Air Bearing Actuator

LBC

■ Precision Components

CONTENTS

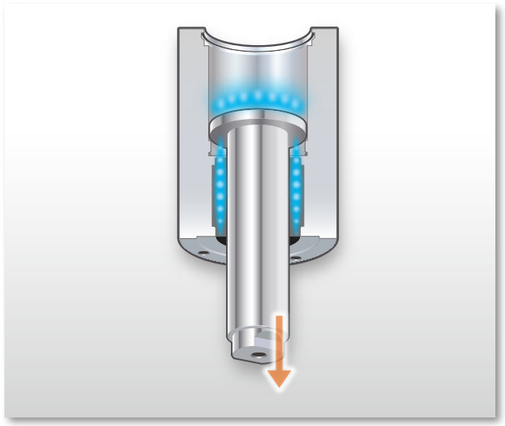
Air Bearing Actuator

LBC Series

Actuator for Ultra-Precision Load Control Achieves zero sliding resistance with air bearings

Compatible with clean environments

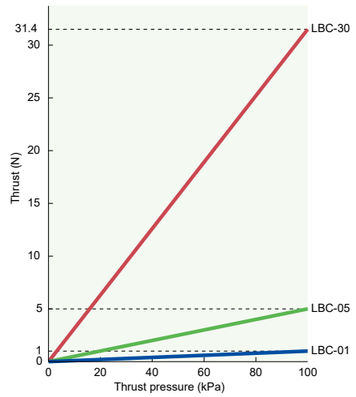
Completely non-contact air drive method with no particle generation and no lubrication. Compatible with environments requiring high cleanliness.



High-precision linear control

Since sliding resistance is zero, high-precision linear control of load is possible using an electro-pneumatic regulator for LBC.

Thrust Characteristics



Soft touch control with forces starting from 0.01 N

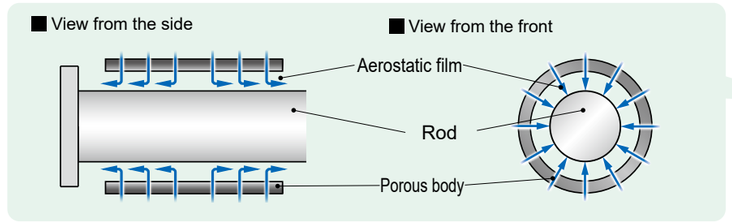
Since the load can be controlled from a minute force of 0.01 N, soft touch to the target workpiece is possible. Does not apply impact or cause scratches.

Excellent responsiveness

The rod material (movable part) is made of aluminum alloy for weight reduction, resulting in excellent responsiveness.

What is an Air Bearing (Aerostatic Bearing)*

A bearing that eliminates frictional resistance by floating the rod with an aerostatic film generated on the surface of a porous body



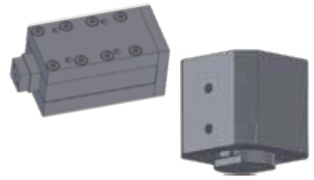
Series Variations

●Standard

3 types based on thrust range.

Model Name	Thrust Range
LBC-01	0.02 N to 1 N
LBC-05	0.1 N to 5.0 N
LBC-30	0.6 N to 31.4 N

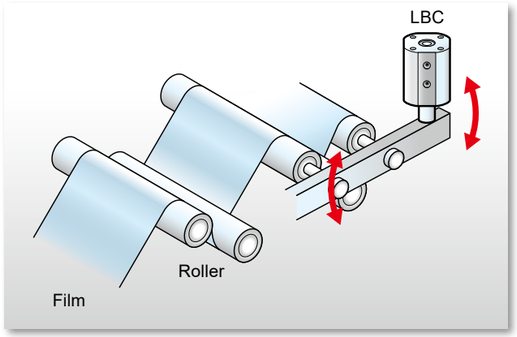
●Special specifications



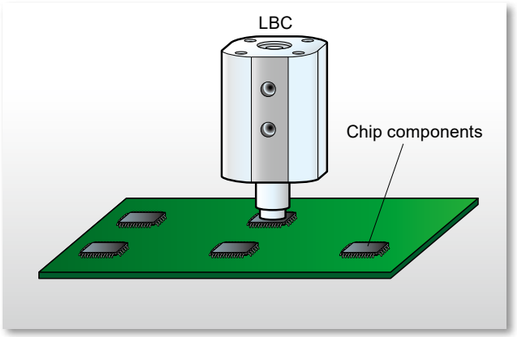
Many production records for specifications other than standard types. We flexibly handle thrust, stroke, shape, anti-rotation, etc. Please contact CKD.

