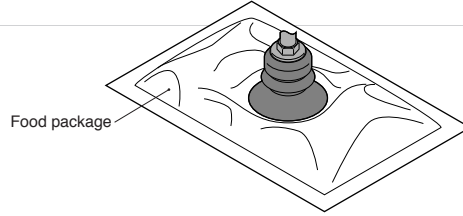


Vacuum Pad Bellows Series

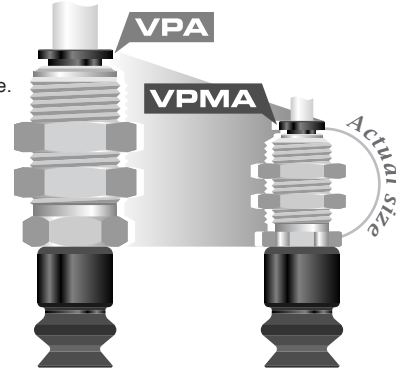
Characteristics

- Best suitable for retort packaging or bags for packaged foods.
- ▶ Pad dia.: $\phi 10\text{mm}$ to $\phi 80\text{mm}$ ▶ Holder shape: 5 types



Small-sized Vacuum Pad Holder

- Pad holder is miniaturized by changing materials and contributes to lightweight.
- Existing Pad holders (A & B type) are downsized and realized space saving.
- Pad replacement can be done without removing pad holders from equipments as it was used to be.
- Optional Free holder and Pad Direct mounting Filter can be selected with the holder.
- ▶ Pad dia.: $\phi 10\text{mm}$ to $\phi 30\text{mm}$ ▶ Holder shape: 4 types
- ▶ Pad material: Nitrile rubber, Silicon rubber, Anti-static rubber (low resistance)



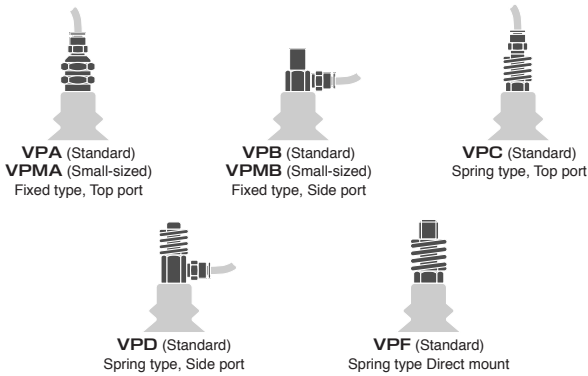
-S3 specification

- The model with "No copper alloy" and "Low level ozone resistance (equipped with HNBR seal)" is available from VPA, VPB, VPMA, and VPMB pad holders.

Model Designation (Example)



(1) Holder type



(2) Pad dia.

Code	10	20	30	40	50	80
Dia.	$\phi 10\text{mm}$ 0.39in.	$\phi 20\text{mm}$ 0.79in.	$\phi 30\text{mm}$ 1.18in.	$\phi 40\text{mm}$ 1.57in.	$\phi 50\text{mm}$ 1.97in.	$\phi 80\text{mm}$ 3.15in.

(3) Pad shape

B: Bellows type

(4) Pad material

Material	Nitrile rubber	Silicon rubber	Anti-static rubber (Surface resistance: $10^9\sim 10^{12}\Omega$)
Code	N	S	SE

(5) Joint size and type

Pad size	$\phi 10$		$\phi 10$ to $\phi 30$		$\phi 10$ to $\phi 50$		$\phi 70$ to $\phi 100$
	Quick-fitting joint	Barb fitting	Quick-fitting joint	Barb fitting	Quick-fitting joint	Barb fitting	Female thread
Dia. (O.D.xI.D.)	3x2 (mm)	3x2 (mm)	4x2.5 (mm)	4x2.5 (mm)	6x4 (mm)	6x4 (mm)	Rp(G)1/8
Code	3J*	3B*	4J*	4B*	6J	6B	01
Pad size	$\phi 10$ to $\phi 50$			$\phi 70$ to $\phi 100$			
	Quick-fitting joint			Barb fitting			
Dia. (O.D.xI.D.)	1/4x0.18in.			1/4x0.18in.			
Code	1/4J			1/4B			
Code	N1						

* Only Small-sized holder is available.

(6) Free holder (option) or Fall prevention valve (option)

FH: Free holder swing angle 30°

FHH: Free holder swing angle 15°

ECV: Fall prevention valve

* Please add up the price of the option to the standard pad price.

(7) Filter (option)

F15: Pad direct mounting Filter (Pad dia.: $\phi 10$ to $\phi 25\text{mm}$)

F30: Pad direct mounting Filter (Pad dia.: $\phi 30$ to $\phi 50\text{mm}$)

* Please add up the price of the option to the standard pad price.

(8) Wrench size specification

U: inch spec.

No code: mm spec.

(9) Material option

-S3: No copper alloy & HNBR seal

No code: Standard

▶ In case of ordering, please apply Model code in the following chart.

Detailed Safety Instructions











Before using the PISCO device, be sure to read the "Safety Instructions", "Common Safety Instructions for Products Listed in This Manual" on page 13 to 15 and "Common Safety Instructions for Vacuum Pads" on page 205.

- ⚠Warnings:
1. Small pad holders (VPMA, VPMB) are designed as smaller and lighter than standard holders. Therefore, load intensity resistance of small pad holder is poor compared to standard pad holder. Please pay due consideration for load setting and make sure to check with actual application.
 2. When replacing pad on the small pad holder, confirming the construction drawing of the manual, tighten it with a proper tool at the recommended tightening torque (table 2 of page 205) using outer hexagon of pad holder, and make sure that there is no looseness.
 3. When fixing the holder using equipped bulkhead of small pad holder, confirming the construction drawing of the manual, tighten it with a proper tool at the recommended tightening torque (table 3 of page 205) using outer hexagon of pad holder, and make sure that there is no looseness.





⚠Caution : 1. When using anti-static pad, please treat to dissipate the static electricity using a metal plate or etcetera to fix the holder, otherwise the static electricity may left charged in the vacuum pad.



The products listed in this page are ECO-friendly products.
* Please refer to page 4 for the details of ECO-friendly products.


VPA Fixed Type, Top Port 								VPF Spring Type, Direct Mount 				<table border="1"> <thead> <tr><th>Model</th></tr> </thead> <tbody> <tr><td>VPF10B^④</td></tr> <tr><td>VPF20B^④</td></tr> <tr><td>VPF30B^④</td></tr> <tr><td>VPF40B^④</td></tr> <tr><td>VPF50B^④</td></tr> </tbody> </table>	Model	VPF10B ^④	VPF20B ^④	VPF30B ^④	VPF40B ^④	VPF50B ^④																																													
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VPD30B ^④ 6J	VPD30B ^④ 1/4JU																																																														
VPD40B ^④ 6J	VPD40B ^④ 1/4JU																																																														
VPD50B ^④ 6J	VPD50B ^④ 1/4JU																																																														
VPD80B ^④ 01	VPD80B ^④ N1U																																																														
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VPD50B ^④ 6B	VPD50B ^④ 1/4BU																																																														

