LBC

Air bearing actuator

Special

Overview

Air static pressure soft actuator based on non-contact air bearing mechanism with zero sliding resistance. The actuator enables sensitive and precise load control when combined with electro pneumatic regulator (EV).

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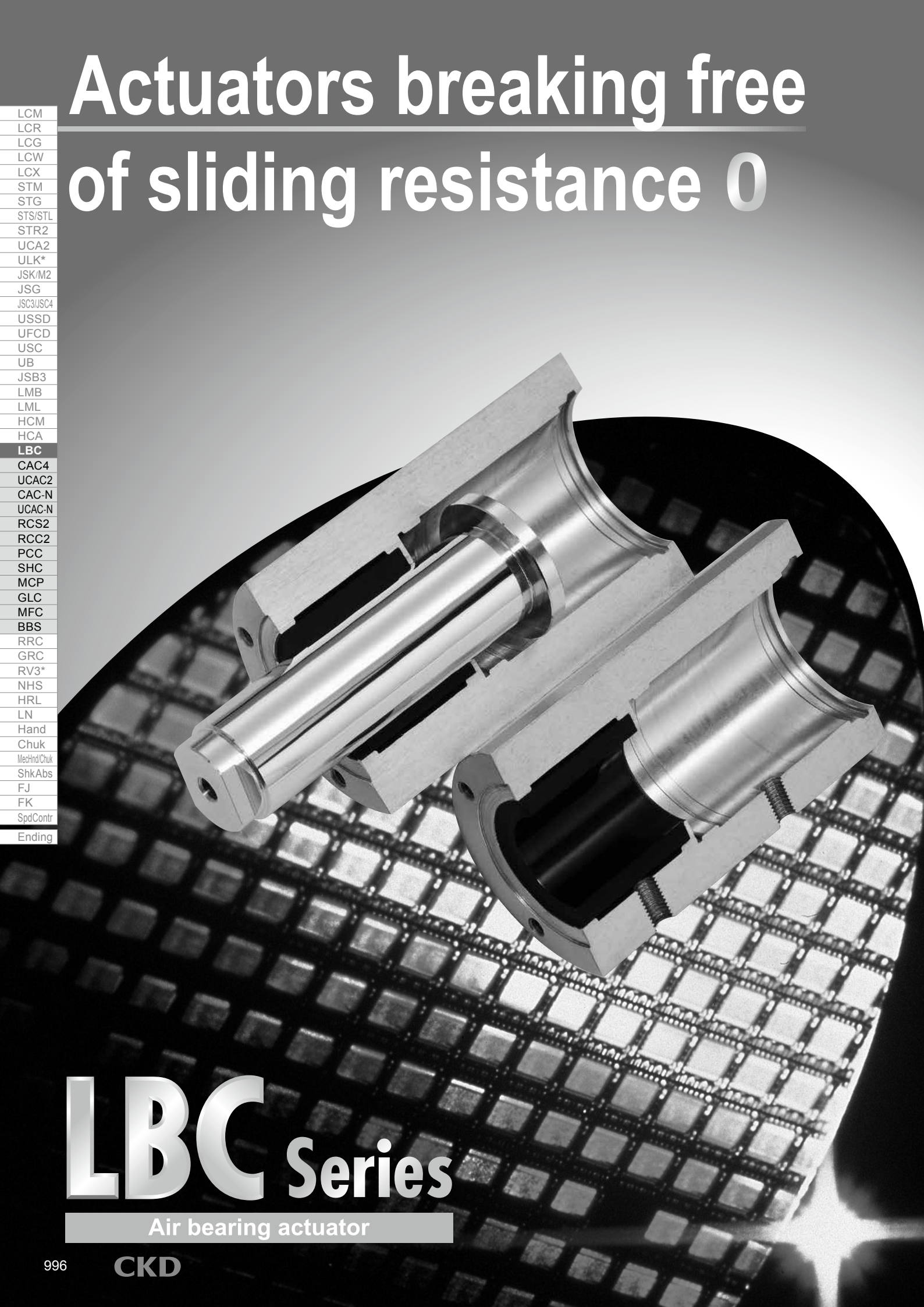
Actuators breaking free of sliding resistance 0

