4A** [Weight: 47.5 g]



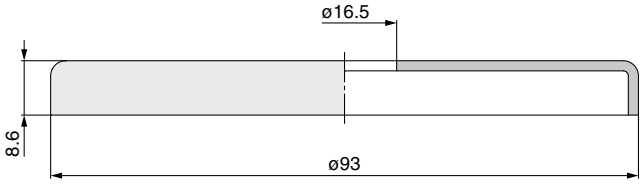
Applicable pad part no.
ZP3E-100UM□
ZP3E-80BM□

Part no.	**ZP3EA-H5A** [Weight: 76 g]



Applicable pad part no.
ZP3E-125UM□
ZP3E-100BM□

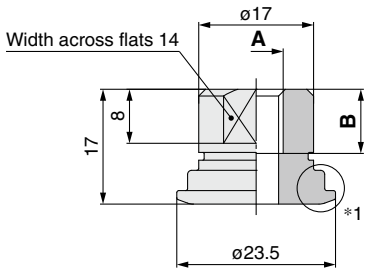
Part no.	**ZP3EA-H6A** [Weight: 105 g]



Applicable pad part no.
ZP3E-125BM□

Female Thread Plate

Part no.	ZP3EA-PT1-B8 [Weight: 9.9 g]
	ZP3EA-PT1-B10 [Weight: 8.5 g]

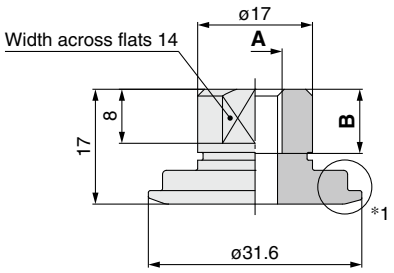


Dimensions

Part no.	A	B
ZP3EA-PT1-B8	M8 x 1.25	9.5
ZP3EA-PT1-B10	M10 x 1.5	13

Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-32BM□
ZP3E-40BM□

Part no.	ZP3EA-PT2-B8 [Weight: 14 g]
	ZP3EA-PT2-B10 [Weight: 12.6 g]

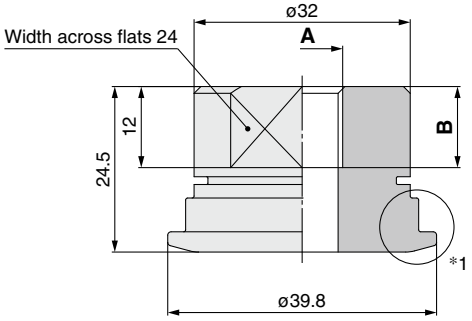


Dimensions

Part no.	A	B
ZP3EA-PT2-B8	M8 x 1.25	9.5
ZP3EA-PT2-B10	M10 x 1.5	13

Applicable pad part no.
ZP3E-50UM□
ZP3E-50BM□

Part no.	ZP3EA-PT3-B12 [Weight: 48.6 g]
	ZP3EA-PT3-B18 [Weight: 38.5 g]

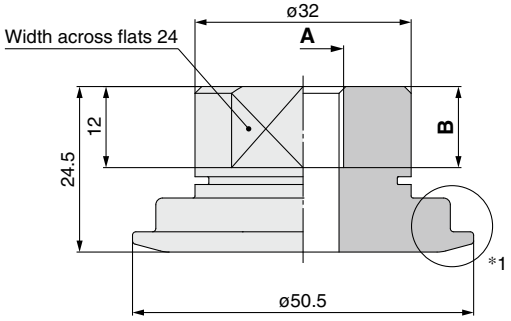


Dimensions

Part no.	A	B
ZP3EA-PT3-B8	M8 x 1.25	9.5
ZP3EA-PT3-B10	M10 x 1.5	13

Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-80BM□

Part no.	ZP3EA-PT4-B12 [Weight: 62 g]
	ZP3EA-PT4-B18 [Weight: 52 g]

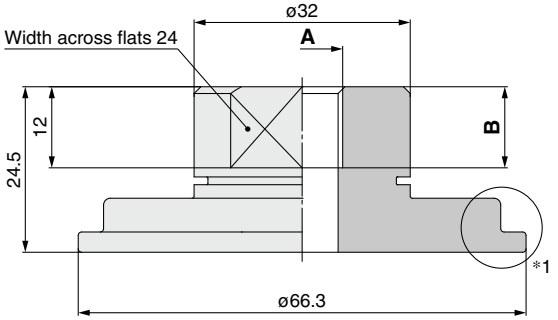


Dimensions

Part no.	A	B
ZP3EA-PT4-B12	M12 x 1.75	12
ZP3EA-PT4-B18	M18 x 1.5	18

Applicable pad part no.
ZP3E-100UM□
ZP3E-80BM□

Part no.	ZP3EA-PT5-B12 [Weight: 92.4 g]
	ZP3EA-PT5-B18 [Weight: 82.4 g]

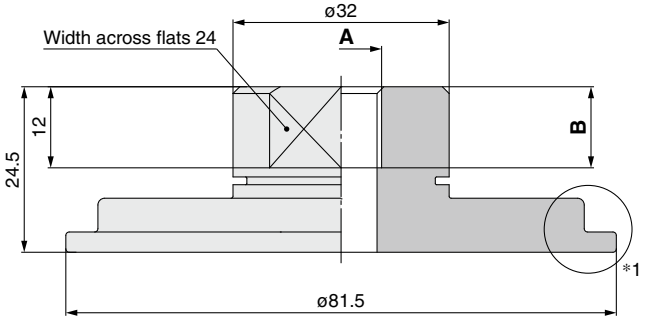


Dimensions

Part no.	A	B
ZP3EA-PT5-B12	M12 x 1.75	12
ZP3EA-PT5-B18	M18 x 1.5	18

Applicable pad part no.
ZP3E-125UM□
ZP3E-100BM□

Part no.	ZP3EA-PT6-B12 [Weight: 126 g]
	ZP3EA-PT6-B18 [Weight: 116 g]



Dimensions

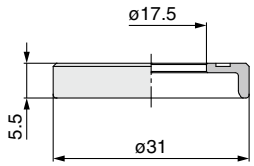
Part no.	A	B
ZP3EA-PT6-B12	M12 x 1.75	12
ZP3EA-PT6-B18	M18 x 1.5	18

Applicable pad part no.
ZP3E-125BM□

∗1 Refer to page 105 for detailed dimensions.

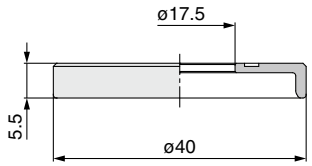
Holder (for Female thread plate/Ball joint)

Part no.	**ZP3EA-H1B** [Weight: 3.6 g]



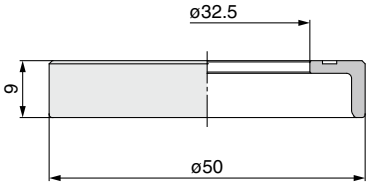
Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-32BM□
ZP3E-40BM□

Part no.	**ZP3EA-H2B** [Weight: 6.1 g]



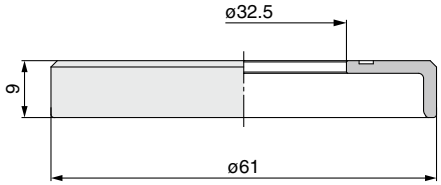
Applicable pad part no.
ZP3E-50UM□
ZP3E-50BM□

Part no.	**ZP3EA-H3B** [Weight: 12.1 g]



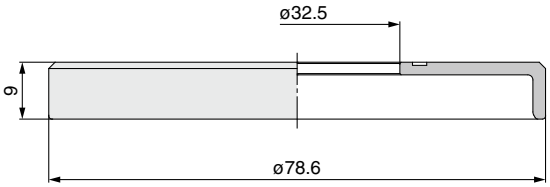
Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-80BM□

Part no.	**ZP3EA-H4B** [Weight: 18.4 g]



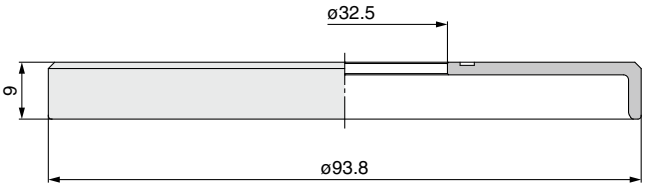
Applicable pad part no.
ZP3E-100UM□
ZP3E-80BM□

Part no.	**ZP3EA-H5B** [Weight: 31 g]



Applicable pad part no.
ZP3E-125UM□
ZP3E-100BM□

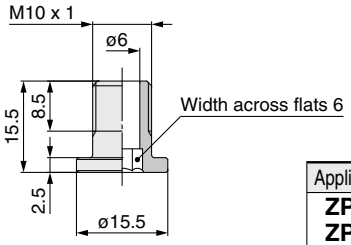
Part no.	**ZP3EA-H6B** [Weight: 44.2 g]



Applicable pad part no.
ZP3E-125BM□

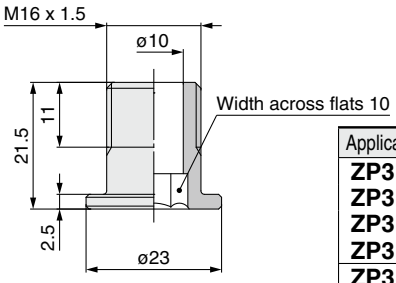
Set Screw

Part no.	**ZP3EA-A10** [Weight: 8.7 g]



Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-50UM□
ZP3E-32BM□
ZP3E-40BM□
ZP3E-50BM□

