MEGATORQUE MOTOR™
PB Series

New product contribute to reducing cost and improving productivity of machines with its incredible usability and excellent performance.
MEGATORQUE MOTOR is a kind of servo motor.

**Features**
- A compact size servo motor with large through hole for wiring and piping.
- Positioning using standard Pulse train command.
- Auto Tuning Function for easy start up.

**Typical applications**
- Replacing Gear reducer and AC servo motor with Direct Drive motor.
- Reducing size and envelope of conventional positioning/transfer system.

**Line up**

<table>
<thead>
<tr>
<th>Motor</th>
<th>Reference No.</th>
<th>Outer diameter</th>
<th>Maximum output torque</th>
<th>Motor height</th>
</tr>
</thead>
<tbody>
<tr>
<td>PB1 Motor</td>
<td>M-PB1006JN001</td>
<td>φ102</td>
<td>60 [N·m]</td>
<td>126 [mm]</td>
</tr>
<tr>
<td></td>
<td>M-PB3015JN001</td>
<td>φ152</td>
<td>30 [N·m]</td>
<td>92 [mm]</td>
</tr>
<tr>
<td></td>
<td>M-PB3030JN001</td>
<td>φ152</td>
<td>15 [N·m]</td>
<td>75 [mm]</td>
</tr>
<tr>
<td></td>
<td>M-PB3060JN001</td>
<td>φ152</td>
<td>6 [N·m]</td>
<td>75 [mm]</td>
</tr>
</tbody>
</table>

**Application**

- High speed and high accuracy
- Compact
- Clean
- Maintenance free
- Hollow structure (convenient for wiring/tubing)

**Advantage of Direct Drive Motor**

The highly precise positioning which has no backlashes or lost motions is achieved. Because MEGATORQUE MOTOR is directly connected with a load without using reduction gears. Long term maintenance free is achieved by using a grease prelubricated bearing.

- Positioning accuracy: Non backlash, high precision positioning
- Positioning time: Short cycle time
- Deterioration with age: No performance degradation due to aging
- Maintenance: Long term maintenance free
- Compact: NSK motor allows users to design compact and lightweight system

**System configuration**

**Combination table**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M-PB1006JN001</td>
<td>M-ECC-PB1060GA201</td>
<td>M-EGA-15A2301</td>
<td>M-CA***A101</td>
<td>M-CC***A101</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>002 : 2 [m]</td>
<td>002 : 2 [m]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>004 : 4 [m]</td>
<td>004 : 4 [m]</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>008 : 8 [m]</td>
<td>008 : 8 [m]</td>
</tr>
<tr>
<td>M-PB3015JN001</td>
<td>M-ECC-PB3015GA201</td>
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</tr>
<tr>
<td>M-PB3030JN001</td>
<td>M-ECC-PB3030GA201</td>
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<tr>
<td>M-PB3060JN001</td>
<td>M-ECC-PB3060GA201</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Accessories**

<table>
<thead>
<tr>
<th>Name</th>
<th>Reference No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power connector</td>
<td>M-FAE0001</td>
<td>CNA connector</td>
</tr>
<tr>
<td>IO connector</td>
<td>M-FAE0002</td>
<td>CNT connector</td>
</tr>
<tr>
<td>Mounting bracket</td>
<td>M-FAE0003</td>
<td>Front mounting bracket for Driver</td>
</tr>
<tr>
<td>Regenerative resistor</td>
<td>M-FAE0004</td>
<td>80 [W]</td>
</tr>
<tr>
<td>Regenerative resistor</td>
<td>M-FAE0005</td>
<td>220 [W]</td>
</tr>
<tr>
<td>PC communication cable</td>
<td>M-FAE0006</td>
<td>Cable length : 2 850 [mm]</td>
</tr>
<tr>
<td>Connector set</td>
<td>M-FAE0007</td>
<td>CNA and CNT</td>
</tr>
</tbody>
</table>
2. Motor