Application Example

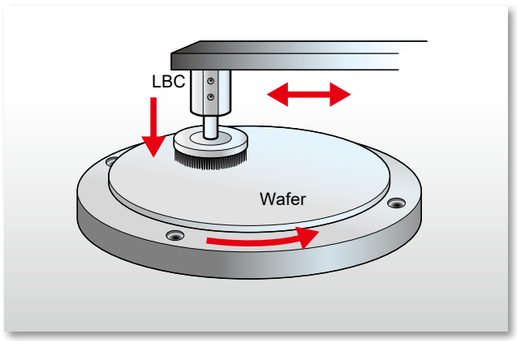
Film Tension Control



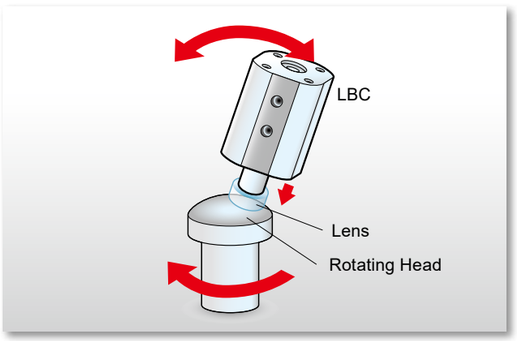
Chip Component Mounting (For Bonding Equipment)



Wafer Cleaning (For Scrubber Cleaning Machine)



Lens Polishing Finish



(*) This product has no rod return mechanism. When used horizontally or in a downward vertical orientation, if a return stroke is required, please use another cylinder or similar device to actuate the return of the LBC unit itself.

Air Bearing Actuator
Single Acting, Push type

LBC Series

RoHS

Model No. Notation

LBC - 01

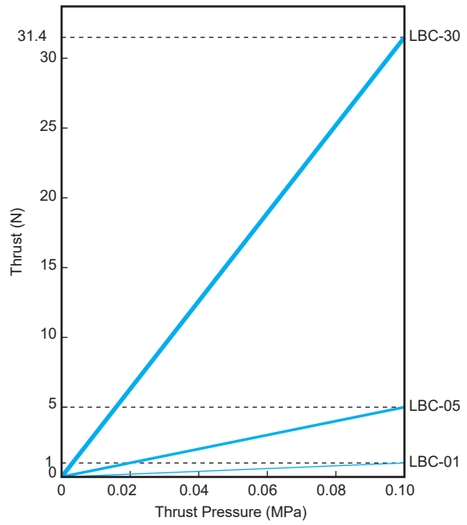
Model No.