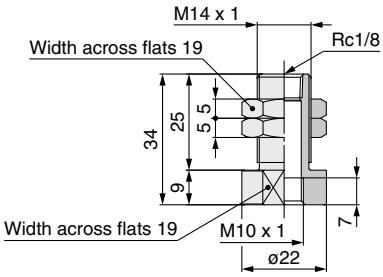
Part no.	**ZP3EA-A16** [Weight: 25.9 g]



Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-100UM□
ZP3E-125UM□
ZP3E-63BM□
ZP3E-80BM□
ZP3E-100BM□
ZP3E-125BM□

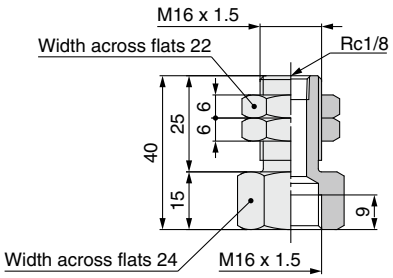
Male Thread Adapter (Vacuum inlet: Vertical)

Part no.	**ZP3EA-TAL14** [Weight: 27.0 g]



Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-50UM□
ZP3E-32BM□
ZP3E-40BM□
ZP3E-50BM□

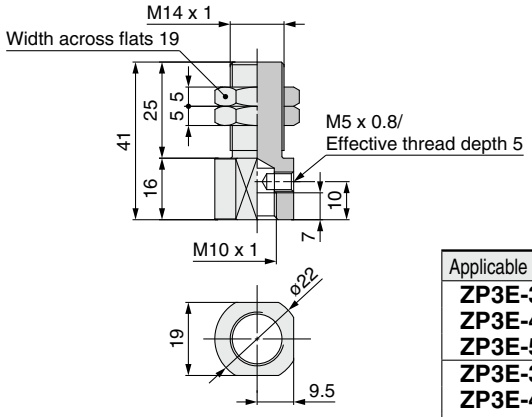
Part no.	**ZP3EA-TAL16** [Weight: 99.8 g]



Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-100UM□
ZP3E-125UM□
ZP3E-63BM□
ZP3E-80BM□
ZP3E-100BM□
ZP3E-125BM□

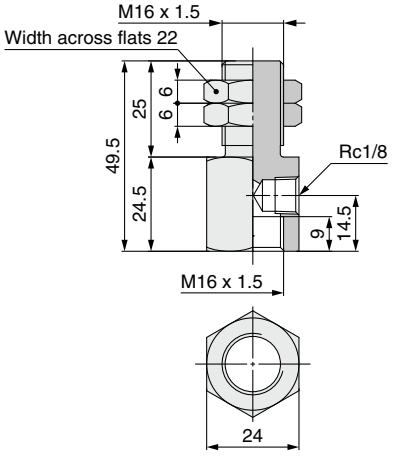
Male Thread Adapter (Vacuum inlet: Lateral)

Part no.	**ZP3EA-YAL14** [Weight: 36.3 g]



Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-50UM□
ZP3E-32BM□
ZP3E-40BM□
ZP3E-50BM□

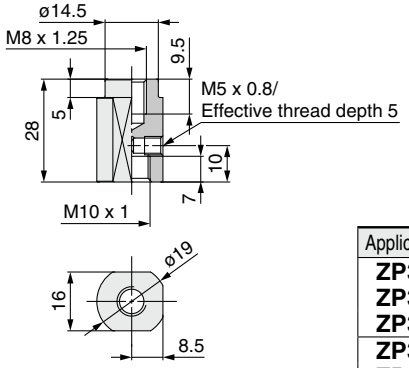
Part no.	**ZP3EA-YAL16** [Weight: 116.6 g]



Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-100UM□
ZP3E-125UM□
ZP3E-63BM□
ZP3E-80BM□
ZP3E-100BM□
ZP3E-125BM□

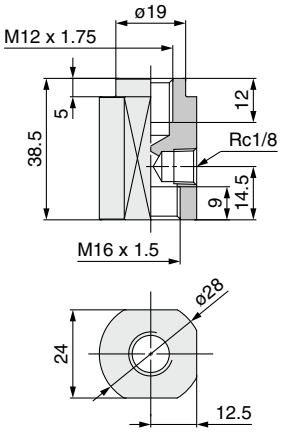
Female Thread Adapter (Vacuum inlet: Lateral)

Part no.	**ZP3EA-YB8** [Weight: 15 g]



Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-50UM□
ZP3E-32BM□
ZP3E-40BM□
ZP3E-50BM□

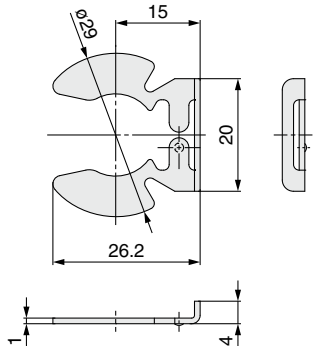
Part no.	**ZP3EA-YB12** [Weight: 42.3 g]



Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-100UM□
ZP3E-125UM□
ZP3E-63BM□
ZP3E-80BM□
ZP3E-100BM□
ZP3E-125BM□

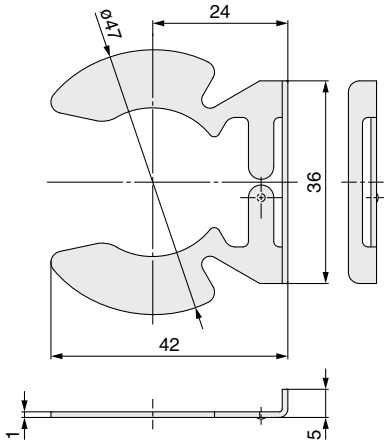
Stopper

Part no.	**ZP3EA-S1** [Weight: 2.9 g]



Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-50UM□
ZP3E-32BM□
ZP3E-40BM□
ZP3E-50BM□

Part no.	**ZP3EA-S2** [Weight: 7.6 g]

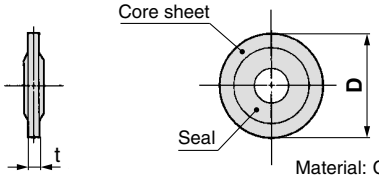


Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-100UM□
ZP3E-125UM□
ZP3E-63BM□
ZP3E-80BM□
ZP3E-100BM□
ZP3E-125BM□

Seal Washer

Part no.	
	ZP3EA-SW6 [Weight: 1.0 g]
	ZP3EA-SW10 [Weight: 1.1 g]
	ZP3EA-SW12 [Weight: 4.2 g]
	ZP3EA-SW16 [Weight: 5.2 g]

(Sales unit: 5 pcs.)



Material: Core sheet — Rolled steel
Seal ——— NBR

Dimensions

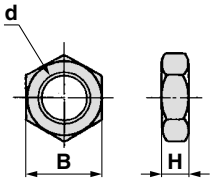
Part no.	t	D	Applicable thread size
ZP3EA-SW6	1.3	14	M6 x 1
ZP3EA-SW10	1.6	15.5	M10 x 1
ZP3EA-SW12	2	24.3	M12 x 1.25
ZP3EA-SW16	2	28	M16 x 1.5

Mounting Nut

Part no.	
	ZPNA-M6 [Weight: 0.7 g]
	ZPNA-M12 [Weight: 8.0 g]
	ZPNA-M14 [Weight: 6.6 g]
	ZPNA-M16 [Weight: 10.1 g]
	ZPNA-M18 [Weight: 26.4 g]
	ZPNA-M22 [Weight: 24.7 g]

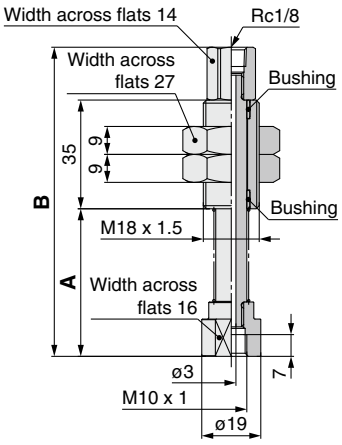
Dimensions

Part no.	d	B	H	Sales unit
ZPNA-M6	M6 x 1	8	3	10 pcs.
ZPNA-M12	M12 x 1.25	19	7	
ZPNA-M14	M14 x 1	19	5	
ZPNA-M16	M16 x 1.5	22	6	2 pcs.
ZPNA-M18	M18 x 1.5	27	9	
ZPNA-M22	M22 x 1.5	30	8	



Buffer Assembly (Vacuum inlet: Vertical)

Part no.	
	ZP3EB-T1JB10 [Weight: 172 g]
	ZP3EB-T1JB30 [Weight: 187 g]
	ZP3EB-T1JB50 [Weight: 198 g]

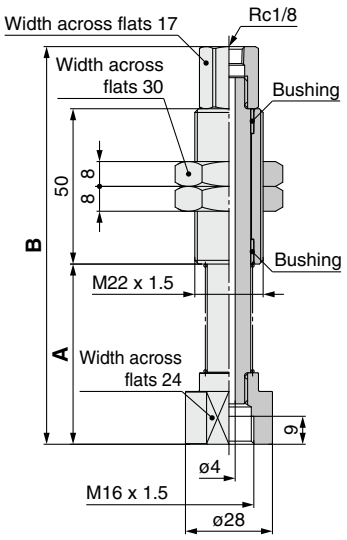


Dimensions

Part no.	A	B
ZP3EB-T1JB10	47.5	99.5
ZP3EB-T1JB30	72.5	124.5
ZP3EB-T1JB50	92.5	144.5

Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-50UM□
ZP3E-32BM□
ZP3E-40BM□
ZP3E-50BM□

Part no.	
	ZP3EB-T2JB10 [Weight: 308 g]
	ZP3EB-T2JB30 [Weight: 337 g]
	ZP3EB-T2JB50 [Weight: 360 g]



