Pearl Rotary Joint

AC Series

CATALOG
Features

Can be used in a high-temperature range (max. 180°C).
(Quasi-standard products that can be used at 180°C or higher are available.)

Can be used for alternate heating and cooling.

High performance is maintained for a long time due to reduced seal wear.

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The contents are subject to change without notice.
**Service Conditions**

<table>
<thead>
<tr>
<th>Series</th>
<th>Fluid</th>
<th>Size</th>
<th>Max. Pressure (MPa)</th>
<th>Max. Rotation Speed (min⁻¹)</th>
<th>Max. Temperature (℃)</th>
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Note 1) The maximum service temperature of 180℃ is a standard specification.
2) The pressure upper limit is 1.0 MPa when using saturated steam.

**Structures and Materials**

A mechanical seal consists of a combination of carbon and carbon steel.

**Materials of Main Components (Standard Specification)**

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Heat-resistant paint is applied to external parts.

Note) Component materials are indicated on product drawings.
Contact our sales representative for requests for product drawings.
### ACL Series

**Simplex, Thread Connection**

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**Note**

1. A bushing (1/2 x 3/8) is installed to 10A connecting port C. F is the dimension from the bushing.
2. The 80A rotor does not have a shank (W) for engaging a spanner.
### ACLF

**Simplex, Flange Connection**

![Diagram of ACLF Simplex, Flange Connection](image)

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**Note**

1. A bushing (1/2 x 3/8) is installed to 10A connecting port C. F is the dimension from the bushing.
2. The 80A flange is detachable.
### Internal Pipe Size

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</table>

**, Note:**

1. **50A to 80A** are shipped with connecting port C facing downward.
2. The **80A** rotor does not have a shank (W) for engaging a spanner.
3. If the standard specification is selected, the direction of thread **B** is the same as that of thread **A**.
   - (If **A** is right-hand thread, **B** is also right-hand thread. If **A** is left-hand thread, **B** is also left-hand thread.)
   - Upon request, we can produce products in which the thread directions of threads **A** and **B** are different from each other.
## Table

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<td>120</td>
<td>19</td>
<td>10</td>
<td>4-M12</td>
<td>20A 27.2 G3/4</td>
<td>38</td>
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<tr>
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<td>Rc2</td>
<td>Rc1½</td>
<td>65</td>
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<td>120</td>
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<td>60</td>
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<td>403</td>
<td>298</td>
<td>19</td>
<td>62</td>
<td>60</td>
<td>80 e9</td>
<td>110</td>
<td>136</td>
<td>20</td>
<td>12</td>
<td>4-M12</td>
<td>40A 34.0 G1</td>
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<td>Rc2</td>
<td>Rc2</td>
<td>90</td>
<td>74</td>
<td>193</td>
<td>130</td>
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<td>30</td>
<td>70</td>
<td>496</td>
<td>458</td>
<td>327</td>
<td>20</td>
<td>85</td>
<td>72</td>
<td>90 e9</td>
<td>125</td>
<td>154</td>
<td>20</td>
<td>15</td>
<td>6-M12</td>
<td>40A 48.6 G1½</td>
<td>43</td>
<td>426</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note**
1) 50A to 80A are shipped with connecting port C facing downward.
2) The 80A flange is detachable.
3) B is a right-hand thread.
### Internal Pipe Dimensions (mm)

| Size | A  | C  | E  | F  | G  | D  | H  | I  | M  | N  | L  | L1 | L3 | n  | L4 | L5 | d  | W  |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 25A  | R1 | Rc1| Rc3/4 | 60 | 49 | 110| 75 | 32 | 20 | 50 | 312| 295| 205| 12 | 48 | 25 | 24 | 32 |
| 32A  | R1¼ | Rc1| R1 | 47 | 60 | 130| 95 | 40 | 20 | 50 | 363| 341| 243| 14 | 52 | 25 | 30 | 46 |
| 40A  | R1¼ | Rc1| R1 | 47 | 60 | 130| 95 | 40 | 20 | 50 | 363| 341| 243| 14 | 52 | 25 | 34 | 46 |
| 50A  | R2 | Rc1½ | R1 | 55 | 55 | 138| 100| 40 | 20 | 55 | 421| 389| 269| 15 | 63 | 30 | 46 | 58 |
| 65A  | R2½ | Rc2| Rc1½ | 65 | 70 | 180| 120| 46 | 25 | 60 | 499| 460| 310| 19 | 78 | 30 | 60 | 71 |
| 80A  | R3 | Rc2| Rc2 | 85 | 70 | 193| 130| 52 | 30 | 70 | 525| 486| 541| 502| 334| 20 | 85 | 34 | 72 |