Small-sized Pad holder type

VPMA Fixed Type, Top Port 								VPMB Fixed Type, Side Port 																																																			
<table border="1"> <thead> <tr><th>Standard Model</th><th>-S3 spec. Model</th></tr> </thead> <tbody> <tr><td>VPMA10B^④3J</td><td>VPMA10B^④1/4J-S3</td></tr> <tr><td>VPMA10B^④4J</td><td>VPMA20B^④1/4J-S3</td></tr> <tr><td>VPMA20B^④4J</td><td>VPMA30B^④1/4J-S3</td></tr> <tr><td>VPMA30B^④4J</td><td></td></tr> </tbody> </table>			Standard Model	-S3 spec. Model	VPMA10B ^④ 3J	VPMA10B ^④ 1/4J-S3	VPMA10B ^④ 4J	VPMA20B ^④ 1/4J-S3	VPMA20B ^④ 4J	VPMA30B ^④ 1/4J-S3	VPMA30B ^④ 4J		<table border="1"> <thead> <tr><th>Standard Model</th><th>-S3 spec. Model</th></tr> </thead> <tbody> <tr><td>VPMA10B^④3B</td><td>VPMA10B^④1/4B-S3</td></tr> <tr><td>VPMA10B^④4B</td><td>VPMA10B^④1/4B-S3</td></tr> <tr><td>VPMA20B^④4B</td><td>VPMA20B^④1/4B-S3</td></tr> <tr><td>VPMA20B^④6B</td><td>VPMA20B^④1/6B-S3</td></tr> <tr><td>VPMA30B^④4B</td><td>VPMA30B^④1/4B-S3</td></tr> <tr><td>VPMA30B^④6B</td><td>VPMA30B^④1/6B-S3</td></tr> </tbody> </table>			Standard Model	-S3 spec. Model	VPMA10B ^④ 3B	VPMA10B ^④ 1/4B-S3	VPMA10B ^④ 4B	VPMA10B ^④ 1/4B-S3	VPMA20B ^④ 4B	VPMA20B ^④ 1/4B-S3	VPMA20B ^④ 6B	VPMA20B ^④ 1/6B-S3	VPMA30B ^④ 4B	VPMA30B ^④ 1/4B-S3	VPMA30B ^④ 6B	VPMA30B ^④ 1/6B-S3	<table border="1"> <thead> <tr><th>Standard Model</th><th>-S3 spec. Model</th></tr> </thead> <tbody> <tr><td>VPMB10B^④3J</td><td>VPMB10B^④1/4J-S3</td></tr> <tr><td>VPMB10B^④4J</td><td>VPMB20B^④1/4J-S3</td></tr> <tr><td>VPMB20B^④4J</td><td>VPMB30B^④1/4J-S3</td></tr> <tr><td>VPMB30B^④4J</td><td></td></tr> </tbody> </table>			Standard Model	-S3 spec. Model	VPMB10B ^④ 3J	VPMB10B ^④ 1/4J-S3	VPMB10B ^④ 4J	VPMB20B ^④ 1/4J-S3	VPMB20B ^④ 4J	VPMB30B ^④ 1/4J-S3	VPMB30B ^④ 4J		<table border="1"> <thead> <tr><th>Standard Model</th><th>-S3 spec. Model</th></tr> </thead> <tbody> <tr><td>VPMB10B^④3B</td><td>VPMB10B^④1/4B-S3</td></tr> <tr><td>VPMB10B^④4B</td><td>VPMB10B^④1/4B-S3</td></tr> <tr><td>VPMB20B^④4B</td><td>VPMB20B^④1/4B-S3</td></tr> <tr><td>VPMB20B^④6B</td><td>VPMB20B^④1/6B-S3</td></tr> <tr><td>VPMB30B^④4B</td><td>VPMB30B^④1/4B-S3</td></tr> <tr><td>VPMB30B^④6B</td><td>VPMB30B^④1/6B-S3</td></tr> </tbody> </table>			Standard Model	-S3 spec. Model	VPMB10B ^④ 3B	VPMB10B ^④ 1/4B-S3	VPMB10B ^④ 4B	VPMB10B ^④ 1/4B-S3	VPMB20B ^④ 4B	VPMB20B ^④ 1/4B-S3	VPMB20B ^④ 6B	VPMB20B ^④ 1/6B-S3	VPMB30B ^④ 4B	VPMB30B ^④ 1/4B-S3	VPMB30B ^④ 6B	VPMB30B ^④ 1/6B-S3
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Cautions

- *1. The white-letter model type in  is new model.
- *2. For ^④, please select a pad material.
- *3. Build-to-order production for pad with holder



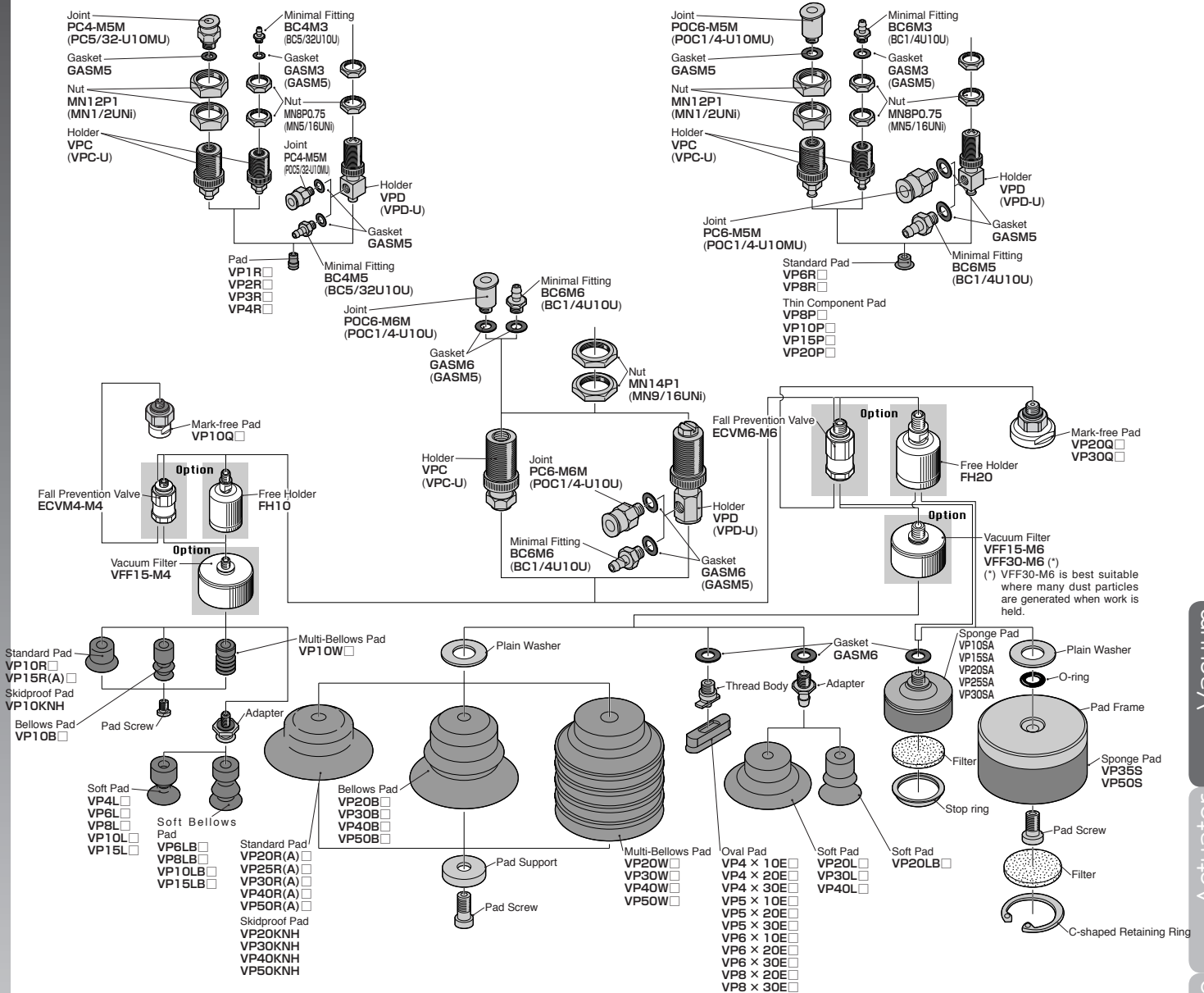
Package specification

1 pc. in a bag

Small-sized pad holder types

(1)	Holder	Type	VPMA												VPMB															
		Pad mount. screw (mm)	M4×0.7						M6×1						M4×0.7						M6×1									
		Adapter for Soft Pad	VPL15-M4						VPL40-M6						VPL15-M4						VPL40-M6									
(2)	Pad dia. (mm)	0.7	6	8	4	6	8	10	15	10	15	20	25	30	4×10	0.7	6	8	4	6	8	10	15	10	15	20	25	30	4×10	
		1	8	10											4×20	1	8	10										4×20		
		1.5		15										4×30	1.5		15										4×30			
		2		20										5×10	2		20										5×10			
		3												5×20	3												5×20			
		4												5×30	4												5×30			
														6×10													6×10			
														6×20													6×20			
														6×30													6×30			
														8×20													8×20			
														8×30													8×30			
(3)	Stroke (mm)																													
(4)	Pad shape & material	General (R)	RN						RN							RN												RN		
			RS							RS							RS												RS	
			RF							RF							RF													RF
			RU							RU							RU													RU
			RSE							RSE							RSE													RSE
			RE							RE							RE													RE
		RG							RG							RG													RG	
		Deep (A)								AN																			AN	
										AS																			AS	
										AF																			AF	
										AU																				AU
										AG																				AG
		Small-sized (RM)	RMN														RMN													
			RMS														RMS													
			RMF														RMF													
			RMU														RMU													
			RMSE														RMSE													
			RME														RME													
		RMG														RMG														
		Sponge (S)																												
Bellows (B)								BN																						
								BS																						
								BSE																						
								WN																						
Multi-Bellows (W)								WS																						
								WG																						
Oval (E)															EN													EN		
															ES													ES		
															EE													EE		
Soft (L)								LN																						
								LS																						
								LFS																						
								LSE																						
Soft Bellows (LB)								LBN																						
								LBS																						
Skidproof (K)								KNH																						
Ultrathin (P)																														
Mark-free (Q)								QK																						
								QM																						
								QKE																						
(5)	Joint shape	180J						3J							180J													4J		
		3J						4J							3J													4J		
		3B						3B							3B													4B		
		4B						4B							4B													6B		
(6)	Spring cover																													
(7)	Free holder																													
(8)	Fall Prevention Valve							ECVM4-M4																			ECVM6-M6			
(9)	Filter							VFF15-M4																				VFF15-M6		
																												VFF30-M6		

Parts of Vacuum Pad



Parts of Vacuum Pads List

Standard type and Skidproof type

Pad Model	Pad Screw Model	Plain Washer Model	Pad Support Model
VP10R, VP15R(A), VP10KNH	VPM46-6	-	-
VP20R(A), VP25R(A), VP20KNH	VPM610-8	HW10.5x18x1.6	-
VP30R(A), VP30KNH	VPM612-10	HW10.5x18x1.6	-
VP40R(A), VP40KNH	VPM610-15	HW10.5x22x1.6	VPW40
VP50R(A), VP50KNH	VPM610-15	HW10.5x22x1.6	VPW50