1 Thrust

1 Thrust

Code	Content
01	1 N
05	5 N
30	30 N

Thrust Characteristics



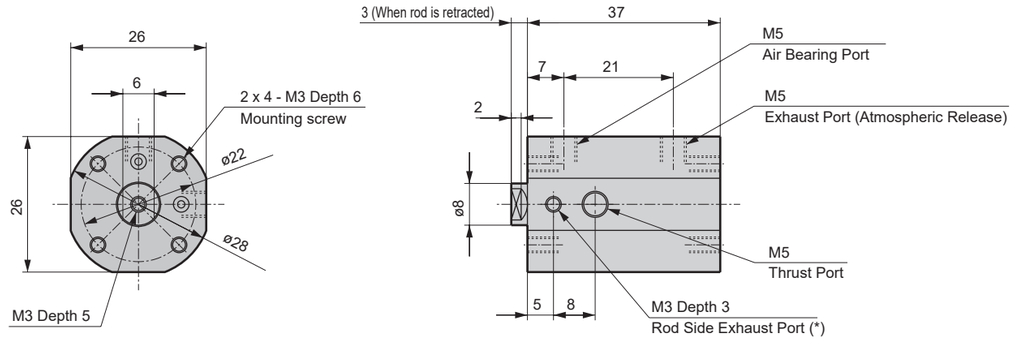
Specifications

Item			LBC-01	LBC-05	LBC-30
Actuation Method			Single Acting, PusH-type (*1)		
Operating Fluid			Clean Compressed Air (Equivalent to ISO 8573-1: 2010 Class 1.4.2)		
Operating Pressure MPa	Air Bearing Port		0.3 to 0.5		
	Thrust Port		0.002 to 0.1		
Ambient Temperature		°C	5 to 35		
Proof Pressure		MPa	0.75		
Pressure Receiving Area		mm²	10	50	314
Thrust Range		N	0.02 to 1.0	0.1 to 5.0	0.6 to 31.4
Stroke		mm	5^{+1}_{0}		30^{+1}_{0}
Allowable Lateral Load		N	1.2	0.8	4.0
Weight		g	50	45	345
Movable Part Weight (*2)		g	5	4.5	65
Bearing Part Air Consumption (*3)		L/min	2.5 or less	2.5 or less	7.5 or less

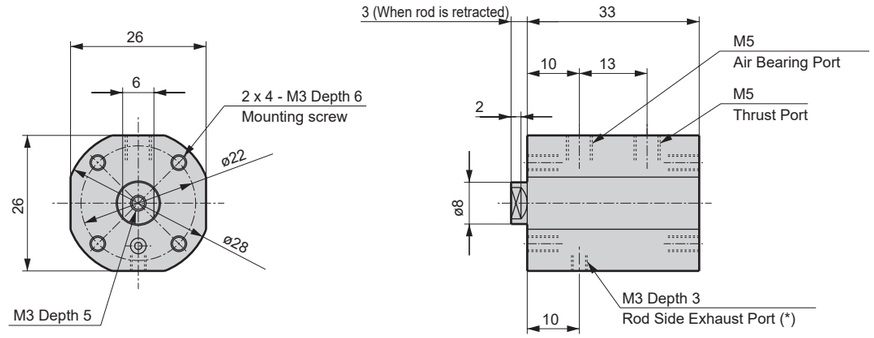
*1: There is no rod return mechanism.
*2: Movable part Weight indicates the total Weight of the rod, stopper, and cross recessed countersunk head machine screw.
*3: Value at bearing pressure 0.5 MPa.

