CKD

SM-358521-A

INSTRUCTION MANUAL

FINE BUFFER

FBU2 SERIES

- Please read through this instruction manual before using the product.
- Please attentively read safety-related instructions in particular.
- Please keep this instruction manual with care for future reference.

2nd

CKD Corporation

For the Safe Use of the Product

The safe use of this product requires fundamental knowledge of pneumatic appliances, including materials, piping, electricity, and mechanisms (an equivalent level to JIS B 8370: Pneumatic fluid power -- General rules relating to systems).

We will not be liable for any accidents attributable to those without such knowledge or arising out of mishandling.

Customers use their products in a wide range of fields, and it is, therefore, impossible for us to identify all of them. Depending on your working conditions, your product may not operate to its maximum performance or cause an accident. Before determining working conditions, carefully check the specifications of the product with your intended application and the workplace environment, and get familiarized with how to operate it.

Although this product incorporates various safety measures, an accident may result from mishandling. To prevent it, **read this instruction manual carefully to familiarize yourself with correct use.**

Additionally, observe all handling precautions contained in the text and the following.

⚠CAUTION:

- Before disassembling the actuator for inspection, release residual pressure, and confirm that no pressure is remaining in it.
- When the actuator is driving, keep yourself away from it.
- You may get an electric shock if you touch electric wiring connections (exposed live parts), such as an actuator with a solenoid valve and an actuator with a switch. Before disassembling or inspecting the product, turn off the power. Do not touch live parts with a wet hand.

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FBU2 series
FINE BUFFER

Manual No. SM-358521-A

1 UNPACKING 2 INSTALLATION

1. Unpacking

1) Confirm that the product model number you ordered matches that marked on the product's nameplate.

2) Check the surface of the product for damage or flaws.

3) Store the product so as not to allow foreign substances into the product through the screw holes at both ends, the holes in the side faces, and the clearance in the bearing.

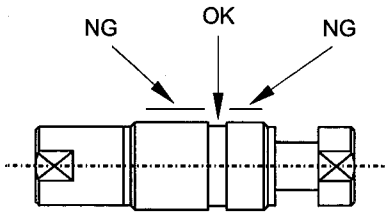
2. Installation

2.1 Installation

1) The working temperature range depends on the bearing type. Use the product within the range specified below.
Standard bearing type (S): 5 to 50°C
High-accuracy bearing type (H/HV): 5 to 40°C

2) This product contains a magnet in it.
Do not use it in a location where magnetic cutting chips or dust exist. Otherwise, the product may get damaged or malfunction.
Additionally, confirm the effect of the magnetic flux on the appliances around the product.

3) Use nuts (continuous thread type: 8M, 12M) or hexagon socket head set screws (spigot type: 7D, 12D) to fasten the product.
When fastening the product with hexagon socket head set screws, tighten them into the groove of the fixed shaft to the specified torque.
Excessive tightening torque may damage the body or bearing and result in failure or malfunction.



Product designation	Locking screw size	Tightening torque(N·m)
FBU2-7D	M2 hexagon socket head set	0.10 to 0.12
FBU2-12D	M2.5 hexagon socket head set screw	0.18 to 0.20

4) Install noting that strong bend power is not applied to the shaft enough when the vacuum pad is installed. The installation of the vacuum pad is recommended to be executed before a fixed shaft is set up to the machine. Exchange noting that strong power is not applied to a movable shaft enough when vacuum pad rubber is exchanged. Exchange the pad holders once when strong power is applied when padsare exchanged.

5) Thinly spread the lubricant such as grease for the protection of O ring, and build the fixation of the internal passage type high-accuracy bearing into the machine slowly.

6) Use the load installed on a movable axis or less the payload(treatment device and adsorbate)

Product designation	Or less the payload(g)
FBU2-7/8	30
FBU2-12	80

2.2 Piping

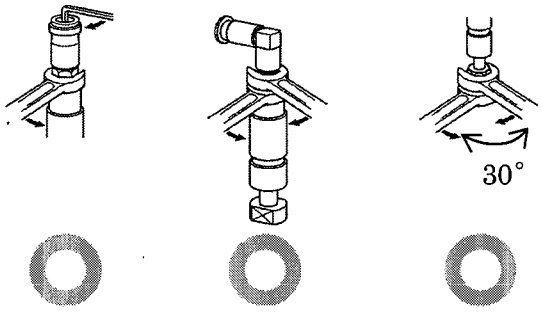
1) Do not take the pipes out of the package until piping.
Foreign substances enter the product through the piping ports or the clearance in the bearing, which may result in failure or malfunction.