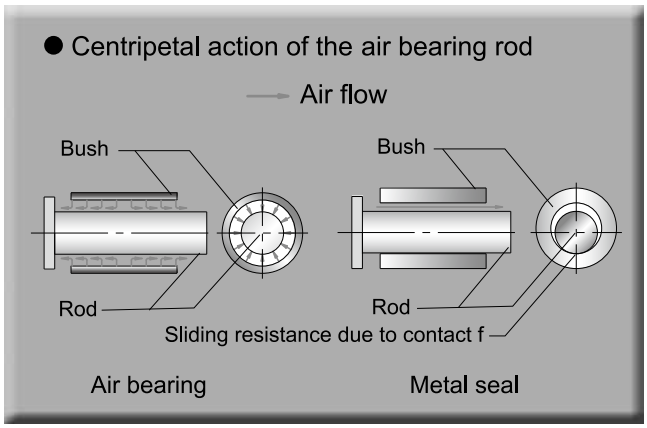


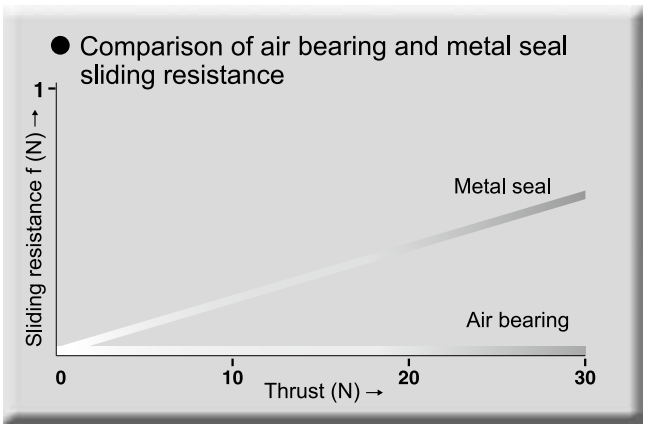
LBC Series

Air bearing actuator

Minimum control load 0.01 N

Air static pressure type soft actuator LBC Series based on non-contact air bearing mechanism with zero sliding resistance.
The actuator enables sensitive and precise load control when combined with an electro-pneumatic regulator (EV).





Appropriate for clean environments

Non-contact, non-lubricated air driving method without generating dust. The product is appropriate for clean environments.

Soft touch

Due to allowable minimum load control of 0.01 N, a soft touch on the workpiece is possible. The workpiece is not exposed to impact or damaged.

Optimum load for workpiece

The best load according to the purpose and application will be applied to the workpiece.

Excellent response

The rod (moving part) made of light aluminum alloy enables excellent response.

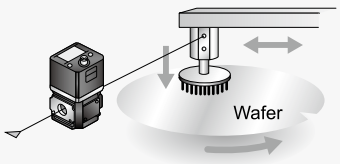
Space-saving & compact

High precision linear control

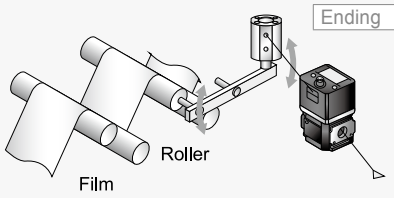
As there is no sliding resistance, high precision linear load control is possible with the electro-pneumatic regulator (EV-FL).

Applications (Note)

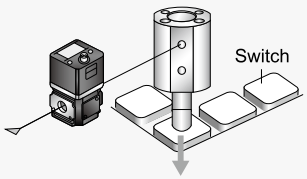
● For scrubber washing machine or disc lapping



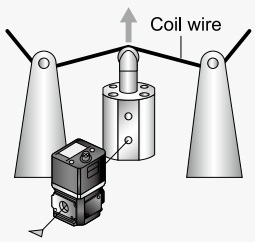
● Film tension control



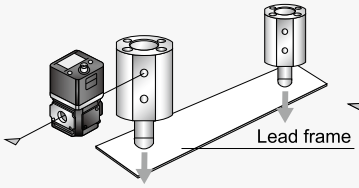
● Inspection of pressure-sensitive sensor and pressure-sensitive switch



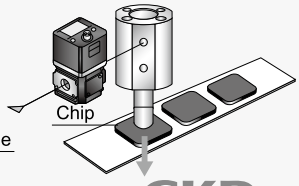
● Coil winding tension control



● Retaining lead frame



● Chip parts assembly



(Note) Rod return mechanism is not provided. If returning the rod is necessary in horizontal or vertical downward applications, combine any other cylinder to return the LBC itself.