Bellows type and Multi-Bellows type

Pad Model	Pad Screw Model	Plain Washer Model	Pad Support Model
VP10B, VP10W	VPM46-6	-	-
VP20B, VP20W	VPM610-8	HW10.5x18x1.6	-
VP30B, VP30W	VPM612-10	HW10.5x18x1.6	-
VP40B, VP40W	VPM610-15	HW10.5x22x1.6	VPW40
VP50B, VP50W	VPM610-15	HW10.5x22x1.6	VPW50

Sponge type

Pad Model	Pad Screw Model	Plain Washer Model	Filter (10 pcs./bag) Model	Stop ring Model	C-shaped Retaining Ring Model	Pad Frame Model	O-ring Model
VP10SA, VP15SA	-	-	-	-	-	-	-
VP20SA	-	-	SEE1202	VPW12	-	-	-
VP25SA	-	-	SFE35	VPW16	-	-	-
VP30SA	-	-	SFE2202	VPW22	-	-	-
VP35S	VPM610-12	HW10.5x22x1.6	SFE35	-	RTW16	VPH35S	S8
VP50S	VPM610-12	HW10.5x22x1.6	SFE50	-	RTW26	VPH50S	S8

Oval type

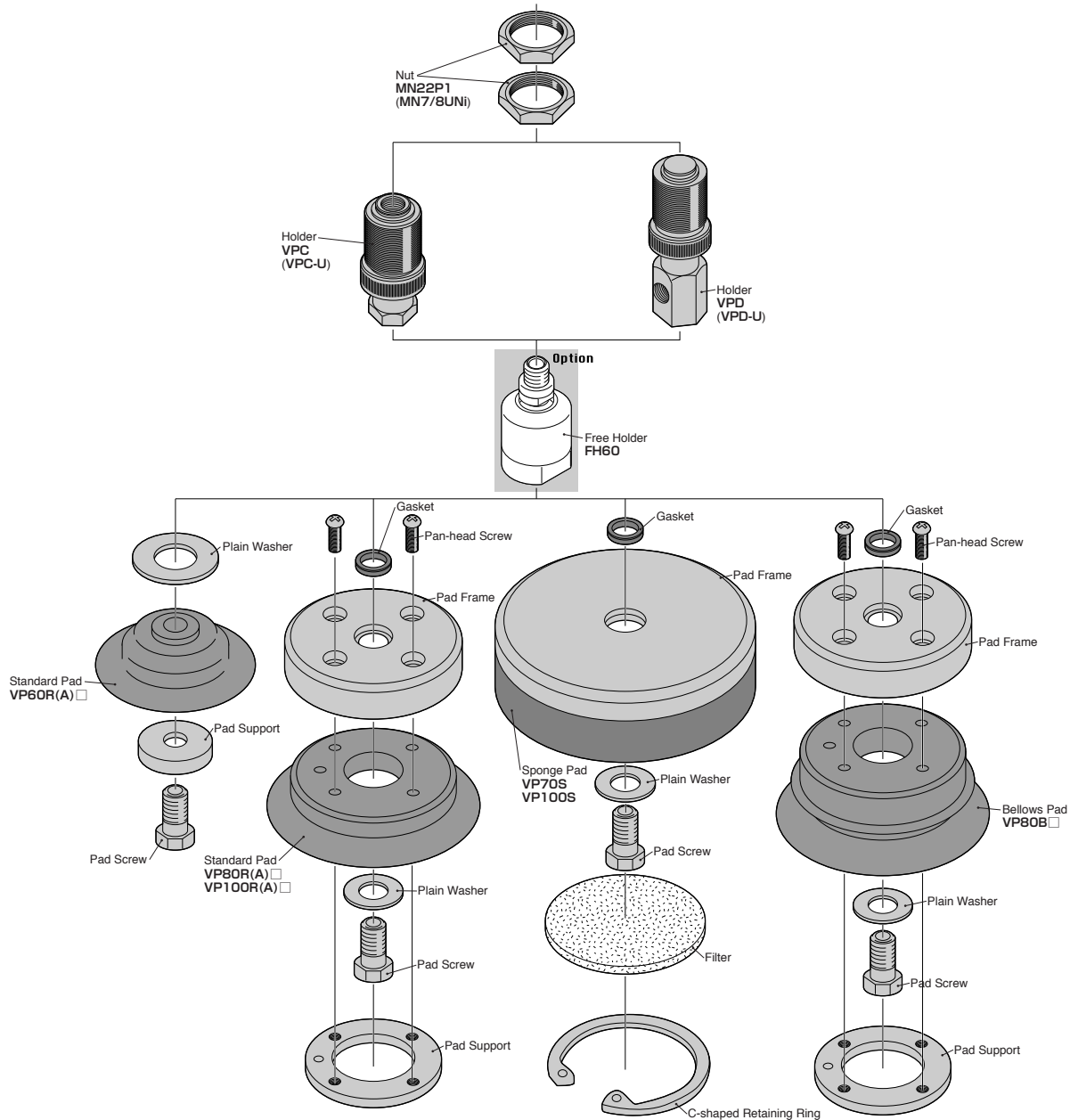
Pad Model	Thread Body Model
VP x 10E	FSPH10
VP x 20E, VP x 30E	FSPH20

Soft type

Pad Model	Adapter Model
VP4L to VP15L	FVPL15-M4
VP20L to VP40L	FVPL40-M6

Soft Bellows type

Pad Model	Thread Body Model
VP6LB to VP15LB	FVPL15-M4
VP20LB	FVPL40-M6



Parts of Vacuum Pads List

Standard type

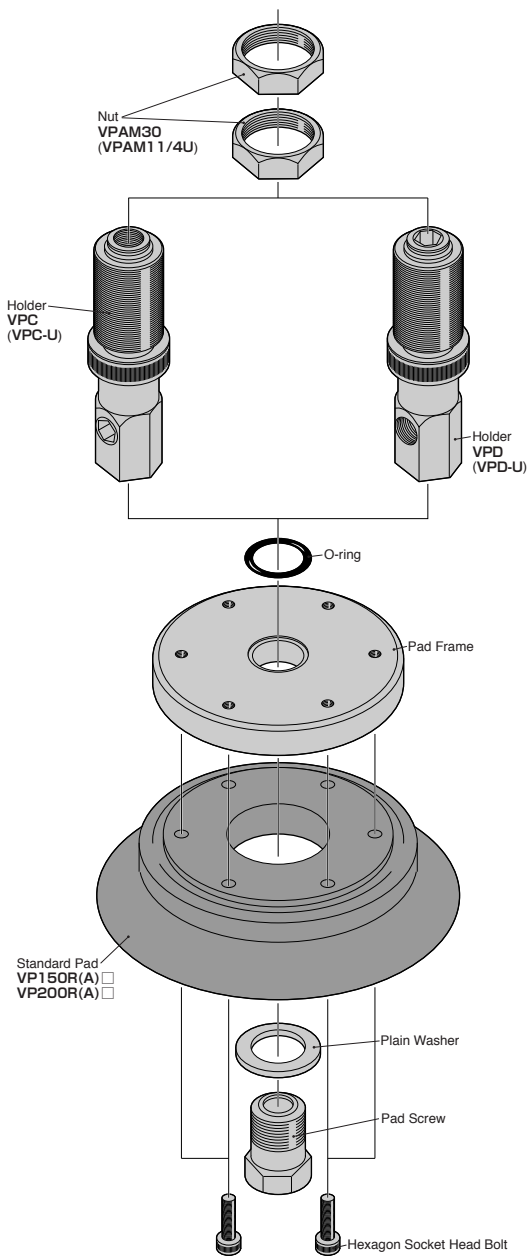
Pad Model	Pad Screw Model	Plain Washer Model	Pad Support Model	Pad Frame Model	Gasket Model	Pan-head Screw Model
VP60R(A) □	VPM1018	HW17×32×2.6	VPW60	—	—	—
VP80R(A) □	VPM1018	HW10.5×22×1.6	VPW80R	VPH80R	SG10	M4×12
VP100R(A) □	VPM1018	HW10.5×22×1.6	VPW100R	VPH100R	SG10	M5×12

Sponge type

Pad Model	Pad Screw Model	Plain Washer Model	Filter (10 pcs./bag) Model	C-shaped Retaining Ring Model	Pad Frame Model	Gasket Model
VP70S	VPM1018	HW10.5×22×1.6	SFE70	RTW40	VPH70S	SG10
VP100S	VPM1018	HW10.5×22×1.6	SFE100	RTW60	VPH100S	SG10

Bellows type and Multi-Bellows type

Pad Model	Pad Screw Model	Plain Washer Model	Pad Support Model	Pad Frame Model	Gasket Model	Pan-head Screw Model
VP80B □	VPM1018	HW10.5×22×1.6	VPW80R	VPH80R	SG10	M4×12