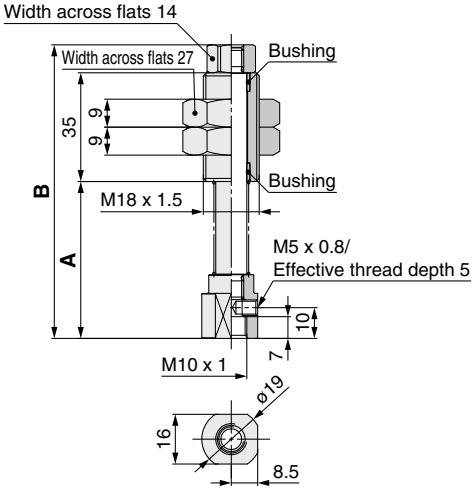
Dimensions

Part no.	A	B
ZP3EB-T2JB10	58	128
ZP3EB-T2JB30	83	153
ZP3EB-T2JB50	103	173

Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-100UM□
ZP3E-125UM□
ZP3E-63BM□
ZP3E-80BM□
ZP3E-100BM□
ZP3E-125BM□

Buffer Assembly (Vacuum inlet: Lateral)

Part no.	
	ZP3EB-Y1JB10 [Weight: 170 g]
	ZP3EB-Y1JB30 [Weight: 186 g]
	ZP3EB-Y1JB50 [Weight: 196 g]

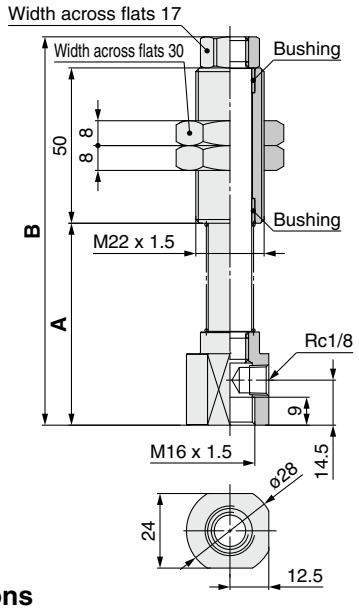


Dimensions

Part no.	A	B
ZP3EB-Y1JB10	50.5	94.5
ZP3EB-Y1JB30	75.5	119.5
ZP3EB-Y1JB50	95.5	139.5

Applicable pad part no.
ZP3E-32UM□
ZP3E-40UM□
ZP3E-50UM□
ZP3E-32BM□
ZP3E-40BM□
ZP3E-50BM□

Part no.	
	ZP3EB-Y2JB10 [Weight: 306 g]
	ZP3EB-Y2JB30 [Weight: 337 g]
	ZP3EB-Y2JB50 [Weight: 362 g]



Dimensions

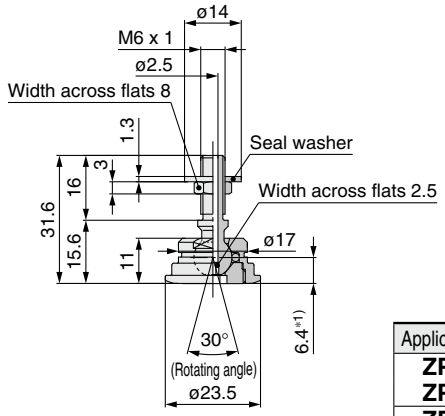
Part no.	A	B
ZP3EB-Y2JB10	65	125
ZP3EB-Y2JB30	90	150
ZP3EB-Y2JB50	120	170

Applicable pad part no.
ZP3E-63UM□
ZP3E-80UM□
ZP3E-100UM□
ZP3E-125UM□
ZP3E-63BM□
ZP3E-80BM□
ZP3E-100BM□
ZP3E-125BM□

Ball Joint Assembly/Unit Part No.

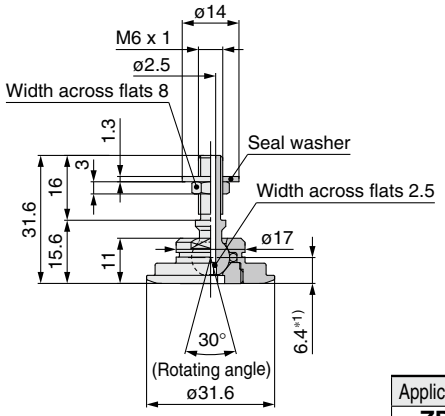
Ball Joint Assembly

Part no.	ZP3EA-F1-AL6 [Weight: 27.3 g]



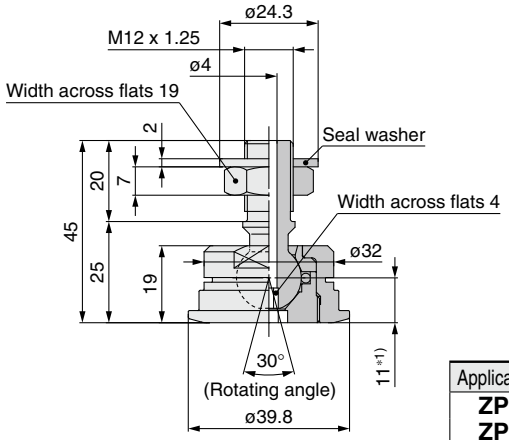
Applicable pad part no.
ZP3E-32UM
ZP3E-40UM
ZP3E-32BM
ZP3E-40BM

Part no.	ZP3EA-F2-AL6 [Weight: 38.7 g]



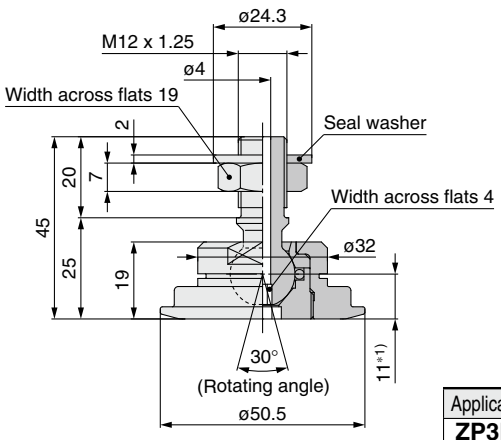
Applicable pad part no.
ZP3E-50UM
ZP3E-50BM

Part no.	ZP3EA-F3-AL12 [Weight: 109 g]



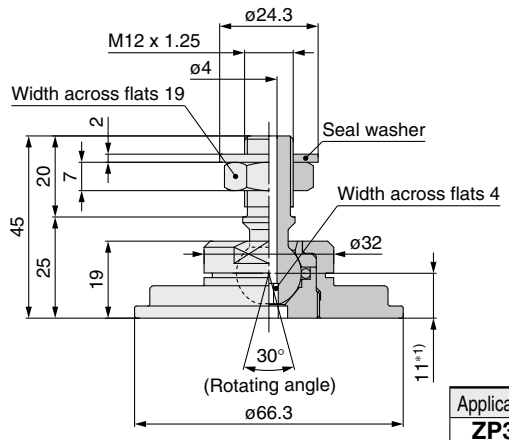
Applicable pad part no.
ZP3E-63UM
ZP3E-80UM
ZP3E-63BM

Part no.	ZP3EA-F4-AL12 [Weight: 122 g]



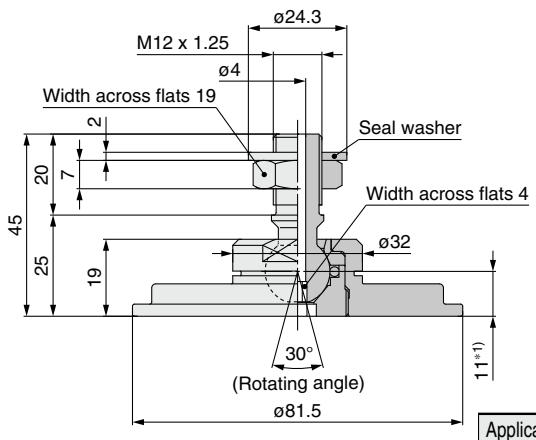
Applicable pad part no.
ZP3E-100UM
ZP3E-80BM

Part no.	ZP3EA-F5-AL12 [Weight: 153 g]



Applicable pad part no.
ZP3E-125UM
ZP3E-100BM

Part no.	ZP3EA-F6-AL12 [Weight: 186 g]

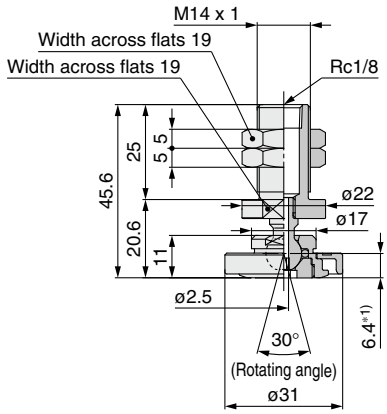


Applicable pad part no.
ZP3E-125BM

*1) Center of the rotating angle

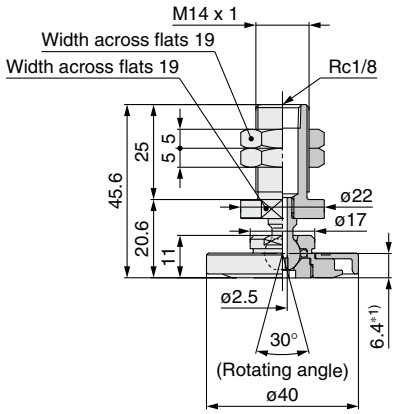
Ball Joint Unit: Male Thread (Vacuum inlet: Vertical)

Part no.	**ZP3EU-F1-TAL14** [Weight: 51.8 g]



