For safe and reliable operation, it is essential to read the user’s manual carefully before using this equipment.

Our clutches and brakes used in various equipment including industrial equipment, information equipment and recreation facilities play an important part in automation or motion control systems.

We have a new slogan in Japan; “ECOing”, a combination of “eco” and “ing”. This is to promote eco-friendly technological development and manufacturing. Our ecological activities are of course not limited to Japan and practiced in many countries around the world.

SINFONIA TECHNOLOGY CO., LTD. continually upgrades and improves its products. Actual features and specifications may therefore differ slightly from those described in this catalog.

SINFONIA SINFONIA TECHNOLOGY CO., LTD.
Shiba NBF Tower, 1-30, Shiba-daigakuen 1-chome, Minato-ku, Tokyo 105-8564, Japan
TEL +81-3-5473-1826 FAX +81-3-5473-1845

SINFONIA TECHNOLOGY (SINGAPORE) PTE. LTD.
96 Robinson Road, #13-02 SIF Building, Singapore 068899
TEL +65-6223-6122 FAX +65-6225-2729

PT. SINFONIA TECHNOLOGY INDONESIA
Graha Paramita 8th Floor Suite E Jl. Denpasar Raya Block D2 KAV. 8 Kuningan, Jakarta 12940, Indonesia
TEL: 021-252-3606 (hunting) FAX: 021-252-3608

SINFONIA TECHNOLOGY (SHANGHAI) CO., LTD.
Room3006, Building B Far East International Plaza, No 317, Xian Xia Road, Changning District, Shanghai, China
Zip Code:200051
TEL +86-21-6275-0606 FAX +86-21-3209-8975

For safe and reliable operation, it is essential to read the user’s manual carefully before using this equipment.
Particle Clutches/Brakes

Particle type Series

Features

1. High precision torque over a wide range of values
   By using efficient magnetic circuitry, the transmitted torque can be varied between 3% and 100% of maximum rated torque.

2. Stable torque and long operating life
   The ideal spherical powder obtains stable torque and smooth slip operation.

3. High thermal radiation capability
   Using a heat resistant powder, and a structure with high thermal radiation capability, our devices are capable of heavy continuous slip operation. Heat pipe powder brake is incredible thermal radiation capability which outperforms water-cooled models.

4. Non-shock, smooth linkage and brake
   Achieve an excellent buffer effect with its constant torque and smooth slip torque.

5. Non-abrasive powder and silent operation
   Unlike abrasive clutches/brakes there is no wearing powder, and silent operation is possible since there is no linkage sound.

6. Rapid response
   The generated magnetic flux operates instantaneously as the effective flux, providing rapid torque response.

List of Models

<table>
<thead>
<tr>
<th>Type</th>
<th>Clutch</th>
<th>Brake</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shaft type</td>
<td>Hollow center type</td>
</tr>
<tr>
<td>POC</td>
<td>Naturally cooled</td>
<td>PHC-R Self-ventilating</td>
</tr>
<tr>
<td>PHC</td>
<td>Self-ventilating</td>
<td></td>
</tr>
<tr>
<td>PMC</td>
<td>Naturally cooled</td>
<td></td>
</tr>
<tr>
<td>PRB-H</td>
<td>Naturally cooled (with side fin)</td>
<td></td>
</tr>
<tr>
<td>PTB</td>
<td>Heat pipe cooled</td>
<td></td>
</tr>
</tbody>
</table>

Appearance

<table>
<thead>
<tr>
<th>Type</th>
<th>Clutch</th>
<th>Brake</th>
</tr>
</thead>
<tbody>
<tr>
<td>POB</td>
<td>Naturally cooled</td>
<td>PHB Naturally cooled</td>
</tr>
<tr>
<td>PHB</td>
<td>Naturally cooled</td>
<td></td>
</tr>
<tr>
<td>PRB-H</td>
<td>Naturally cooled (with side fin)</td>
<td></td>
</tr>
<tr>
<td>PTB</td>
<td>Heat pipe cooled</td>
<td></td>
</tr>
</tbody>
</table>

Models Names

**POB-10**

- **Nominal number**
- **Model symbol**
  - POC: Shaft type / Naturally cooled clutch
  - PHC: Hollow center type / Self-ventilating clutch
  - PMC: Micro type / Naturally cooled clutch
  - POB: Shaft type / Naturally cooled brake
  - PHB: Hollow center type / Naturally cooled brake
  - PRB-H: Hollow center type / Naturally cooled brake (with side fin)
  - PTB: Shaft type / Heat pipe cooled brake
DESIGN AND OPERATIONS

The main components of the clutch/brake are the electromagnetic field (stationary part) containing the coil, the drive-part of the clutch (cylinder and input shaft) and the driven-part of the clutch (rotor and output shaft). The cylindrical space between the cylinder and the rotor is filled with dry magnetic particle. The cylinder is the nonsaturation type incorporating a nonmagnetic-flux barrier ring in the center of its rim. Consequently, its built-up characteristics is excellent.

When the coil is excited with direct current from electrical source, the magnetic flux, as illustrated in the figure below, is established. The magnetized particles contained between the two rotating parts (cylinder and rotor) are solidified into a chainlike configuration, which bind tightly the two rotating parts together. When the coil is deenergized, the magnetic flux instantaneously disappears, the solidified particles disperse, and the transmission of torque ceases immediately. Due to its structural design where the input and output shafts are of the split-shaft type or simple hollowed shaft type, installation of clutches and brakes is simplified. Moreover, since the stationary coil type, no slipping and brush are required. This facilitates inspection and maintenance of the equipment. In the case of the electromagnetic particle brake, the operating principle is identical with that of the clutch. However, the rotor, illustrated in the figure, is fixed to the bracket. When the coil is excited, braking is initiated.