#### Notes
1) The 80A rotor does not have a shank (W) for engaging a spanner.
2) Internal pipes of 8A and 15A consist of two parts. (See the figure above.)
3) ACW-2 has a rotor with a keyway so that the internal pipe can rotate in phase with the rotor.
4) Contact our sales representative for internal pipe shapes and dimensions for installation to this product.
### ACFW-1 and ACFW-2

**Duplex, Rotational IP, Flange Connection**

#### Internal pipes of 8A and 15A
(Two-part configuration)

<table>
<thead>
<tr>
<th>Size</th>
<th>Flange</th>
<th>Internal Pipe</th>
<th>J-K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R P O t m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25A</td>
<td>8A 13.8</td>
<td>287</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10A 17.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40A</td>
<td>15A 21.7</td>
<td>332</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20A 27.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50A</td>
<td>20A 27.2</td>
<td>365</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25A 34.0</td>
<td>369</td>
<td></td>
</tr>
<tr>
<td>65A</td>
<td>25A 34.0</td>
<td>406</td>
<td></td>
</tr>
<tr>
<td></td>
<td>32A 42.7</td>
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</tr>
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<td>80A</td>
<td>40A 48.6</td>
<td>418</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50A 60.5</td>
<td>471</td>
<td></td>
</tr>
</tbody>
</table>

Note 1) Internal pipes of 8A and 15A consist of two parts. (See the figure above.)

2) ACFW-2 has a rotor with a keyway so that the internal pipe can rotate in phase with the rotor.

3) Contact our sales representative for internal pipe shapes and dimensions for installation to this product.
### Masses of AC Series (kg)

<table>
<thead>
<tr>
<th>Type</th>
<th>10A</th>
<th>15A</th>
<th>20A</th>
<th>25A</th>
<th>32A</th>
<th>40A</th>
<th>50A</th>
<th>65A</th>
<th>80A</th>
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</thead>
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<tr>
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<td>2.2</td>
<td>3.2</td>
<td>5.2</td>
<td>9.0</td>
<td>9.2</td>
<td>12.0</td>
<td>19.0</td>
<td>25.0</td>
</tr>
<tr>
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<td>2.4</td>
<td>2.4</td>
<td>3.4</td>
<td>5.6</td>
<td>9.6</td>
<td>9.8</td>
<td>13.5</td>
<td>20.5</td>
<td>27.0</td>
</tr>
<tr>
<td>AC</td>
<td>-</td>
<td>2.3</td>
<td>3.8</td>
<td>6.0</td>
<td>9.3</td>
<td>9.5</td>
<td>12.5</td>
<td>22.0</td>
<td>28.0</td>
</tr>
<tr>
<td>ACF</td>
<td>-</td>
<td>2.5</td>
<td>4.0</td>
<td>6.4</td>
<td>-</td>
<td>10.1</td>
<td>14.0</td>
<td>23.5</td>
<td>30.0</td>
</tr>
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<td>ACW-1, ACW-2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6.5</td>
<td>11.3</td>
<td>11.5</td>
<td>14.0</td>
<td>25.0</td>
<td>32.0</td>
</tr>
<tr>
<td>ACFW-1, ACFW-2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6.9</td>
<td>-</td>
<td>12.1</td>
<td>15.5</td>
<td>26.5</td>
<td>34.0</td>
</tr>
</tbody>
</table>

### Flow Rate

The maximum flow velocity in the product is about 3 m/s when the fluid is water, and about 30 m/s when the fluid is steam. Tables 1 and 2 show guidelines for the maximum flow rates calculated based on the above flow velocity.

