Automatic compensation of position errors in assembling process!

The Center Master is a unique device that enables the automatic compensation of position and angle errors in component assembly errors using multiple elastomer shear pads (ESPs) on the principle of Remote Center Compliance (RCC) developed and tested at the Massachusetts Institute of Technology (MIT) in the U.S. It can be used for a broad range of applications from precision component insertion operation by robots or dedicated machines to press fitting operation applying a load of 100 kN or more.

- Reduce assembly failures caused by centering errors
- Improve assembly quality by automatically compensating position errors
- Reduce man-hours at initial installation and simplify maintenance process
- Reduce the risk of machine failure caused by unbalanced load

Compensation operation

Example) Press fitting (insertion) of precision axle

**Automatic compensation of position error**

- Approaching to the hole with a position error.
- When the fitted part contacts the chamfered surface of the housing, the floating part of the device moves along the chamfered surface.
- Press fitting (insertion) without position errors.

**Automatic compensation of angle error**

- Approaching to the hole with an angle error.
- The floating part of the device moves to correct position and angle errors in order.
- Insertion without angle errors.

*Angle compensation is performed only by the Center Master for insertion model.

Center master built-in hand press

Digital Indicator F 381A

By entering the load signal from center master, the quality of press-fit results is determined and total work can be recorded in the SD card. Systematic management is possible by combining the digital indicator and center master.

Hand Master™

High-precision hand press ideal for caulking, press-fitting, and so on in the manufacturing process of precision parts. Misalignment can be automatically corrected by the built-in centering device.
S Series
(press-fitting, load cell, flange)

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated capacity (kN) (N)</th>
<th>Basic center distance (mm)</th>
<th>Press-to-use allowable (Press-up load) (kgf/Ømm)</th>
<th>Error correction range</th>
<th>Elastic coefficient 1 *</th>
<th>Axial direction (N/mm) (kgf/mm)</th>
<th>Horizontal direction (N/mm) (kgf/mm)</th>
<th>Vertical direction (N/mm) (kgf/mm)</th>
<th>Product weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-4D-070-065-02</td>
<td>19.6 (2)</td>
<td>70</td>
<td>30 (3.0)</td>
<td>±2</td>
<td>6.6</td>
<td>632.5 (63.3)</td>
<td>141.3 (14.4)</td>
<td>11.8 (1.2)</td>
<td>2.9 (0.3)</td>
</tr>
<tr>
<td>S-4D-070-065-04</td>
<td>39.2 (4)</td>
<td>60</td>
<td>50 (4.0)</td>
<td>±2</td>
<td>6.6</td>
<td>632.5 (63.3)</td>
<td>141.3 (14.4)</td>
<td>11.8 (1.2)</td>
<td>2.9 (0.3)</td>
</tr>
<tr>
<td>S-4D-070-065-06</td>
<td>58.8 (6)</td>
<td>50</td>
<td>60 (5.0)</td>
<td>±2</td>
<td>6.6</td>
<td>632.5 (63.3)</td>
<td>141.3 (14.4)</td>
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</tbody>
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SS Series
(press-fitting, load cell)

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<tr>
<th>Model</th>
<th>Rated capacity (kN) (N)</th>
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</tr>
</tbody>
</table>

B Series
(press-fitting, flange)

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated capacity (kN) (kgf)</th>
<th>Basic center distance (mm)</th>
<th>Press-to-use allowable (Press-up load) (kgf/Ømm)</th>
<th>Error correction range</th>
<th>Elastic coefficient 1 *</th>
<th>Axial direction (N/mm) (kgf/mm)</th>
<th>Horizontal direction (N/mm) (kgf/mm)</th>
<th>Vertical direction (N/mm) (kgf/mm)</th>
<th>Product weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS-600-040-048</td>
<td>6.0 (610)</td>
<td>40</td>
<td>14 (1.4)</td>
<td>±2</td>
<td>7.7</td>
<td>526.2 (62.3)</td>
<td>138.2 (13.9)</td>
<td>11.8 (1.2)</td>
<td>2.0 (0.4)</td>
</tr>
<tr>
<td>BS-600-055-048</td>
<td>7.5 (770)</td>
<td>50</td>
<td>19 (2.0)</td>
<td>±2</td>
<td>7.3</td>
<td>526.2 (62.3)</td>
<td>138.2 (13.9)</td>
<td>11.8 (1.2)</td>
<td>2.0 (0.4)</td>
</tr>
<tr>
<td>BS-600-060-048</td>
<td>8.5 (870)</td>
<td>60</td>
<td>24 (2.4)</td>
<td>±2</td>
<td>7.0</td>
<td>526.2 (62.3)</td>
<td>138.2 (13.9)</td>
<td>11.8 (1.2)</td>
<td>2.0 (0.4)</td>
</tr>
</tbody>
</table>