2.1. Motor Reference number

Example of Reference number: M-PB 1 006 JN 001

2.2. Specifications

<table>
<thead>
<tr>
<th>Functional item</th>
<th>M-PB1006JN001</th>
<th>M-PB3015JN001</th>
<th>M-PB3030JN001</th>
<th>M-PB3060JN001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor outer diameter [mm]</td>
<td>φ102</td>
<td>φ152</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum output torque [N·m]</td>
<td>6</td>
<td>15</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>Rated output torque [N·m]</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>20</td>
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<tr>
<td>Rated wattage [W]</td>
<td>63</td>
<td>157</td>
<td>314</td>
<td>126</td>
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<tr>
<td>Radial run-out [μm]</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial run-out [μm]</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor height [mm]</td>
<td>75</td>
<td>92</td>
<td>126</td>
<td></td>
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<tr>
<td>Motor hollow diameter [mm]</td>
<td>φ35</td>
<td>φ56</td>
<td></td>
<td></td>
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<tr>
<td>Maximum rotational speed [s⁻¹]</td>
<td>10</td>
<td>956</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Rated rotational speed [s⁻¹]</td>
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<td>1</td>
<td></td>
</tr>
<tr>
<td>Resolution of position sensor [count/rev]</td>
<td>524 288</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute positioning accuracy [arc-sec]</td>
<td>112 *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability [arc-sec]</td>
<td>+/-5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable axial load [N]</td>
<td>1 000</td>
<td>2 000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable axial load [μm]</td>
<td>120</td>
<td></td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Allowable radial load [N]</td>
<td>270</td>
<td></td>
<td>540</td>
<td></td>
</tr>
<tr>
<td>Allowable moment load [N·m]</td>
<td>9</td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Allowable range of inertia [kg·m²]</td>
<td>0.0026</td>
<td>0.014</td>
<td>0.016</td>
<td>0.021</td>
</tr>
<tr>
<td>Mass [kg]</td>
<td>2.6</td>
<td>5.8</td>
<td>7.2</td>
<td>10.2</td>
</tr>
</tbody>
</table>

Environmental conditions

Ambient temperature 0 to 40 [°C]; humidity: 20 to 80 [%]; use indoors.

Free from dust, condensation and corrosive gas. IP30 equivalent.

2.3. Speed – Torque curve

2.4. Dimensions

M-PB1006JN001

M-PB3015JN001

M-PB3030JN001

M-PB3060JN001

1. The bend radius of the motor cable lead (φ7) and the resolver cable lead (φ7) should be R30 [mm] or more.

2. Do not use the leads of the motor cable and the resolver cable with flexing motion.

3. Do not add the stress (tension, vibration, etc.) to the joint of the leads and the connector. It causes the disconnection and the loose connection.
3.1. Driver Reference number

Example of Reference number: M-EGA-15A2301

3.2. Specifications

3.2.1. General specifications

Functional item | M-EGA-15A2301 | M-EGA-30A2301
--- | --- | ---
Control function | Position control | Position control
Control system | 4GBT: PMM control Sinusoidal drive | 4GBT: Sinusoidal drive
Main circuit power | Three phase 200 to 230 [VAC] +10/-15 [%], 50/60 [Hz] +/-3 [Hz] | Single phase 200 to 230 [VAC] +10/-15 [%], 50/60 [Hz] +/-3 [Hz]
Control power | Main Power (Rated) M-PB1505JN001: 0.3 [kVA] | M-PB3005JN001: 2.0 [kVA]
Power capacity | Control Power 40 [W] | 30 [W]

Environmental conditions

Operating temperatures | 0 to 55 [°C] | 0 to 55 [°C]
Storing temperatures | -20 to +65 [°C] | -20 to +65 [°C]
Operating/Storing humidity | Below 90 [%RH] (No condensation) | Below 90 [%RH] (No condensation)
Elevation | Below 1,000 [m] | Below 1,000 [m]
Vibration | 4.9 [m/s²] | 4.9 [m/s²]
Shock | 19.6 [m/s²] | 19.6 [m/s²]

Dimensions (H×W×D) | 160×40×130 [mm] | 160×50×130 [mm]
Mass | 0.75 [kg] | 0.9 [kg]

Alarms

Over current, Current detection error, Over load, Regeneration error, Driver overheating, External overheating, Over voltage, Main circuit power low voltage, Main circuit power supply open phase, Control power supply low voltage, Encoder error, Over speed, Speed control error, Speed feedback error, Excessive position, Positioning control pulse error, Built-in memory error, Parameter error.