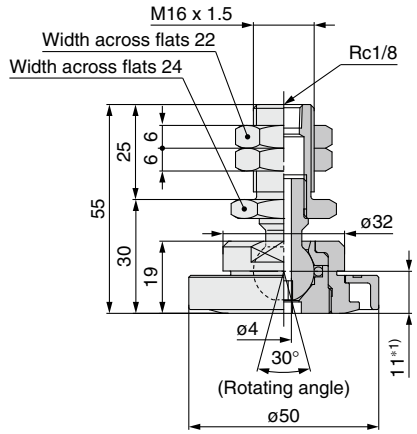
Applicable pad part no.
ZP3E-32UM
ZP3E-40UM
ZP3E-32BM
ZP3E-40BM

Part no.	**ZP3EU-F2-TAL14** [Weight: 65.7 g]



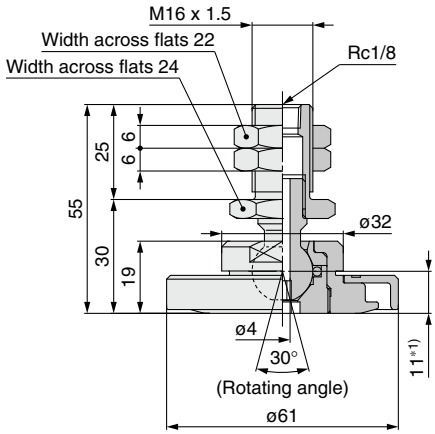
Applicable pad part no.
ZP3E-50UM
ZP3E-50BM

Part no.	**ZP3EU-F3-TAL16** [Weight: 139 g]



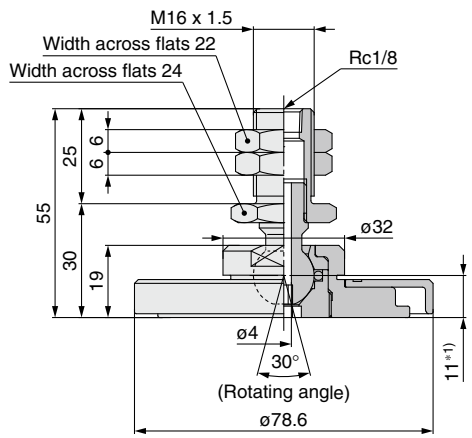
Applicable pad part no.
ZP3E-63UM
ZP3E-80UM
ZP3E-63BM

Part no.	**ZP3EU-F4-TAL16** [Weight: 159 g]



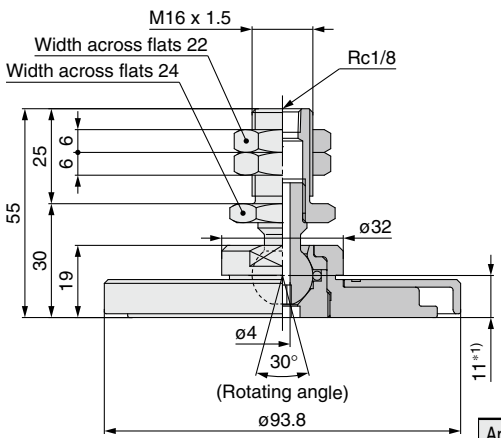
Applicable pad part no.
ZP3E-100UM
ZP3E-80BM

Part no.	**ZP3EU-F5-TAL16** [Weight: 202 g]



Applicable pad part no.
ZP3E-125UM
ZP3E-100BM

Part no.	**ZP3EU-F6-TAL16** [Weight: 249 g]

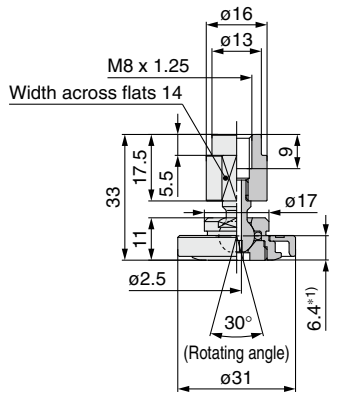


Applicable pad part no.
ZP3E-125BM

*1) Center of the rotating angle

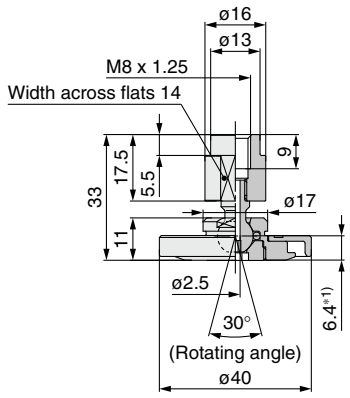
Ball Joint Unit: Female Thread (Vacuum inlet: Vertical)

Part no.	**ZP3EU-F1-TB8** [Weight: 33.7 g]



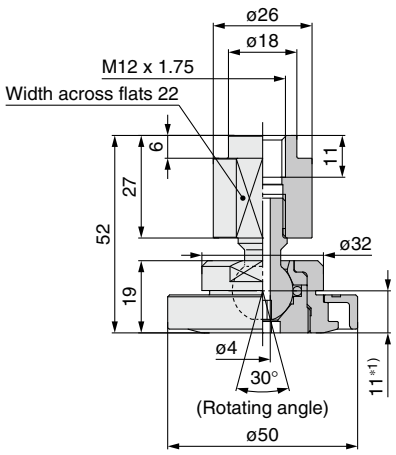
Applicable pad part no.
ZP3E-32UM
ZP3E-40UM
ZP3E-32BM
ZP3E-40BM

Part no.	**ZP3EU-F2-TB8** [Weight: 47.7 g]



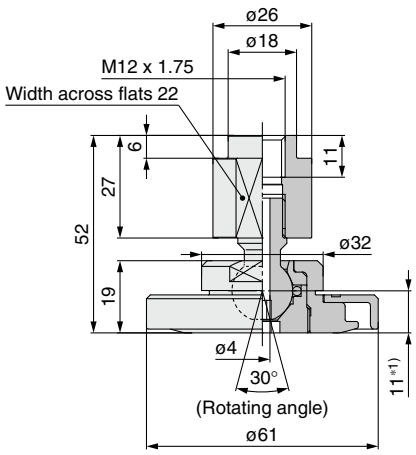
Applicable pad part no.
ZP3E-50UM
ZP3E-50BM

Part no.	**ZP3EU-F3-TB12** [Weight: 126 g]



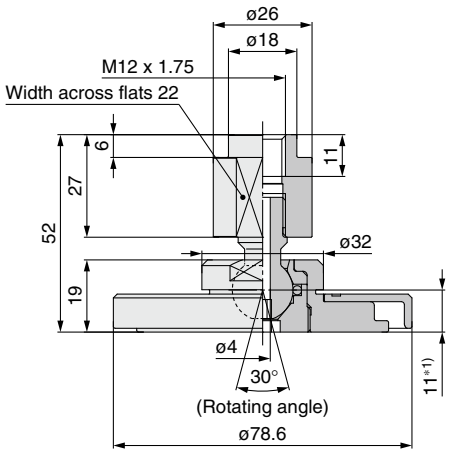
Applicable pad part no.
ZP3E-63UM
ZP3E-80UM
ZP3E-63BM

Part no.	**ZP3EU-F4-TB12** [Weight: 146 g]



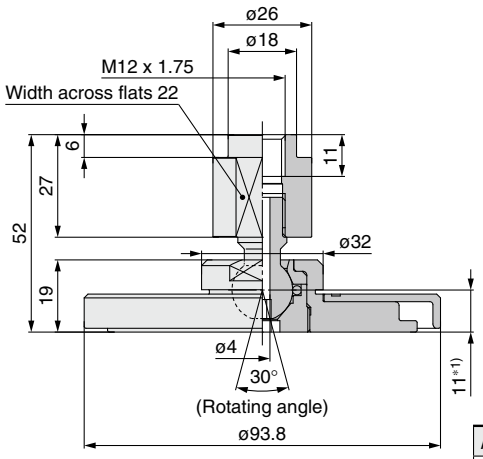
Applicable pad part no.
ZP3E-100UM
ZP3E-80BM

Part no.	**ZP3EU-F5-TB12** [Weight: 189 g]



Applicable pad part no.
ZP3E-125UM
ZP3E-100BM

Part no.	**ZP3EU-F6-TB12** [Weight: 236 g]

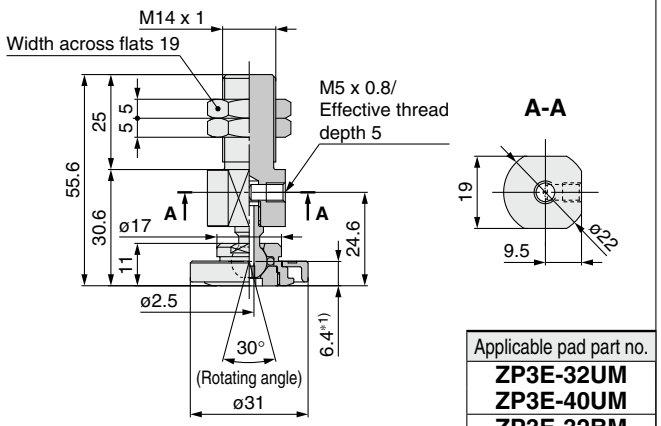


Applicable pad part no.
ZP3E-125BM

∗1) Center of the rotating angle

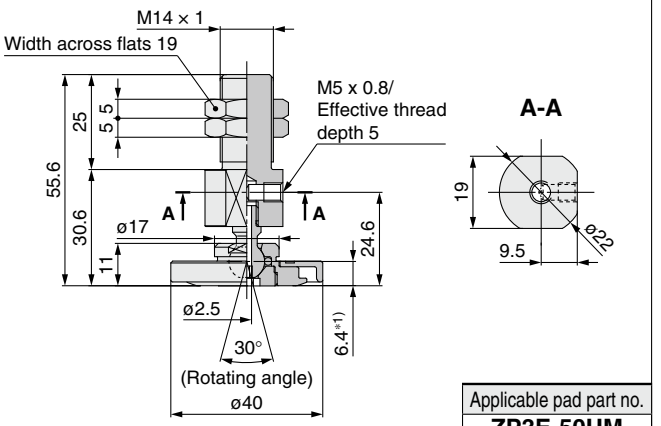
Ball Joint Unit: Male Thread (Vacuum inlet: Lateral)

