



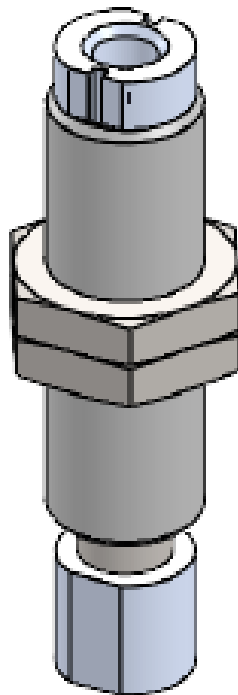
Operation Manual

PRODUCT NAME

Magnet Buffer / Fixed Piping Type

MODEL / Series / Product Number

ZP3B(1,2,3)MS* series



SMC Corporation

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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.

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots
etc.



Danger

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



Warning

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



Caution

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



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. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.



Safety Instructions



Caution

SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries.

Use in non-manufacturing industries is not allowed.

Products SMC manufactures and sells cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country.

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

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified 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.



ZP3B Series / Product-Specific Precautions

Please be sure to read this before use. For safety precautions, please refer to the back cover; for vacuum equipment and , please refer to the “SMC Product Handling Precautions” and “Instruction Manuals” on our website. <https://www.smcworld.com>

Precautions for Use

(1) When installing the buffer, tighten the mounting nuts within the recommended torque range shown in Table 1 below

Tightening outside the recommended torque range may cause operational failure.

Table 1. Recommended Tightening Torque for Buffer Installation

Model	Connection thread diameter	Recommended tightening torque [N·m]
ZP3B1MS**-B3-*	M8x0.75	1.5 to 2.0
ZP3B2MS**-B5-*	M10x1.0	2.5 to 3.5
ZP3B3MS**-B5-*	M12x1.0	4.5 to 5.5