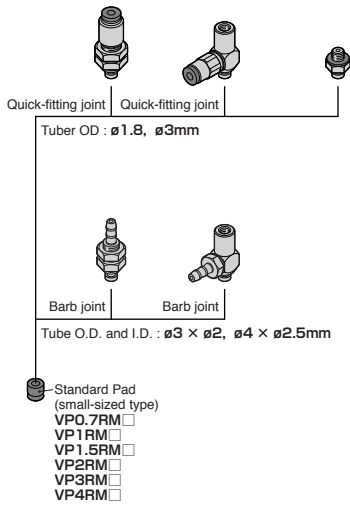


Parts of Vacuum Pads List

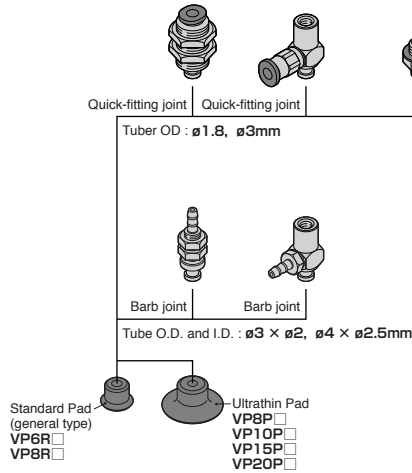
Standard type

Pad Model	Pad Screw Model	Plain Washer Model	Pad Frame Model	O-ring Model	Hexagon Socket Head Bolt Model
VP150R□	VPM2028	HW21×34×3	VPH150R	22×1.5	M5×20
VP200R□	VPM2028	HW21×34×3	VPH200R	22×1.5	M5×25

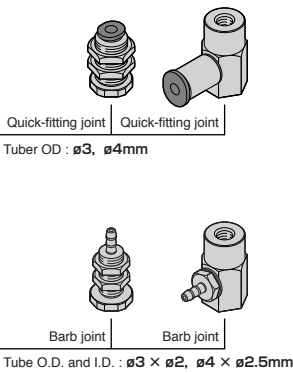
VPMA VPMB VPME



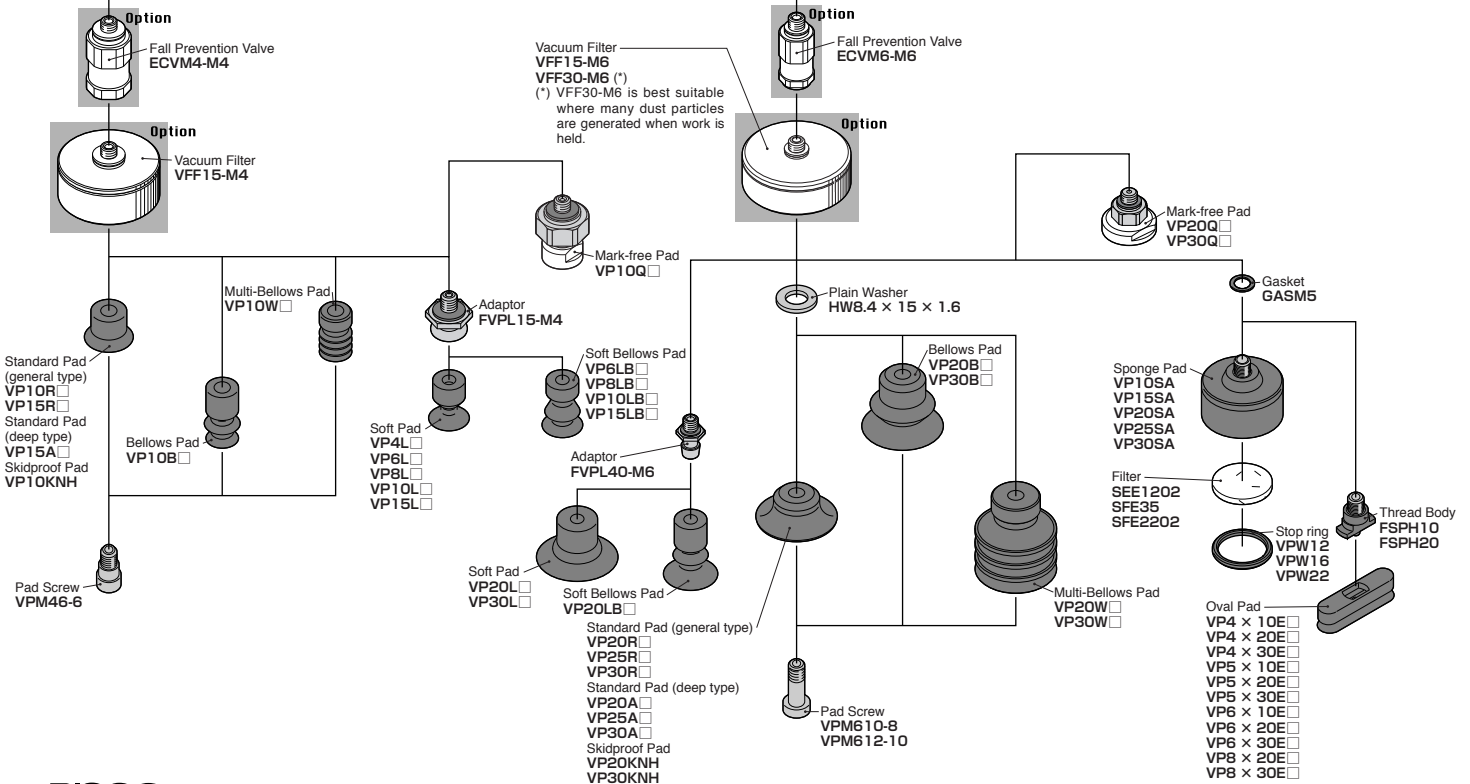
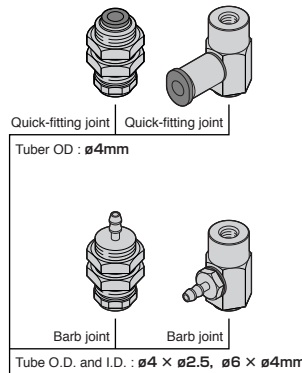
VPMA VPMB VPME

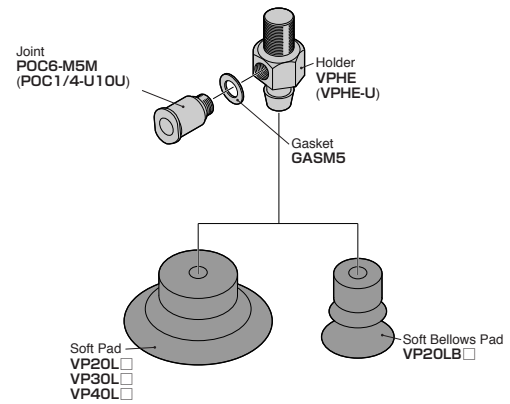
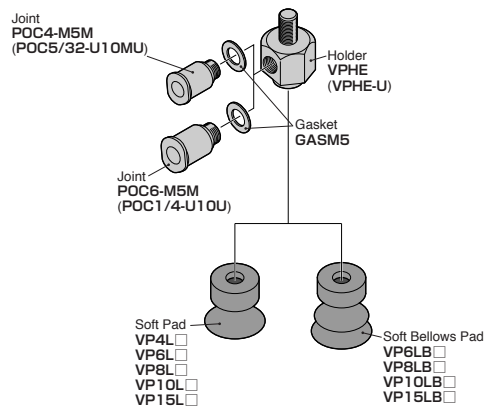
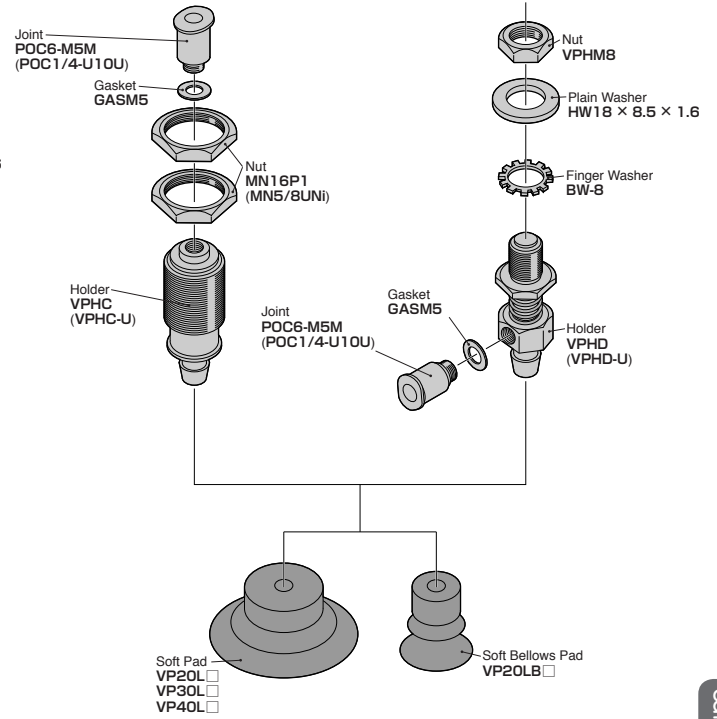
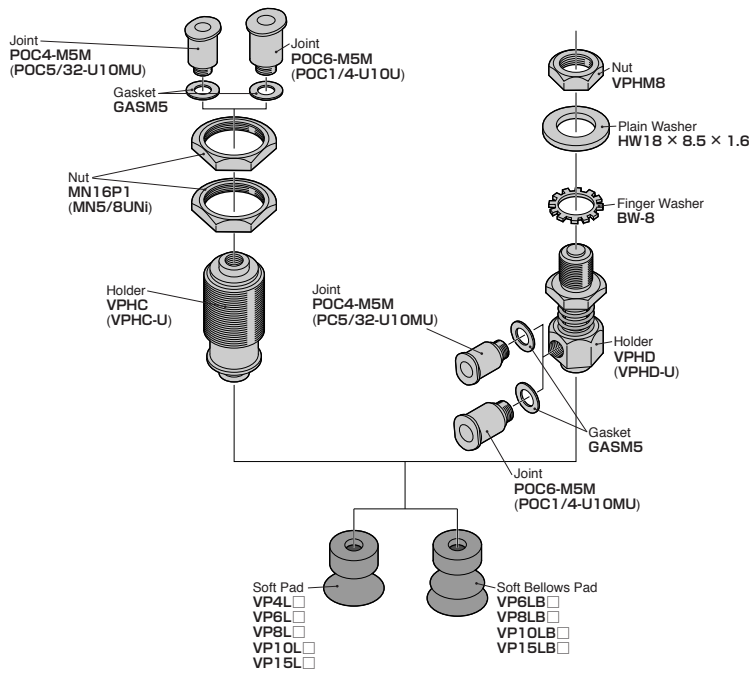