BS Series (press-fitting)

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated capacity (kN) (kgf)</th>
<th>Basic center distance (mm)</th>
<th>Press-to-use allowable (Press-up load) (kgf/Ømm)</th>
<th>Error correction range</th>
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</tbody>
</table>

A Series (insertion)

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated capacity (kN) (kgf)</th>
<th>Basic center distance (mm)</th>
<th>Press-to-use allowable (Press-up load) (kgf/Ømm)</th>
<th>Error correction range</th>
<th>Elastic coefficient 1 *</th>
<th>Axial direction (N/mm) (kgf/mm)</th>
<th>Horizontal direction (N/mm) (kgf/mm)</th>
<th>Vertical direction (N/mm) (kgf/mm)</th>
<th>Product weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB-600-040-048</td>
<td>6.0 (610)</td>
<td>40</td>
<td>14 (1.4)</td>
<td>±2</td>
<td>7.7</td>
<td>526.2 (62.3)</td>
<td>138.2 (13.9)</td>
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</tr>
</tbody>
</table>

1 Elastic coefficient: Refers to the elasticity at the elastic center (P point); and is the average value of mechanical stopper inside the product until operation begins (approx. 0.2mm)
2 The rated capacity of A series is reference value. It means that force can be applied without affecting the life span as insertion. Make sure to use center master for press-fitting for press fitting work because press-fitting may become poor when center master not for press fitting is used for press fitting work.

Please avoid using in an environment that will corrode the interior of this product.

Line-up is as of Feb 2017
Contact us for custom orders.

**Model** | Dimensions [mm] | Notes |
--- | --- | --- |
S4D-070-065-02 | A 48.8, 46.6, 41.2 | B 45.9, 43.1, 37.0 |
S4D-070-065-08 | C 39.1, 36.6, 31.0 |
S4D-070-080-02 | D 8 | E 51, 41.2 |
S4D-070-080-06 | F 45.9, 43.1, 37.0 |
S4D-090-078-02 | G 45.9, 43.1, 37.0 |
S4D-090-078-06 | H 39.1, 36.6, 31.0 |
S4D-110-088-03 | I 78.5, 65.2, 51.0 |
S4D-110-088-06 | J 54.2, 41.2, 26.9 |
S4D-130-100-03 | K 54.2, 41.2, 26.9 |
S4D-130-100-06 | L | 37.0, 27.0 |
S4D-150-130-04 | M | 37.0, 27.0 |
S4D-150-130-07 | N | 37.0, 27.0 |
S4D-150-130-12 | O | 37.0, 27.0 |

**Model** | Dimensions [mm] | Notes |
--- | --- | --- |
SS4D-070-065-02 | A 51.5 | B 48.6, 44.2, 39.1 |
S4D-070-065-08 | C 46.6, 43.1, 37.0 |
S4D-070-080-02 | D 41.2 | E 39.1, 36.6, 31.0 |
S4D-070-080-06 | F 45.9, 43.1, 37.0 |
S4D-090-078-02 | G 45.9, 43.1, 37.0 |
S4D-090-078-06 | H 39.1, 36.6, 31.0 |
S4D-110-088-03 | I 78.5, 65.2, 51.0 |
S4D-110-088-06 | J 54.2, 41.2, 26.9 |
S4D-130-100-03 | K 54.2, 41.2, 26.9 |
S4D-130-100-06 | L | 37.0, 27.0 |
S4D-150-130-04 | M | 37.0, 27.0 |
S4D-150-130-07 | N | 37.0, 27.0 |
S4D-150-130-12 | O | 37.0, 27.0 |

**Model** | Dimensions [mm] | Notes |
--- | --- | --- |
B6-040-048 | A 11.5, 10.6, 9.1 | B 8 | C 4.5, 3.9, 3.2 |
B6-050-054 | D 9.5, 8.6, 7.1 |
B6-060-060 | E 8.6, 7.1, 5.6 |
B6-070-065 | F 7.1, 5.6, 4.1 |
B6-080-070 | G 6.2, 4.7, 3.2 |
B6-090-078 | H 5.2, 3.7, 2.2 |
B6-100-084 | I 4.2, 2.7, 1.2 |
B6-110-088 | J 3.2, 2.2, 1.2 |
B6-120-095 | K 2.4, 1.8, 1.2 |
B6-130-099 | L 1.8, 1.2, 1.2 |
B6-140-108 | M 1.2, 1.2, 1.2 |
B6-150-130 | N | 1.2, 1.2, 1.2 |