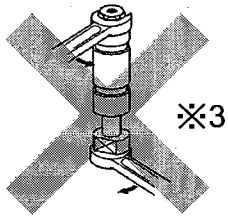
2) Before piping, clean the inside of the pipes by air flushing to remove foreign substances, cutting chips, etc.

3) When the product is to be used for vacuum applications, the tension caused by the piping tube is added to thrust pressure. It is advisable for you to use a tube with low piping tension.

4) Tighten the pipes to the specified torque. ※
Screw in until stopping because piping and the pad etc. are tightened in the hand. Lightly place wrench putting 30°on the standard and tighten to crowd. Tighten the pipes by holding the width across the flat on the same side as the nut to be tightened.
If you tighten them by holding the width across the flat on another side, structural damage may result.

Connecting screw	Tightening torque (N·m)
M3	0.3 to 0.6
M5	1.0 to 1.5





※3—3) Confirm

3. Use

1) Use the product in a vertical position.
Transverse load will cause the characteristics of the product to vary or affect its longevity.

2) When the product is made to rotate, beware of the maximum retaining torque of the magnet.
If force in excess of the maximum retaining torque, a power swing will occur, rotating the product by 180 degrees.

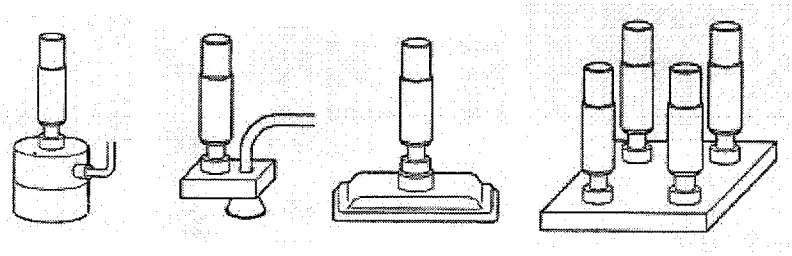
3) Keep the guide tube free of damage.
A damaged guide tube may cause damage to the bearing and result in failure or malfunction.
The guide tube consists of a thin-wall steel pipe and is liable to deform. Handle it with extreme care.

4) Do not apply any lubricant to the guide tube.
A lubricant may cause a functional change.

5) The internal passage type high-accuracy bearing is accompanied by vacuum leakage.
This type uses a clearance seal structure to ensure a higher level of thrust pressure stability and repeatability.
It consequently develops vacuum leakage (a pressure drop of 10 kPa or below to an initial pressure of – 80 kPa).

6) The internal passage type high-accuracy bearing is use in a clean environment.
The bearing space narrows because of the improvement of the return position accuracy.
There is a possibility that a movable shaft becomes a defective operation by the invasion of the foreign.

7) The moment of the movable axis power also or less the payload causes the taking malfunction and the breakdown the following use.
- Install big treatment devices other than the adsorption putt on the head peace.
- Big size or adsorption putt take situation.
- For use that the offset load hangs to a movable axis.
- Maintain one treatment device and work with two or more FBU2.



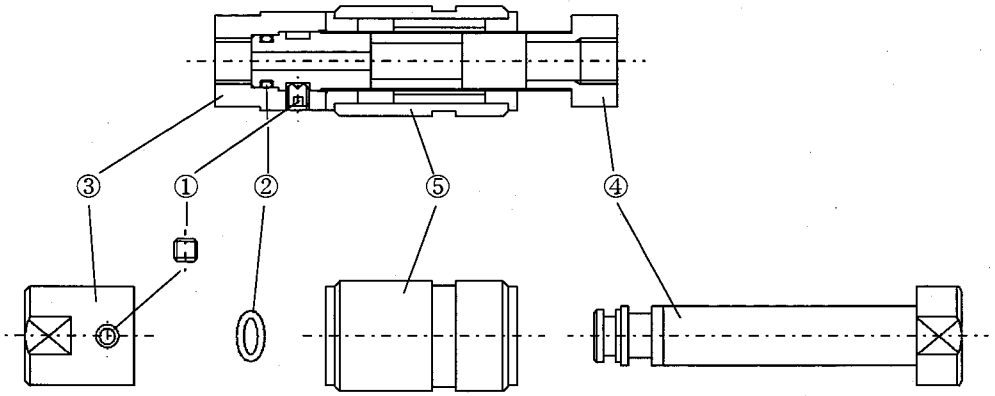
4. Maintenance

1) To keep the product in the optimum condition, perform a periodical inspection semiannually or annually.

2) Inspection points
   ① Check if the buffer operates smoothly.
   ② Vacuum leakage (air tightness)
   ③ Damage and deformation of the movable shaft

3) Action against buffer malfunction caused by foreign substances
   The internal structure of the product is shown below. All products of the series have the same internal structure although they are different in appearance.
   By removing the hexagon socket head set screw for the tailpiece, the product can be divided into the movable shaft assembly, the tailpiece, and the fixed shaft assembly. The inside of the movable shaft and fixed shaft assemblies cannot be disassembled because of the bonded structure.