External Dimension Drawings

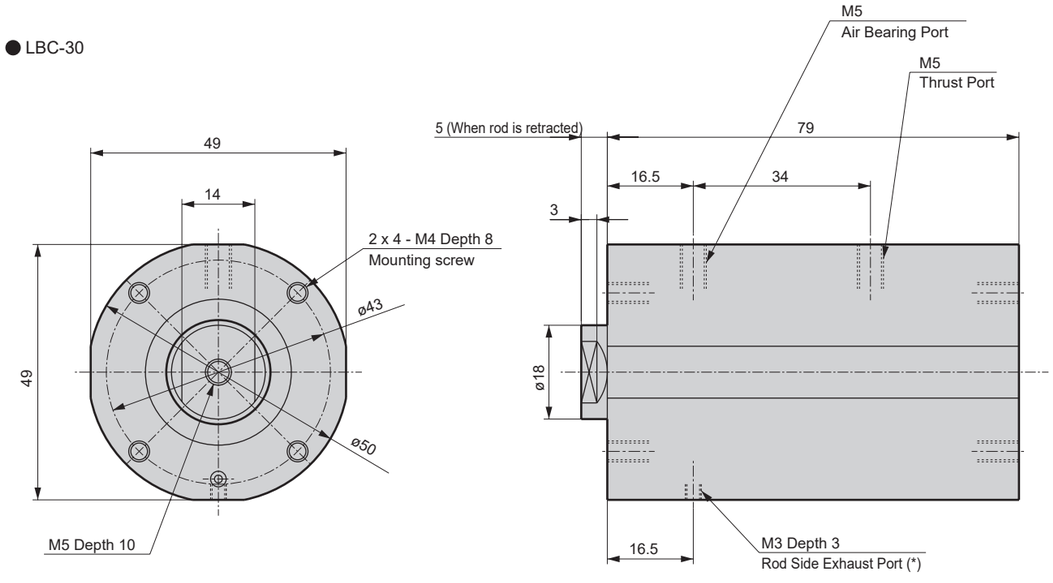
● LBC-01



● LBC-05



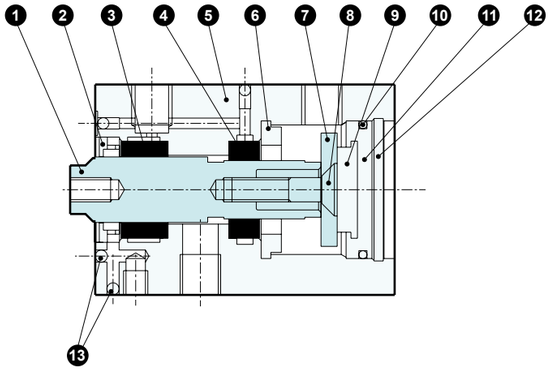
● LBC-30



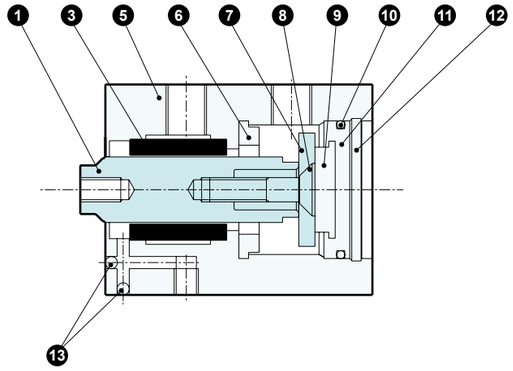
(*) To prevent air leakage from the rod part, evacuate using a vacuum generator from the rod side exhaust port.

Internal Structure Diagram/Materials

● LBC-01



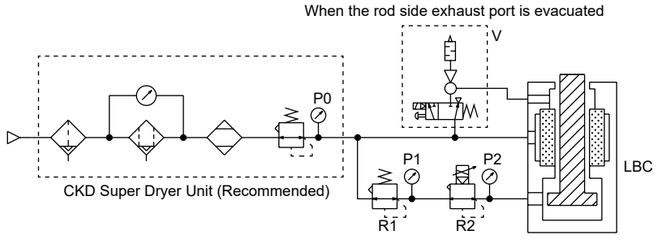
● LBC-05, 30



Do not disassemble

Part No.	Part Name	Material	Remarks	Part No.	Part Name	Material	Remarks
1	Rod	Aluminum alloy		8	Cross Recessed Countersunk Head Machine Screw	Stainless steel	
2	Cap	Aluminum alloy	Alumite	9	Cushion Rubber R	Urethane rubber	
3	Bushing 1	Carbon Graphite Porous Material		10	Gasket	Nitrile rubber	
4	Bushing 2	Carbon Graphite Porous Material		11	Bottom Plate	Special Aluminum	Chromate
5	Body	Aluminum alloy	Alumite	12	C-ring for hole	Stainless steel	
6	Cushion Rubber L	Urethane rubber		13	Steel ball	Stainless steel	
7	Stopper	Aluminum alloy	Alumite				

Circuit Used



P0: Air Bearing Port Supply Pressure (0.3 to 0.5 MPa)
P1: Electro-Pneumatic Regulator Supply Pressure (0.2 MPa)
P2: Thrust Port Supply Pressure (0.002 to 0.1 MPa)
R1: Regulator
R2: Electro-Pneumatic Regulator for LBC
(EV25□□-FL (Refer to P. 10 to 12. Use this as reference.)
Special Order Details
• Control Pressure 0 to 0.1 MPa (Improved control pressure accuracy)
• Fixed Orifice(Improved relief performance in low pressure range)
• Normally Open (NO) Type
(Prevents rod ejection when power is OFF))
V: Celvacs (VSK)
(Only when prevention of air leakage from the rod part is required)

MEMO

Precision Components
LBC
GFM
PVP
FBU2
AFB-RB
Ending

Electro-Pneumatic Regulator for LBC (Special Specification Product)

EV2500 Series

- Electro-Pneumatic Regulator compatible with Air Bearing Actuator LBC
- Pressure Control Range 0 to 0.1 MPa
- Operation Method NO Type

CE UKCA RoHS

For compatible detailed model No.s, please visit the CKD website.