Digital operator

Status display, Monitor display, Alarm display, Parameter setting, Test operation, Adjustment mode

Dynamic brake circuit

Built-in

Regeneration process circuit

Built-in

Monitors

Spindle monitor (VMON) 2.0 [V] +/-10 [%] (at 1,000 [min⁻¹])
Torque (TCMON) 2.0 [V] +/-10 [%] (at 100 [%])

3.2.2. Input command, position feedback signal output, general input, general output

Position command

Maximum input pulse frequency | 4 [Mpps] (CW+CCW pulse, Code + Pulse train)
Input pulse form | CW+CCW command pulse, Code + Pulse train or 0 [°] -phase difference two-phase pulse train command

Position feedback signal

A/B phase pulse output: N/32,767 (N=1 to 32,767), 1/N (N=1 to 64) or 2/N (N=3 to 64)
Z phase pulse output: 80 [count/rev]

Sequence input

Input power voltage range: 5 [VDC] +/-5 [%] / 12 to 24 [VDC] +/-10 [%], 300[mA] or over
 Servo on, Alarm reset, Torque limit, CW rotation prohibited, CCW rotation prohibited, Command prohibited, Forward discharge, Emergency stop, Gain switching, Internal speed setting, Start of estimation of magnetic pole position, etc.

Sequence output

Circuit power for output signal: 5 [VDC] +/-5 [%] / 12 to 24 [VDC] +/-10 [%], 20 [mA] or over
Servo ready, Power on, Servo on, Torque limiting, Speed limiting, Low speed, Velocity attenuation, Matching speed, Zero speed, Command acceptable, Status of gain switch, Velocity loop proportional control status, CW Over Travel, CCW Over Travel, Warning, Alarm code (3 bit), Start of estimation of magnetic pole position, etc.
3.4. CN1 Signal and function

<table>
<thead>
<tr>
<th>Terminal number</th>
<th>Signal name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>CONT7</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>CONT8</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>CONT9</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>CONT10</td>
</tr>
<tr>
<td>5</td>
<td>17</td>
<td>CONT11</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
<td>CONT12</td>
</tr>
<tr>
<td>7</td>
<td>19</td>
<td>CONT13</td>
</tr>
<tr>
<td>8</td>
<td>20</td>
<td>CONT14</td>
</tr>
<tr>
<td>9</td>
<td>21</td>
<td>CONT15</td>
</tr>
<tr>
<td>10</td>
<td>22</td>
<td>CONT16</td>
</tr>
<tr>
<td>11</td>
<td>23</td>
<td>CONT17</td>
</tr>
<tr>
<td>12</td>
<td>24</td>
<td>CONT18</td>
</tr>
<tr>
<td>13</td>
<td>25</td>
<td>CONT19</td>
</tr>
<tr>
<td>14</td>
<td>26</td>
<td>CONT20</td>
</tr>
<tr>
<td>15</td>
<td>27</td>
<td>CONT21</td>
</tr>
<tr>
<td>16</td>
<td>28</td>
<td>CONT22</td>
</tr>
<tr>
<td>17</td>
<td>29</td>
<td>CONT23</td>
</tr>
<tr>
<td>18</td>
<td>30</td>
<td>CONT24</td>
</tr>
<tr>
<td>19</td>
<td>31</td>
<td>CONT25</td>
</tr>
</tbody>
</table>

**Terminal number 26 to 29:** CW + CCW pulse command, Code + pulse train command or 90°-phase difference two-phase pulse train command can be selected.