[Internal structure/Disassembly schematic]



[Disassembly/Assembly procedure]

Step 1) Remove the hexagon socket head set screw ①.
Completely remove it to prevent the O-ring ② from tearing.

Step 2) Remove the tailpiece ③ from the movable shaft assembly ④.

Step 3) Remove the O-ring ② from the movable shaft assembly ④.

Step 4) Wipe off the grease in the groove in the O-ring ② attached to the movable shaft assembly ④.

Draw the moveable shaft assembly ④ out of the fixed shaft assembly ⑤.

Part	Part name	Remarks
①	Hexagon socket head set screw	M2(FBU2-7/8M)
		M2.5(FBU2-12/12M)
②	O-ring	
③	Tailpiece	
④	Movable shaft assembly	Not disassemblable.
⑤	Fixed shaft assembly	Not disassemblable.

Step 5) Clean the moveable shaft assembly ④ and the fixed shaft assembly ⑤ by air blowing.
An epoxy-based adhesive is used for these assemblies.
Exercise care when washing them with a solvent.

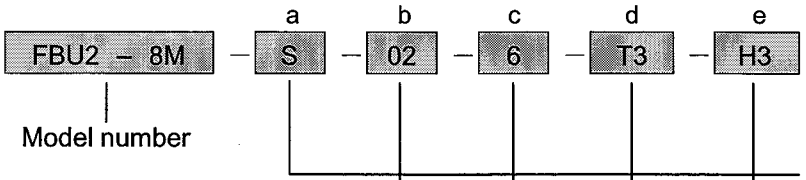
Step 6) Reassembly
Assemble the parts by reversing the steps above. Grease should be applied to prevent the O-ring ② from tearing.
Apply a locking adhesive to the hexagon socket head set screw ①, and tighten it to the specified torque.
(At the time of delivery from the plant: A low-strength anaerobic adhesive is applied.)

Locking screw size	Tightening torque (N·m)
M2 hexagon socket head set screw	0.12 to 0.14
M2.5 hexagon socket head set screw	0.18 to 0.20

Step 7) Operation check
Do not fail to perform an operation check after reassembly.
If you find something wrong with the product after maintenance, please consult us.

5. How to order

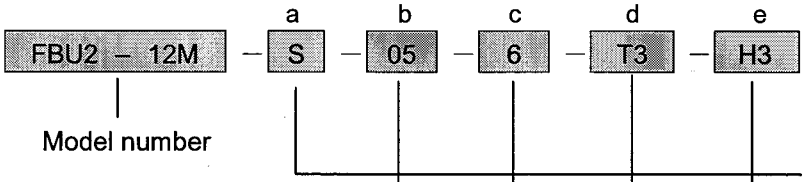
● Outside diameter: M8 x 0.75 continuous thread type



< Example of model number >
FBU2-8M-S-02-6-T3-H3
a. Bearing accuracy : Standard
b. Thrust pressure (N): 0.2 N
c. Buffer stroke (mm) : 6 mm
d. Tailpiece shape : M3, internal thread depth: 3
e. Headpiece shape : M3, internal thread depth: 3

Symbol	Description
a. Bearing accuracy	
S	Standard (bearing clearance:0.2 mm or less)
b. Thrust pressure(N)	
02	0.2
c. Buffer stroke(mm)	
2	2
6	6
d. Tailpiece shape	
TB	Without a hole
T3	M3, internal thread depth: 3
e. Headpiece shape	
HB	Without a hole
H3	M3, internal thread depth: 3

● Outside diameter: M12 x 1 continuous thread type

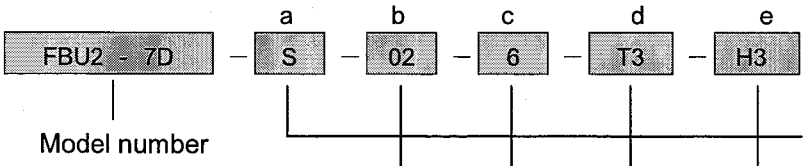


< Example of model number >
FBU2-12M-S-05-16-T5-H3
a. Bearing accuracy : Standard
b. Thrust pressure (N): 0.5 N
c. Buffer stroke (mm) : 16 mm
d. Tailpiece shape : M5, internal thread depth: 4
e. Headpiece shape : M3, internal thread depth: 3