**Model** | Dimensions [mm] | Notes |
--- | --- | --- |
BS6-040-048 | A 50 | B 40.0, 34.8, 29.6 |
BS6-050-054 | C 38.0, 32.6, 27.2 |
BS6-060-060 | D 34.8, 29.6, 24.2 |
BS6-070-065 | E 32.6, 27.2, 21.8 |
BS6-080-070 | F 29.6, 24.2, 18.8 |
BS6-090-078 | G 27.2, 21.8, 16.4 |
BS6-100-084 | H 24.2, 18.8, 12.4 |
BS6-110-088 | I 21.8, 16.4, 10.0 |
BS6-120-095 | J 18.8, 12.4, 6.0 |
BS6-130-099 | K 16.4, 10.0, 5.0 |
BS6-140-108 | L 12.4, 6.0, 2.0 |
BS6-150-130 | M 10.0, 5.0, 2.0 |

**Model** | Dimensions [mm] | Notes |
--- | --- | --- |
A6-030-040 | A 44.0, 38.6, 33.2 | B 2.0, 1.6, 1.2 |
A6-040-048 | C 42.0, 36.6, 31.2 |
A6-050-054 | D 39.6, 34.2, 28.8 |
A6-060-060 | E 37.2, 31.8, 26.4 |
A6-070-065 | F 34.8, 29.4, 24.0 |
A6-080-070 | G 32.4, 27.0, 21.6 |
A6-090-078 | H 29.0, 23.6, 18.2 |
A6-100-084 | I 26.6, 21.2, 15.8 |
A6-110-088 | J 24.2, 18.8, 13.4 |
A6-120-095 | K 21.8, 16.4, 11.0 |
A6-130-099 | L 19.4, 13.0, 8.6 |
A6-140-108 | M 17.0, 10.6, 6.2 |
A6-150-130 | N | 14.6, 8.2, 3.8 |

### S and SS series - Load cell specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated capacity</td>
<td>Refer to mechanical specifications on the data sheet enclosed with the product.</td>
</tr>
<tr>
<td>Rated output</td>
<td>Refer to electrical specifications on the data sheet enclosed with the product.</td>
</tr>
<tr>
<td>Non-linearity (SN)</td>
<td>%R.O. ±1</td>
</tr>
<tr>
<td>Hysteresis (SH)</td>
<td>%R.O. ±0.5</td>
</tr>
<tr>
<td>Repeatability (SR)</td>
<td>%R.O. ±0.5</td>
</tr>
<tr>
<td>Creep (SR)</td>
<td>%R.O. ±0.5</td>
</tr>
<tr>
<td>Zero balance (SZ)</td>
<td>%R.O. ±1</td>
</tr>
<tr>
<td>Operation temperature range (TC)</td>
<td>°C 0 to +50</td>
</tr>
<tr>
<td>Temperature effect (TE)</td>
<td>%R.O./10°C ±0.1</td>
</tr>
<tr>
<td>5pan</td>
<td>%R.O./10°C ±0.1</td>
</tr>
<tr>
<td>Resistance (RE)</td>
<td>Input Q 700±10</td>
</tr>
<tr>
<td></td>
<td>Output Q 700±10</td>
</tr>
<tr>
<td>Insulation resistance (IN)</td>
<td>V DC 10</td>
</tr>
<tr>
<td>Excitation voltage capacity (EC)</td>
<td>V DC 15</td>
</tr>
<tr>
<td>Insulation resistance (IR)</td>
<td>MΩ (50V DC) 2000</td>
</tr>
<tr>
<td>Max. safe overload (LR)</td>
<td>%R.C. 150</td>
</tr>
<tr>
<td>Max. marginal overload (LR)</td>
<td>%R.C. 200</td>
</tr>
<tr>
<td>Cable length (4-conductor color shield)</td>
<td>m Approx.5</td>
</tr>
</tbody>
</table>

### Structure of product code

Model: XXXX - YYY - ZZZ - WW

**S****: For press-fitting (Integrated load cell, with flange)

**SS****: For press-fitting (Integrated load cell, without flange)

**B****: For press-fitting (with flange)

**BS****: For press-fitting (without flange)

**A****: For insertion

### Wiring diagram

- **+EXC** (Brown)
- **+SIG** (Green)
- **-EXC** (White)
- **-SIG** (Yellow)
- **SHIELD** (Black)

### 4 conductor shield cable Approx. 5m

#### Elastic center distance

- **d**: Elastic center distance
- **D**: Outer diameter of tool mounting plate

- **Horizontal direction**
- **Torsional direction**
- **Angular direction**

In general, an error range within ±5mm for the elastic center distance is recommended. The correction function of the center error may weaken if the error range is large.

### Allowable weight for assembly (press-fit tool)

The maximum value that can be used by mounting to the center master with the combined value of weights of the press-fit tool and the work. When exceeded, the correction function of center error may not operate and the life may be significantly reduced.

### Outer diameter of tool mounting plate

Set the outer diameter of the work at 90% or less than the outer diameter of the mounting plate. The correction function of the center error may weaken if the outer diameter of the work is large.