Principle of heat pipe:
The heat pipe has for the first time been utilized by NASA to cope with incandescence or space ships and heat dissipation of communication devices, a new technology by which a large quantity of heat can be transported rapidly. Its distinguished features are wide spreading over various fields including electrical equipment field.
Clutch or Brake Selection Guide

1. To use in the state of continuous slip
To use in the state of continuous slip with a constant torque and a constant rpm for tension control of dummy loads and start up winding brake, the continuous slip power is calculated by the following formula. Here, it is possible to use the required brake torque by adjusting the rated torque in the range 3~100%.

\[ P_s = 0.103 \times T \times n \]  \( W \)

\( T \): Set torque of brake (Nm)
\( n \): rpm of brake shaft (r/min)

Select the brake for the above state.

(1) Temporarily select the one having the rated torque 50 Nm from the set torque 35Nm.
(2) Calculate the slip power.

\[ P_s = 0.103 \times 35 \times 65 = 234W \]

The type having the slip power larger than 234W is required.

(3) The type may be selected from the allowable slip power diagram:

For the shaft type, the allowable slip power of POB-10 is 270W (234W<270W). Therefore, POB-10 may be used.

(4) The simple selection table below with the continuous slip power considered is based on rpm of 1000 r/min. Therefore, it is required to determine the feasibility of use at this rpm by an allowable slip power diagram.

Simple Selection Table with Slip Power Considered

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated Torque (Nm)</th>
<th>Cooling System</th>
<th>6</th>
<th>12</th>
<th>25</th>
<th>50</th>
<th>100</th>
<th>200</th>
<th>400</th>
</tr>
</thead>
<tbody>
<tr>
<td>POB</td>
<td>Natural Cooling System</td>
<td>84</td>
<td>130</td>
<td>180</td>
<td>230</td>
<td>450</td>
<td>600</td>
<td>900</td>
<td></td>
</tr>
<tr>
<td>POB</td>
<td>Natural Cooling System</td>
<td>84</td>
<td>130</td>
<td>180</td>
<td>230</td>
<td>450</td>
<td>600</td>
<td>900</td>
<td></td>
</tr>
</tbody>
</table>

2. To make tension control
To make constant tension control with continuous slip applying a start up winding brake, calculation is made using the following formulae:

Principal data dimensions of application conditions necessary for examination:

(1) Line speed:
Maximum Vmax, Minimum Vmin (m/min)
(2) Start up winding dia:
Maximum Dmax, Minimum Dmin (mm)
(3) Set tension:
Maximum Fmax, Minimum Fmin (N)
(4) Minimum rpm (Nmin)
(5) Minimum brake torque (Tmin)
(6) Maximum brake torque (Tmax)
(7) Maximum slip power (Pmax)

(Example)

<table>
<thead>
<tr>
<th>Power (W)</th>
<th>Slip</th>
<th>Allowable</th>
</tr>
</thead>
<tbody>
<tr>
<td>270</td>
<td>1000</td>
<td>234</td>
</tr>
</tbody>
</table>

3. Set tension:
Select the brake for the above state.

(1) Required brake torque (T) at start up and rpm of brake (N)

\[ T = \frac{F_{\text{max}} \times D_{\text{max}}}{\pi} \times 10^{-3} \text{ (Nm)} \]

\[ N = \frac{V_{\text{max}}}{V_{\text{min}}} \times 10^{3} \text{ (r/min)} \]

(2) Required brake torque (T) at final stage and rpm of brake (N)

\[ T = \frac{F_{\text{max}} \times D_{\text{max}}}{\pi} \times 10^{-3} \text{ (Nm)} \]

\[ N = \frac{V_{\text{max}}}{V_{\text{min}}} \times 10^{3} \text{ (r/min)} \]

(3) Maximum rpm (Nmax)

\[ N_{\text{max}} = \frac{F_{\text{max}} \times D_{\text{max}}}{\pi} \times 10^{-3} \text{ (r/min)} \]

(4) Minimum rpm (Nmin)

\[ N_{\text{min}} = \frac{F_{\text{min}} \times D_{\text{min}}}{\pi} \times 10^{-3} \text{ (r/min)} \]

(5) Minimum brake torque (Tmin)

\[ T_{\text{min}} = \frac{F_{\text{min}} \times D_{\text{min}}}{\pi} \times 10^{-3} \text{ (Nm)} \]

(6) Maximum brake torque (Tmax)

\[ T_{\text{max}} = \frac{F_{\text{max}} \times D_{\text{max}}}{\pi} \times 10^{-3} \text{ (Nm)} \]

(7) Maximum slip power (Pmax)

\[ P_{\text{max}} = 0.0164 \times F_{\text{max}} \times V_{\text{max}} \text{ (W)} \]

(Example)

(Conditions)

1. Line speed:

Maximum Vmax=160m/min
Minimum Vmin=85m/min

2. Start up winding dia:

Maximum Dmax=900mm
Minimum Dmin=150mm

3. Set tension:

F=140(N)constant

Select the brake for the above state.