VPMA VPMB



VPMA VPMB





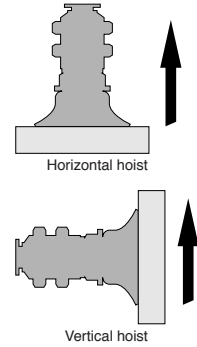
Vacuum Pad Selection Guide

Selection Guide 1 ▶ Decide pad diameter by the formula of theoretical suction force ① & graph ②

From the pad area and the vacuum level, the theoretical suction force can be calculated. Please take the calculated force as reference and confirm by actual application if necessary.

Because the theoretical suction force is the value with static condition, the sufficient safety margin should be given considering the weight of work and force created by acceleration at the time of transfer (hoist, stop, rotation, etc.)

Also, please give enough room for deciding a number of pads and attaching positions.



① Calculation by formula

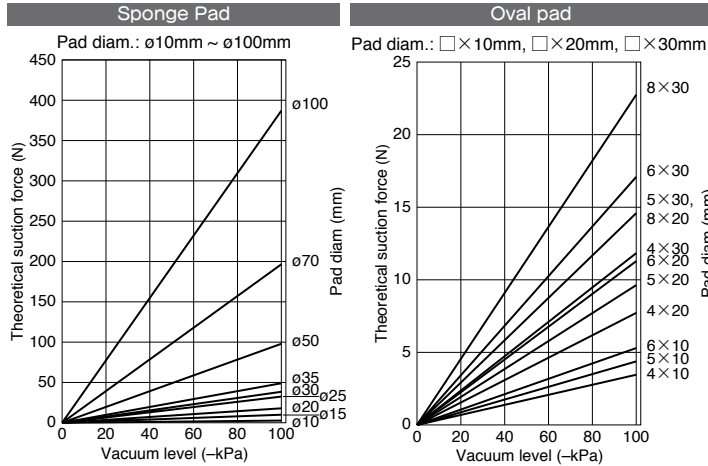
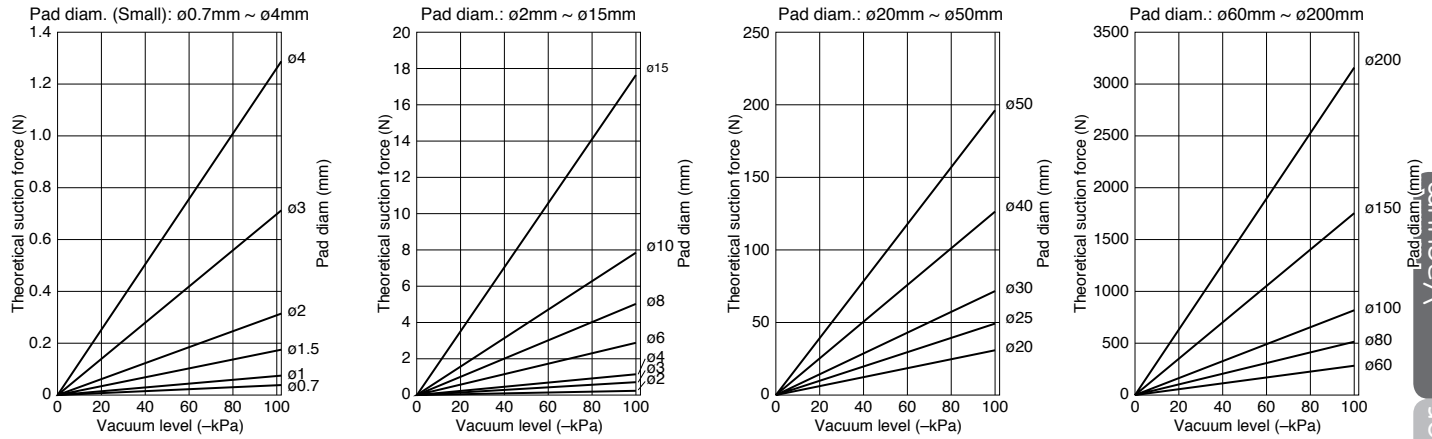
$$W = \frac{C \times P}{101} \times 10.13 \times f$$

W: Suction force (N)
 C: Pad area (cm²) (= radius (cm) × radius (cm) × 3.14)
 P: Vacuum level (-kPa) (-kPa = 3.386 × -in.Hg)
 f: safety rate horizontal hoist: 1/4
 vertical hoist: 1/8

*1. Sponge Pad: The inner diameter instead of outer diameter is used for at the time of calculation. Please refer the following theoretical suction force graph.
 *2. Bellows, Multi-bellows, Soft-type, Soft-bellows, Ultrathin pads: As a property of pad, the theoretical suction force may exceed the strength of pad rubber itself depending on the vacuum level. Please check with actual application.

② Graph of theoretical suction force <please apply a safety margin to the value obtained from the graph>

Standard / Bellows / Multi-bellows / Soft / Soft bellows / Skidproof / Ultrathin / Mark-free Pads (*1)



*1. Depending on the pad shape/configuration, pad diameter listed in the graph is not selectable as product. Please check the following table for standard pad size availability.

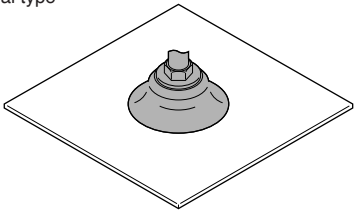
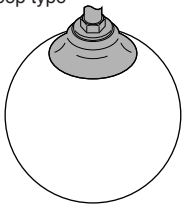

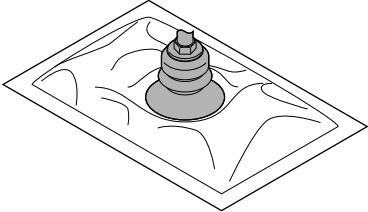
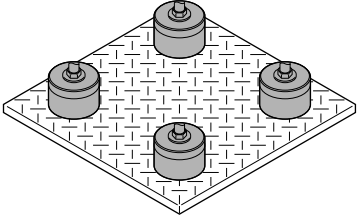
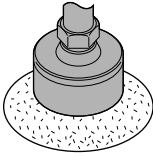
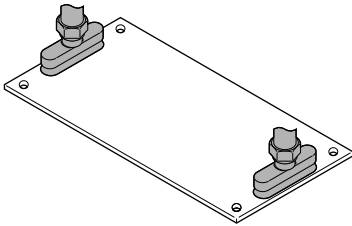
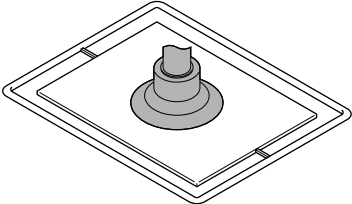
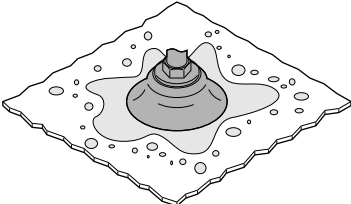
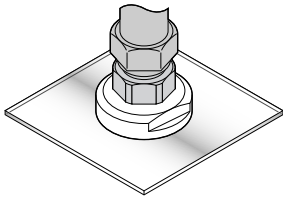
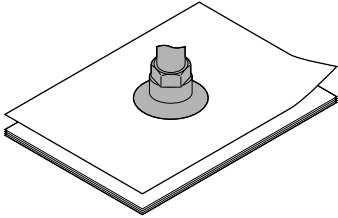
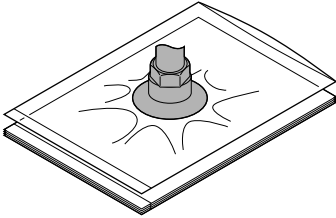
Pad type	Standard	Bellows	Multi-bellows	Soft	Soft bellows	Skidproof	Ultrathin	Mark-free
Pad diam.:								
ø2mm	○	-	-	-	-	-	-	-
ø3mm	○	-	-	-	-	-	-	-
ø4mm	○	-	-	○	-	-	-	-
ø6mm	○	-	-	○	-	-	-	-
ø8mm	○	-	-	-	○	-	-	-
ø10mm	○	○	○	○	○	-	○	○
ø15mm	○	-	-	○	○	-	○	-
ø20mm	○	○	○	-	○	○	○	○
ø25mm	○	-	-	-	-	○	-	-
ø30mm	○	○	○	○	-	○	-	○
ø40mm	○	○	○	○	-	○	-	-
ø50mm	○	○	○	-	-	○	-	-
ø60mm	○	-	-	-	-	-	-	-
ø80mm	○	○	-	-	-	-	-	-
ø100mm	○	-	-	-	-	-	-	-
ø150mm	○	-	-	-	-	-	-	-
ø200mm	○	-	-	-	-	-	-	-

* ○ means that pad size is available.