Model No. Notation

EV2500 - 0 08 - C11 B - FL298410

- EV2500: Model No.
- 0: ❶ Input Signal
- 08: Connection Port Size Rc1/4
- C11: ❷ Cable Option
- B: ❸ Bracket Option
- FL298410: ❹ Identification Number

❶ Input Signal

Code	Content
0	0-10 VDC
1	0-5 VDC
2	4-20 mADC or 1-5 VDC
3	10 kΩ Variable Resistor or 0-10 VDC (Connected to internal 10 VDC power supply)

❷ Cable Option

Code	Content
Blank	None
C11	1m attached
C13	3m attached

❸ Bracket Option

Code	Content
Blank	None
B	C-type bracket attached
B4	B-type bracket attached

❹ Identification Number

Code	Content
FL298410	For LBC-01
FL298411	For LBC-05
FL298412	For LBC-30

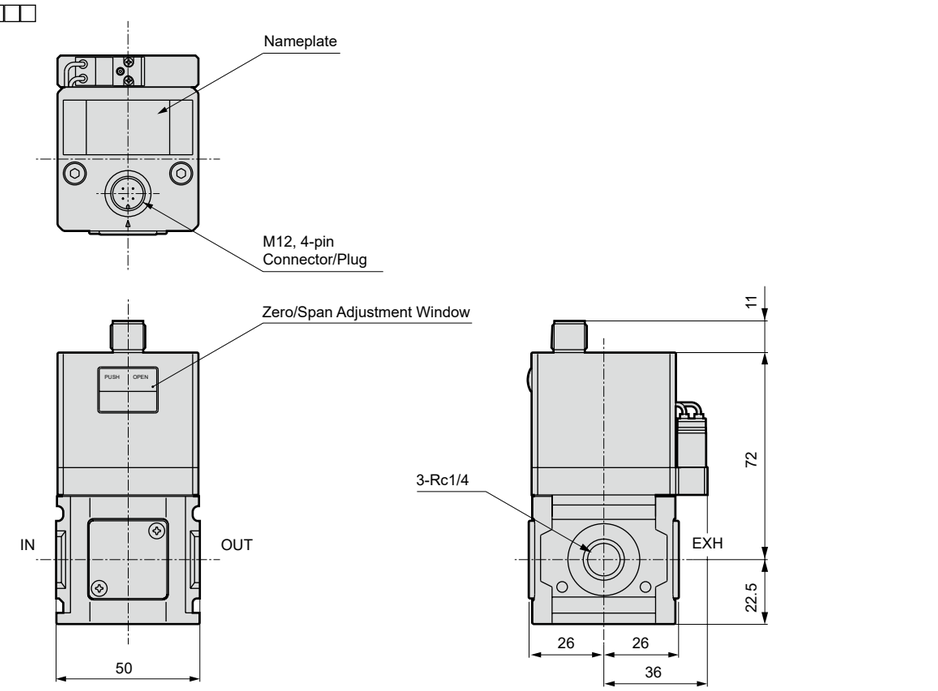
Specifications

Item		EV2500-□08-FL			
Operating Fluid		Clean Compressed Air (ISO 8573-1: 2010 Class 1.3.2)			
Operating Pressure		0.2 to 0.3 MPa			
Proof Pressure		0.7 MPa			
Pressure Control Range		0 to 0.1 MPa			
Power Supply Voltage		DC24V ±10%(Stabilized power supply with ripple factor 1% or less)			
Current Consumption		0.1 A or less (Inrush current 0.6 A when power is ON)			
Input Signal (Input Impedance)		0-10 VDC (20 kΩ)	0-5 VDC (10 kΩ)	4-20 mADC or 1-5 VDC (250 Ω) *1	10 kΩ Variable Resistor or 0-10 VDC (20 kΩ)
Monitor Output		1-1.8 VDC(However, none for 10 kΩ variable resistor input)			
Insulation Resistance		100 MΩ (500 VDC) or more			
Dielectric Strength		1500 VAC 1 minute			
Accuracy *2	Hysteresis	1% F.S. or less			
	Linearity	±0.5% F.S. or less			
	Resolution	0.5% F.S. or less			
	Repeatability	0.5% F.S. or less			
Temperature Characteristics	Zero Point Fluctuation	0.75% F.S./°C or less			
	Span Fluctuation	0.35% F.S./°C or less			
Step Response *3		0.6 s or less			
Vibration Resistance		98 m/s² or less			
Operating Ambient Temperature		5-50°C			
Mounting Orientation		Free			
Connection Port Size		Rc 1/4			
Weight		330 g			