1) For start up winding brake

To make start up winding control applying the electromagnetic powder clutch, following points should be examined:

(1) Required clutch torque (T) at start up and rpm of output shaft (Ns)

\[ T = \frac{F_{\text{max}} \times D_{\text{min}}}{\pi \times 10^{-3}} \times 10^{3} \text{ (Nm)} \]

\[ N_{\text{set}} = \frac{V_{\text{max}}}{V_{\text{min}}} \times 10^{3} \text{ (r/min)} \]

(2) Required clutch torque (T) at final stage and rpm of output shaft (Ns)

\[ T = \frac{F_{\text{max}} \times D_{\text{max}}}{\pi \times 10^{-3}} \times 10^{3} \text{ (Nm)} \]

\[ N_{\text{set}} = \frac{V_{\text{max}}}{V_{\text{min}}} \times 10^{3} \text{ (r/min)} \]

(3) Maximum rpm (Nmax)

\[ N_{\text{max}} = \frac{F_{\text{max}} \times D_{\text{max}}}{\pi \times 10^{-3}} \times 10^{3} \text{ (r/min)} \]

(4) Minimum rpm (Nmin)

\[ N_{\text{min}} = \frac{F_{\text{min}} \times D_{\text{min}}}{\pi \times 10^{-3}} \times 10^{3} \text{ (r/min)} \]

(5) Minimum clutch torque (Tmin)

\[ T_{\text{min}} = \frac{F_{\text{min}} \times D_{\text{max}}}{\pi \times 10^{-3}} \times 10^{3} \text{ (Nm)} \]

(6) Maximum clutch torque (Tmax)

\[ T_{\text{max}} = \frac{F_{\text{max}} \times D_{\text{max}}}{\pi \times 10^{-3}} \times 10^{3} \text{ (Nm)} \]

(7) Maximum slip power (Pmax)

\[ P_{\text{max}} = 0.0164 \times F_{\text{max}} \times V_{\text{max}} \times \left( \frac{N_{\text{set}}}{N_{\text{max}}} \times \frac{D_{\text{max}}}{D_{\text{min}}} - 1 \right) \text{ (W)} \]

Ns: rpm of clutch input shaft

(Example)

(Conditions)

1. Line speed:

Maximum Vmax=30m/min
Minimum Vmin=10m/min

2. Start up winding dia:

Maximum Dmax=900mm
Minimum Dmin=150mm

3. Set tension:

F=120(N)constant

Select the clutch for the above state.

1) For start up winding brake

To make start up winding control applying the electromagnetic powder clutch, following points should be examined:

(1) Required clutch torque (T) at start up and rpm of output shaft (Ns)

\[ T = \frac{F_{\text{max}} \times D_{\text{min}}}{\pi \times 10^{-3}} \times 10^{3} \text{ (Nm)} \]

\[ N_{\text{set}} = \frac{V_{\text{max}}}{V_{\text{min}}} \times 10^{3} \text{ (r/min)} \]

(2) Required clutch torque (T) at final stage and rpm of output shaft (Ns)

\[ T = \frac{F_{\text{max}} \times D_{\text{max}}}{\pi \times 10^{-3}} \times 10^{3} \text{ (Nm)} \]

\[ N_{\text{set}} = \frac{V_{\text{max}}}{V_{\text{min}}} \times 10^{3} \text{ (r/min)} \]
(2) Required clutch torque (T) at final stage and rpm of output shaft (Ns)
\[ T = \frac{120 \times 650}{2} \times 10^{-1} = 39 (Nm) \]
Ns = \frac{30}{\sqrt{650}} \times 10^{14.7} (r/min)

(3) Maximum rpm (Nmax)
\[ N_{max} = \frac{10^{3}}{150} \times \frac{30}{\sqrt{650}} = 64 (r/min) \]

(4) Minimum rpm (Nmin)
\[ N_{min} = \frac{10^{3}}{650} \times \frac{30}{\sqrt{150}} = 14.7 (r/min) \]

(5) Minimum clutch torque (Tmin)
\[ T_{min} = \frac{10^{3}}{150} \times \frac{30}{\sqrt{650}} = 9 (Nm) \]

(6) Maximum clutch torque (Tmax)
\[ T_{max} = \frac{10^{3}}{150} \times \frac{30}{\sqrt{650}} = 39 (Nm) \]

(7) Maximum slip power (Pmax)
\[ N_{s} = \frac{10^{3}}{30} \times 14.7 (r/min) = 317 (W) \]

Since the relative rpm exceeding 30 r/min of the maximum rpm (Nmax) is required for rpm of clutch input shaft No, No is temporarily set to 94 r/min (64 + 30) here.

3) To use as torque limiter
To prevent overload of the motor or power engine as well as damage to the machine/product, the clutch is slipped by using the constant torque characteristic of an electromagnetic particle clutch when a torque exceeding a specified one is applied. Calculation is made using the following formula:

Equivalent slip power
\[ P_{ave} = \frac{P_{s} \times T_{c} \times n_{i}}{t_{1} \times t} (W) \]

Ps = 0.103 \times T_{c} \times n_{i} (W)
\[ n_{i} = \frac{T_{c}}{K_{t} \times 9550} (Nm) \]
\[ T_{c} \times n_{i} = 204 (W) \]

Example
(Condition)
(1) Tightening torque
\[ \text{Tightening torque} = 12 \times 10 = 120 \times 6 \times 10 = 650 \] (Nm)
\[ n_{i} = \frac{120}{50} = 1.1 (Nm) \]

(2) Equivalent slip power (Pave)
\[ P_{ave} = \frac{(204) \times (100)}{650} = 64.5 (W) \]

(3) The allowable slip power of POC-0.6A is 84W (64.5W<84W, the control range of POC-0.6A is 0.18 to 6 Nm, <3-100%>), so POC-0.6A is available.