**Terminal number 13 to 16, 23 to 27:** Shipping set

**Terminal number 39 to 46:** Shipping set

<table>
<thead>
<tr>
<th>Terminal number</th>
<th>Signal name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13 CONT7</td>
<td>Position command pulse disabled function/shutdown at zero velocity function</td>
</tr>
<tr>
<td>2</td>
<td>14 CONT8</td>
<td>Alarm reset function</td>
</tr>
<tr>
<td>3</td>
<td>15 CONT9</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>16 CONT10</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>17 CONT11</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>18 CONT12</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>19 CONT13</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>20 CONT14</td>
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<td>9</td>
<td>21 CONT15</td>
<td></td>
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<td>10</td>
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<td>11</td>
<td>23 CONT17</td>
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<td>12</td>
<td>24 CONT18</td>
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<td>13</td>
<td>25 CONT19</td>
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<td>14</td>
<td>26 CONT20</td>
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<td>15</td>
<td>27 CONT21</td>
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<td>16</td>
<td>28 CONT22</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>29 CONT23</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>30 CONT24</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>31 CONT25</td>
<td></td>
</tr>
</tbody>
</table>

4.1. Motor cable

4.1.1. Motor cable Reference number

**Example:**

```
M-CA 004 A1 01
```

4.1.2. Dimension

4.2. Converter cable

4.2.1. Converter cable Reference number

**Example:**

```
M-CC 004 A1 01
```

4.2.2. Dimension

5.1. Converter Reference Number

**Example:**

```
M-ECC PB1006 GA 2 01
```

5.2. Dimension
**Application software**

"MEGATORQUE MOTOR SETUP" software for PC provides useful features such as Parameters adjustment, Monitoring, Confirm alarm history, JOG operation and Oscilloscope function.

"MEGATORQUE MOTOR SETUP" software can be downloaded from NSK Web site free of charge. (http://www.nsk.com/)

Optional RS-232C communication cable is available. Reference number : M-FAE0006

- Please use USB port with commercially available RS-232C to USB converter unit if PC does not have a RS-232C COM port. Recommended RS-232C to USB converter unit is , BUFFALO USB serial cable : model BSUSRC0610BS.

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**1. Main menu**
- Read out/Save/Edit parameter setting value.

**2. Parameter edit menu**

**3. Monitor menu**
- Monitor motor operation and parameters.

**4. Alarm history**
- Confirm current and old alarm history.

**5. Jog operation**
- Jog operation for test run.

**6. Positioning operation**
- Positioning by PC for test run.

**7. Trace operation**
- Graphic trace for motor internal data.

**8. System analysis**
- Measure system frequency response.
Selection of MEGATORQUE MOTOR

To select appropriate MEGATORQUE MOTOR, examine the following data.

8.1 Loads on the Motor
(1) Load moment of inertia \( J \)
When the MEGATORQUE MOTOR System is used, the moment of inertia of the load mounted to the Motor rotor will significantly affect the acceleration/deceleration characteristics. Thus, calculation of the moment of inertia of the load \( J \) is required.

(2) Axial load, radial load, and moment load
Ensure the axial load/radial load and the moment load are set within the allowable axial, radial and moment loads. (Refer to ‘2 Motor’ in this catalog for allowable loads. Max. axial load in upside down mounting configuration is +/-0.02 [mm] at 300 [mm] distance from the center.

\[ \theta = \tan^{-1}(0.02) = 1.14^\circ \]  
\[ \tan \theta = 0.02 \div 300 = 0.0000067 \]  
\[ \theta = 0.0000067 \times 180 \div \pi = 0.00198^\circ \]

Due to +/-14 > +/-5, both PB1 and PB3 can be used in terms of repeatability.