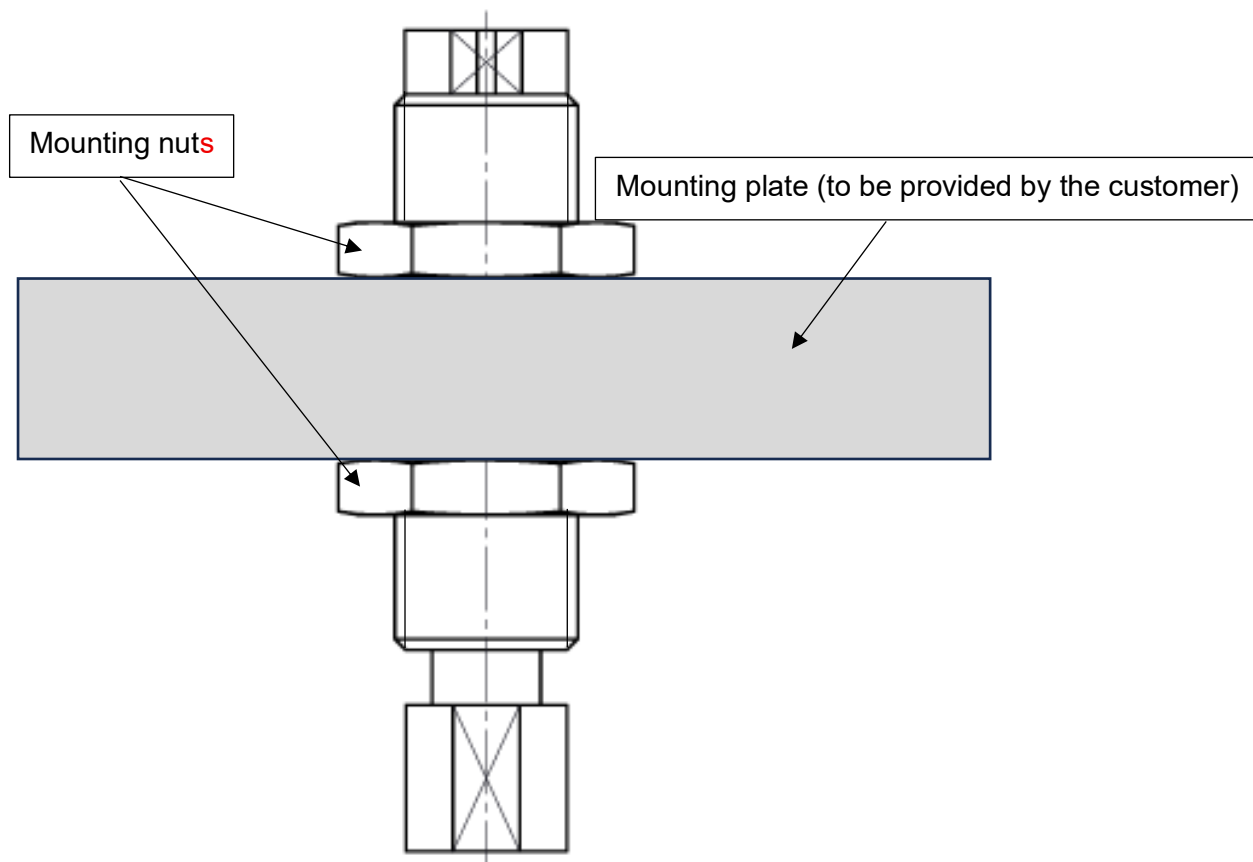


Figure 1. Example of product installation using a mounting plate



ZP3B Series / Product-Specific Precautions

Be sure to read this before use. For safety precautions, please refer to the back cover, "Vacuum Equipment/General".
For general precautions, please refer to the "SMC Product Handling Precautions" and "Operating Instructions" on our website. <https://www.smcworld.com>

Precautions for Use

(2) When installing the suction cup adapter, tighten it to the recommended tightening torque shown in Table 2 below.

Tightening outside the recommended torque range may result in poor sealing or loosening of the screws.

Table 2. Recommended tightening torque for suction cup adapters

Model	Connection thread	Recommended tightening torque [N·m]
ZP3B1MS**-B3-*	M3x0.5	0.2 to 0.25
ZP3B2MS**-B5-*	M5x0.8	1.3 to 1.7
ZP3B3MS**-B5-*	M5x0.8	

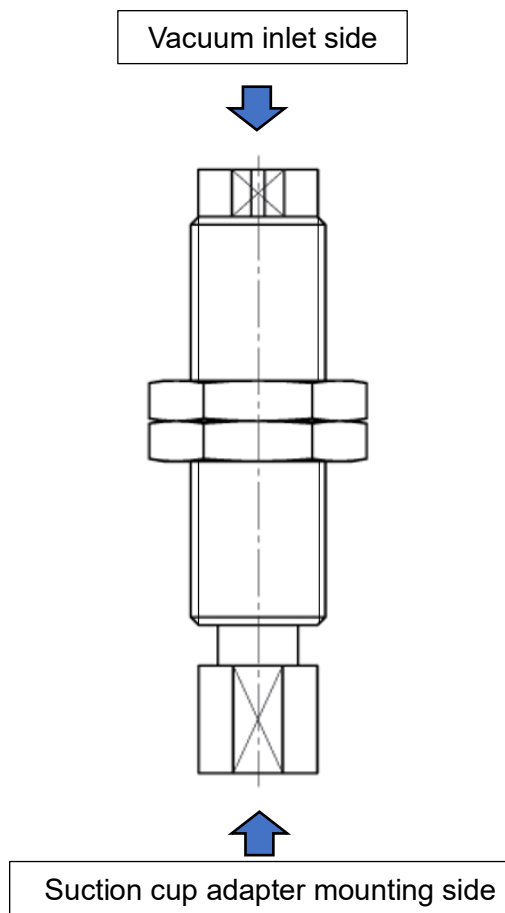


Figure 2. Suction cup adapter mounting position



ZP3B Series / Product-Specific Precautions

Be sure to read this before use. For safety precautions, please refer to the back cover, "Vacuum Equipment/General

For general precautions, please refer to the "SMC Product Handling Precautions" and "Operating Instructions " on our website. <https://www.smcworld.com>

Precautions for Use

(3) The buffer is intended for load relief (horizontal lifting applications).

Using the buffer for diagonal or vertical lifting may result in malfunction.

(4) Do not scratch or dent the piston tube.

Scratches or dents may damage the bushings and cause poor sliding performance.

Also, please be careful not to deform the piston tube, as it has a thin wall.

(5) This product contains a built-in magnet.

Please check that nearby equipment is not affected by the magnetic flux.

Do not use this product if there are any magnetic foreign objects present, as they may become lodged in the sliding parts and cause poor sliding performance.

(6) This product's anti-rotation mechanism maintains balance through magnetic force.

Since this product's anti-rotation mechanism is not mechanical, inertial forces from the workpiece or external forces during transport may cause a shift in the rotation direction. If the torque is below the maximum holding torque, the product will rotate and remain in place within ± 90 [°deg].

Additionally, if the torque is removed, it returns to its original position and maintains balance.

If the maximum holding torque is exceeded, the mechanism will lose synchronization and rotate 180 [deg].

Please ensure that this product is suitable for your intended usage conditions before use.

(7) The mesh filter in this product is replaceable.