4) For simple ON-OFF use
(1) Selecting clutch capacity
When selecting a suitable electromotor, choose one whose size is adequate for the torque value the clutch shaft must adjusted from 3 to 100% by controlling the exciting current.
\[ T = 9550 \times \frac{P_{n}}{n_{i}} \times K_{t} (Nm) \]
Kt : Safety coefficient when using clutch.

(2) Selecting brake capacity
\[ T = 9550 \times \frac{P_{n}}{n_{i}} \times B (Nm) \]
B : Brake rate – 80% or 150% is normally used.

(3) Engaging energy rate or braking energy rate
When using for starting and stopping machinery, the engaging frequency must be considered and the engaging energy or the braking energy rate must be examined.

(Engaging energy rate)
\[ E = \frac{J \times n_{i}}{1800} \times T_{c} \times \frac{N}{60} (W) \]

(Braking energy rate)
\[ E = \frac{J \times n_{i}}{1800} \times T_{c} \times \frac{N}{60} (W) \]
Characteristics

1. Allowable slip power characteristics

- **POC/POB**  Shaft type / Naturally cooled

- **PHC-R**  Hollow center type / Self-ventilating

- **PMC**  Micro type / Naturally cooled

- **PHB**  Hollow center type / Naturally cooled

- **PRB-H**  Hollow center type / Naturally cooled (with side fin)

- **PTB**  Shaft type / Heat pipe cooled
2. Allowable slip torque characteristics

- **POC/POB** Shaft type / Naturally cooled
- **PHC-R** Hollow center type / Self-ventilating
- **PHB** Hollow center type / Naturally cooled
- **PRB-H** Hollow center type / Naturally cooled (with side fin)
- **PMC** Micro type / Naturally cooled
- **PTB** Shaft type / Heat pipe cooled
Exciting current – Torque characteristic

Type: POC-0.6A
Speed: 1000r/min
Rated voltage: DC-24V
Rated current: 0.792A

Relative rpm – Torque characteristic

Type: POC-5A
Rated voltage: DC-24V
Rated current: 1.875A

Drag torque characteristic

As the cause of drag torque, the effect of clutch bearing loss, seal part friction loss, windage loss, or residual magnetism is suspected. Drag torque has no effect during continuous slip operation, but large drag torque exerts an adverse effect such as load drag during ON/OFF application. SINFONIA TECHNOLOGY CO., LTD. reduces drag torque to approximately 1% of the rated torque in consideration of the above. (Since the value of drag torque varies depending on the model, contact us separately.)
Current – Torque characteristics

- POC-0.3
- POC-0.6A
- POC-1.2A
- POC-2.5A
- POC-5A
- POC-10
- POC-20
- POC-40
- POC-80

- POB-0.3
- POB-0.6A
- POB-1.2A
- POB-2.5A
- POB-5A
- POB-10
- POB-20
- POB-40
- POB-80
### Maximum rpm moment of inertia

<table>
<thead>
<tr>
<th>Model</th>
<th>Shaft Type / Cooling Method</th>
<th>Max Speed (rpm)</th>
<th>Input Side J(\text{kg\cdot m})</th>
<th>Output Side J(\text{kg\cdot m})</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTB-2.5BL3</td>
<td>Naturally cooled</td>
<td>1800</td>
<td>5.40 \times 10^{-4}</td>
<td>2.01 \times 10^{-4}</td>
</tr>
<tr>
<td>PTB-5BL3</td>
<td>Naturally cooled</td>
<td>1800</td>
<td>7.30 \times 10^{-4}</td>
<td>2.40 \times 10^{-4}</td>
</tr>
<tr>
<td>PTB-10BL3</td>
<td>Naturally cooled</td>
<td>1800</td>
<td>4.40 \times 10^{-4}</td>
<td>1.06 \times 10^{-3}</td>
</tr>
<tr>
<td>PTB-20BL3</td>
<td>Naturally cooled</td>
<td>1800</td>
<td>2.40 \times 10^{-3}</td>
<td>6.40 \times 10^{-3}</td>
</tr>
<tr>
<td>PTB-40BL3</td>
<td>Naturally cooled</td>
<td>1500</td>
<td>9.90 \times 10^{-3}</td>
<td>2.40 \times 10^{-2}</td>
</tr>
<tr>
<td>PTB-80BL3</td>
<td>Naturally cooled</td>
<td>1500</td>
<td>9.90 \times 10^{-1}</td>
<td>2.40 \times 10^{-1}</td>
</tr>
</tbody>
</table>

### Other Models

- **POC** Shafts (Naturally cooled)
  - PHC-R Hollow center type / Self-venting
  - PHB Hollow center type / Naturally cooled
  - PMC Micro type / Naturally cooled
  - PRB-H Hollow center type / Naturally cooled (with side fin)
  - PTB Shaft type / Heat pipe cooled
### Cautions for handling

**Before use**

1. Be careful not to damage or block the flange, and be careful of the terminal block, as it is made of resin.
2. The powder inserted sometimes settles in irregular distributed in the bottom of the unit places, by causing the shock of the transporting, making rotation difficult. In the cases, the unit may be turned upside down and the outside tapped slightly to correct it.