Symbol	Description
a. Bearing accuracy	
S	Standard (bearing clearance:0.2 mm or less)
b. Thrust pressure(N)	
05	0.5
10	1.0
c. Buffer stroke(mm)	
2	2
6	6
16	16
d. Tailpiece shape	
TB	Without a hole
T3	M3, internal thread depth: 3
T5	M5, internal thread depth: 4
e. Headpiece shape	
HB	Without a hole
H3	M3, internal thread depth: 3
H5	M5, internal thread depth: 4

5 HOW TO ORDER

● Outside diameter: Ø7h7 spigot type



Mounting bracket model number

FBU2-7D-B1
FBU2-7D-B2

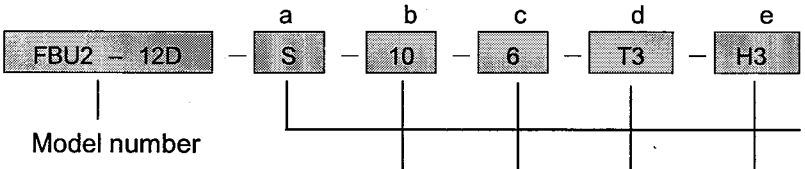
< Example of model number >
FBU2-7D-H-02-6-T3-H3

a. Bearing accuracy : High accuracy
b. Thrust pressure (N) : 0.2 N
c. Buffer stroke (mm) : 6 mm
d. Tailpiece shape : M3, internal thread depth: 3
e. Headpiece shape : M3, internal thread depth: 3

Precaution about model numbers
Note 1: The combination of the bearing accuracy HV, the tailpiece shape T3, and the headpiece shape HB is not available.

Symbol	Description
a. Bearing accuracy	
S	Standard (bearing clearance: 0.2 mm or less)
H	High-accuracy (bearing clearance: 0.05 mm or below)
HV	Internal passage type high-accuracy (bearing clearance: 0.05 mm or below)
b. Thrust pressure (N)	
02	0.2
c. Buffer stroke (mm)	
2	2
6	6
d. Tailpiece shape	
TB	Without a hole
T3	M3, internal thread depth: 3
e. Headpiece shape	
HB	Without a hole
H3	M3, internal thread depth: 3

● Outside diameter: Ø12h7 spigot type



Mounting bracket model number

FBU2-12D-B1
FBU2-12D-B2

< Example of model number >
FBU2-12D-HV-05-6-TB-H5

a. Bearing accuracy: Internal passage type high-accuracy bearing
b. Thrust pressure (N): 0.5 N
c. Buffer stroke (mm): 6 mm
d. Tailpiece shape: Without a hole
e. Headpiece shape: M5, internal thread depth: 4

Precaution about model numbers
Note 1: The high-accuracy bearings H and HV are not available with a stroke of 16 mm.
Note 2: The combination of the bearing accuracy HV, the tailpiece shape T3,T5, and the headpiece shape HB is not available.

Symbol	Description
a. Bearing accuracy	
S	Standard (bearing clearance:0.2 mm or less)
H	High-accuracy (bearing clearance:0.05 mm or below)
HV	Internal passage type high-accuracy (bearing clearance: 0.05 mm or below)
b. Thrust pressure(N)	
5	0.5
10	1.0
c. Buffer stroke(mm)	
2	2
6	6
16	16
d. Tailpiece shape	
TB	Without a hole
T3	M3, internal thread depth: 3
T5	M5, internal thread depth: 4
e. Headpiece shape	
HB	Without a hole
H3	M3, internal thread depth: 3
H5	M5, internal thread depth: 4

6. Specification

All values shown below are data at a room temperature of 23℃.

Item			FBU2-8M	FBU2-7D		FBU2-12M	FBU2-12D	
			S	S	H/HV	S	S	H/HV
Outside diameter			M8×0.75	Φ7h7		M12×1	Φ12h7	
Buffer thrustpressure		N	0.2			0.5,1.0		
Thrust pressure variation Note 1)			±15% or less					
Buffer stroke		mm	2,6			2,6,16	2,6	
Ambient temperature		℃	5 to 50	5 to 40		5 to 50		5 to 40
Bearing clearance		mm	0.2 or less	0.05 or less		0.2 or less		0.05 or less
Maximum retaining torque		N·cm	0.25			Note 2)		
Repeatability	X-Y	mm	±0.1 or less	±0.05 or less		±0.1 or less		±0.05 or less
	Z	mm	±0.1 or less					
	θ	°	3 or less					
Load capacity		g	30			80		

Note 1) The value is the variation in thrust pressure during stroking. The thrust pressure does not become proportional to the stroke.

Note 2) For the retaining torque of the FBU2-12M/12D, see the table shown below.

Thrust pressure	Stroke(mm)	Retaining torque(N·cm)
0.5	2	0.5
	6	0.5
	16	1.2
1	2	1.2
	6	1.2
	16	2.5

■ If you require a product of special specifications, please consult us.