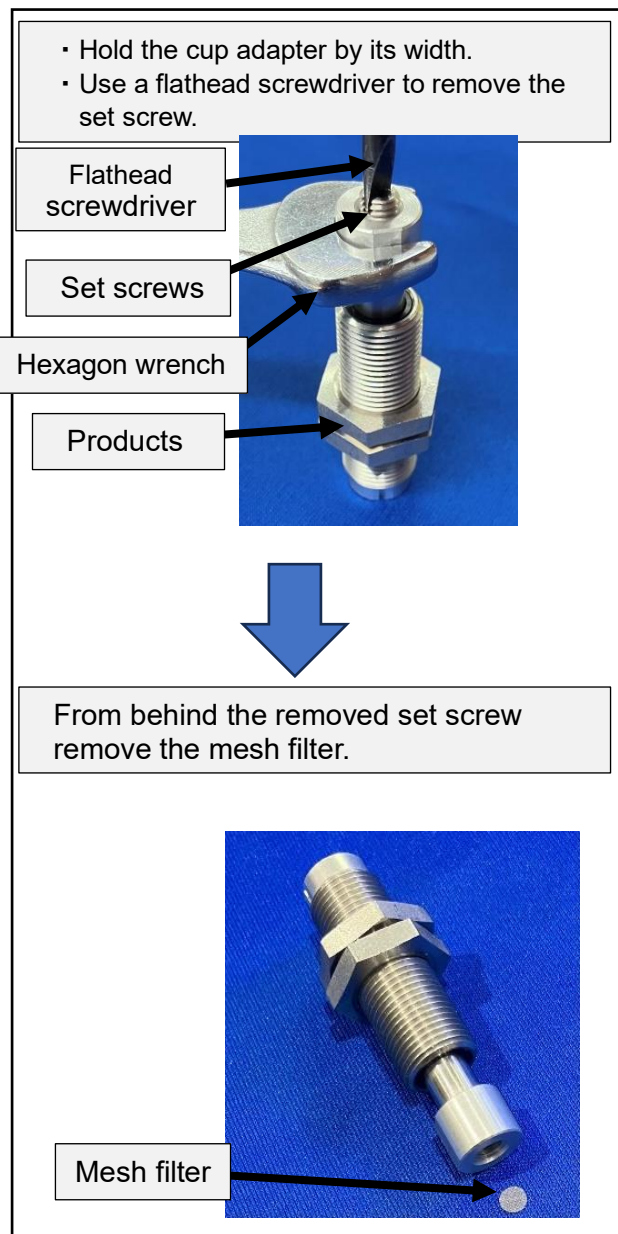
In case of the buffer with a mesh filter, the mesh filter can be replaced if clogging occurs.

The replacement part numbers are listed in Table 3, and the replacement procedure is shown in Figure 3.

Table 3. Replacement part numbers for mesh filters

Mesh filter replacement part numbers	Compatible product part number
ZPMF-200-D023	ZP3B1MS(3,6)*-B3-MF
ZPMF-200-D04	ZP3B2MS(3,6)*-B5-MF
	ZP3B3MS(3,6,16)*-B5-MF