Part no.	**ZP3EU-F1-YAL14** [Weight: 64.5 g]



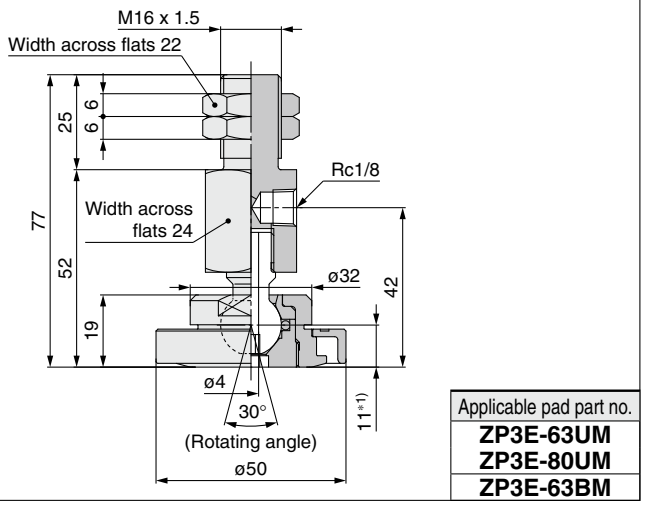
Applicable pad part no.
ZP3E-32UM
ZP3E-40UM
ZP3E-32BM
ZP3E-40BM

Part no.	**ZP3EU-F2-YAL14** [Weight: 78.4 g]



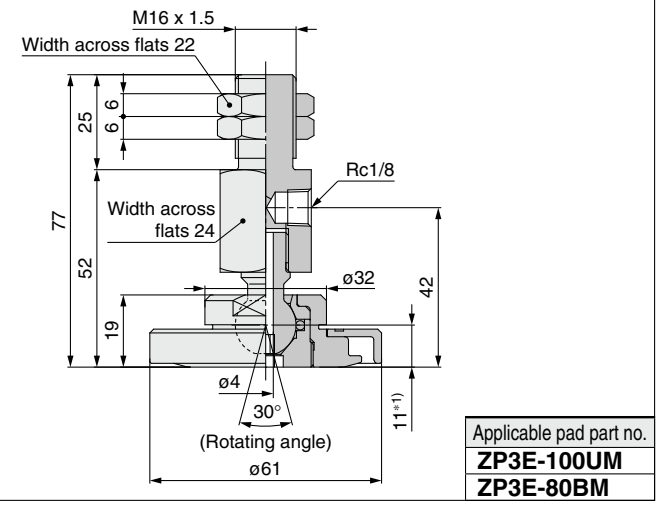
Applicable pad part no.
ZP3E-50UM
ZP3E-50BM

Part no.	**ZP3EU-F3-YAL16** [Weight: 266 g]



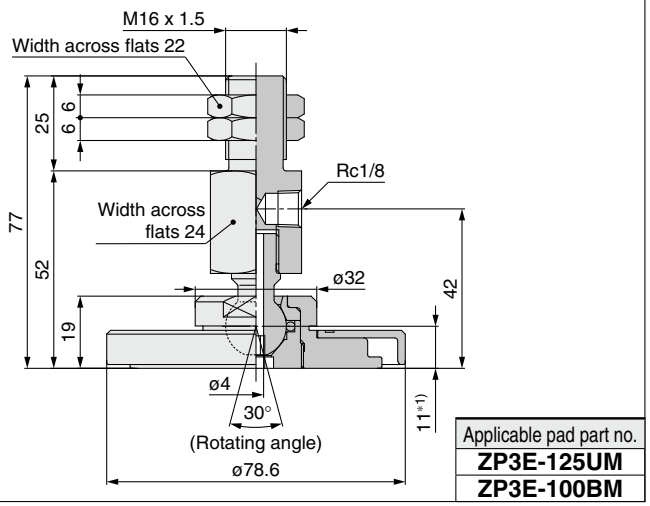
Applicable pad part no.
ZP3E-63UM
ZP3E-80UM
ZP3E-63BM

Part no.	**ZP3EU-F4-YAL16** [Weight: 286 g]



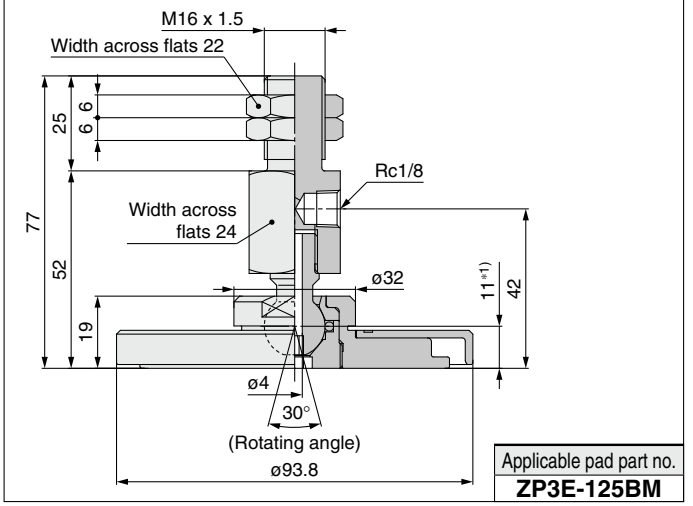
Applicable pad part no.
ZP3E-100UM
ZP3E-80BM

Part no.	**ZP3EU-F5-YAL16** [Weight: 329 g]



Applicable pad part no.
ZP3E-125UM
ZP3E-100BM

Part no.	**ZP3EU-F6-YAL16** [Weight: 376 g]

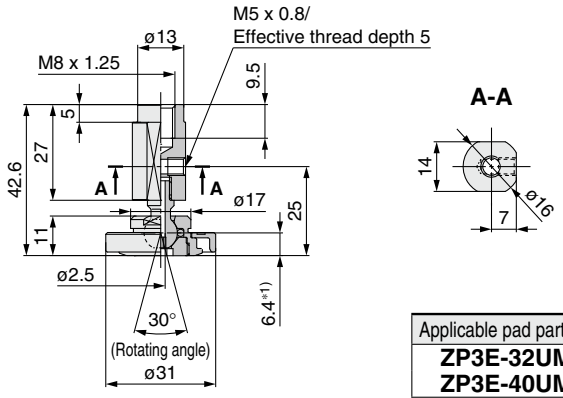


Applicable pad part no.
ZP3E-125BM

∗1) Center of the rotating angle

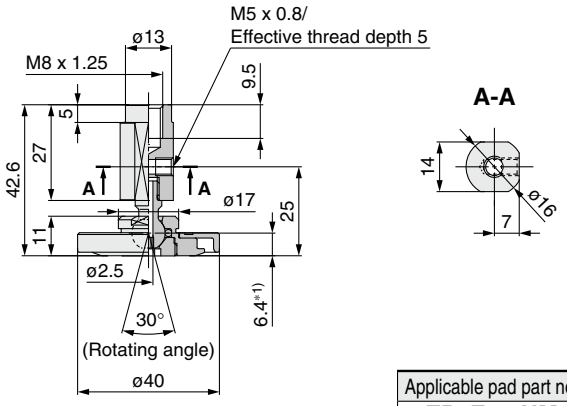
Ball Joint Unit: Female Thread (Vacuum inlet: Lateral)

Part no.	**ZP3EU-F1-YB8** [Weight: 37.9 g]



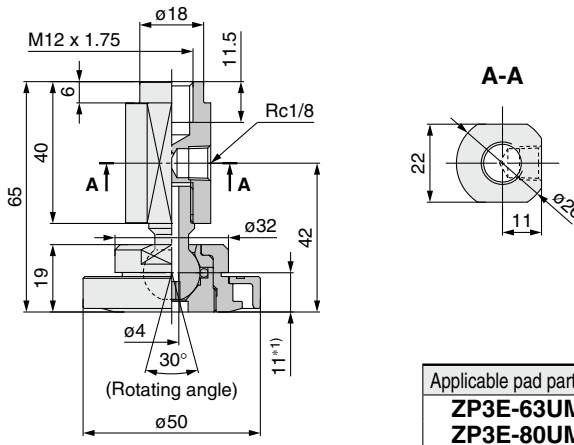
Applicable pad part no.
ZP3E-32UM
ZP3E-40UM
ZP3E-32BM
ZP3E-40BM

Part no.	**ZP3EU-F2-YB8** [Weight: 51.8 g]



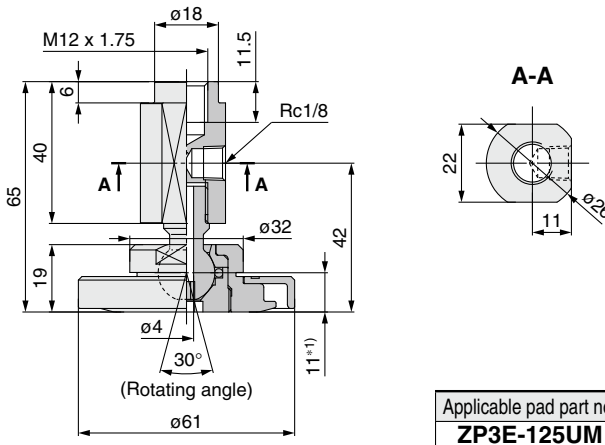
Applicable pad part no.
ZP3E-50UM
ZP3E-50BM