Vacuum Actuator Tube Plarailchain Robot Parts

Selection Guide 2 ▶ Select pad configuration from work

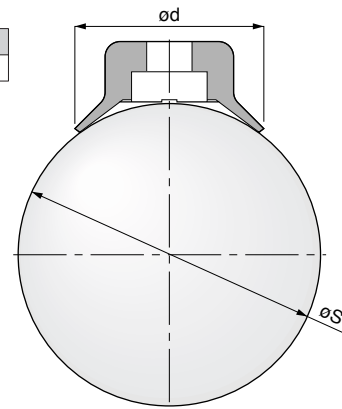
Please select the pad configuration best suitable for your application from the followings.

Standard			Bellows / Multi-bellows type
General type 	Deep type 	Small type 	
Thick & flat work	Spherical fruit (apple, etc.) or round ball	Small work or semiconductor product	Food package
Sponge type		Oval type	
			
External wall, pebble, seashell		Long work such as circuit board or semiconductor product	
Soft / Soft bellows type	Skidproof type	Mark-free type	
			
Injection parts or easily scratched parts	Oily press cut parts	Liquid crystal glass, painting process, semiconductor production equipment	
Ultrathin type			
			
Copy paper, plastic film or thin work			

*1. Please refer to the following table for size selection of deep type standard pad when suctioning the spherical object.

Diameter of sphere: S (mm)	ø20	ø30	ø40	ø50	ø80	ø100	ø120	ø160	ø200
Pad diam.: d (mm)	ø15	ø20	ø25	ø30	ø40	ø50	ø60	ø80	ø100

*2. Please refer to the next page for pad material property.



Selection Guide 3 ▶ Select pad material suitable for application

Please select pad rubber material best suitable for your application by referring to the following table.

Item	Pad material	Nitrile rubber	Food safe NBR	Silicone rubber	Anti-static rubber	Urethane rubber	Fluorine rubber	Fluorosilicone rubber	Anti-static rubber (low resistance)	Chloroprene rubber (Sponge)	
	Order code	N, NH *1	G	S	SE	U	F	FS	E	S	
Application		Corrugated board Plywood Metal plate Food-related Other general work		Semiconductor Molding parts eject Thin work Food-related		Corrugated board Plywood Metal plate	Chemical environment High temp. work	Molding parts eject	General work of semiconductor	Rough surface work	
Pad color		Black	Grey	White	Black	Blue	Grey	Light brown	Black	Black	
Properties	Surface hardness (Shore A)	Standard type	50°~60°	60°	50°	60°	60°	50°~60°	—	70°	—
		Bellows type	50°~60°	—	50°	60°	—	—	—	—	—
		Multi-bellows type	50°~60°	60°	50°	—	—	—	—	—	—
		Oval type	50°~60°	—	50°	—	—	—	—	70°	—
		Soft type	50°~60°	—	50°	60°	—	—	50°	—	—
		Soft bellows type	50°~60°	—	50°	—	—	—	—	—	—
		Skidproof type	50°~60°	—	—	—	—	—	—	—	—
	Ultrathin type	50°~60°	—	—	—	—	—	40°	—	—	
	Highest operating temp.		110°C (230°F)		180°C (356°F)		60°C (140°F)	230°C (446°F)	180°C (356°F)	100°C (212°F)	80°C (176°F)
	Lowest operating temp.		-30°C (-22°F)		-40°C (-40°F)		-20°C (-4°F)	-10°C (14°F)	-50°C (-58°F)	-50°C (-58°F)	-45°C (-49°F)
Weather-proof		△		○		○	○	○	○	○	
Ozone-proof		△		○		○	○	○	×	○	
Acid-resistance		△		○		×	○	○	△	△	
Alkaline-resistance		○		○		×	×	○	○	○	
Oil-proof	(Petrol/diesel oil)	○		△		○	○	△	×	×	
	(Benzene/toluene)	△		△		△	○	△	×	△	
Surface resistivity		—		—	10 ⁴ ~ 10 ⁶ Ω/sq	—	—	—	Max. 200Ω/sq	—	

Evaluation

- ◎ : Best suitable
- : Suitable
- △ : Good
- × : NG

*1. Pad material order code: NH is only selectable for skidproof type pad.

Note 1) Each material property is of synthetic rubber generally used for vacuum pad.

Note 2) Actual use at the operating temperature limit is instant application. Using for a period of time, please check its resistivity well.

Please select pad resin material best suitable for your application by referring to the following table.

Item	Pad material	PEEK	POM	conductive PEEK
		K	M	KE
Application		Semiconductor/liquid crystal production device	Various production line Food-related equipment Package machine	Semiconductor/liquid crystal production device Electronic parts
Pad color		Natural (light brown)	White	Black
Properties	Highest operating temp.	250°C (482°F)	95°C (203°F)	250°C (482°F)
	Lowest operating temp.	-50°C (-58°F)	-60°C (-76°F)	-50°C (-58°F)
	Weather-proof	○	×	○
	Acid-resistance	○	×	○
	Alkaline-resistance	○	△	○
	Self-lubrication	○	○	○
	Wear-resistance	○	○	○
	Surface resistivity	—	—	Max. 10 ⁷ Ω/sq

Evaluation

- ◎ : Best suitable
- : Suitable
- △ : Good
- × : NG

Note 1) The property is of only pad resin but not including pad holders. Please select the pad in consideration of specification of pad holder as well.

Note 2) Each material property is general property of each material and not a guaranteed value. Please check on actual application.

Note 3) Actual use at the operating temperature limit is instant application. Using for a period of time, please check its resistivity well.

Vacuum

Actuator

Tube

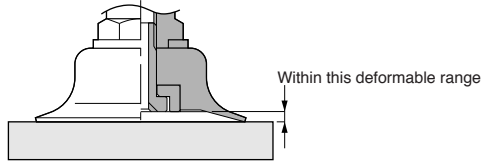
Plarailchain

Robot Parts

Reference Guide of Vacuum Pad

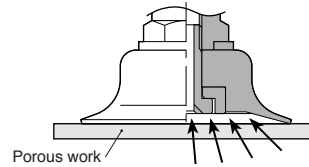
Shock on pad

When pushing a pad to the work, please do not apply a shock and large force. It may cause deformation or crack of pad and worn away quickly. Therefore, adjust the pad position so that the lip of pad touches lightly on work or within the deformable range of lip. Especially with small pad, please give fine positioning.



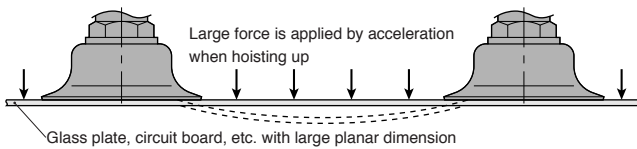
Porous or perforated work

For suctioning porous work, because suction force decreases by air leak amount, the measure of increasing the capacity of ejector or vacuum pump or enlarging the cross sectional area of piping is necessary. Selecting small pad is also a choice to decrease the amount of air leak.



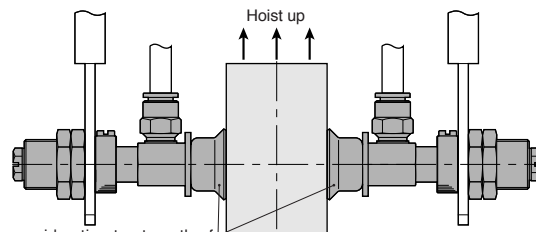
Large and wide flat plate work

When hoisting glass plate, circuit board, or etcetera with large planar dimension, large force by acceleration may be applied to it or it may get undulated by self weight. Therefore, it is necessary to take sufficient safety measure with pad positioning or selecting large pad.



Hoist with suctioning the side of work

All pad holder is designed for horizontal hoist. Therefore, the vertical hoist by suctioning the side of work requires giving due consideration to strength of pad and pad holder.

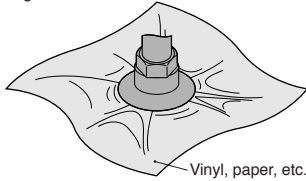


Pay due consideration to strength of pad and pad holder by holding from both sides of work or the like. The work must be hold from side

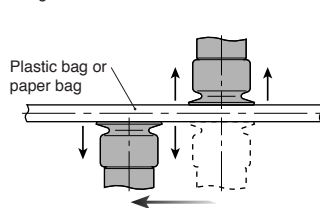
Suctioning soft work

When suctioning soft work like vinyl, paper, or thin sheet, work is deformed or wrinkled up. Please select small pad and minimize the vacuum force additionally. Please refer to Fig-1. When opening plastic or paper bag, it may be easily done by using small pads and positioning them slightly displaced from the center on opposed surface of bag. Please refer to Fig-2.