Mesh filter removal procedure



Mesh filter installation process

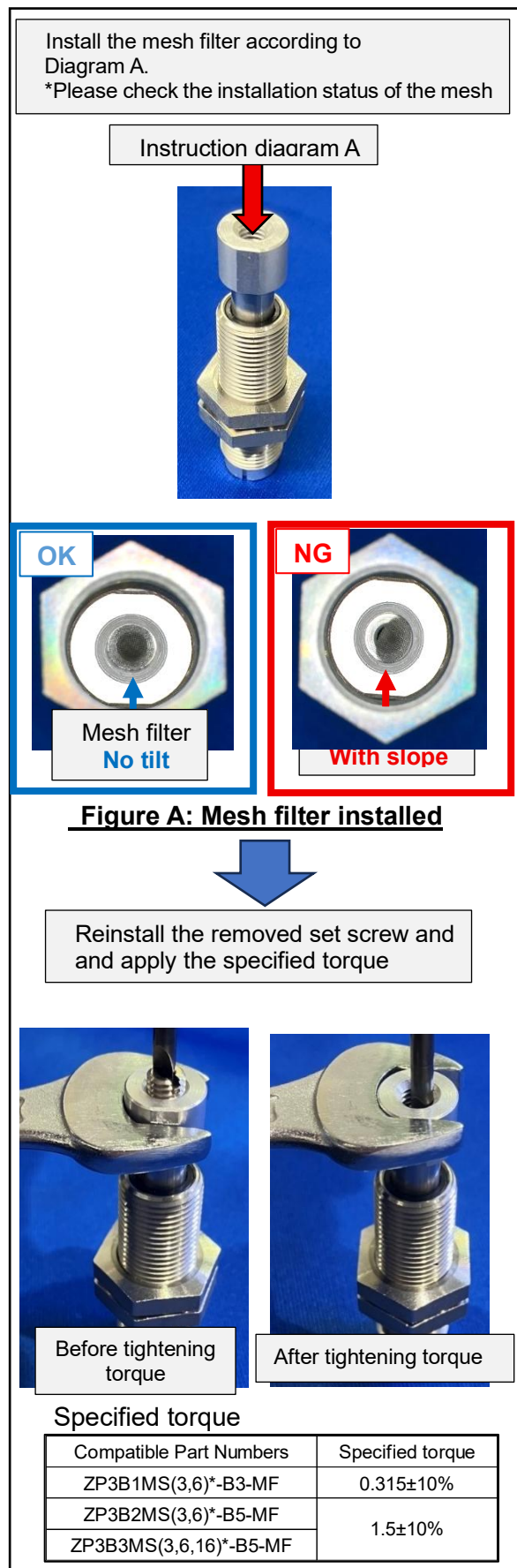
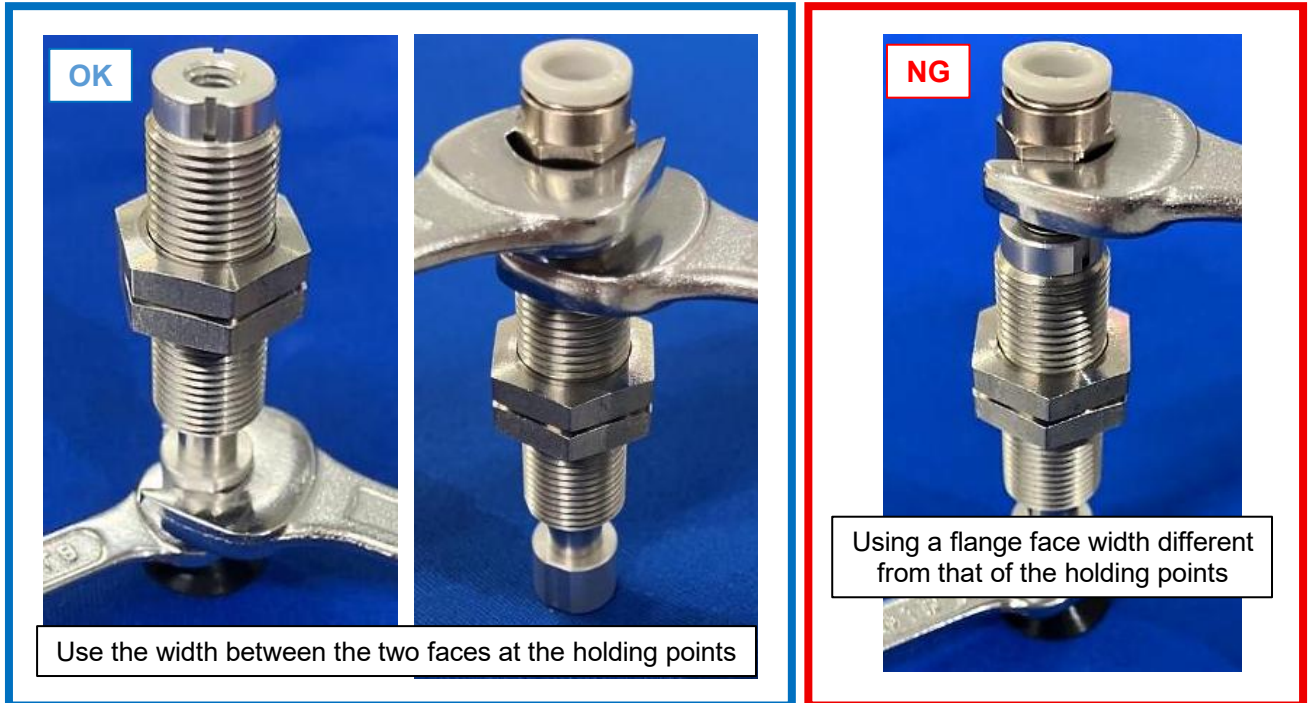


Figure 3. Mesh filter replacement procedure

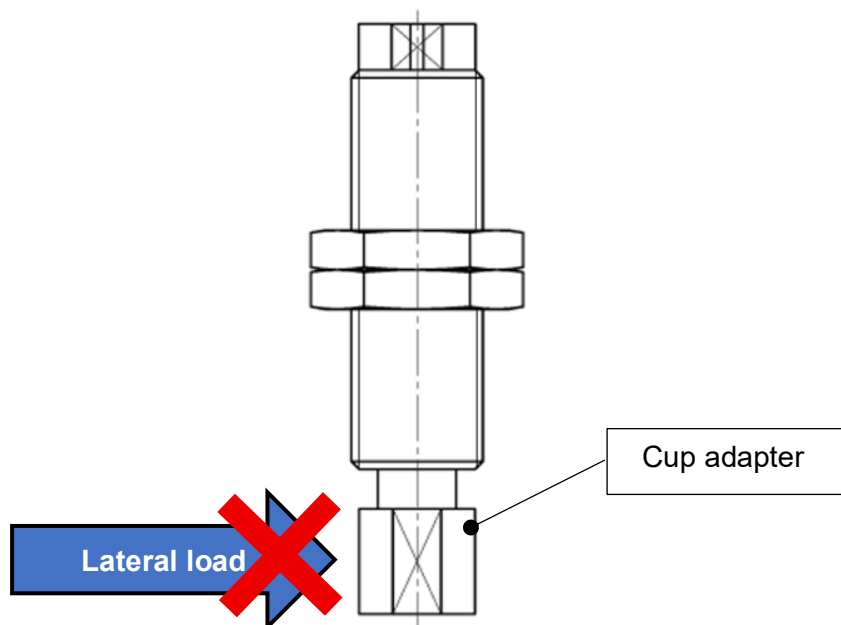
(8) When connecting the suction cup adapter and piping, use the width of the two flanges at the holding points.