8.2 Runout Accuracy
The relationship between external force and load is represented in the following three patterns.

<table>
<thead>
<tr>
<th>Horizontal mounting</th>
<th>Upside down mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axial load: ( F )</td>
<td>-</td>
</tr>
<tr>
<td>Radial load: ( r )</td>
<td>-</td>
</tr>
<tr>
<td>Moment load: ( M )</td>
<td>-</td>
</tr>
</tbody>
</table>

When \( F \) is an external force:
- Axial load: \( F = \text{total weight of jigs and works} \)
- Radial load: \( r = \text{total weight of jigs and works} \)
- Moment load: \( M = \text{total weight of jigs and works} \)

When \( r \) is an external force:
- Axial load: \( F = \text{total weight of jigs and works} \)
- Radial load: \( r = \text{total weight of jigs and works} \)
- Moment load: \( M = \text{total weight of jigs and works} \)

When \( M \) is an external force:
- Axial load: \( F = \text{total weight of jigs and works} \)
- Radial load: \( r = \text{total weight of jigs and works} \)
- Moment load: \( M = \text{total weight of jigs and works} \)

(3) Load torque consideration
When motor takes load torque, both load torque and practical effect torque must be considered.

8.3 Positioning Accuracy
The positioning accuracy of the MEGATORQUE MOTOR System is considered by two respects as follows:
(1) Absolute positioning accuracy
(2) Repeatability

8.4 Positioning Time (Index Time)
Positioning time can be roughly calculated as follows;

\[ \Delta t = \left( \frac{J_O + J_m}{J_O + J_m + J_T} \right) \times \left( \frac{t_f}{N} \right) \]

Where \( J_O \): Rotor moment of inertia \([\text{kg} \cdot \text{m}^2]\)  
\( J_m \): Load moment of inertia \([\text{kg} \cdot \text{m}^2]\)  
\( J_T \): Moment load \([\text{kg} \cdot \text{m}^2]\)  
\( t_f \): Travel time \([\text{s}]\)  
\( N \): Rotational speed \([\text{s}^{-1}]\)

8.5 Selection of External Regenerative resistor
(1) Obtain rotational energy of MEGATORQUE MOTOR during deceleration.
Calculate the rotational energy using the following equation:

\[ \text{Rotational energy} = \frac{1}{2} \times J \times \omega^2 \]

\( J \): Rotor moment of inertia \([\text{kg} \cdot \text{m}^2]\)
\( \omega \): Rotational speed \([\text{rad/s}]\)

When difference is greater than zero, use the following procedure to obtain the required capacity for an external regenerative resistor.

(2) Regenerative energy capacity to internal capacitors.
The regenerative energy capacity of the internal capacitors is different with Driver Reference number.

(3) Calculate energy consumed by external regenerative resistor.
Energy consumed by external regenerative resistor \( J_e \) = Capacitor absorption energy \([\text{J}]\)  
\[ J_e = \frac{1}{2} \times J \times \omega^2 \]

When the difference is zero or less, no external regenerative resistor is necessary.

(4) Calculate required external regenerative resistor.
Required capacity for an external regenerative resistor \( W \)
\[ W = \text{Energy consumed by external regenerative resistor} \times \text{Operation cycle} \times 0.25 \]

When the quotient is 80 or less, use regenerative resistor : M-FAE0004  
When the quotient is 220 or less, use regenerative resistor : M-FAE0005


8.6 Effective Torque Calculations

<table>
<thead>
<tr>
<th>Horizontal mounting</th>
<th>Upside down mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axial load: ( F )</td>
<td>-</td>
</tr>
<tr>
<td>Radial load: ( r )</td>
<td>-</td>
</tr>
<tr>
<td>Moment load: ( M )</td>
<td>-</td>
</tr>
</tbody>
</table>
8.6. Effective torque calculations

When selecting a MEGATORQUE MOTOR, it is necessary to consider the Max. required torque and the required effective torque for the actual operation which must be lower than rated torque.

Determine whether 45° can be positioned in 0.3 [s], assuming the load moment of inertia is 0.12 [kg-m^2].

Also calculate the effective torque when an operation cycle is 2.0 [s].

Conditions:  
- Jm (Load moment of inertia) = 0.12 [kg-m^2]
- Tr (Motor moment of inertia) = 0.014 [kg-m^2]
- T (Torque at speed N) = 15 [Nm] (PB3015 : 1.25 [s^-1])
- Tm (Load torque) = 0 [Nm]

Assuming the load moment of inertia is 0.12 [kg-m^2], the motor is required to rotate at the speed of 1.25 [s^-1] with a torque of 15 [Nm].