### Allowable overhand load

To connect the clutch/brake unit through pulleys or sprockets, limit the overhang load within the allowable overhang of the input shaft or output shaft load (see Fig 1, Table 2 and 3). The overhang load practically acts by obtaining the following expression.

\[
F = \frac{2Tf}{D} \quad (N)
\]

Where,

- \( F \): load (N) [kgf]
- \( T \): transfer torque (Nm) [kgf]
- \( f \): load coefficient \((2–4\) for belt, \(1.2–1.5\) for sprocket)
- \( D \): pitch dia. (m) of pulleys and sprockets

### Table 1. Allowable overhand load

<table>
<thead>
<tr>
<th>TYPE</th>
<th>( f ) (mm)</th>
<th>( P ) (N)</th>
<th>( \phi ) (mm)</th>
<th>( P ) (N)</th>
<th>( \phi ) (mm)</th>
<th>( P ) (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POC/POB-0.3</td>
<td>10</td>
<td>134</td>
<td>13</td>
<td>125</td>
<td>23</td>
<td>100</td>
</tr>
<tr>
<td>POC/POB-0.6A</td>
<td>10</td>
<td>205</td>
<td>13</td>
<td>190</td>
<td>26</td>
<td>130</td>
</tr>
<tr>
<td>POC/POB-1.2A</td>
<td>10</td>
<td>235</td>
<td>17</td>
<td>200</td>
<td>34.5</td>
<td>140</td>
</tr>
<tr>
<td>POC/POB-2.5A</td>
<td>10</td>
<td>400</td>
<td>21.5</td>
<td>315</td>
<td>43</td>
<td>220</td>
</tr>
<tr>
<td>PTB-2.5BL</td>
<td>10</td>
<td>930</td>
<td>28.5</td>
<td>615</td>
<td>57</td>
<td>420</td>
</tr>
<tr>
<td>POC/POB-10</td>
<td>10</td>
<td>1425</td>
<td>33.5</td>
<td>1065</td>
<td>67</td>
<td>720</td>
</tr>
<tr>
<td>PTB-10BL</td>
<td>10</td>
<td>1730</td>
<td>35.5</td>
<td>1200</td>
<td>71</td>
<td>900</td>
</tr>
<tr>
<td>POC/POB-20</td>
<td>10</td>
<td>2640</td>
<td>46</td>
<td>1960</td>
<td>92</td>
<td>1470</td>
</tr>
<tr>
<td>PTB-20BL</td>
<td>10</td>
<td>3910</td>
<td>55</td>
<td>2940</td>
<td>110</td>
<td>2260</td>
</tr>
</tbody>
</table>

(Notes) 1. This table is based on \( 1000 \) r/min, and bearing life \( 6000 \) hr.
2. Multiply the value by the coefficient shown on the table depending upon the speed and use coefficient, 
   shown as speed coefficient in table 2, use coefficient is table 3.
3. This table shows in the case that the thrust load is not applied.

### Table 2. Speed coefficient

<table>
<thead>
<tr>
<th>No. of revolution (rpm)</th>
<th>Speed coefficient</th>
<th>No. of revolution (rpm)</th>
<th>Speed coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>2.74</td>
<td>100</td>
<td>2.18</td>
</tr>
<tr>
<td>200</td>
<td>1.72</td>
<td>400</td>
<td>1.37</td>
</tr>
<tr>
<td>600</td>
<td>1.20</td>
<td>800</td>
<td>1.09</td>
</tr>
</tbody>
</table>

### Table 3. Use coefficient

<table>
<thead>
<tr>
<th>Use Example of use</th>
<th>Use coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machines used for short time or intermittently, not causing serious influence even if stopped by an accident.</td>
<td>1.50</td>
</tr>
<tr>
<td>Machinery not used continuously but for which positive operation is required.</td>
<td>1.22</td>
</tr>
<tr>
<td>Machinery fully operated regularly for 8 hr a day.</td>
<td>1.00</td>
</tr>
</tbody>
</table>

### Before the operation

1. After completing the installation, confirm whether control circuit is adequately functioned and the excited voltage is set within the specified value or not. In this time, do not rotate the clutch or brake and make the excited current to ON-OFF. And also dose the other portion of machine operate smoothly?
2. If there is not an error, operate in accordance with the following procedure. As the powder inserted sometimes settles in irregular distributed in the interior of clutch or brake, by causing of the shock the transporting, make the adapting operation to concentrate the powder into operating gap.
   - **Procedure of preparative operation**
     A) At the condition of non excited unit, after rotating for 1 minute as high as possible \( (1000 \text{ r/min.}, \text{Max.}) \), the excited current shall be set to 1/4 to 1/5 rated current, and ON and OFF operation that one cycle consists of 5 sec ON and 10 sec OFF shall be repeated 20 cycles during the rotation.  
     B) When clutch or brake is in stilled newly, or the equipment in stilled with clutch or brake is transported to the other places, after doing the preparative operation surely, the regular operation shall be done.
   C) If the preparative operation is poor, the torque is lower or not stabilized, if the preparative operation is proper, the powder \( \text{(Magnetic powder)} \) are evenly distributed into the unit, and so the torque is produced in proportion to the excited current.

### (3) The amount of powder to be sealed shall be follows

<table>
<thead>
<tr>
<th>Size</th>
<th>Amount to be sealed (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>6.5</td>
</tr>
<tr>
<td>0.6</td>
<td>10</td>
</tr>
<tr>
<td>1.2</td>
<td>15</td>
</tr>
<tr>
<td>2.5</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>20</td>
<td>160</td>
</tr>
<tr>
<td>40</td>
<td>270</td>
</tr>
</tbody>
</table>

### Horizontal axis installation

Specification of clutch/brake is performance in a thing of a state of horizontal axis installation, and please use it for a stability axis in principle.