If you use the width between two faces on the side opposite the holding points, you will not be able to apply the specified tightening torque.



(9) This product may leak if a lateral load is applied to the cup adapter.

Please ensure that the product is used within the allowable moment load limit.



(10) Buffer reaction force increases during startup.

Please take the maximum reaction force during startup into account when using this product.

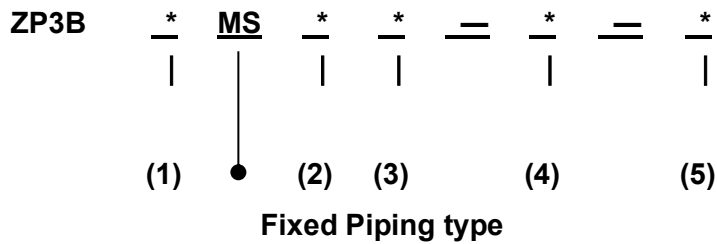
1. About the product

1.1 Product application range

This product is a buffer for suction cups.

1.2 How to order

How to order is shown below.



(1) Buffer size

Symbol	Connection thread
1	M8x0.75
2	M10x1.0
3	M12x1.0

(2) Nut material

Symbol	Nut material
Nil	Stainless steel
G	Steel (Zinc chromated)

(3) Stroke

Symbol	Stroke	Applicable body size		
		M8x0.75	M10x1.0	M12x1.0
3	3 mm	●	●	●
6	6 mm	●	●	●
16	16 mm	-	-	●

(4) Adapter / Vacuum inlet thread size

Symbol	Type	Thread size	Adapter / Vacuum inlet thread size		
			Applicable buffer size		
			M8x0.75	M10x1.0	M12x1.0
B3	Female thread	M3x0.5	●	-	-
B5		M5x0.8	-	●	●

(5) Mesh filter

Symbol	Mesh filter
Nil	None
MF	With mesh filter

1.3 Product Specifications

The product specifications are shown below.

At an ambient temperature of 23 degrees Celsius

Model	ZP3B1MS**-B3-*	ZP3B2MS**-B5-*	ZP3B3MS**-B5-*	
Size	M8x0.75	M10x1.0	M12x1.0	
Buffer type	Magnet	Magnet	Magnet	
With or without non-rotating	With*1	With*1	With*1	
With or without bushings	With	With	With	
Ambient and fluid temperatures [degrees Celsius]	5 to 50	5 to 50	5 to 50	
Stroke [mm]	3,6	3,6	3.6	16
Buffer reaction force [N] *2	0.8 ± 0.15	1.1 ± 0.15	1.4 ± 0.15	
Accuracy of buffer reaction force [%]*2	Within ±15% F.S.	Within ±15% F.S.	Within ±15% F.S.	
Maximum reaction force [N] *2	1.5 or less	2.0 or less	2.5 or less	
Maximum holding torque [N·m] (Reference value) *3	0.9 or more	1.3 or more	1.7 or more	3.9 or more
Maximum allowable moment [N·m] (Reference value) *4	6.2	16.5	20.8	25.2
Specification with mesh filter	Mesh opening: 200 μm			
Nut tightening torque [N·m]	1.5 to 2.0	2.5 to 3.5	4.5 to 5.5	
Adapter/vacuum inlet	M3x0.5	M5x0.8		

*1 By the magnetic holding

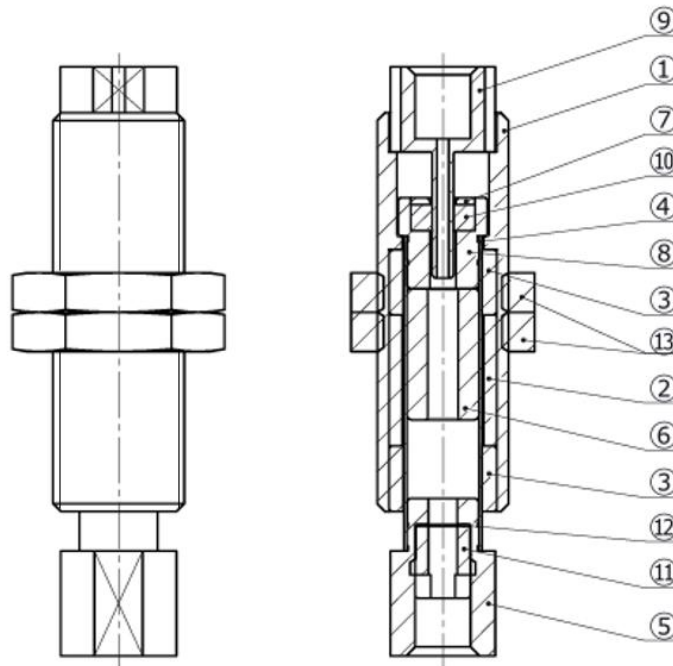
*2 See “1.7 Product Terminology” for details