Air bearing actuator
Single acting/push

LBC Series

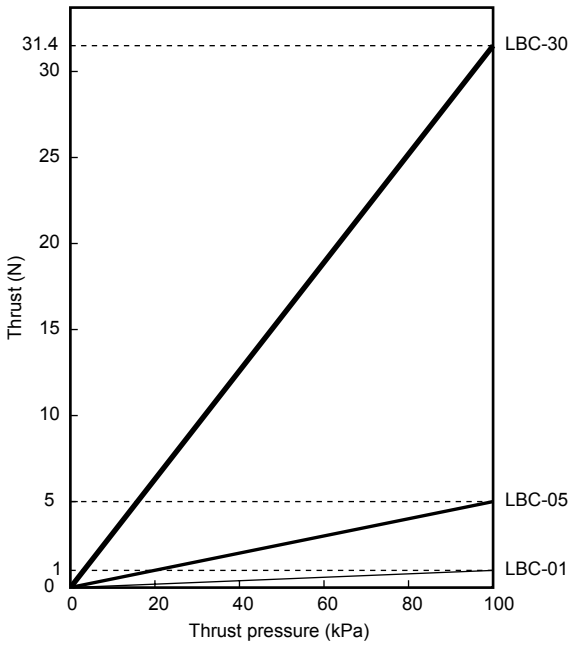
RoHS CAD

Specifications

Item			LBC-01	LBC-05	LBC-30
Actuation			Single acting/push (*1)		
Working fluid			Clean compressed air (JIS B 8392-1: 2003 Grade 1.4.2 or equivalent)		
Working pressure MPa	Air bearing port		0.3 (≈44 psi, 3 bar) to 0.5 (≈73 psi, 5 bar)		
	Thrust port		0.002 (≈0.29 psi, 0.02 bar) to 0.1 (≈15 psi, 1 bar)		
Ambient temperature		°C	5 (41°F) to 35 (95°F)		
Proof pressure		MPa	0.75 (≈110 psi, 7.5 bar)		
Pressurized area		mm^2	10	50	314
Thrust range		N	0.02 to 1.0	0.1 to 5.0	0.6 to 31.4
Stroke length		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 : Rod return mechanism is not available.
*2 : Movable part weight indicates the total weight of rod, stopper and cross headed flat head screw.
*3 : Value when bearing pressure is 0.5 MPa