● Fig-1

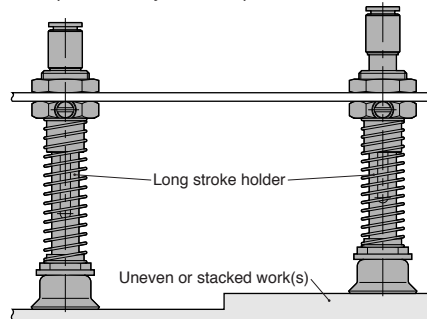


● Fig-2



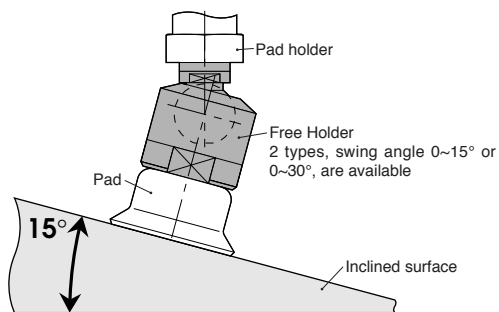
Work with uneven height

Such as uneven, multi-level work or stacked work, when distance of pad(s) and work(s) cannot be decided, long stroke holder is useful. Even the distance of pad and work differ, compensation by stroke is possible.



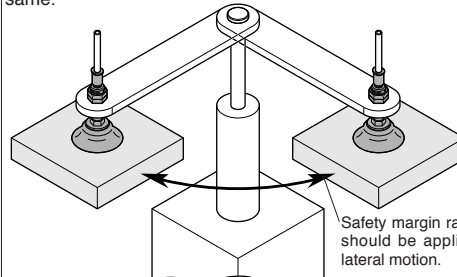
Work with inclined surface

When the surface to be suctioned is inclined, use Free Holder (pad angle adjuster.)



Swiveling work transfer

When swiveling transfer of work with a pad fixed by screw is carried out, the pad may be loose by screw loose. Therefore please design it with great care. It is require special care if suctioning (pad) position and gravity center of work is not same.





Common Safety Instructions for Vacuum Pads

Be sure to read the following instructions before selecting and using the PISCO devices. Also read the detailed instructions for individual series.

- Warnings:**
1. Where there is the danger of work dropping, provide some drop prevention means to assure safety.
 2. When installing the pad holder, make sure that it is fixed securely. Looseness may cause trouble.
 3. Take special care of the screwed pad which performs swinging transport. Swinging can loosen the screw, thus leading to trouble.
 4. Trouble may arise from leaks or clog in the vacuum circuit, wear, cracking or deterioration of the pad, galling of the sliding part of the pad holder or looseness at connections. Therefore be sure to carry out periodic maintenance and checks.
 5. For applications involving transport by the Pad, take acceleration, shocks and draft pressure into consideration. Otherwise work may drop during transport.

- Cautions:**
1. When deciding pad diameter, number of pad, and attaching position(s), please understand the theoretical suction force well and apply sufficient safety margin.
 2. Select the pad material as instructed to best suit for your service environment and conditions.
 3. Select the pad form (type) according to the type and form of work to be held. Read the manual carefully for the right choice.
 4. Use a spring-type holder when the work height varies or when the work is subject to damage by external forces. Confirm the specified spring force and stroke in the manual before use.
 5. When using a spring-type holder, which has a sliding part, take care to minimize the lateral forces. Otherwise the holder life will be shortened and malfunction will be caused.
 6. When replacing the pad, confirm the procedure by checking the Vacuum Pad drawing in the manual. Then tighten it with a proper tool at the recommended tightening torque (see table 1 below), using the hexagonal part of the holder and then make sure that there is no looseness.

Table 1. Recommended tightening torque

Pad holder type	Standard	Small sized holder
Pad thread size	Tightening torque	
M4x0.7	0.5 ~ 1.0N·m (0.37 ~ 0.74lbf·ft)	0.9 ~ 1.1N·m (0.66 ~ 0.81lbf·ft)
M6x1	2 ~ 2.7N·m (1.48 ~ 1.99lbf·ft)	
M10x1.5	5 ~ 7N·m (3.69 ~ 5.16lbf·ft)	n/a
M20x2	9 ~ 10N·m (6.64 ~ 7.38lbf·ft)	n/a

7. When replacing pad adaptor (FVPL) of soft type and soft-bellows type pads, confirming the construction drawing of the manual, tighten it with a proper tool at the following recommended tightening torque (table 2) using outer hexagon of pad holder, and make sure that there is no looseness.

Table 2. Recommended tightening torque

Pad screw size (mm)	Tightening torque
M4x0.7	0.7 ~ 0.8N·m (0.52 ~ 0.59lbf·ft)
M6x1	1.5 ~ 2.0N·m (1.11 ~ 1.48lbf·ft)

8. When fixing the holder using equipped bulkhead of standard pad holder and small-sized pad holder, confirming the construction drawing of the manual, tighten it with a proper tool at the following recommended tightening torque (table 3) using outer hexagon of pad holder, and make sure that there is no looseness.

Table 3. Recommended tightening torque

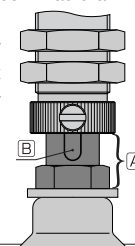
Pad holder type	Standard	Small sized holder
Pad thread size	Tightening torque	
M4x0.5	1 ~ 1.2N·m (0.74 ~ 0.89lbf·ft)	n/a
M4x0.7	n/a	1 ~ 1.2N·m (0.74 ~ 0.89lbf·ft)
M5x0.5	1.5 ~ 2N·m (1.11 ~ 1.48lbf·ft)	
M6x0.75	2 ~ 3N·m (1.48 ~ 2.21lbf·ft)	
M8x0.75	2.5 ~ 3.5N·m (1.84 ~ 2.58lbf·ft)	
M10x1	5 ~ 7N·m (3.69 ~ 5.16lbf·ft)	
M12x1	12 ~ 14N·m (8.85 ~ 10.33lbf·ft)	n/a
M14x1	18 ~ 21N·m (13.28 ~ 15.49lbf·ft)	n/a
M16x1	18 ~ 20N·m (13.28 ~ 14.75lbf·ft)	n/a
M20x1	19 ~ 21N·m (14.01 ~ 15.49lbf·ft)	n/a
M24x2	40 ~ 50N·m (29.5 ~ 36.88lbf·ft)	n/a

9. When replacing standard pad diameter $\phi 80$, $\phi 100$ mm and bellows pad diameter $\phi 80$ mm, confirming the construction drawing of the manual, tighten it with a proper tool at the following recommended tightening torque (table 4) using outer hexagon of pad holder, and make sure that there is no looseness.

Table 4. Recommended tightening torque

Thread size	Tightening torque
M4x0.7	0.5 ~ 0.7N·m (0.37 ~ 0.52lbf·ft)
M5x0.8	

10. When replacing the filter element of the Pad with filter, confirm the procedure by checking the Vacuum Pad drawing in the manual.
11. Handle the joint by observing the "Common Safety Instructions for Quick-Fitting Joints".
12. When fixing the spring loaded pad holder, please avoid tightening it using hex on the shaft by wrench (refer to part A on the drawing). Additionally, when replacing the pad rubber, please fix and hold the shaft by wrench and loosen the pad screws. Without doing so may damage the key groove on the shaft (refer to part B on the drawing) and may cause poor movement.





Safety Instructions

- This Safety Instructions aim to prevent injuries to human bodies and damage to properties by requiring proper use of PISCO devices.


Also the relevant requirements of ISO 4414 and JIS B8370 must be observed.


ISO 4414: Pneumatic fluid power ... Recommendations for the application of equipment to transmission and control systems.

JIS B 8370: General standards for pneumatic systems

Safety instructions are classified into "Danger", "Warning" and "Caution", depending on the degree of danger or damage involved when the safety instructions are not complied with in handling the equipment.

 **Danger** : Failure to heed the warning of apparent danger may result in death or serious injuries.

 **Warning** : Failure to heed the warning of conditionally dangerous situations may result in death or serious injuries.

 **Caution** : Failure to heed the warning of conditionally dangerous situations may result in minor or not too serious injuries or damage to properties.

 **Warning** : 1. Make a selection of pneumatic equipment.

(1) Well knowledgeable and experienced persons such as a pneumatic system designer or who is in charge of deciding specification should select pneumatic equipment.

(2) The applicable conditions of the products in this catalogue are diverse. Therefore, judge the conformity of systems with required analysis or tests by system designers or persons who is in charge of deciding specifications. The guarantee of initial performance and safety of the system is on responsibility of the person who decides specifications. Hereafter, examine all the specification with updated products catalogues and technical documents in order to avoid malfunctions of equipment, and then develop systems.

2. Handle pneumatic equipment with enough knowledge and experience.

(1) Mishandling of compressed air is dangerous. Conduct assembly, operation and maintenance of devices with pneumatic equipment by persons with enough knowledge and experience.