Part no.	**ZP3EU-F3-YB12** [Weight: 139 g]



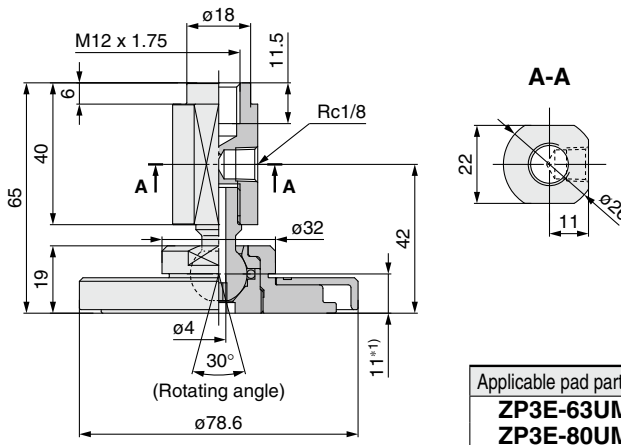
Applicable pad part no.
ZP3E-63UM
ZP3E-80UM
ZP3E-63BM

Part no.	**ZP3EU-F4-YB12** [Weight: 159 g]



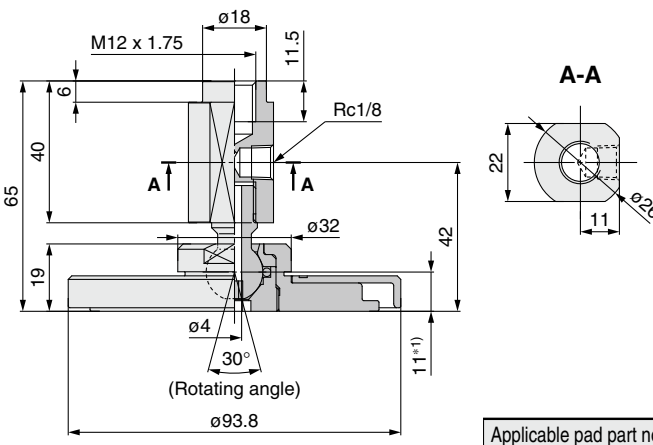
Applicable pad part no.
ZP3E-125UM
ZP3E-100BM

Part no.	**ZP3EU-F5-YB12** [Weight: 202 g]



Applicable pad part no.
ZP3E-63UM
ZP3E-80UM
ZP3E-63BM

Part no.	**ZP3EU-F6-YB12** [Weight: 249 g]



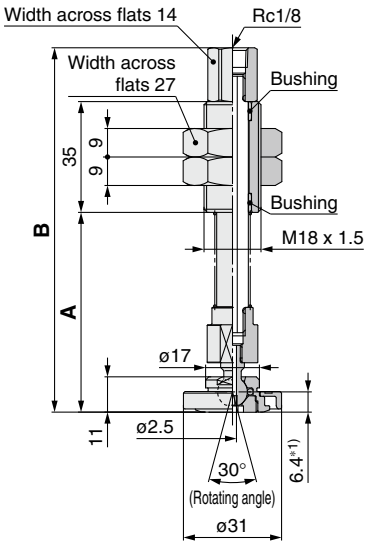
Applicable pad part no.
ZP3E-125BM

*1) Center of the rotating angle

Ball Joint Buffer Unit Part No.

Ball Joint Buffer Unit (Vacuum inlet: Vertical)

Part no.	
	ZP3EU-TF1JB10 [Weight: 202 g]
	ZP3EU-TF1JB30 [Weight: 211 g]
	ZP3EU-TF1JB50 [Weight: 223 g]

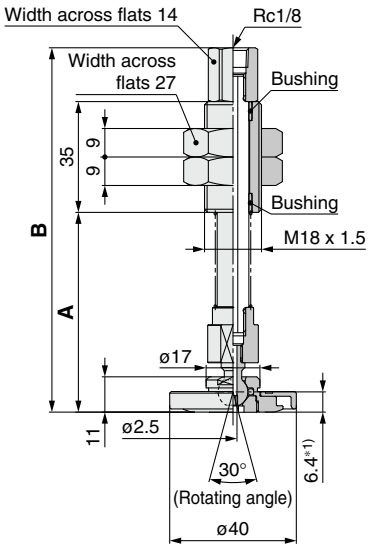


Dimensions

Part no.	A	B
ZP3EU-TF1JB10	63	115
ZP3EU-TF1JB30	88	140
ZP3EU-TF1JB50	108	160

Applicable pad part no.
ZP3E-32UM
ZP3E-40UM
ZP3E-32BM
ZP3E-40BM

Part no.	
	ZP3EU-TF2JB10 [Weight: 211 g]
	ZP3EU-TF2JB30 [Weight: 225 g]
	ZP3EU-TF2JB50 [Weight: 237 g]

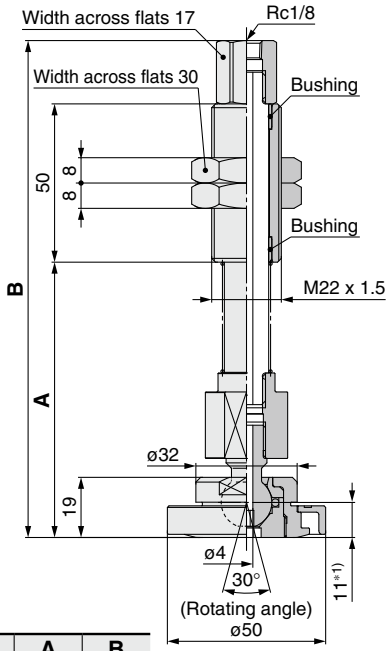


Dimensions

Part no.	A	B
ZP3EU-TF2JB10	63	115
ZP3EU-TF2JB30	88	140
ZP3EU-TF2JB50	108	140

Applicable pad part no.
ZP3E-50UM
ZP3E-50BM

Part no.	
	ZP3EU-TF3JB10 [Weight: 409 g]
	ZP3EU-TF3JB30 [Weight: 438 g]
	ZP3EU-TF3JB50 [Weight: 461 g]

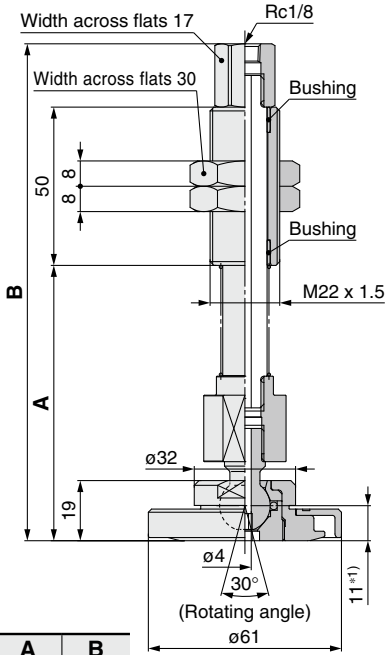


Dimensions

Part no.	A	B
ZP3EU-TF3JB10	87	157
ZP3EU-TF3JB30	112	182
ZP3EU-TF3JB50	132	202

Applicable pad part no.
ZP3E-63UM
ZP3E-80UM
ZP3E-63BM

Part no.	
	ZP3EU-TF4JB10 [Weight: 429 g]
	ZP3EU-TF4JB30 [Weight: 458 g]
	ZP3EU-TF4JB50 [Weight: 481 g]



Dimensions

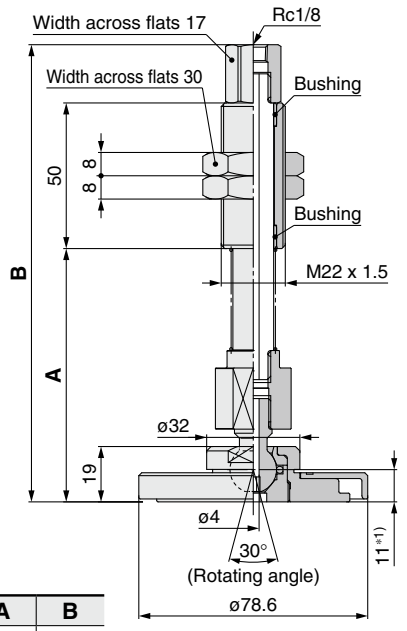
Part no.	A	B
ZP3EU-TF4JB10	87	157
ZP3EU-TF4JB30	112	182
ZP3EU-TF4JB50	132	202

Applicable pad part no.
ZP3E-100UM
ZP3E-80BM

∗1) Center of the rotating angle

Ball Joint Buffer Unit (Vacuum inlet: Vertical)

Part no.	
	ZP3EU-TF5JB10 [Weight: 472 g]
	ZP3EU-TF5JB30 [Weight: 501 g]
	ZP3EU-TF5JB50 [Weight: 524 g]

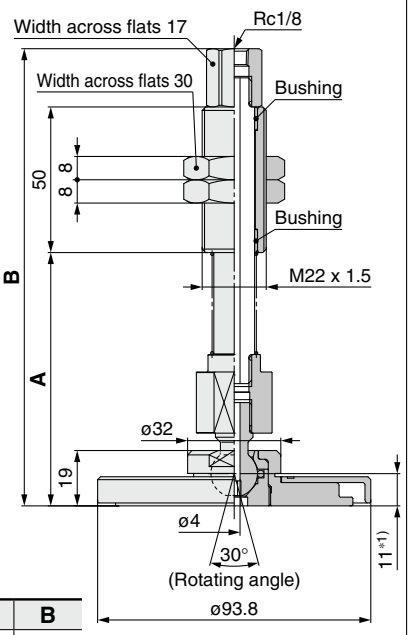


Dimensions

Part no.	A	B
ZP3EU-TF5JB10	87	157
ZP3EU-TF5JB30	112	182
ZP3EU-TF5JB50	132	202

Applicable pad part no.
ZP3E-125UM
ZP3E-100BM

Part no.	
	ZP3EU-TF6JB10 [Weight: 519 g]
	ZP3EU-TF6JB30 [Weight: 548 g]
	ZP3EU-TF6JB50 [Weight: 571 g]