**Water Flow Rate (Simplex)** = \( A \times 3 \times 3600/10000 \)

**Flow Rate of Saturated Steam (Simplex)** = \( A \times 30 \times (\text{Density of saturated steam}) \times 3600/10000 \)

#### Table 1  Flow Rate (Simplex)

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Flow Passage Area (cm²)</th>
<th>Water Flow Rate (m³/h)</th>
<th>Flow Rate of Saturated Steam (kg/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.503</td>
<td>0.543</td>
<td>6.16</td>
<td>0.1MPa 9.00 0.2MPa 13.9 0.3MPa 20.3 0.4MPa 32.7 0.5MPa 44.9 0.6MPa 56.9</td>
</tr>
<tr>
<td>ACF</td>
<td>1.13</td>
<td>1.22</td>
<td>13.9</td>
<td>0.1MPa 9.00 0.2MPa 13.9 0.3MPa 20.3 0.4MPa 32.7 0.5MPa 44.9 0.6MPa 56.9</td>
</tr>
<tr>
<td>ACLF</td>
<td>1.13</td>
<td>1.22</td>
<td>13.9</td>
<td>0.1MPa 9.00 0.2MPa 13.9 0.3MPa 20.3 0.4MPa 32.7 0.5MPa 44.9 0.6MPa 56.9</td>
</tr>
<tr>
<td>AC</td>
<td>2.01</td>
<td>2.17</td>
<td>24.6</td>
<td>0.1MPa 9.00 0.2MPa 13.9 0.3MPa 20.3 0.4MPa 32.7 0.5MPa 44.9 0.6MPa 56.9</td>
</tr>
<tr>
<td>ACLF</td>
<td>3.80</td>
<td>4.11</td>
<td>46.6</td>
<td>0.1MPa 9.00 0.2MPa 13.9 0.3MPa 20.3 0.4MPa 32.7 0.5MPa 44.9 0.6MPa 56.9</td>
</tr>
<tr>
<td>AC</td>
<td>7.07</td>
<td>7.63</td>
<td>86.6</td>
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</tr>
<tr>
<td>ACLF</td>
<td>8.04</td>
<td>8.69</td>
<td>98.5</td>
<td>0.1MPa 9.00 0.2MPa 13.9 0.3MPa 20.3 0.4MPa 32.7 0.5MPa 44.9 0.6MPa 56.9</td>
</tr>
<tr>
<td>AC</td>
<td>8.04</td>
<td>8.69</td>
<td>98.5</td>
<td>0.1MPa 9.00 0.2MPa 13.9 0.3MPa 20.3 0.4MPa 32.7 0.5MPa 44.9 0.6MPa 56.9</td>
</tr>
<tr>
<td>ACLF</td>
<td>16.6</td>
<td>17.9</td>
<td>204</td>
<td>0.1MPa 9.00 0.2MPa 13.9 0.3MPa 20.3 0.4MPa 32.7 0.5MPa 44.9 0.6MPa 56.9</td>
</tr>
<tr>
<td>AC</td>
<td>24.6</td>
<td>26.6</td>
<td>302</td>
<td>0.1MPa 9.00 0.2MPa 13.9 0.3MPa 20.3 0.4MPa 32.7 0.5MPa 44.9 0.6MPa 56.9</td>
</tr>
<tr>
<td>ACLF</td>
<td>40.7</td>
<td>44.0</td>
<td>499</td>
<td>0.1MPa 9.00 0.2MPa 13.9 0.3MPa 20.3 0.4MPa 32.7 0.5MPa 44.9 0.6MPa 56.9</td>
</tr>
</tbody>
</table>

Note 1) \( A = \) (Minimum flow passage area)
Water Flow Rate (Duplex) = (B or C) × 3 × 3600/10000 (Note 4)
Flow Rate of Saturated Steam (Duplex) = B × 30 × (Density of saturated steam) × 3600/10000 (Note 5)

Table 2  Flow Rate (Duplex)

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Flow Passage Area (cm²)</th>
<th>Water Flow Rate (m³/h)</th>
<th>Flow Rate of Saturated Steam (kg/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B (Note2)</td>
<td>C (Note3)</td>
<td>0.1MPa</td>
</tr>
<tr>
<td>ACF</td>
<td>15A-6A</td>
<td>0.265</td>
<td>0.332</td>
<td>0.286</td>
</tr>
<tr>
<td></td>
<td>20A-6A</td>
<td>1.14</td>
<td>0.332</td>
<td>0.358</td>
</tr>
<tr>
<td></td>
<td>20A-8A</td>
<td>0.51</td>
<td>0.694</td>
<td>0.556</td>
</tr>
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<td>ACF</td>
<td>25A-8A</td>
<td>2.31</td>
<td>0.694</td>
<td>0.749</td>
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<td></td>
<td>25A-10A</td>
<td>1.45</td>
<td>1.00</td>
<td>1.08</td>
</tr>
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<td></td>
<td>32A-15A</td>
<td>3.37</td>
<td>1.94</td>
<td>2.09</td>
</tr>
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<td>4.34</td>
<td>1.94</td>
<td>2.09</td>
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<td>3.53</td>
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<td>3.53</td>
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<td>7.54</td>
<td>5.73</td>
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<td>5.73</td>
<td>6.18</td>
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<td>10.3</td>
<td>9.46</td>
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</tr>
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<td>6.08</td>
<td>11.6</td>
<td>6.57</td>
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<td>80A-50A</td>
<td>12.0</td>
<td>19.2</td>
<td>12.9</td>
</tr>
</tbody>
</table>

