When surface friction is taken away,

- A small thrust force
- A fine thrust force
- No feedback

Going beyond pneumatics to contribute to FA innovation

Our obsession to go to extremes to excel in specific elements

By using a porous medium,

- Whole surface suction
- Floating

conveyance becomes possible.

More information can be found at http://www.ckd.co.jp/
When friction becomes constant,

- Few stick-slips
- Few thrust force fluctuations

By using magnetic force,

- Thrust force becomes constant
- Maintenance is obsolete

By reducing size,

- Installation in limited space becomes possible
When surface friction is eliminated

**LBC Series**

Air braking system soft actuator with zero sliding resistance, adapted non-contact air bearing mechanism.

**High precision linear control**

Because sliding resistance is zero, high precision linear control of load is possible by using an electropneumatic regulator (EV-FL).

**Soft touch**

Soft touch of workpieces is made possible by controlling load with a minute thrust force of 0.01N. No impulse is applied. No scratches can be made.

**Handling work by optimal load**

The optimal load can be applied to work according to the purpose and use.

<table>
<thead>
<tr>
<th>Specification</th>
<th>LBC-01</th>
<th>LBC-05</th>
<th>LBC-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working fluid</td>
<td>Compressed air (0.3 μm filter is used, no oil or moisture content)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working pressure (MPa)</td>
<td>Air bearing port</td>
<td>0.3 to 0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thrust port</td>
<td>0.002 to 0.1</td>
<td></td>
</tr>
<tr>
<td>Thrust force range (N)</td>
<td>0.02 to 1.0</td>
<td>0.1 to 5.0</td>
<td>0.6 to 31.4</td>
</tr>
</tbody>
</table>

**Application examples**

**Tension control of film**

**Tension control for coil winding**

Film  
Roller  
LBC  
Winding  
LBC
Wafer cleaning (for scrubbers)

Chip part assembly (for bonding equipment)

Semiconductor component finish polishing

Lens finish polishing

Measuring probe for surface scanning

Semiconductor tester needle head height detection
Air gyro enabling parallel adjustment.
Demonstrates its ability in parallel correction, automatic adjustment and workload reduction.

By “copying”, parallel adjustment at once
By pressing faces against each other, which are desired to be in parallel, adjustment by copying is completed within a few seconds. Automation is possible. (*Under our company’s test conditions)

High precision copying without relying on craftsmanship
“Copying” is the method of using spherical surface static pressure bearing to float spherical surface base by air pressurization. Support high precision parallel adjustment (Parallelism 2μm) with no friction or abrasion.

Application examples

Flip chip bonder: Crimping head angle adjustment

Bump leveler: Pressurizing head angle adjustment

Laminating equipment: Laminating FPD panels

CMOS package assembly: Camera module assembly
With a special sliding mechanism, smooth and low speed operation without stick-slip is achieved.

**Super-low speed down to 1 mm/sec**

Speed is stable with no stick-slip.

**Soft movement at both ends**

Smooth start and stop even at the beginning and end of the stroke.

**Compact design**

All models have the same dimensions as the standard models.

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**Speed reference of cylinder**

- 1 mm/sec: Super-low speed cylinder
- 10 mm/sec: Low speed cylinder
- 50 mm/sec: Normal cylinder
- 1000 mm/sec: High speed cylinder
- 3000 mm/sec: Super-high speed cylinder

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**Product lineup**

- Pencil cylinder [SCPD3-F]
- Super compact cylinder [SSD2-F]
- Small-size direct cylinder [MDC2-F]
- Table-shape rotary actuator [GRC-F]
- Small-size compact cylinder [MSD-F]
- Linear slide cylinder [LCR-F]
- Super twin rod cylinder [STR2-F]
- Super mount cylinder [SMG-F]

---

**Application examples**

**Rubbing device**

Use the fine speed cylinder as a lifter. Prevent static by lifting up the glass substrates slowly from the working table.

**Lens (glass) polishing (pressing force constant control)**

Polishing jig

Fine speed cylinder

Lens (glass)
A newly invented buffering unit using magnetic suction force. Soft contact and stable pressing force eliminate damage to the workpiece. The most suitable for damage-free handling of small-size devices and fragile works.

**Constant pressing force**

When the embedded magnets in the movable and fixed axes are shifted, diagonal lines of magnetic forces are formed, and then a force is generated to try and return to the axis direction.

**Small-size and light-weight (FBU2 series)**

There are only two component parts: a moving part and a fixed part. Therefore, it became possible to reduce the size and make it ultra-lightweight (5g or lower). In addition, because the moving part mass is small, soft-touch for work and shock reduction becomes possible.