Thrust characteristics



How to order

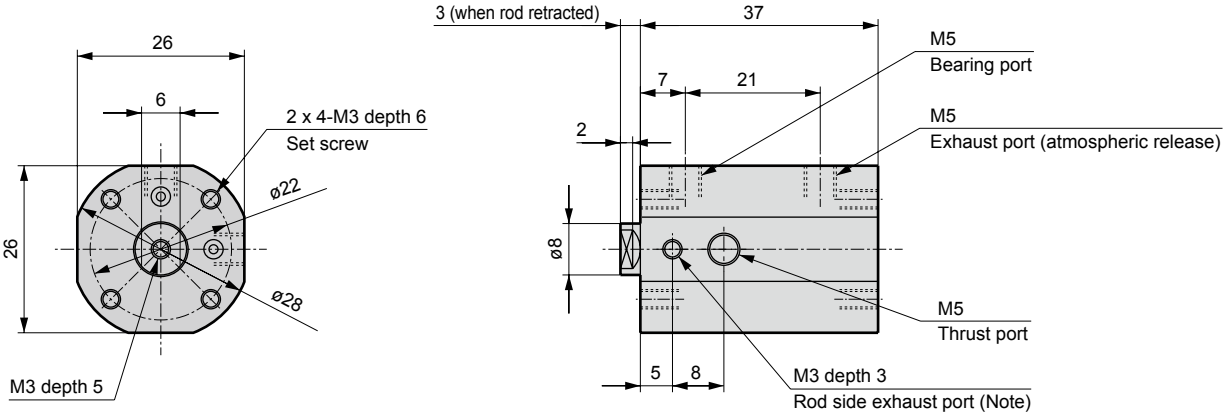
LBC - 01

Ⓐ Thrust

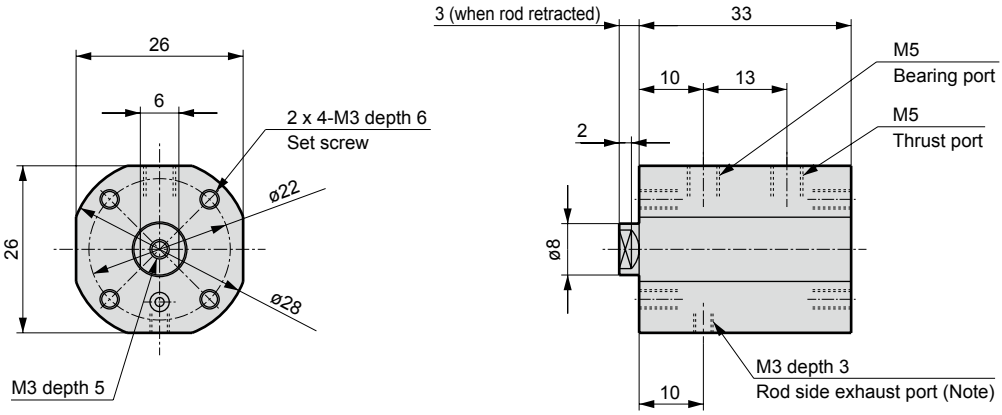
Code	Description
Ⓐ Thrust	
01	1N
05	5N
30	30N