*3 If the torque is applied over the maximum holding torque, the rod rotates 180 [deg] from its original position. The holding torque is the force that allows the rod to return to its original position when an external force has been applied and removed

*4 If a load exceeding the maximum allowable moment is applied, leakage will occur.

1.4 Construction

The structural diagram of the product is shown below.

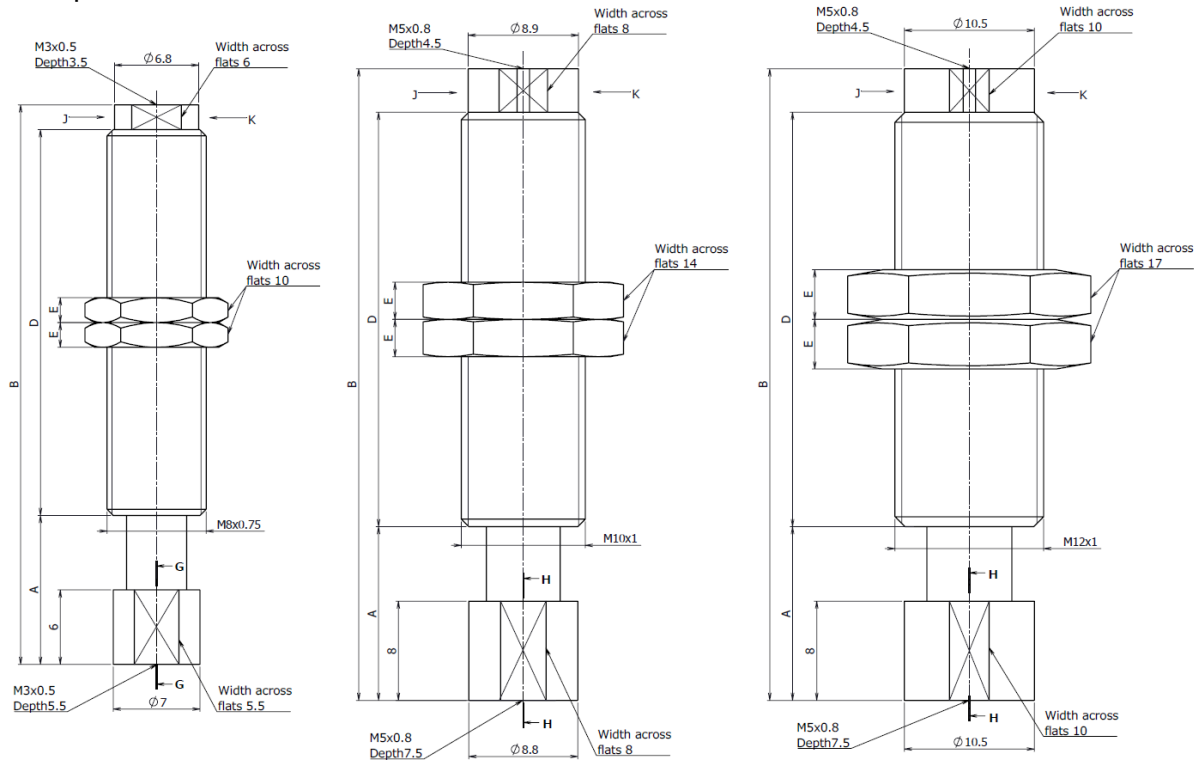


Structural cross-section

Part number	Part name	Material (Surface Treatment)	Remarks
1	Buffer body	Stainless steel	
2	Outer magnet	Neodymium magnet	
3	Bushing	Oil-impregnated POM	
4	Piston tube	Stainless steel	
5	Cup adapter	Aluminum alloy (Clear anodized)	
6	Inner magnet	Neodymium bonded magnets	
7	Buffer piston A	Aluminum alloy	
8	Buffer piston B	Stainless steel	
9	Pipe adapter	Aluminum alloy (Clear anodized)	
10	Gasket	NBR + special treatment	
11	Set screw	Stainless steel	With mesh filter
12	Mesh	Stainless steel	With mesh filter
13	Nut	Stainless steel	For ZP3B*MS*-*
		Steel (Zinc chromated)	For ZP3B*MSG*-*

1.5 Dimensions

The product dimensions is shown below.