θ (Rotational angle) = 45°

Repeatability = ±100 [arc-sec]

Operating precautions

Magnetic pole position estimation

PB motor needs to implement magnetic pole position estimation process at every power cycle to secure its proper performance.

By executing magnetic pole position estimation, motor detects magnetic pole position. Motor makes Max. +/- 18° motion during magnetic pole position estimation must be applied to motor.

In case of wall mounting configuration, no unbalanced load in rotating direction must be applied to motor.

Start motor operation after completion of magnetic pole position estimation.

Installation of motor

- Install and secure the Motor on a rigid base, otherwise mechanical vibrations may occur.
- Mount the motor using the tapped or through-holes.
- The mounting surface flatness should be less than 0.02 [mm].
- The Motor can be attached either horizontally or vertically. (When the motor is mounted upside down, the allowable axial load has a limitation.)
- Take care not to push up the underside cover when attaching the motor.
- Please see below figure for counterbore depth from base top.
- The bend radius of the motor cable lead and the resolver cable lead should be R30 [mm] or more. Do not use the leads of the motor cable and the resolver cable with flexing motion.

Warranty information

The warranty period is 1 year from the date of purchase, excluding labor costs.

Conditions:

- Jm (Load moment of inertia) = 0.12 [kg-m^2]
- Tr (Motor moment of inertia) = 0.014 [kg-m^2]
- T (Torque at speed N) = 15 [Nm] (PB3015 : 1.25 [s^-1])
- Tm (Load torque) = 0 [Nm]
- θ (Rotational angle) = 45°
- θ (Settling time) = 0.04 [s]
- t (Settling time) = 0.24 [s]

Calculation:

- Acceleration time, t_a = (Jm + Tr) / (2πN / T) = (0.12 + 0.014) / (2π × 1.25) / (15 / 1.4 - 0) = 0.1 [s]
- Travel time, t = 45 / (360 × 1.25) + 0.1 = 0.2 [s]
- Positioning time, t = t_a + t = 0.2 + 0.04 = 0.24 [s]

The effective torque required for the actual operational pattern in use (see following diagram) needs to be examined.

Also determine whether the PB3015 meets the operational conditions.

Also calculate the effective torque for an operation cycle of 2.0 [s].

An effective torque of 4.4 [Nm] is determined by multiplying the equation above by a temperature coefficient of 1.3, which is less than the PB3015's rated output torque of 5.0 [Nm]. Therefore, the PB3015 sufficiently meets the operational conditions and no external regenerative resistor is necessary.

In case results do not meet rated torque ≥ effective torque, recalculation with revised conditions is required.

(Note) Since the installation condition shown below can cause mechanical resonant vibration or failure of estimation of magnetic pole due to low rigidity of the mounting base and the load, installation of motor to mounting base and load to motor have to be secure and rigid.
Warranty Period

- The warranty period is either one year from delivery or 2,400 hours of operation, whichever comes first.

Limited warranty

- The warranty is limited to the products supplied by NSK Ltd.
- The defective products will be repaired free of charge within the applicable warranty period.
- Repairs after expiration of the applicable warranty period will be subject to payment.

Immunities

- The products are not warranted in one of the following cases even within the warranty period.
  - Failure of the unit due to installation and operation not in accordance with the instruction manual specified by the supplier.
  - Failure of the unit due to improper handling and use, modification and careless handling by the user.
  - Failure of the unit due to the causes other than those attributable to the supplier.
  - Failure of the unit due to modification or repair that is conducted by a person(s) or party(ies) other than the supplier.
  - Other types of failure due to natural disasters and accidents (causes not attributable to the responsibility of the supplier).
- Damages induced by a failure if the supplied unit are not covered.

Service Fee

- Prices of goods do not include any applicable service charges, such as the dispatching of engineers.
- Startup or maintenance services that require the dispatching of engineers are subject to payment even during the applicable warranty period.

Discontinuation of Production and Maintenance Service Period

- Any discontinuation of production will be announced one year in advance. The maintenance service period is five (5) years after discontinuation of production. Announcement will be released by the supplier or published on the NSK Web site.