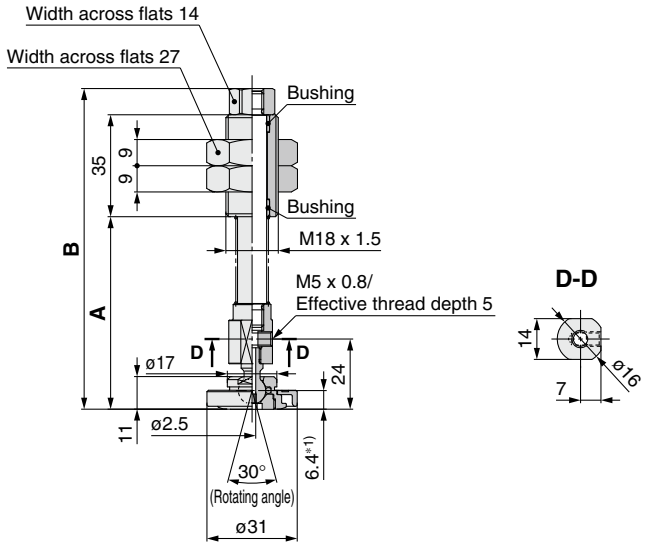
Dimensions

Part no.	A	B
ZP3EU-TF6JB10	87	157
ZP3EU-TF6JB30	112	182
ZP3EU-TF6JB50	132	202

Applicable pad part no.
ZP3E-125BM

Ball Joint Buffer Unit (Vacuum inlet: Lateral)

Part no.	
	ZP3EU-YF1JB10 [Weight: 195 g]
	ZP3EU-YF1JB30 [Weight: 211 g]
	ZP3EU-YF1JB50 [Weight: 224 g]

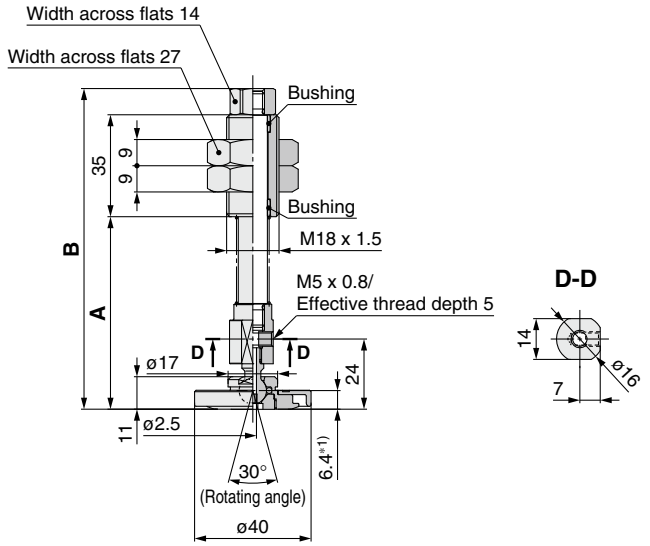


Dimensions

Part no.	A	B
ZP3EU-YF1JB10	66	110
ZP3EU-YF1JB30	91	135
ZP3EU-YF1JB50	111	150

Applicable pad part no.
ZP3E-32UM
ZP3E-40UM
ZP3E-32BM
ZP3E-40BM

Part no.	
	ZP3EU-YF2JB10 [Weight: 209 g]
	ZP3EU-YF2JB30 [Weight: 225 g]
	ZP3EU-YF2JB50 [Weight: 237 g]



Dimensions

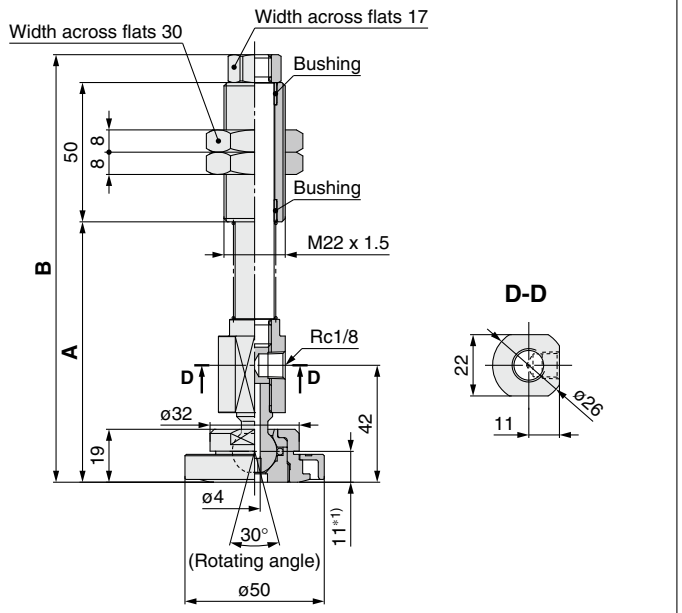
Part no.	A	B
ZP3EU-YF2JB10	66	110
ZP3EU-YF2JB30	91	135
ZP3EU-YF2JB50	111	150

Applicable pad part no.
ZP3E-50UM
ZP3E-50BM

∗1) Center of the rotating angle

Ball Joint Buffer Unit (Vacuum inlet: Lateral)

Part no.	
	ZP3EU-YF3JB10 [Weight: 410 g]
	ZP3EU-YF3JB30 [Weight: 441 g]
	ZP3EU-YF3JB50 [Weight: 466 g]

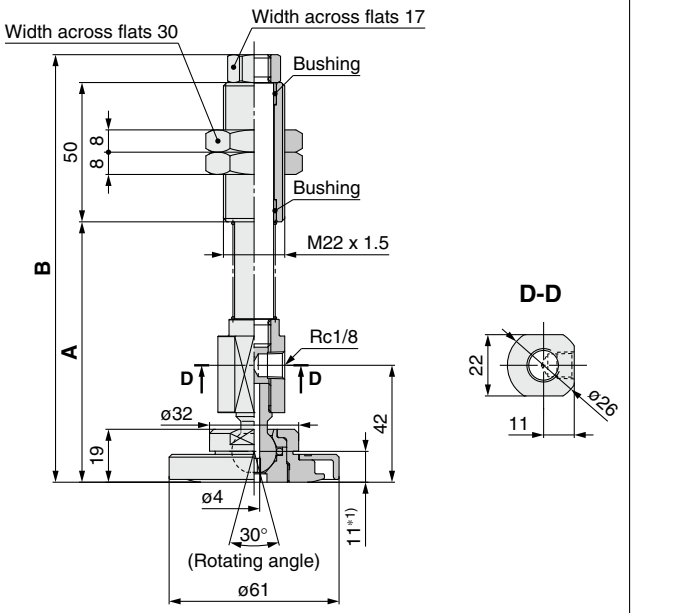


Dimensions

Part no.	A	B
ZP3EU-YF3JB10	93.5	153.5
ZP3EU-YF3JB30	118.5	178.5
ZP3EU-YF3JB50	138.5	198.5

Applicable pad part no.
ZP3E-63UM
ZP3E-80UM
ZP3E-63BM

Part no.	
	ZP3EU-YF4JB10 [Weight: 430 g]
	ZP3EU-YF4JB30 [Weight: 461 g]
	ZP3EU-YF4JB50 [Weight: 486 g]

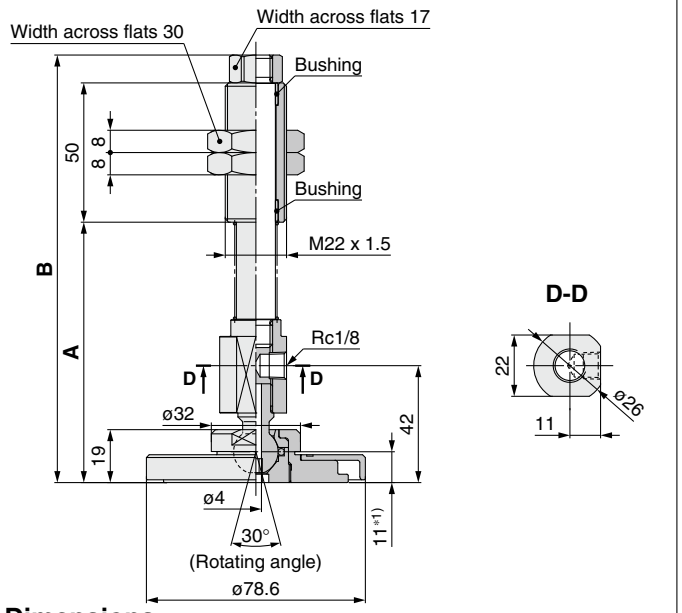


Dimensions

Part no.	A	B
ZP3EU-YF4JB10	93.5	153.5
ZP3EU-YF4JB30	118.5	178.5
ZP3EU-YF4JB50	138.5	198.5

Applicable pad part no.
ZP3E-100UM
ZP3E-80BM

Part no.	
	ZP3EU-YF5JB10 [Weight: 473 g]
	ZP3EU-YF5JB30 [Weight: 504 g]
	ZP3EU-YF5JB50 [Weight: 529 g]