**Clean and long-life**

Compared to the metal spring method, the amount of dust raised is extremely small because the movable contact area is small and does not have metal contact. In addition, because thrust force occurs by magnetic power, there is no stress like a metal spring. As a result, long life and stable performance are achieved.

**Pressing force characteristics**

![Graph showing pressing force characteristics](image)

**Small-size, light-weight**

Fixed part  Movable part  Movable axis  Magnet  Fixed axis

**Application examples**

- **Lamination transfer**
  ![Lamination transfer diagram](image)

- **PCB/flexible board transfer**
  ![PCB transfer diagram](image)

- **Chip inspection equipment**
  ![Chip inspection equipment diagram](image)

- **Electronic device suction transfer**
  ![Electronic device suction transfer diagram](image)
An all-in-one product with compact, lightweight multiple heads.

- A magnetic spring buffer, air cylinder and cylinder switch are integrated into one.
- Thin and space saving. Use of manifolds with a tight pitch is possible.
- Low dust generation, long service life, constant pressure and soft touch with a built-in magnetic spring buffer.

**Active Fine Buffer**

**AFB Series**

**AFB-P Series**

Pneumatic cylinder drive Fine Buffer

An all-in-one product with compact, lightweight multiple heads.

- A magnetic spring buffer, air cylinder and cylinder switch are integrated into one.
- Thin and space saving. Use of manifolds with a tight pitch is possible.
- Low dust generation, long service life, constant pressure and soft touch with a built-in magnetic spring buffer.

**Motor drive Fine Buffer**

**AFB-RB Series**

A motor and a magnetic spring buffer are integrated into one, handling both rotation and buffer operation.

An all-in-one product with compact, lightweight multiple heads.

- Compact, arranged with a tight pitch.
- Low dust generation, long service life, constant pressure and soft touch with a built-in magnetic spring buffer.
Air Fiber

**UP/EH/PG/CG Series**

**Air fiber**

**UP/EH Series**

**Energy saving and space saving**

Ultra small size with outer diameter of φ1.8 × internal diameter of φ1.2. Significantly reduce piping space. In addition, small piping volume leads to energy savings.

**Prevention of static and dust adherence**

The Air Fiber (UP Series) has anti-static properties which prevent static buildup and dust adherence.

**PG/CG Series**

**One-touch coupling for air fiber**

**One-touch attaching and detaching**

Attaching and detaching are done by only pressing the push ring of the coupling and inserting/removing the tube. Easy attaching and detaching compared to the existing products. In addition, corrosion resistance is improved by introducing polypropylene (PP) resin for resin material as standard.

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**Variation of models**

<table>
<thead>
<tr>
<th>Model</th>
<th>Variation</th>
<th>Series</th>
<th>Tube material properties</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air fiber</td>
<td>Standard specification</td>
<td><strong>UP Series</strong></td>
<td>Urethane (Antistatic)</td>
<td>7 Colors</td>
</tr>
<tr>
<td></td>
<td>Clean specification</td>
<td><strong>EH Series</strong></td>
<td>Special polyolefin</td>
<td>2 Colors</td>
</tr>
<tr>
<td>One-touch coupling</td>
<td>Standard specification</td>
<td><strong>PG Series</strong></td>
<td>Copper Alloy + Electroless nickel plating, PP</td>
<td>10 types 16 models</td>
</tr>
<tr>
<td></td>
<td>Clean specification</td>
<td><strong>CG Series</strong></td>
<td>Stainless (Degrease), PP</td>
<td>6 types 11 models</td>
</tr>
</tbody>
</table>
Ultra small, thinnest at 8mm. Further space saving with head separation!! Check absorption and desorption of minute semiconductor chips. (Filter clogging, nozzle crushing can be detected.)

Ultra small and light-weight

Space saving by separation of sensor head. Sensor head alone is reduced 48% compared to the existing volume ratio, and is the most lightweight in the industry with a mass of 4g, and is the thinnest in the industry with a width of 8mm.

Works as a stand-alone sensor head

Now compatible with just the sensor head (without coupling).