### Relative rpm

Since the relative rpm exceeding 30 r/min, and please consult us when it is equal to or less than it.

### Torque range

Adjusting the rated torque in the range 3–100%.
**Maintenance**

1. Surface temperatures in the normal operating condition are shown in the following table.

<table>
<thead>
<tr>
<th>Type</th>
<th>Cooling system</th>
<th>Portion nomenclature</th>
<th>Maximum allowable temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>POC/POB</td>
<td>Natural cooled</td>
<td>Yoke surface</td>
<td>80°C Max.</td>
</tr>
<tr>
<td>PHC-R</td>
<td>Self-ventilated</td>
<td>Yoke surface</td>
<td>80°C Max.</td>
</tr>
<tr>
<td>PTB-BL3</td>
<td>Heat pipe with fan</td>
<td>Yoke surface</td>
<td>80°C Max.</td>
</tr>
</tbody>
</table>

2. If the powder absorbs the humidity, the characteristic of unit is hindered. Be careful not to let the water or oil enter to the interior of the clutch/brake. Especially in the case of installing the unit adjacent to the gear box, as the oil will enter to the unit, mediating the shaft, the oil seal must be done perfectly.

3. Confirm whether the bolts for the installation of clutch/brake, the mounting stand and coupling are loosened or not.

4. While the use, if the following malfunctions are detected, check the ball bearings and there is a trouble, change to the new ball bearings. Shown as the following table 6.
   - Rotation is heavy.
   - Torque varies at every rotation.
   - Noise is made from the bearing.

<table>
<thead>
<tr>
<th>Size</th>
<th>POC/POB</th>
<th>PHC-R</th>
<th>PTB-BL3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>6202</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>0.6</td>
<td>6202/6002</td>
<td>6008/6005</td>
<td>–</td>
</tr>
<tr>
<td>1.2</td>
<td>6003</td>
<td>6008/6004</td>
<td>6003</td>
</tr>
<tr>
<td>2.5</td>
<td>6005</td>
<td>6012/6007</td>
<td>6005</td>
</tr>
<tr>
<td>5</td>
<td>6206</td>
<td>6015/6010</td>
<td>6206</td>
</tr>
<tr>
<td>10</td>
<td>6308/6307</td>
<td>6018/6012</td>
<td>6308/6307</td>
</tr>
<tr>
<td>20</td>
<td>6309/6308</td>
<td>6022/6015</td>
<td>6309/6308</td>
</tr>
<tr>
<td>40</td>
<td>6311/6310</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>80</td>
<td>6314/6315</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

(Note) Sealed grease is Andec 260, Non-contacting rubber seal (2NK)

5. Torque may decrease when the clutch or brake is subject to long periods of use under severe working conditions. In such case, changing of the powder will restore the torque. Refer to the next procedures of changing powder.

![Installation Example](image)
### POC-0.3, 0.6A, 1.2A, 2.5A, 5A, 10, 20, 40

<table>
<thead>
<tr>
<th>Model</th>
<th>Static friction torque (Nm)</th>
<th>Rated voltage (DC-V)</th>
<th>Power consumption at 75°C (W)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POC-0.3</td>
<td>3</td>
<td>24</td>
<td>13.3</td>
<td>2.5</td>
</tr>
<tr>
<td>POC-0.6A</td>
<td>6</td>
<td>24</td>
<td>19.2</td>
<td>3.5</td>
</tr>
<tr>
<td>POC-1.2A</td>
<td>12</td>
<td>24</td>
<td>20.4</td>
<td>5.5</td>
</tr>
<tr>
<td>POC-2.5A</td>
<td>25</td>
<td>24</td>
<td>26.8</td>
<td>10</td>
</tr>
<tr>
<td>POC-5A</td>
<td>50</td>
<td>24</td>
<td>47.3</td>
<td>16.5</td>
</tr>
<tr>
<td>POC-10</td>
<td>100</td>
<td>24</td>
<td>52.8</td>
<td>35</td>
</tr>
<tr>
<td>POC-20</td>
<td>200</td>
<td>24</td>
<td>66</td>
<td>58</td>
</tr>
<tr>
<td>POC-40</td>
<td>400</td>
<td>24</td>
<td>92</td>
<td>100</td>
</tr>
</tbody>
</table>

### POC-80

<table>
<thead>
<tr>
<th>Model</th>
<th>Static friction torque (Nm)</th>
<th>Rated voltage (DC-V)</th>
<th>Power consumption at 75°C (W)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POC-80</td>
<td>800</td>
<td>24</td>
<td>110</td>
<td>250</td>
</tr>
</tbody>
</table>

---

**POC-0.3**

- Diameter direction: D
- Shaft direction: D1
- Attachment: L, M, X1, Y
- Shuft end: YJ

**POC-10~40**

- Lead wire: 300
- Terminal block (Type 10, 20)
- Set screw: 6-YJ (under Type 20)
- 8-YJ (Type 40)