Dimensions

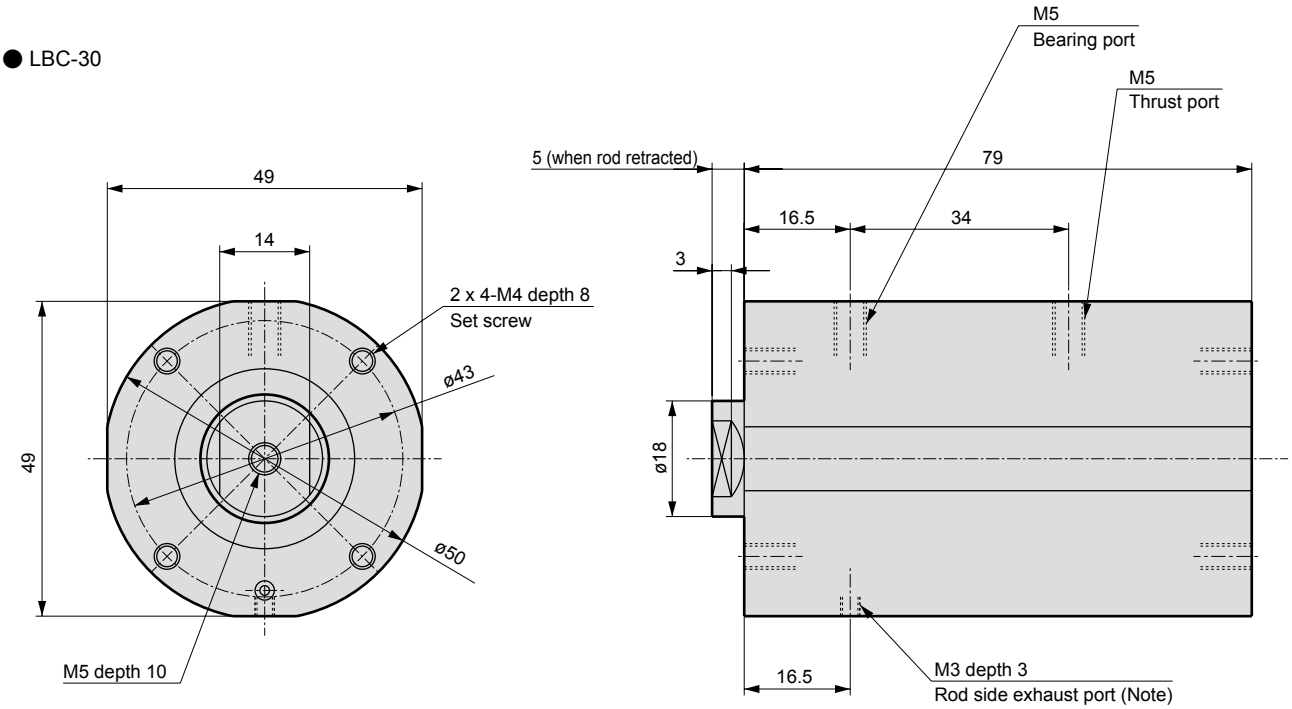
● LBC-01



● LBC-05



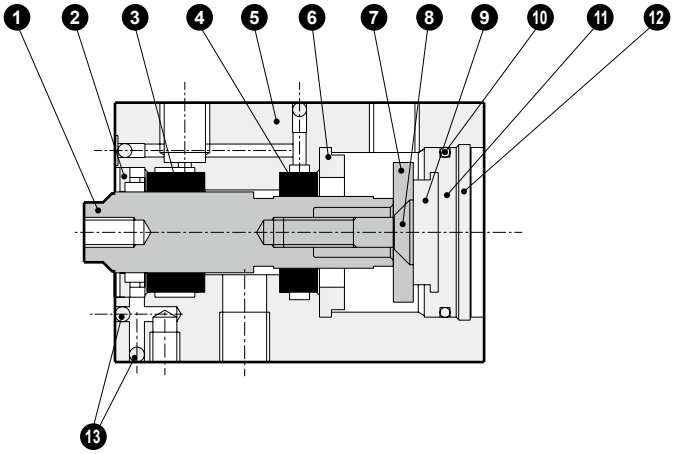
● LBC-30



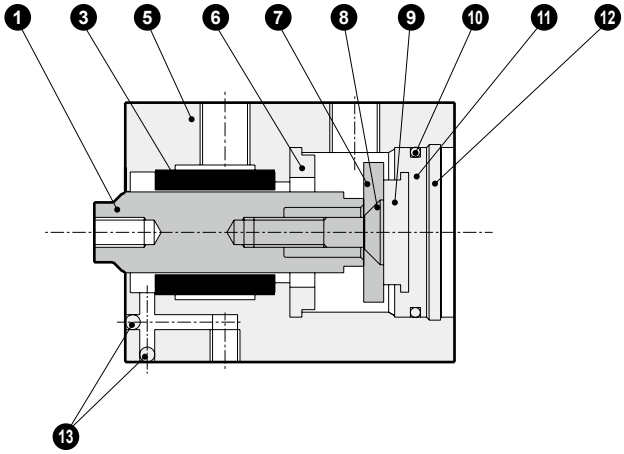
(Note) To prevent air leaks from the rod section, evacuate air from the rod side exhaust port using a vacuum generator.

Internal structure and parts list

● LBC-01



● LBC-05, 30

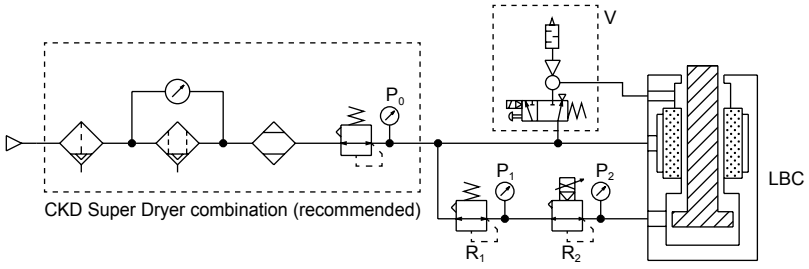


Cannot be disassembled

No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Rod	Aluminum alloy		8	Cross headed flat head screw	Stainless steel	
2	Cap	Aluminum alloy	Alumite	9	Cushion rubber R	Urethane rubber	
3	Bush 1	Carbon graphite porous material		10	Gasket	Nitrile rubber	
4	Bush 2	Carbon graphite porous material		11	Base plate	Special aluminum	Chromate
5	Body	Aluminum alloy	Alumite	12	Snap ring for hole	Stainless steel	
6	Cushion rubber L	Urethane rubber		13	Steel ball	Stainless steel	
7	Stopper	Aluminum alloy	Alumite				

Circuits used

When air is evacuating from the rod side exhaust port



P_0: Air bearing port supply pressure (0.3 to 0.5 MPa)
P_1: Electro pneumatic regulator supply pressure (0.2 MPa)
P_2: Thrust port supply pressure (0.002 to 0.1 MPa)
R_1: Regulator
R_2: Electro pneumatic regulator for LBC
EV25**-FL (Refer to pages 1001 to 1003 for details.)
Details of customization
- Control pressure 0 to 0.1 MPa (Control pressure accuracy is improved)
- Fixed orifice (Pressure relief performance for low pressure range is improved)
- Normally open (NO)
(Prevents the rod from popping out when the power supply is turned OFF)

V : SELVACS (VSK)
(Only when necessary to prevent air leak from the rod section)

Electro pneumatic regulator for LBC (made to order)

EV2500 Series

- Electro pneumatic regulator for air bearing actuator LBC
- Pressure control range: 0 to 0.1 MPa
- Actuation: NO