Aflluent flow rate range

With just an ultra-small body, the following 8 types of flow rates are available from small to large (10ℓ/min).
- Bidirectional flow: ±0.5, ±1, ±5, ±10ℓ/min
- Unidirectional flow: 0.5, 1, 5, 10ℓ/min

Application examples

- Chip mounter
- Plastic (PET) bottle leakage inspection
- Vacuum confirmation with collet nozzle
- Parts feeder

Overview

By squeezing the functions and integrating them into the device, further size and weight reduction was achieved. Installation of the sensor near the measuring section and on the tip of the moving section, improves the system’s responsiveness. In addition, the bidirectional detection properties provide high value-added properties compatible in a wide range of fields.
Precise suction plate

PVP Series

Introducing CKD’s proprietary thermal binding fluororesin with a porosity of 40%. No damage on the workpiece even with an ultra-thin or soft material, eliminating deformation and warping caused by adsorption. Excellent performance demonstrated in difficult and precise processes.

High precision work processing

Flatness of suction surface: 2μm, Parallelism: 5μm. (Specification values of R36-18, C-50, and S-50-50) High work fixing precision, and enabled high precision work process.

Powerful suction

With a porosity of 40%, the whole surface can be utilized with powerful suction. However, no deformation is caused to the workpiece by the suction power.

No damage to workpiece

Hardness of suction surface is Shore D60. No damage to the work by soft contact.

No reflection (black color plate)

In the inspection process, the conventional white suction plate was unusable due to reflection, but by introducing the black color, reflection has been eliminated.

Flexible plate shapes

3 standard plate shapes are available. Flexible customization of the shape according to customer’s needs is available.

<table>
<thead>
<tr>
<th>Standard type</th>
<th>Example of special shape order type</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVP-R 1 Donut shape</td>
<td></td>
</tr>
<tr>
<td>PVP-C 2 Round shape</td>
<td></td>
</tr>
<tr>
<td>PVP-S 3 Square shape</td>
<td></td>
</tr>
<tr>
<td>Disc, etc.</td>
<td></td>
</tr>
<tr>
<td>Semiconductor, silicon wafer, etc.</td>
<td></td>
</tr>
<tr>
<td>Plastic substrate, etc.</td>
<td></td>
</tr>
</tbody>
</table>

* Please contact us to find the details of the special shape order.
Application examples

- Sticking/peeling film
- Robot hand
- Inspection equipment
- Liquid crystal glass bonding process
- Film substrate transfer process
- Solar battery manufacturing process

- PVP
- Film substrate
- Color filter
- Solar battery cell
Revolution on the line
Contributing to enhanced quality and yield rate

The Glass Float Module GFM series is CKD’s latest floating system for contactless, clean and damage-prevention transportation. Significantly decreased air consumption by introducing advanced materials, achieved a high quality floating system by controlling static and particle generation.

Supports substrate floating applications and high-precision floating from glass substrate transfer to process/product inspection.
**Stable, contactless, high precision floating**
Achieves stable floating by introducing advanced porous materials, while simultaneously reducing air consumption.
(Excluding GFM-T)

**Prevention of static charge on work**
Suppresses static by using new anti-static materials.
(Excluding GFM-T)

**Realizes Class 10 level**
Suppression of particles by the floating air is realized with the use of a new porous material.
* Equivalent to JIS B 9920 Class 4 according to CKD testing of the GFM Series, with measurement values including particle diameters of 0.5 μm or higher.
(Excluding GFM-T)

**Ideal for high-sensitivity inspection**
Use of a black body eliminates irregular reflection and improves workpiece visibility.

**Abundant applications**
We propose ideal pneumatic components for floating systems.

---

**Variation of models**

<table>
<thead>
<tr>
<th>Model variation</th>
<th>Major application</th>
<th>Floating quantity [μm]</th>
<th>Air consumption ℓ/m (abs) (At 0.1MPa)*1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GFM-A</strong></td>
<td>Positioning</td>
<td>10μm or higher*2</td>
<td>0</td>
</tr>
<tr>
<td><strong>GFM-T Series</strong></td>
<td>Rough transfer</td>
<td>250μm or higher*2</td>
<td>5</td>
</tr>
<tr>
<td><strong>GFM-RF Series</strong></td>
<td>Transferring</td>
<td>250μm or higher*2</td>
<td>10</td>
</tr>
<tr>
<td><strong>GFM-RF Series</strong></td>
<td>Loader/Unloader</td>
<td>150μm or higher*2</td>
<td>15</td>
</tr>
<tr>
<td><strong>GFM-P</strong></td>
<td>Various type of processes</td>
<td>30μm or higher*3</td>
<td>20</td>
</tr>
</tbody>
</table>

*1 Please consider the value as a rough estimate of the flow rate.
*2 Please consider the value as a rough estimate of the floating amount.
*3 Numerical values will change due to the positive or negative pressure flow rate combinations.
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