---

**Lead wire 300**

- Terminal block

---

**POC-0.6A~5A**

- Lead wire: 300
- Set screw: 6-YJ

---

**Set screw**

- 6-YJ

---

**Input shaft**

- Output shaft
### PHC-0.6, 1.2, 2.5, 5, 10, 20R

<table>
<thead>
<tr>
<th>Model</th>
<th>Static friction torque (Nm)</th>
<th>Rated voltage (DC-V)</th>
<th>Power consumption at 75°C (W)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHC-0.6R</td>
<td>6</td>
<td>24</td>
<td>22.5</td>
<td>4.2</td>
</tr>
<tr>
<td>PHC-1.2R</td>
<td>12</td>
<td>24</td>
<td>23</td>
<td>5.7</td>
</tr>
<tr>
<td>PHC-2.5R</td>
<td>25</td>
<td>24</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>PHC-5R</td>
<td>50</td>
<td>24</td>
<td>54</td>
<td>17</td>
</tr>
<tr>
<td>PHC-10R</td>
<td>100</td>
<td>24</td>
<td>152.8</td>
<td>43</td>
</tr>
<tr>
<td>PHC-20R</td>
<td>200</td>
<td>24</td>
<td>66</td>
<td>70</td>
</tr>
</tbody>
</table>

### PMC-10, 20A3

<table>
<thead>
<tr>
<th>Model</th>
<th>Static friction torque (Nm)</th>
<th>Rated voltage (DC-V)</th>
<th>Power consumption at 75°C (W)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMC-10A3</td>
<td>1</td>
<td>24</td>
<td>13.5</td>
<td>0.90</td>
</tr>
<tr>
<td>PMC-20A3</td>
<td>2</td>
<td>24</td>
<td>15</td>
<td>1.34</td>
</tr>
</tbody>
</table>

### Model Diameter direction Shuft direction Shuft hole Attachment

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>D</th>
<th>D2</th>
<th>D1</th>
<th>L</th>
<th>Q</th>
<th>R</th>
<th>Y1</th>
<th>Y2</th>
<th>P.C.D Tap</th>
<th>P.C.D Tap</th>
<th>d</th>
<th>b</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>POQ-0.6R</td>
<td>89</td>
<td>134</td>
<td>50</td>
<td>50</td>
<td>93</td>
<td>42</td>
<td>25.5</td>
<td>4</td>
<td>4</td>
<td>60</td>
<td>M4 × 6</td>
<td>M4 × 6</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>POQ-1.9R</td>
<td>89</td>
<td>132</td>
<td>45</td>
<td>70</td>
<td>96</td>
<td>46</td>
<td>25</td>
<td>4</td>
<td>4</td>
<td>80</td>
<td>M4 × 6</td>
<td>M5 × 6</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>POQ-2.5R</td>
<td>140</td>
<td>182</td>
<td>70</td>
<td>70</td>
<td>132</td>
<td>42</td>
<td>45</td>
<td>4</td>
<td>5</td>
<td>80</td>
<td>M6 × 8</td>
<td>M6 × 8</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>POQ-5R</td>
<td>165</td>
<td>219</td>
<td>87</td>
<td>87</td>
<td>148</td>
<td>68</td>
<td>40</td>
<td>4</td>
<td>4</td>
<td>102</td>
<td>M8 × 10</td>
<td>M8 × 10</td>
<td>35</td>
<td>10</td>
</tr>
<tr>
<td>POQ-10R</td>
<td>190</td>
<td>290</td>
<td>105</td>
<td>110</td>
<td>183.5</td>
<td>63.5</td>
<td>60</td>
<td>4</td>
<td>6</td>
<td>140</td>
<td>M8 × 10</td>
<td>M10 × 10</td>
<td>45</td>
<td>12</td>
</tr>
<tr>
<td>POQ-20R</td>
<td>220</td>
<td>335</td>
<td>130</td>
<td>130</td>
<td>222</td>
<td>69</td>
<td>75</td>
<td>4</td>
<td>9</td>
<td>150</td>
<td>M10 × 12</td>
<td>M10 × 12</td>
<td>55</td>
<td>15</td>
</tr>
</tbody>
</table>

### PMC-10A1, PMC-20A1

- Lead wire 300
- Input hub
- Output shaft
- Set screw 4-YJ

<table>
<thead>
<tr>
<th>Model</th>
<th>C</th>
<th>C1</th>
<th>C2</th>
<th>D1</th>
<th>D2</th>
<th>L</th>
<th>M</th>
<th>M1</th>
<th>N</th>
<th>O</th>
<th>S</th>
<th>Y</th>
<th>P.C.D Hole</th>
<th>P.C.D Tap</th>
<th>Q1</th>
<th>Q2</th>
<th>QK</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMC-10A1</td>
<td>76</td>
<td>58</td>
<td>30</td>
<td>58</td>
<td>54</td>
<td>85</td>
<td>27</td>
<td>15</td>
<td>4</td>
<td>39</td>
<td>51</td>
<td>6</td>
<td>68</td>
<td>4.5</td>
<td>M4 × 6</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>PMC-20A1</td>
<td>92</td>
<td>69</td>
<td>35</td>
<td>69</td>
<td>54</td>
<td>116</td>
<td>47</td>
<td>22</td>
<td>4</td>
<td>32</td>
<td>51</td>
<td>6</td>
<td>92</td>
<td>4.5</td>
<td>M4 × 6</td>
<td>24</td>
<td>25</td>
</tr>
</tbody>
</table>
### PMC-40A3

<table>
<thead>
<tr>
<th>Model</th>
<th>Static friction torque (Nm)</th>
<th>Rated voltage (DC-V)</th>
<th>Power consumption at 75°C (W)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMC-40A3</td>
<td>4</td>
<td>24</td>
<td>18</td>
<td>2.5</td>
</tr>
</tbody>
</table>