Special – purpose Applications

- This product is intended for general industrial applications and is not designed or manufactured for use under dangerous conditions.
- Contact NSK before using this product for any special-purpose applications, including nuclear power equipment and systems or aerospace, medical, and safety devices.
- While this product is manufactured under strict quality controls, NSK recommends that an appropriate safety device be installed when used with equipment that could cause serious accidents or damage in the event of product failure.
# Form for Requesting MEGATORQUE MOTOR Selection

NSK will assist in selecting the optimal MEGATORQUE MOTOR. Please fill in the necessary items on the below form and send it by fax to the local NSK office. Items marked with (*) represent the important information required for selection. Please provide as much detail as possible.

### To My, XXX XXX, in charge of Precision Machinery & Parts, NSK

### To

**Company Name:** YYY Corporation  
**Contact:** TEL 03-1234-5678 FAX 03-1234-5678  
**Name:** YYY

#### Application and equipment used

- Specify with as much detail as possible.

#### Motor installation position

- Horizontal mounting  
- Wall mounting  
- Upside down mounting  
- Others

Schematic drawing (an attached illustration showing outside dimensions is acceptable)

- Please provide information on outside dimensions, dimensions from the center, material, etc.

#### Load conditions

- Geometry, dimensions, thickness, material (or mass) of table  
- Dimensions, mass, quantity of loads  
- PCD (distance between the jigs/loads) (example of description)  
- External force (pressure/impact load, sliding friction, etc.)

*Specify position, direction, etc. in the schematic drawing.

**Attachment:** Yes  
**No**

#### Motor size requested

**Positioning command system**

- Internal program system  
- Pulse train input operation  
- RS-232C operation  
- CC-Link

**Index angle / Number of points**

- Settle at  
- Number of points:

**Repeatability (°/s)**

- Specify setting time.

**Cycle (desired positioning time)**

- Attachments:

**Input power voltage**

- 100 to 220 [VAC]  
- 200 to 230 [VAC]  
- Others ( [VAC])

**Environmental conditions**

- Operating environment (equivalent to IP50)  
- Oil, water and chemical  
- Chips and dust  
- Clean  
- Contact NSK for details.

**Cable specification and length**

- Stationary cable  
- Flexible cable  
- Length: [m]  
- Select “Movable” when cable is repeatedly bent anywhere along the wiring route.

Other request items

Please reply by January 12, 20XX. (example)

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### Example of completed form

To

**Company Name:** YYY Corporation  
**Contact:** TEL 03-1234-5678 FAX 03-1234-5678  
**Name:** YYY

#### Application and equipment used

- Semiconductor inspection machine

#### Motor installation position

- Horizontal mounting  
- Wall mounting  
- Upside down mounting  
- Others

Schematic drawing (an attached illustration showing outside dimensions is acceptable)

- Please provide information on outside dimensions, dimensions from the center, material, etc.

#### Load conditions

- Geometry, dimensions, thickness, material (or mass) of table  
- Dimensions, mass, quantity of loads  
- PCD (distance between the jigs/loads) (example of description)  
- External force (pressure/impact load, sliding friction, etc.)

*Specify position, direction, etc. in the schematic drawing.

**Attachment:** Yes  
**No**

#### Motor size requested

**Positioning command system**

- Internal program system  
- Pulse train input operation  
- RS-232C operation  
- CC-Link

**Index angle / Number of points**

- Settle at  
- Number of points:

**Repeatability (°/s)**

- Specify setting time.

**Cycle (desired positioning time)**

- Attachments:

**Input power voltage**

- 100 to 220 [VAC]  
- 200 to 230 [VAC]  
- Others ( [VAC])

**Environmental conditions**

- Operating environment (equivalent to IP50)  
- Oil, water and chemical  
- Chips and dust  
- Clean  
- Contact NSK for details.

**Cable specification and length**

- Stationary cable  
- Flexible cable  
- Length: [m]  
- Select “Movable” when cable is repeatedly bent anywhere along the wiring route.

Other request items

Please reply by January 12, 20XX. (example)