Note 2) B = A - (Internal pipe section area)
Note 3) C = (Internal pipe flow passage area)
Note 4) B or C, whichever is smaller
Note 5) The flow rate of saturated steam (duplex) is calculated based on the flow passage area of B.

Internal pipe outer diameters and thickness are based on the values of "internal pipe dimensions" in the table shown on the right.
If an internal pipe with a different thickness is used, the water flow rate (for duplex) varies.
1) Dynamic torque varies depending on product storage conditions, storage period, or fluid types.
2) Starting torque is larger than dynamic torque. Although starting torque is even larger when wringing occurs, it does not indicate any fault.
3) Data are typical values measured based on in-house test standards. They are not guaranteed values.
Accessories

1) A product installed with a flange is supplied with a gasket (copper jacket) and four sets of a stud bolt (SS400), a hex. nut (SS400), and a spring washer (SWRH) for up to 65A or six sets there of for 80A.

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Gasket</th>
<th>Stud Bolt</th>
<th>Hex. Nut</th>
<th>Spring Washer</th>
</tr>
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<tbody>
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<td>M8 No.2</td>
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<td>20</td>
<td>M10</td>
<td>M10 No.2</td>
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<td>74</td>
<td>M12</td>
<td>M12 No.2</td>
</tr>
</tbody>
</table>

2) A duplex, stationary IP, flange connection product (ACF) is supplied with a lock nut (right-hand thread, SS400) used for securing the internal pipe.

3) A duplex, rotational IP product (ACW-1, ACW-2, ACFW-1, or ACFW-2) is supplied with a seal kit for the internal pipe.

Accessories (Flange Connection) (mm)

Accessories (Duplex, Rotational IP) (mm)

Note) Dimensions of the rotor ring, spring, washer, and nut (for 25A) are the “maximum outer diameter x length (thickness)”. 

Internal pipe size 8A~50A (Except for 25A)
### Flange Connection - Dimensions on the Roll Side (Reference Values)

**Flange Dimensions**

<table>
<thead>
<tr>
<th>Size</th>
<th>d</th>
<th>R</th>
<th>P</th>
<th>O</th>
<th>t</th>
<th>m</th>
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<td>25</td>
<td>d9</td>
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<td>11 8</td>
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<td>125</td>
<td>154</td>
<td>20 15</td>
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</table>

**Dimensions on the Roll Side**

<table>
<thead>
<tr>
<th>Size</th>
<th>d'</th>
<th>R'</th>
<th>P'</th>
<th>m'</th>
<th>Z</th>
<th>J-K</th>
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<td>12</td>
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<td>12</td>
<td>4-M8</td>
</tr>
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<td>20A</td>
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<td>4-M10</td>
</tr>
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<td>8</td>
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<td>4-M10</td>
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<td>4-M12</td>
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<tr>
<td>80A</td>
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<td>90</td>
<td>125</td>
<td>14</td>
<td>19</td>
<td>6-M12</td>
</tr>
</tbody>
</table>

Note: Roll side dimension d' is a standard dimension. If the maximum outer diameter of an internal pipe is larger than d', it cannot be inserted into a roll. Determine dimension d' by considering the maximum outer diameter of the internal pipe.
Pearl Joint — Pearl Rotary Joint —

AC Series

Model Names and Types

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Type</th>
<th>Size</th>
<th>Thread Direction</th>
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<tr>
<td>AC</td>
<td>W</td>
<td>Z</td>
<td>–2</td>
</tr>
</tbody>
</table>