JIS symbol

RoHS

Specifications

Item		EV2500-□08-FL			
Working fluid		Clean compressed air (JIS B 8392-1: 2012 Grade 1.3.2)			
Working pressure range		0.2 (≈29 psi, 2 bar) to 0.3 MPa (≈44 psi, 3 bar)			
Proof pressure		0.7 MPa (≈100 psi, 7 bar)			
Pressure control range		0 (≈0 psi, 0 bar) to 0.1 MPa (≈15 psi, 1 bar)			
Power supply voltage		24 VDC ± 10% (stabilized power supply with ripple rate 1% or less)			
Current consumption		0.1 A or less (0.6 A rush current when power is ON)			
Input signal (input impedance)		0 to 10 VDC (20 kΩ)	0 to 5 VDC (10 kΩ)	4 to 20 mADC or 1 to 5 VDC (250 Ω) *1	10 kΩ variable resistance or 0-10 VDC (20 kΩ)
Monitor output		1 to 1.8 VDC (none for 10 kΩ variable resistance input)			
Insulation resistance		100 MΩ (500 VDC) or more			
Withstand voltage		1500 VAC 1 min.			
Accuracy	Hysteresis	1% F.S. or less			
	Linearity	±0.5% F.S. or less			
	Resolution	0.5% F.S. or less			
*2	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/s^2 or less (JISC60068-2-6)			
Operating ambient temperature range		5 to 50°C			
Mounting orientation		Free			
Port size		Rc1/4			
Weight		330 g			

*1 : When used with a signal voltage of 1 to 5 VDC, 4 to 20 mA of current flows into the EV interior from the signal source. Confirm specifications of the signal source before use.
*2 : The above characteristics are for FS 10 to 100% control pressure with a power supply voltage 24.0 VDC and a working pressure 0.3 MPa.
*3 : Working pressure: Max. working pressure and step feed: 50% F.S. → 100% F.S. 50%F.S. → 60%F.S. 50%F.S. → 40%F.S.

How to order

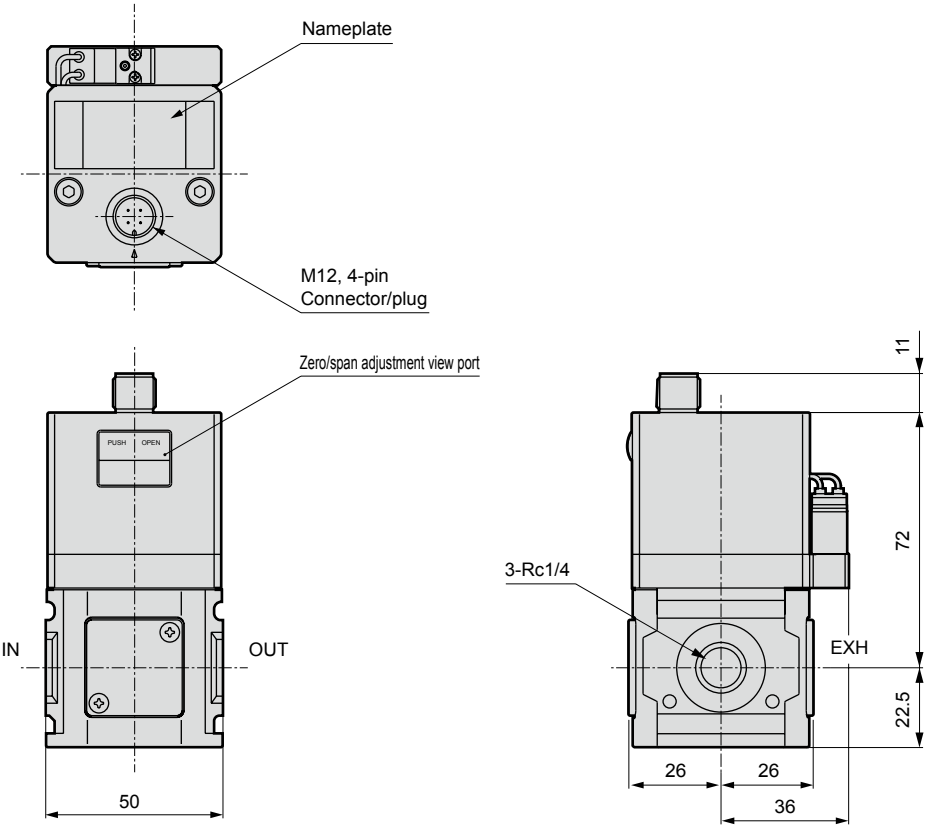
EV2500 - 0 08 - C11 B - FL298410

- Ⓐ Input signal
- Ⓑ Port size
- Ⓒ Other options (Cable option)
- Ⓒ Other options (Bracket option)
- Ⓓ (Identification number)