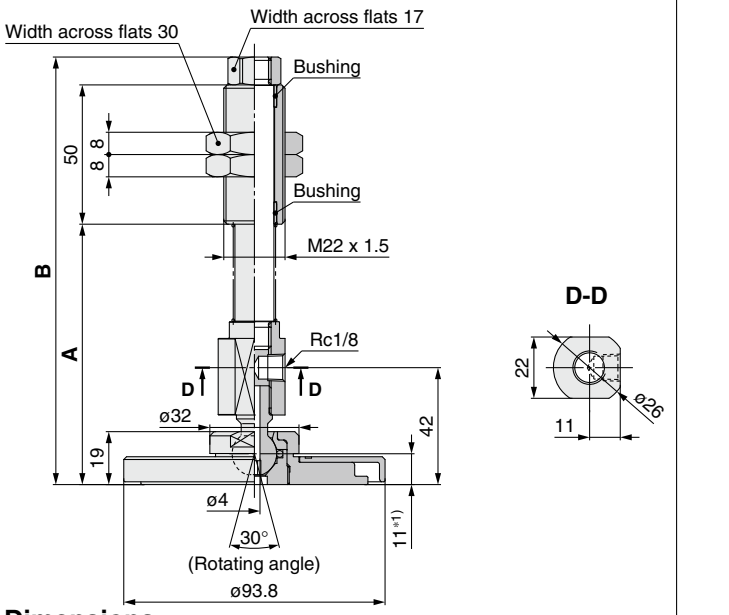


Dimensions

Part no.	A	B
ZP3EU-YF5JB10	93.5	153.5
ZP3EU-YF5JB30	118.5	178.5
ZP3EU-YF5JB50	138.5	198.5

Applicable pad part no.
ZP3E-125UM
ZP3E-100BM

Part no.	
	ZP3EU-YF6JB10 [Weight: 520 g]
	ZP3EU-YF6JB30 [Weight: 551 g]
	ZP3EU-YF6JB50 [Weight: 576 g]



Dimensions

Part no.	A	B
ZP3EU-YF6JB10	93.5	153.5
ZP3EU-YF6JB30	118.5	178.5
ZP3EU-YF6JB50	138.5	198.5

Applicable pad part no.
ZP3E-125BM

∗1) Center of the rotating angle

Vacuum Equipment Precautions 1

Be sure to read this before handling.

Design/Selection

⚠Warning

1. Check the specifications.

Products represented in this catalog are designed only for use in compressed air systems (including vacuum).
Do not operate at pressures or temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications.)
Please contact SMC when using a fluid other than compressed air (including vacuum).
We do not guarantee against any damage if the product is used outside of the specification range.

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

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

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

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

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

<When there is vacuum leakage from the workpiece or the piping>
If the ejector's suction flow rate is too low, the adsorption will be poor.

<When piping is long or the diameter is large>
The adsorption response time will delay due to the increased volume of the piping.
Select an ejector with a suitable suction flow rate by referring to the technical data.

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

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

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

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

7. When separating the pad from the workpiece, break the vacuum and confirm that the pressure is atmospheric pressure.

Do not separate them forcibly while vacuum pressure exists between them. This may cause cracking, tearing, or distortion of the pad, or cause the pad to come off the adapter.

8. Do not apply lateral load (force) such as rotation or sliding force of the workpiece to the adsorption surface of the pad during adsorption of the workpiece.

This may cause deformation, cracking, tearing, or distortion of the pad, or cause the pad to come off the adapter.

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

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

10. Vacuum holding using check valves

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

11. Air leakage from main valve

SMC does not guarantee that no air leaks from the main valve used for the vacuum ejector/vacuum pump system. If air leakage is a problem, please contact SMC.

⚠Caution

1. Mounting the suction filter

Because the suction of vacuum equipment acts not only on workpieces but also on dust or water droplets in the surrounding atmosphere, steps must be taken to prevent their penetration into the equipment's interior. Even when using equipment equipped with filters, if there is a considerable amount of dust in the environment, use a separately ordered large-size filter as well.
If there is a possibility of water droplets being sucked in by the vacuum, use a drain separator for vacuum.

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

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

3. For information on related items, such as directional control equipment and actuators, refer to the caution sections in each respective catalog.

4. Do not use the product in an environment that exposes it to vibration. If the product is used in such an environment, we can offer a lock nut type product to prevent it from loosening. Please contact SMC for part number.

Mounting

⚠Warning

1. Operation Manual

Install the products and operate them only after reading the Operation Manual carefully and understanding its contents. Also, keep the manual where it can be referred to as necessary.

2. Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance.

3. Tighten threads with the proper tightening torque.

When installing the products, follow the listed torque specifications.

4. Be sure to fix the product in place when mounting the pad.

Not fixing it firmly into place may cause trouble.

Vacuum Equipment Precautions 2

Be sure to read this before handling.

Mounting

⚠Warning

5. Use caution when implementing rotating transfer with the pad or workpieces and pads with a deviation in the center of the suction position.

Screw looseness due to rotation and pad rotation may cause trouble. Apply screw lock agent as necessary.

6. Avoid operation in rotational direction by using the ball joint pad mechanism.

Wear may cause troubles.

7. Flow of an air pressure circuit, clogging, wear, cracks, or deterioration of the pad or buffer sliding failure (wear of the sliding part, scratching, etc.) may cause trouble. Make sure to perform periodic maintenance.

8. A buffer is used to decrease the load applied to the pad (horizontal lifting).

A malfunction may occur when adsorbing an inclined surface or the side of a workpiece.

9. After the stroke, make sure that the buffer returns to the initial state before starting the next process.

Malfunctions may occur.

10. When pushing a pad to a workpiece, make sure not to apply an impact or a large force.

This would lead to premature deformation, cracking, or wearing of the pad. When pushing a pad onto a workpiece, operate within the deformable range of the pad skirt.

11. When adsorbing a deformed or spherical workpiece, it is necessary to adsorb it by pressing onto the pad with a strong force.

Even if the workpiece can be adsorbed in the initial operation, deformation, cracks, or wear of the pad may occur at an early stage, causing troubles. Make sure to perform periodic maintenance.

12. Foreign matter may get inside the pad.

Although SMC gives full attention to prevent foreign matter from getting inside the product during pad molding, it is difficult to remove foreign matter from rubber polymer completely. Therefore, products with imperceptible fine foreign matter is judged as a conforming product and shipped to customers.

13. There is a possibility of crystallized white powder or exuded liquid on the rubber surface.

The crystallized powder is called bloom, and the exuded liquid is called bleed. Bloom and bleed do not affect product operation. This phenomenon is caused by rubber compounding agents, such as a vulcanizing agent, antioxidants, oxidation inhibitors, softeners, parting agents or others, and differs depending on the rubber material. As this phenomenon is influenced by changes in the environment (temperature differences, light (fluorescent light), humidity, etc.), the occurrence time cannot be estimated.

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

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

Piping

⚠Caution

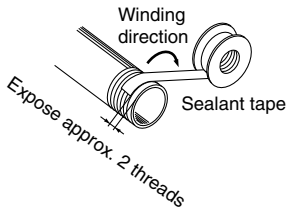
1. Refer to the Fittings and Tubing Precautions (Best Pneumatics No. 6) for handling One-touch fittings.

2. Preparation before piping

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

3. Wrapping of sealant tape

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



4. Use piping with adequate conductance.

Select equipment and piping for the vacuum side which has adequate conductance so that the ejector's maximum suction flow rate can be accommodated by the piping.
Also, make sure that there are no unnecessary restrictions or leaks, etc., along the course of the piping. Furthermore, design of the air supply should be performed while taking into consideration the ejector's maximum air consumption and the air consumption of other pneumatic circuits.

5. Avoid disorganized piping.

Piping which is direct and of the shortest possible length should be used for both the vacuum and supply sides. Disorganized piping should be avoided. Unnecessary length increases the piping volume, and thus increases the response time.

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

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

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

Vacuum Equipment Precautions 3

Be sure to read this before handling.

Air Supply

⚠Warning

1. Type of fluids

Be sure to use the compressed air for the fluid. Please consult with SMC when using the product in applications other than compressed air.

2. When there is a large amount of drain.

Compressed air containing a large amount of drain may cause the pneumatic equipment to malfunction. An air dryer, water separator, and filter should be installed on the upstream side.

Additionally, when applying oil to the compressed air that is used for directional control equipment or actuators, install piping separately so that the air before applying oil is supplied to the vacuum equipment.

If oil flows into the vacuum ejector/vacuum pump system, the silencer, nozzle or filter may be clogged, causing reduced performance.

3. Drain flushing

If drain in the water separator or air filter is not removed, the drain flows from the outlet, causing the pneumatic equipment to malfunction. If the drain flushing is difficult, it is recommended to use a product with an auto drain option. For details about compressed air quality, refer to SMC Best Pneumatics No.5 catalog.

4. Use clean air.

Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt contents, or corrosive gases, etc. Otherwise, the product may break or malfunction.

Operating Environment

⚠Warning

1. Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.

2. Do not use in a place subject to heavy vibration and/or shock.

3. Do not use in an environment where flammable gas or explosive gas exists. Usage may cause a fire or explosion. The products do not have an explosion proof construction.

4. The valve should not be exposed to prolonged sunlight. Use a protective cover.

5. Remove any sources of excessive heat.

6. In locations where there is contact with spatter from water, oil, solder, etc., take suitable protective measures.

7. In cases where the vacuum unit is surrounded by other equipment etc., or the unit is energized for an extended time, take measures to exhaust excess heat so that the temperature should be within specifications.

Operating Environment

⚠Caution

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

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

Maintenance

⚠Warning

1. Perform maintenance inspection according to the procedures indicated in the Operation Manual.

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

2. Maintenance work

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

3. Drain flushing

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

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

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

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

5. Perform maintenance of suction filters and silencers periodically.

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

⚠ Safety Instructions

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

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

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

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

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

⚠ Warning

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

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

2. Only personnel with appropriate training should operate machinery and equipment.

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

3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

⚠ Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

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

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*2) **Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

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

⚠ Caution

SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.