- **AC** Series
- **W** Simplex, Thread
- **Z** Duplex, Stationary IP, Flange
- **–2** Duplex, Rotational IP, Thread
- **25A** Internal Pipe Size
- **–10A** Without internal pipe
- **X** Left-hand thread
- **RH** Flange connection

**Structure - Connection**
- **L** Simplex, Thread
- **LF** Simplex, Flange
- **F** Duplex, Stationary IP, Thread
- **W** Duplex, Rotational IP, Flange
- **FW** Duplex, Rotational IP, Flange

**Keyway**
- **–1** Duplex, Rotational IP Without keyway
- **–2** Duplex, Rotational IP With keyway
- **Other than the above**

**Product Size**
- **10A**
- **15A**
- **20A**
- **25A**
- **32A**
- **40A**
- **50A**
- **65A**
- **80A**

**Internal Pipe Size**
- **–6A**
- **–8A**
- **–10A**
- **–15A**
- **–20A**
- **–25A**
- **–32A**
- **–40A**
- **–50A**

**Option (Part Change/Addition)**
- **Standard specification**
- **D** A dust seal sleeve is used.
- **G** Packings are used (rotational internal pipe type).
- **X** Stainless steel bellows and a spring, and a thermal oil seal ring are used.
- **Y** Stainless steel bellows and a spring are used.
- **Z** The head connecting port is 180 degrees opposite.

**Option (Grease)**
- **Standard specification (Eponex SR2)**
- **N** Silicon-based
- **X** Fluorine-based
- **Z** Aluminum complex
- **G** Customer’s designation / Customer’s supply/Lubrication-free

**Standard Spec**: Without Options

**Quasi-standard Spec**: With Options

**Thread Direction of Rotor**
- **RH** Right-hand thread
- **LH** Left-hand thread
- **F** Flange connection

Note 1) “_” indicates a space. A model name is indicated without spaces.
2) If option (part change/addition) code G is selected, W in a type indication is omitted.
   Thus, the type indication is ACG-1, ACG-2, ACFG-1, or ACFG-2.
3) If two or more option (part change/addition) codes are selected, they are indicated in alphabetical order.
4) The selection of two or more options resulting in a long model name is indicated as type “OC■■■■” to denote a customized product for administrative reasons.
   (*■■■■ indicates a four-digit number allocated to each model.)

If you have any questions, contact our sales representative.

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**Internal Pipe**

**Product Size and Internal Pipe Size**

<table>
<thead>
<tr>
<th>Product Size</th>
<th>15A</th>
<th>20A</th>
<th>25A</th>
<th>32A</th>
<th>40A</th>
<th>50A</th>
<th>65A</th>
<th>80A</th>
</tr>
</thead>
</table>
Precautions on Selection

1. Select a product whose operating conditions are within the service conditions (listed in the table on page 2).
2. An installation thread must be tightened when a roll is operated. Select a left-hand thread for a roll that rotates clockwise when viewed from the product installation side, and select a right-hand one for a roll that rotates counterclockwise.
3. To rotate the internal pipe in phase with the rotor, select ACW-2 or ACFW-2 that has a rotor with a keyway.
4. Select an option as necessary.
   1) See “Model Names and Types” (page 14) for the types of options.
   2) If thermal oil is used at 180°C or higher, select option (part change/addition) code X.
   3) If steam is used at 180°C or higher (1.0 MPa or higher), select option (part change/addition) code Y.
   4) Depending on the application, you can change the standard specification grease (Daphne Eponex SR2) to your desired material. (See the table below.)
   5) If the product is used at 180°C or higher, select option (grease) code X.
5. A rotary joint with mechanical seals is not suitable for operation with no rotation, intermittent rotation, or low-rotation speed (a few rotations per minute), and fluid leakage may occur. Consider the use of a swivel joint with elastic seals.
6. Operation under conditions where both pressure and rotation speed are close to the max. values or long-time dry operation (operation without fluid flow) reduces product lifetime.
7. If the fluid is air, add oil mist to the air.
8. The product cannot be used for liquid containing solid particles (slurry) or pulverulent body.
9. The product cannot be used for fluid that causes corrosion on it.
10. The product is not designed according to the general design rules for safety and hygiene of food processing machinery (JIS B 9650). Consult with us when considering the use of the product in food-related facilities.
11. Depending on the fluid used, the product may subject to restrictions due to national laws or local regulations.