Code	Description
Ⓐ Input signal	
0	0 to 10 VDC
1	0 to 5 VDC
2	4 to 20 mADC or 1 to 5 VDC
3	10 kΩ variable resistance or 0-10 VDC (connected to 10 VDC built-in power supply)
Ⓑ Port size	
08	Rc1/4
Ⓒ Other options	
Cable option	
Blank	None
C11	1 m attached
C13	3 m attached
Bracket option	
Blank	None
B	C type bracket attached
B4	B type bracket attached
Ⓓ (Identification number)	
FL298410	For LBC-01
FL298411	For LBC-05
FL298412	For LBC-30

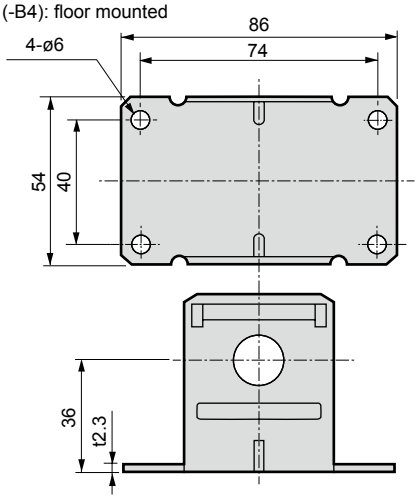
Dimensions

● EV2500-FL******



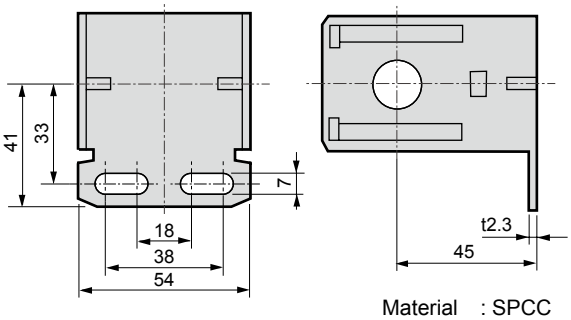
● Bracket option

B type bracket (-B4): floor mounted



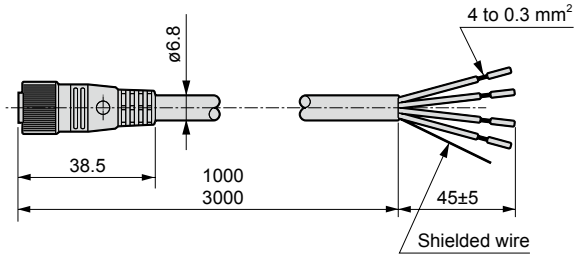
Material : SPCC
Treatment: Zinc plated
Weight : 165g

C type bracket (-B): wall mounted



Material : SPCC
Treatment: Zinc plated
Weight : 148 g

● Cable option



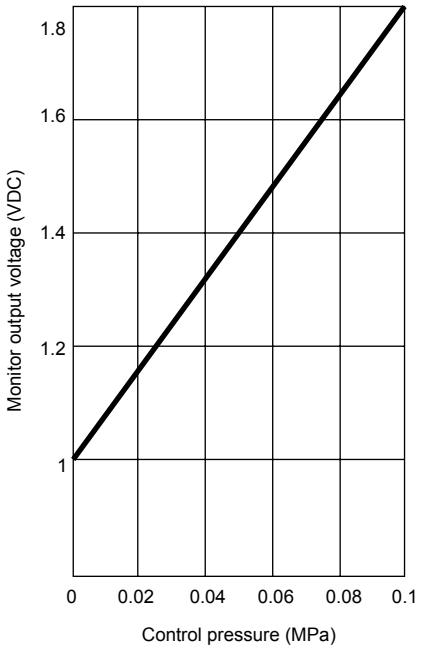
-C1* Shield/cable/connector

Pin No.	Insulator color	Applications	Type of input signal			
			0 to 10 V	0 to 5 V	4 to 20 mA 1 to 5 V	10 kΩVR (0 to 10 V)
1	Red	Power supply ⊕	24 V			
2	Green	——	Monitor output 1 to 1.8 V			VR input terminal
3	Black	Common	0 V			VR input terminal 0 V
4	White	Input signal	0 to 10 V	0 to 5 V	4 to 20 mA 1 to 5 V	VR output terminal (0 to 10 V)

If a cable connector is not used, the following recommended cable sockets (L type) can be used. Use a shielded wire cable.