3. Do not operate and remove the equipment until safety is confirmed.

(1) Conduct inspection and maintenance of equipment after confirming fail-proof measures of work pieces or runaway-proof device are properly working.

(2) When removing equipment, make sure that above safety measures are conducted. Then, stop air supply and electric source of equipment making sure the pressure inside the system is zero before removing equipment.

(3) When re-activate equipment, make sure safety measures against fly-out are taken and re-activate equipment with care.

* Safety Instructions are subject to change without advance notice.



Common Safety Instructions for Products Listed in This Manual

□ PISCO products are designed and manufactured for use with general industrial machinery and equipment. Therefore be sure to observe the following safety instructions:

△ Danger : 1. Do not use PISCO devices with the following equipment:

- (1) Equipment used for the sustenance or control of people's health or lives
- (2) Equipment used for the movement or transport of people
- (3) Equipment used specifically to ensure safety

△ Warning : 1. Avoid the following uses for PISCO devices:

- (1) Use under conditions not specified for the device
- (2) Use in any outdoor environment
- (3) Use in locations where the device is exposed to excessive vibration or shocks
- (4) Use in locations where the device is exposed to any corrosive gas, inflammable gas, chemicals, seawater, or vapor.

* Certain PISCO devices, however, can be used in environments as described above. Therefore check on the specifications for the use of individual devices.

- 2. Do not disassemble or remodel the PISCO devices in such a way as may affect the basic structure, performance or function of them.
- 3. Never touch the release ring of the Quick-Fitting Joint when there is pressure working on it. Touching may release the ring, which in turn may cause the tube to fall out.
- 4. Avoid too frequent switching of air pressure. Otherwise the device body may heat up to cause burns on you.
- 5. Do not allow tension, twist or bending forces to act on the joints. Undue forces may damage the joint body.
- 6. For applications in which the threaded side or the tube connection side is subject to vibration, use Rotary Joints, High Rotary Joints or Multi-Circuit Rotary Blocks only. Swinging or rotation may damage the joint body.
- 7. For applications with hot water of 60°C (140°F) or above or thermal oil, use no other joints than Die Temperature Control Fitting, Tube Fitting Stainless SUS316, Tube Fitting Stainless SUS316 Compression Fitting, and All Brass Compression Fitting. Heat or hydrolysis may damage the joint body.
- 8. For applications in which the scattering of static electricity or charging must be prevented, use no other joints than EG Joints. Static electricity may cause system malfunction or trouble.
- 9. Never use joint other than Tube Fitting Spatter or Tube Fitting Brass where they are exposed to spatter. Otherwise can cause fire.
- 10. Carry out maintenance and checks of equipment only after turning power off, shutting fluid off and making certain that the pressure in the piping has dropped to zero. Please conduct maintenance after confirming following points.
 - (1) Make sure that maintenance is safe for all the systems involving PISCO products.
 - (2) When re-activate equipment after maintenance, make sure safety measures against fly-out are taken and re-activate equipment with care.
 - (3) Please secure space for maintenance when the circuit is designed.
- 11. When the fluid is admitted to the equipment and if there is a possibility to cause damage to it due to leakage, conduct safety measures such as protect cover beforehand.

△ Caution : 1. In installing the piping, be sure to remove dust or drainage from within the piping. Dust or drainage left unremoved may enter other equipment, thus causing troubles.

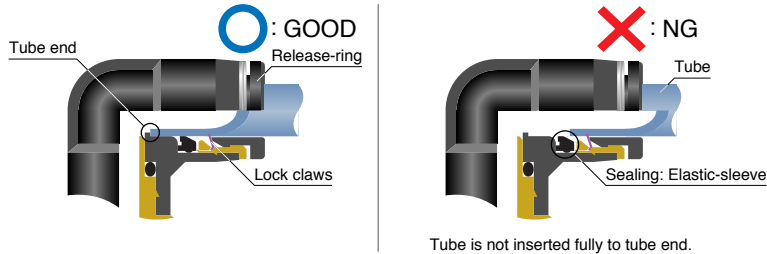
- 2. When using an ultrasoft tube to connect to a Quick-Fitting Joint, be sure to use an insert ring in the bore of the tube. Otherwise the tube may fall out to cause leakage.
- 3. When you use tubes of brands other than ours, be sure to confirm that the outside diameter of the tubes satisfies the tolerance specified Table 1.

Table 1. Tube O.D. Tolerance

mm size	Nylon tube	Urethane tube	inch size	Nylon tube	Urethane tube
ø1.8mm	—	±0.05mm	ø ¹ / ₈	±0.0039in.	±0.0059in.
ø3mm	—	±0.15mm	ø ⁵ / ₃₂	+0.0039in.	±0.0059in.
ø4mm	±0.1mm	±0.15mm	ø ³ / ₁₆	±0.0039in.	±0.0059in.
ø6mm	±0.1mm	±0.15mm	ø ¹ / ₄	±0.0039in.	±0.0059in.
ø8mm	±0.1mm	±0.15mm	ø ⁵ / ₁₆	+0.0039in.	±0.0059in.
ø10mm	±0.1mm	±0.15mm	ø ³ / ₈	±0.0039in.	±0.0059in.
ø12mm	±0.1mm	±0.15mm	ø ¹ / ₂	±0.0039in.	±0.0059in.
ø16mm	±0.1mm	±0.15mm	ø ⁵ / ₈	±0.0039in.	±0.0059in.

4. Cautions on the fitting of tube

- (1) Make certain that the end of the tube is cut at right angles, the tube surface is free from flaws, and the tube is not deformed into an ellipse.
- (2) When fitting a tube, insert the tube to the tube end completely as drawings shown below to prevent leakage.



- (3) On completion of fitting, make certain that the tube does not come out at your pulling.

5. Cautions on the release of tube

- (1) Before releasing the tube, make certain that the pressure inside the tube is zero.
- (2) Push the release ring fully inside and pull out the tube. Unless you push it completely in, the tube may not come out and scrapings of tube may be left inside the joint.

6. Cautions on the installation of joint body

- (1) When installing the joint body, tighten it with a proper tool, using the outside or inside hexagon.
- (2) In tightening the screw, use the tightening torque recommended in Table 3.
 - Use of a torque higher than the recommended level may damage thread or deform gasket, thus causing leaks.
 - Use of a torque lower than the recommended level may cause loose screw and leakage.
- (3) With the joint whose piping direction will not change after tightening, make adjustment within the recommended range of tightening torques.

Table 3. Tightening Torque, Sealock Color and Gasket Material

Thread type	Thread size	Tightening torque	Sealock color	Gasket material	
Metric thread	M3×0.5	0.7N·m (0.52lbf·ft)	n/a	SUS304, NBR	
	M5×0.8	1.0 ~ 1.5N·m (0.74 ~ 1.11lbf·ft)			
	M6×1.0	2.0 ~ 2.7N·m (1.48 ~ 1.99lbf·ft)			
	Taper pipe thread	M3×0.5	0.5 ~ 0.6N·m (0.37 ~ 0.44lbf·ft)	n/a	POM (Polyacetal)
		M5×0.8	1.0 ~ 1.5N·m (0.74 ~ 1.11lbf·ft)		
		M6×0.75	0.8 ~ 1.0N·m (0.59 ~ 0.74lbf·ft)		
Unified thread	M8×0.75	1.0 ~ 2.0N·m (0.74 ~ 1.48lbf·ft)	White	n/a	
	R1/8	7 ~ 9N·m (5.16 ~ 6.64lbf·ft)			
	R1/4	12 ~ 14N·m (8.85 ~ 10.33lbf·ft)			
	R3/8	22 ~ 24N·m (16.23 ~ 17.70lbf·ft)			
National Pipe Thread Taper (American standard)	R1/2	28 ~ 30N·m (20.65 ~ 22.13lbf·ft)	Gray	n/a	
	No. 10-32UNF	1.0 ~ 1.5N·m (0.74 ~ 1.11lbf·ft)			
	1/16-28NPT	7 ~ 9N·m (5.16 ~ 6.64lbf·ft)			
	1/8-27NPT	7 ~ 9N·m (5.16 ~ 6.64lbf·ft)			
	1/4-18NPT	12 ~ 14N·m (8.85 ~ 10.33lbf·ft)			
National Pipe Thread Taper (American standard)	3/8-18NPT	22 ~ 24N·m (16.23 ~ 17.70lbf·ft)	Gray	n/a	
	1/2-14NPT	28 ~ 30N·m (20.65 ~ 22.13lbf·ft)			

Recommended tightening torque for silencer

Thread Type	Thread Size	Tightening Torque
Metric thread	M5×0.8	1/6 turn after hand-tightening
	M6×1.0	
	M10×1.0	
Parallele pipe thread	G1/8	1/2 ~ 1 turn after hand-tightening
	G1/4	
	G3/8	
	G1/2	

7. Cautions on the removal of joint body

- (1) When removing the joint body, loosen it with a proper tool, using the outside or inside hexagon.
- (2) Remove sealant sticking to the thread on the mating equipment. The sealant left sticking may enter the peripheral equipment and cause trouble.

8. Clean-room package option

* The product is washed by clean air after assembling in the normal assembly process as same condition as standard specification model. Then, it is packed in ISO class 6 clean-room.