*1: When using with signal voltage 1-5 VDC, a current of 4-20 mA flows from the signal source into the EV unit. Please check the specifications of the signal source used carefully before use.
*2: The above characteristics are based on power supply voltage 24.0 VDC, operating pressure 0.3 MPa, and control pressure 10 to 100% F.S.
*3: Operating pressure: Maximum operating pressure, step amount: 50% F.S. → 100% F.S. 50% F.S. → 60% F.S. 50% F.S. → 40% F.S.

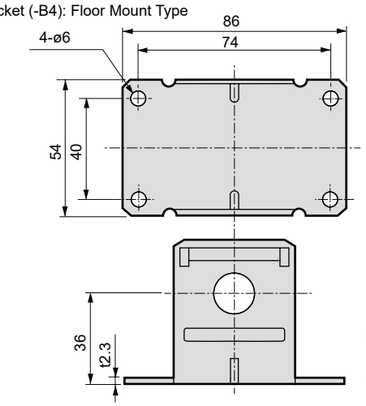
External Dimension Drawings

● EV2500-FL□□□□□



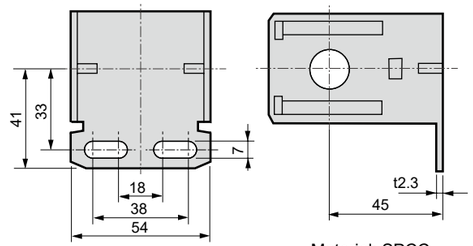
● Bracket Option

B-type Bracket (-B4): Floor Mount Type



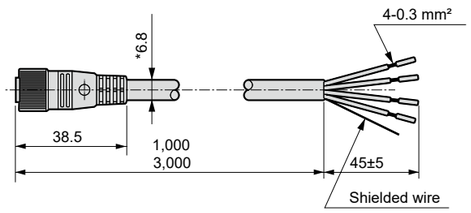
Material: SPCC
Treatment: Zinc plating
Weight: 165 g

C-type Bracket (-B): Wall Mount Type



Material: SPCC
Treatment: Zinc plating
Weight: 148 g

● Cable Option

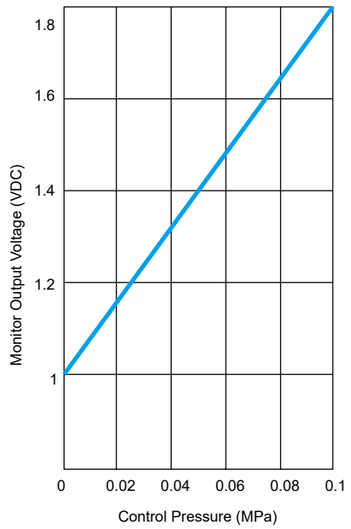


-C1*Shield/cable/connector

Pin No.	Insulation Color	Application	Input Signal-type			
			0-10 V	0-5 V	4-20 mA 1-5 V	10 kΩ VR (0-10 V)
1	Red	Power Supply ⊕	24 V			
2	Green	--	Monitor Output 1-1.8 V			VR Input Terminal
3	Black	Common	0V			VR Input Terminal 0V
4	White	Input Signal	0-10 V	0-5 V	4-20 mA 1-5 V	VR Output Terminal (0-10 V)

If cable connectors are not used, the following recommended cable socket (L-type) can be used. However, please use shielded wire for the cable.
Screw type ELWIKA4012 Correns (Hirschmann)
Soldering type Model XS2C-D422 Omron

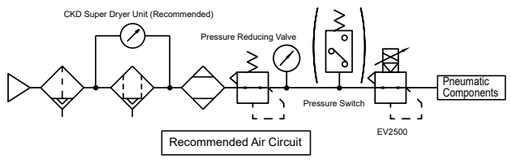
Monitor Output



Precautions for Use

Please also read the precautions for the standard EV2000 series.