As for customized products, we can produce products with modifications that are not included in the options. If you have any questions or wish to purchase customized products, contact our sales representative.

### Grease Type and Service Temperature Range (Guideline)

<table>
<thead>
<tr>
<th>Option Code (Grease)</th>
<th>Brand</th>
<th>Thickener</th>
<th>Application</th>
<th>Temperature Range(℃)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Epones SR2 (Standard)</td>
<td>Lithium complex</td>
<td>General purpose</td>
<td>~ 200</td>
</tr>
<tr>
<td>N</td>
<td>-</td>
<td>Silicon-based</td>
<td>General purpose</td>
<td>-40 ~ 200</td>
</tr>
<tr>
<td>X</td>
<td>-</td>
<td>Fluorine-based</td>
<td>High-temperature</td>
<td>-60 ~ 300</td>
</tr>
<tr>
<td>Z</td>
<td>-</td>
<td>Aluminum complex</td>
<td>Food-processing machinery</td>
<td>-20 ~ 160</td>
</tr>
<tr>
<td>G</td>
<td>Customer’s designation</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Daphne Eponex SR2 is a product of Idemitsu Kosan Co., Ltd.

*Note: “Temperature range” in the table above means the grease service temperature range. It is not the joint service temperature range.*
1) Greasing

AC series requires the periodic greasing (refilling) of ball bearings. Perform greasing with reference to the frequency (guideline) shown to the right.

* Use the brand of grease filled in the product before shipment.
* Daphne Eponex SR2 (Idemitsu Kosan) is filled as a standard specification.
* Grease different from the standard specification is filled if a model name includes an option (grease) code.

2) Replacement of consumables

You can use the product for an extended period of time by replacing consumables. Contact us for replacement. We carry it out according to our repair program. Depending on the products, expenses for purchasing new products may be lower than repair expenses. Contact us for more information.

Product Order

Please provide the following information.

1) When ordering our product you are currently using

① Model name (indicated on the product's nameplate)
② When ordering our product with an internal pipe
   The drawing number if you have a product drawing we provided. The tip shape and dimensions of the internal pipe if you don't have the product drawing.

2) When newly ordering our products

① Model name (see page 14.)
② The tip shape and dimensions of an internal pipe for a product ordered with it
③ Related information
   ・ The name of equipment to which our product is installed
   ・ The name of the fluid used
   ・ Fluid pressure and temperature, and roll rotation speed
   ・ Roll rotation direction viewed from the product installation side
   ・ Roll connection method
   ・ Service environment
   ・ Requests, etc.

If you have any questions, contact our sales representative.
Product Warranty

If a malfunction occurs during the warranty period, contact us or the distributor and send the product to us. Be sure to carefully pack the product for protection before sending it. After receiving the product, we will confirm the malfunction. If the malfunction was clearly caused by the materials of product components or the manufacturing method, we will repair the product in question or replace it with a new one free of charge.

1. Warranty Period
   < New products >
   One (1) year and six (6) months after shipment (from the manufacturing date) or one (1) year after installation, whichever comes first.
   < Repaired products >
   Six (6) months after shipment (from the manufacturing date).

2. We charge a fee for repairs in any of the following cases.
   ① Failure after the warranty period has expired
   ② Failure caused by use of the product deviating from the service conditions
   ③ Failure caused by misuse (improper storage, installation, pipe laying, operation or maintenance, etc.)
   ④ Failure caused by fluid contaminants or foreign objects in the fluid
   ⑤ Failure caused by relocation, transport, or falling of the product after delivery
   ⑥ Failure caused by disassembly, repair, or modification done by personnel other than our service personnel
   ⑦ Failure of the product attributed to using materials or according to standards specified by the customer
   ⑧ Failure of the product attributed to using materials provided by the customer
   ⑨ Failure caused due to unavoidable acts of nature such as fires or other natural disasters

3. Scope of Responsibility
   Our responsibility shall be limited to repairs, replacements, or transport expenses covered by this product warranty provision. Expenses or damages caused by said failures above shall not be covered.

4. Applicable Regions
   This product warranty provision shall be applicable to products installed in Japan.

5. Another Agreement
   If another product warranty agreement is made separately with us and clearly states that said agreement shall have priority over this product warranty provision, this provision shall not be applicable.

6. This product warranty provision shall not restrict the customer's legal rights.