### POB-0.3, 0.6A, 1.2A, 2.5A, 5A, 10, 20, 40

<table>
<thead>
<tr>
<th>Model</th>
<th>Static friction torque (Nm)</th>
<th>Rated voltage (DC-V)</th>
<th>Power consumption at 75°C (W)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POB-0.3</td>
<td>3</td>
<td>24</td>
<td>18</td>
<td>2.5</td>
</tr>
<tr>
<td>POB-0.6A</td>
<td>6</td>
<td>24</td>
<td>19.2</td>
<td>3.3</td>
</tr>
<tr>
<td>POB-1.2A</td>
<td>12</td>
<td>24</td>
<td>20.4</td>
<td>4.9</td>
</tr>
<tr>
<td>POB-2.5A</td>
<td>25</td>
<td>24</td>
<td>26.8</td>
<td>9</td>
</tr>
<tr>
<td>POB-5A</td>
<td>50</td>
<td>24</td>
<td>47.3</td>
<td>15.5</td>
</tr>
<tr>
<td>POB-10</td>
<td>100</td>
<td>24</td>
<td>52.8</td>
<td>33</td>
</tr>
<tr>
<td>POB-20</td>
<td>200</td>
<td>24</td>
<td>66</td>
<td>48</td>
</tr>
<tr>
<td>POB-40</td>
<td>400</td>
<td>24</td>
<td>92</td>
<td>80</td>
</tr>
</tbody>
</table>

### POB-0.3

#### POB-0.6A

1. **Model**: POB-0.6A
2. **Rated voltage**: 24 DC-V
3. **Power consumption at 75°C**: 19.2 W
4. **Mass**: 3.3 kg

<table>
<thead>
<tr>
<th>Diameter</th>
<th>M</th>
<th>X</th>
<th>Y</th>
<th>X1</th>
<th>Y1</th>
<th>Attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-YJ (Type 20)</td>
</tr>
<tr>
<td>4-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8-YJ (Type 40)</td>
</tr>
</tbody>
</table>

### POB-1.2A

1. **Model**: POB-1.2A
2. **Rated voltage**: 24 DC-V
3. **Power consumption at 75°C**: 20.4 W
4. **Mass**: 4.9 kg

<table>
<thead>
<tr>
<th>Diameter</th>
<th>M</th>
<th>X</th>
<th>Y</th>
<th>X1</th>
<th>Y1</th>
<th>Attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-YJ (Type 20)</td>
</tr>
<tr>
<td>4-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8-YJ (Type 40)</td>
</tr>
</tbody>
</table>

### POB-2.5A

1. **Model**: POB-2.5A
2. **Rated voltage**: 24 DC-V
3. **Power consumption at 75°C**: 26.8 W
4. **Mass**: 9 kg

<table>
<thead>
<tr>
<th>Diameter</th>
<th>M</th>
<th>X</th>
<th>Y</th>
<th>X1</th>
<th>Y1</th>
<th>Attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-YJ (Type 20)</td>
</tr>
<tr>
<td>4-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8-YJ (Type 40)</td>
</tr>
</tbody>
</table>

### POB-5A

1. **Model**: POB-5A
2. **Rated voltage**: 24 DC-V
3. **Power consumption at 75°C**: 47.3 W
4. **Mass**: 15.5 kg

<table>
<thead>
<tr>
<th>Diameter</th>
<th>M</th>
<th>X</th>
<th>Y</th>
<th>X1</th>
<th>Y1</th>
<th>Attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-YJ (Type 20)</td>
</tr>
<tr>
<td>4-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8-YJ (Type 40)</td>
</tr>
</tbody>
</table>

### POB-10

1. **Model**: POB-10
2. **Rated voltage**: 24 DC-V
3. **Power consumption at 75°C**: 52.8 W
4. **Mass**: 33 kg

<table>
<thead>
<tr>
<th>Diameter</th>
<th>M</th>
<th>X</th>
<th>Y</th>
<th>X1</th>
<th>Y1</th>
<th>Attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-YJ (Type 20)</td>
</tr>
<tr>
<td>4-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8-YJ (Type 40)</td>
</tr>
</tbody>
</table>

### POB-20

1. **Model**: POB-20
2. **Rated voltage**: 24 DC-V
3. **Power consumption at 75°C**: 66 W
4. **Mass**: 48 kg

<table>
<thead>
<tr>
<th>Diameter</th>
<th>M</th>
<th>X</th>
<th>Y</th>
<th>X1</th>
<th>Y1</th>
<th>Attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-YJ (Type 20)</td>
</tr>
<tr>
<td>4-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8-YJ (Type 40)</td>
</tr>
</tbody>
</table>

### POB-40

1. **Model**: POB-40
2. **Rated voltage**: 24 DC-V
3. **Power consumption at 75°C**: 92 W
4. **Mass**: 80 kg

<table>
<thead>
<tr>
<th>Diameter</th>
<th>M</th>
<th>X</th>
<th>Y</th>
<th>X1</th>
<th>Y1</th>
<th>Attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-YJ (Type 20)</td>
</tr>
<tr>
<td>4-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8-YJ (Type 40)</td>
</tr>
</tbody>
</table>

### Summary

- The table compares various models and their specifications.
- Static friction torque, rated voltage, power consumption, and mass are provided.
- Diagrams illustrate the physical dimensions and attachment points.
- Lead wires and set screws are specified for each model.

---

33 34