ZP3B1MS*(3,6)-B3-*

ZP3B2M*(3,6)-B5-*

ZP3B3M*(3,6,16)-B5-*

Model							A	B	D	E	Min. opening hole size	Weight [g]	
	Buffer size	Specifications	Nut material	Buffer stroke	Adapter mounting thread size / Vacuum inlet	Mesh filter						Without mesh filter	With mesh filter
ZP3B	1	MS	Nil	3	B3	Nil MF	9	39.1	28.1	2	φ0.6	7.94	8.07
			G				7.78	7.91					
			Nil	6			12	45.1	31.1			8.37	8.5
			G				8.21	8.34					
	2		Nil	3	11		44.9	30.4	3	φ0.9	16.5	17	
			G		16		16.5						
			Nil	6	14		50.9	33.4			17.4	17.9	
			G		16.8		17.3						
	3		Nil	3	B5		11	44.9	30.4	φ1.2	27	27	
			G				24.7	24.7					
			Nil	6			14	50.9	33.4		28.2	28.2	
			G				25.9	25.9					
		Nil	16	24			80.9	53.4	38.6		38.6		
		G		36.3			36.3						

1.6 Compatible Cups

Please refer to Attachments 1-1 and 1-2 for the compatible cups for this product.

1.7 Product Terminology

The product terminology listed in the product specifications is as follows.

[Buffer reaction force]

This indicates the averaged buffer reaction force (actual measured value) when the buffer is operated from a stroke of 0.5 mm to the end of the stroke. (Fig. 4)

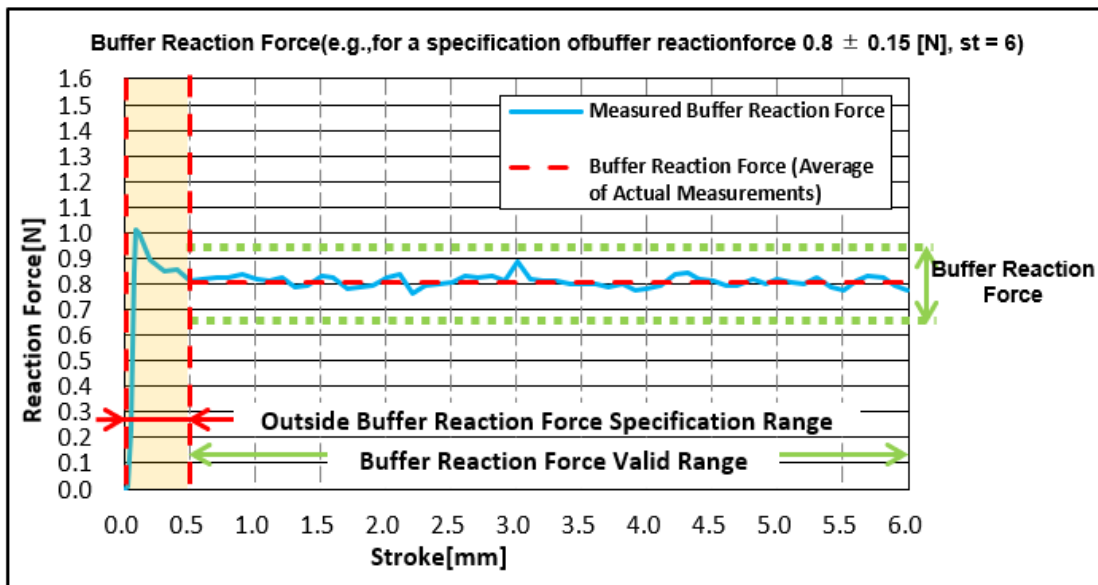


Figure 4. Buffer reaction force

1.7 Product Terminology

[Buffer reaction force accuracy]

This indicates the maximum difference (maximum value minus minimum value) in buffer reaction force when the buffer is moved from a stroke of 0.5 mm to the end of its stroke.

Buffer reaction force accuracy is $\pm 15\%$ F.S. for each buffer reaction force specification. For a buffer reaction force specification of 0.8 ± 0.1 [N], the variation is ± 0.12 [N] (± 0.8 [N] $\times 15\%$).

(Fig. 5)