1 For the operating fluid, use clean compressed air from which solids, moisture, oil, etc., have been sufficiently removed.
(ISO 8573-1: 2010 Class 1.3.2)



2 The operating pressure supplies the specified pressure relative to the control pressure, so ensure it does not deviate from the operating pressure range. Especially, settings where the control pressure exceeds 0 MPa and is set up to 60% F.S. without operating pressure, or where the control pressure remains unstable for a long time, will adversely affect product life; do not make such settings.

3 Unlike the standard EV2000 Series, the pilot operating pressure of this product is released (NO) when the power is OFF, which causes the secondary pressure to drop to atmospheric pressure.

4 This product constantly bleeds the secondary side to release the flow entering from the bearing port of the air bearing actuator, resulting in considerable air consumption from the EXH port. Therefore, significant exhaust noise occurs from the EXH port, and pressure loss occurs depending on the piping diameter; consider the following countermeasures.

- For exhaust noise: Pipe the EXH port for silencing, etc.
- For pressure loss: Increase the piping diameter used, set the operating pressure higher, etc.

Special Specification Product

Accepted as a special specification product. For details, please contact our sales department.

Air Bearing Cylinder Square Shaft Type

- Non-rotating rod type optimal for precision part installation
- Jig and rod weight cancellation mechanism can be built in
- Air flow path for suction and blowing can be built into the rod.
- Square shaft bearing requires no external rotation-stop mechanism.

For Ensuring Safety

Pneumatic Components Warnings/Precautions

Be sure to read this before use.
For general cylinders, please check "Pneumatic Cylinder ① to ⑤" (No. RJ-002AA to 006AA).

Individual Precautions: Air Bearing Actuator LBC Series

Design / Selection

Caution

■ Use clean, dry compressed air (ISO B 8573-1: 2010 Grade 1.4.2 or equivalent).

- To supply clean compressed air, install an air filter and oil mist filter. Use of CKD Super Dryer Unit SU Series is recommended. (Compatible circuit P. 12.)
- The drainage that occurs due to a drop in temperature within the pneumatic piping or pneumatic components can momentarily block the air flow path and cause operational failure. Furthermore, it causes rust, leading to pneumatic equipment failure.
- Any solid foreign matter in the compressed air can enter the pneumatic components and cause clogging, wear or locking in the bearing.

■ Always supply air with the specified pressure (0.3 to 0.5 MPa) to the bearing port when the actuator is in operation.

- If air is not supplied with the specified pressure, the resulting low load capacity of the bearing can cause the shaft to make contact, resulting in operational failure.
- Use a pressure switch and install a protection circuit that stops operation when pressure drops.

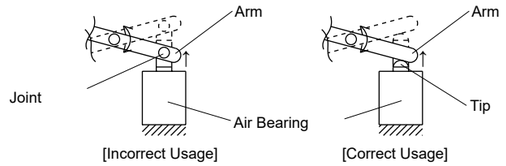
■ Connect a regulator with pressure relief mechanism to the thrust port. If using an electro-pneumatic regulator, please use the product compatible with LBC.
(Compatible circuit P. 12.)

■ The air bearing mounting surface should have a flatness level of 0.01 mm or below.

- Mounting on a low precision surface can cause the bearing to warp, resulting in operational failure.

■ Do not connect the end of the rod to an arm, etc.

- To avoid excessive lateral load from being applied to the bearing, make sure that the rod end is making straight contact with the loading object and that the contact point is a smoothly operating point-contact with low friction.



■ Do not use in applications where the rod is rotated using a motor, etc.

- The rod and bearing will make contact, leading to operational failure.

For precautions regarding mounting, installation, adjustment, operation, and maintenance, please refer to the CKD Equipment Product Site(https: //www.ckd.co.jp/kiki/en/) → 'model No.' → Instruction Manual