Screw fixing	ELWIKA4012	Correns (Hirschmann)
Soldered	XS2C-D422	OMRON Corporation

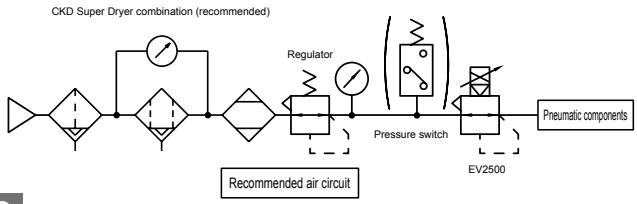
Monitor output



Safety precautions

Also refer to the precautions for the standard EV2000 Series.

1 Use clean compressed air that is free of any solids, moisture or oil for working fluid.
(JIS B 8392-1: 2012 Grade 1.3.2)



2 The working pressure is applied to supply the specified pressure for the control pressure. Ensure that the working pressure stays within the specified range. In particular, a prolonged unstable control pressure or a continued state where the control pressure exceeds 0 MPa and is set to 60% FS maximum when there is no working pressure can adversely affect product life. Avoid such conditions.

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 for the purpose of controlling the flow rate from the bearing port of the air bearing actuator. Significant air flow occurs at the EXH port. For this reason, a loud exhaust noise can be heard from the EXH port, and pressure loss may occur depending on the diameter of the piping. To prevent such occurrences, consider taking the following countermeasures:

- For exhaust noise : Install a pipe on the EXH port to muffle the sound
- For pressure loss : Use a pipe with a larger port size or use a higher working pressure, etc.

Custom order

Available as a custom order. Contact CKD for details.

Air bearing cylinder Square shaft

- Non-rotating rod type optimal for precision part installation.
- Jig and rod self-weight cancellation mechanism can also 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.

Pneumatic components Warnings/cautions

Be sure to read this section before use.
* Refer to Intro Page 73 for cylinders in general.

Product-specific cautions: Air bearing actuator LBC Series

Design/selection

⚠CAUTION

■ Use clean, dry compressed air (JIS B 8392-1: 2003 Grade 1.4.2 or equivalent).

- To supply clean compressed air, install an air filter and oil mist filter. Use of the CKD Super Dryer combination SU Series is recommended. (Refer to page 1003 for compatible circuits)
- 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. This can also further cause rust, resulting in pneumatic components 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.

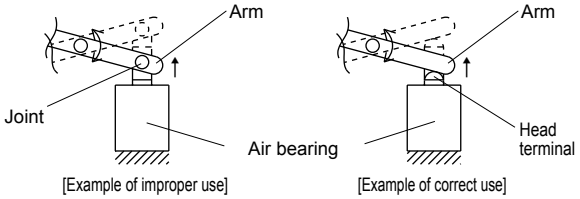
■ Connect a regulator with pressure relief mechanism to the thrust port. When using an electro pneumatic regulator, ensure that it is LBC compatible. (Refer to page 1003 for compatible circuits.)

■ The air bearing mounting surface should have a flatness 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 prevent 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.

Mounting, installation and adjustment

⚠CAUTION

■ Regarding installing, setting up, and/or adjusting the actuator, read through the instruction manual and operate correctly.

■ Wipe the mounting surface with ethanol and remove any foreign matter by flushing with air blow.

■ Supply compressed air to the bearing when installing a jig on the end of the rod.
If compressed air cannot be supplied, keep the rod free from lateral load or vibration. This also applies when building the product into the equipment.
When attaching a tool to the rod, hold the rod so that no torsional torque or lateral load is applied to the rod or bearing and tighten the screws.

■ The rod is made of an aluminum alloy, which can be easily scratched. Do not touch the outside surface of the rod.
Install the product while the width across flats of the rod end is fixed.

Use/maintenance

⚠CAUTION

■ If the product is not going to be in use over a long period of time, store it in a dry, clean environment.