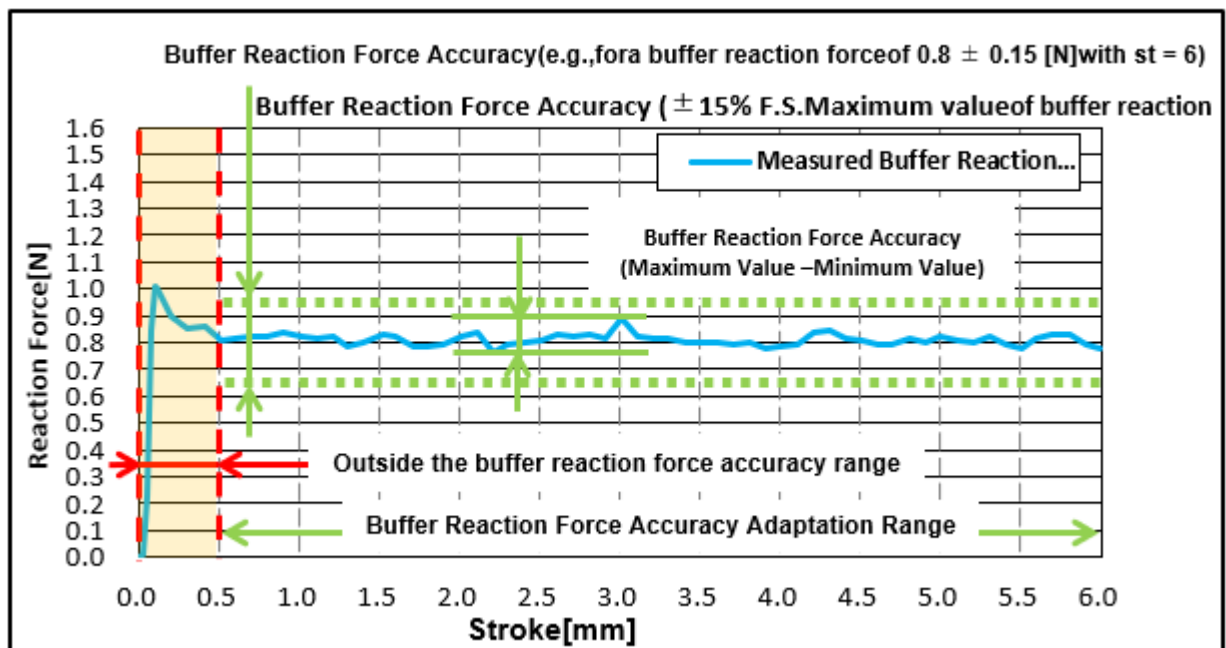


Figure 5. Buffer reaction force accuracy

1.7 Product Terminology

[Maximum reaction force]

This indicates the maximum reaction force when the buffer has moved to the end of its stroke.

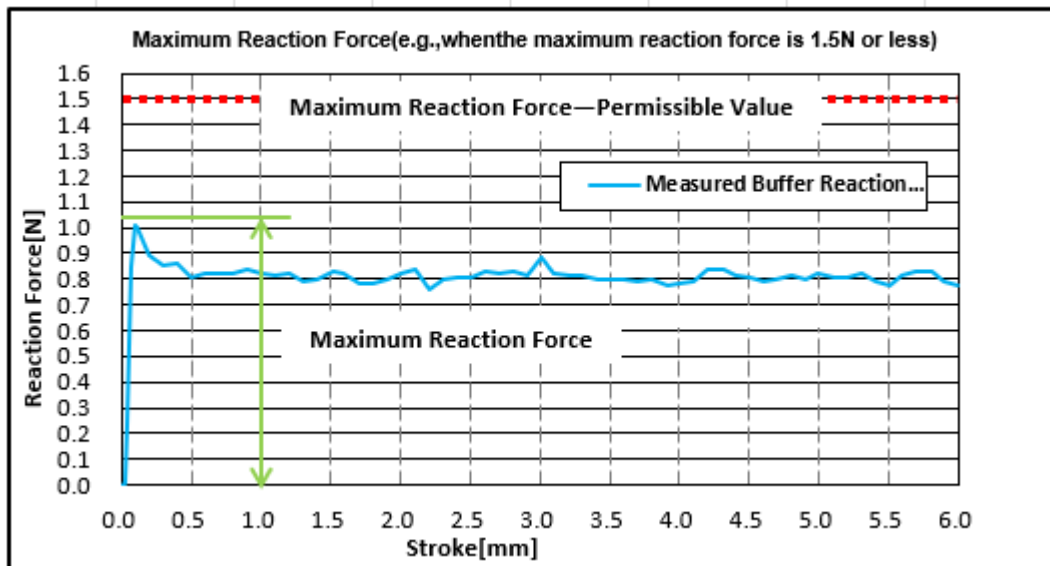


Figure 6. Maximum reaction force

Table 4. Maximum reaction force by product part number

Product part number	Maximum reaction force [N]
ZP3B1MS(3,6)*-B3-*	1.5 or less
ZP3B2MS(3,6)*-B5-*	2.0 or less
ZP3B3MS(3,6,16)*-B5-*	2.5 or less

2 Troubleshooting and Examples of Non-Compliance

Please refer to our “Vacuum Equipment Model Selection Guide,” Document 14 (p. 028).

<https://www.smcworld.com/catalog/BEST-technical-data/pdf/Vacuum-Common.pdf>

SMC Corporation

Tel: + 81 3 5207 8249 Fax: +81 3 5298 5362
URL <https://www.smcworld.com>

Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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Revision History

