Megatorque Motor®
Direct Drive Motor YS Series
Conformity with CE Marking Directives

New models to suit an even wider range of performance requirements
The YS Series system combines NSK’s technical excellence and reliability with outstanding performance and features including:

- simple motor structure and dedicated compact driver units for low cost
- standard stock for short delivery times
- interchangeability of motors, Driver Units and cable sets (lengths 2–30m)
- high resolution, full closed-loop control and zero backlash for high precision
- high load-capacity bearings
- max. torque 240 N•m
- max. speed 3 rps
- repeatability of ±2.1 sec
- hollow-core structure allowing wires and pipes to run inside the motor
- an auto-tuning function to eliminate the time-consuming task of gain adjustment
- conformity with CE Marking requirements

The Megatorque Motor®
The YS Series

The NSK Megatorque Motor is a direct drive motor which achieves highly precise positioning with very high torque at low speed.

The YS Series combines the performance and reliability of the existing Megatorque Motor range with the advantages of compact size and simple design for low cost. In addition to five standard motors that cover a wide range of performance requirements while assuring low cost and short delivery times, NSK now offers special order motors featuring a low profile, knock-pin holes or a brake. All Megatorque Motors in the YS Series conform to European safety requirements and bear the CE Marking. A new analog command function had been added to the dedicated ESA25 Driver Unit.

The Megatorque Motor is suitable for a wide range of industrial applications, including use as a rotary actuator for robots, transfer systems, chamfering machines and printing machines or as a rotary indexer for assembly machines, welding systems, measuring instruments and machining centers.

How to Use This Guide

Use this guide to select the motors, driver units and accessories you need for your application. Pages 3–23 describe the principal specifications and characteristics of each component in the motor system. On page 24 you will find notes on the CE Marking and precautions for using products bearing the CE Marking. Finally, pages 25–26 list all of the product numbers you will need to order a complete system.

If you have any questions, or would like more detailed information about any aspect of the Megatorque Motors’ YS Series, please contact your NSK representative at one of our worldwide offices listed on the back cover.
Standard Type Motors & Motors with Knock-pin Holes

The NSK Megatorque Motor is a direct drive motor which eliminates all gears and other transmission mechanisms to achieve very high torque at low speeds. The YS Series offers five standard type motors, assuring low cost and short delivery times. Motors with knock-pin holes, motors with a brake and low-profile motors are also available.

The Megatorque Motors’ YS Series features:
- high torque at low speed—up to 240 N•m
- repeatability of ±2.1 sec
- brushless structure and permanently lubricated heavy duty bearings for maintenance-free operation
- high axial and moment rigidity
- hollow-core structure allowing wires or pipes to run inside the motor

Principal Specifications

Five standard type motors and five motors with knock-pin holes in the YS Series

If your requirements differ from the standard specifications, please contact NSK.

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum torque (Nm)</td>
<td>40</td>
<td>40</td>
<td>80</td>
<td>80</td>
<td>120</td>
<td>120</td>
<td>240</td>
<td>240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum stall torque (Nm)</td>
<td>15</td>
<td>35</td>
<td>70</td>
<td>105</td>
<td>195</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum current/phase (A)</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable axial load (N)</td>
<td>3700</td>
<td>4500</td>
<td>9500</td>
<td>19600</td>
<td>19600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable moment load (Nm)</td>
<td>60</td>
<td>80</td>
<td>160</td>
<td>400</td>
<td>400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial rigidity (mm/N)</td>
<td>4.0×10^6</td>
<td>3.0×10^6</td>
<td>1.4×10^6</td>
<td>1.0×10^6</td>
<td>1.0×10^6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moment rigidity (rad/Nm)</td>
<td>3.5×10^6</td>
<td>2.5×10^6</td>
<td>1.5×10^6</td>
<td>3.0×10^6</td>
<td>3.0×10^6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotor moment of inertia (kg•m^2)</td>
<td>0.007</td>
<td>0.020</td>
<td>0.065</td>
<td>0.212</td>
<td>0.255</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotor inertia GD2 (kgf•m^2)</td>
<td>0.008</td>
<td>0.090</td>
<td>0.260</td>
<td>0.860</td>
<td>1.020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>10</td>
<td>16</td>
<td>29</td>
<td>55</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Temperature: 0–40°C, Humidity: 20–80% Use indoors, free from dust, condensation and corrosive gases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum speed (r/min)</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution resolution (p/rev)</td>
<td></td>
<td></td>
<td>614400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolver accuracy (usec)</td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolver repeatability (sec)</td>
<td></td>
<td></td>
<td>±2.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compatible driver units:
- M-ESA-Y2020T23
- M-ESA-Y3040T23
- M-ESA-Y4080T23
- M-ESA-Y5120T23
- M-ESA-Y5240T23

M-YS2020GN001 (standard type motor)

The figures on pages 4–8 show the external dimensions of the five standard motors in the YS Series and the five motors with knock-pin holes. Please check that the motors you plan to order will fit your workspace specifications.

M-YS3040GN001 (standard type motor)

For dimensions marked *, an extra 2–3 mm allowance is required for your workspace due to their variations.
Motor Dimensions

M-YS4080GN001 (standard type motor)

M-YS5240GN001 (standard type motor)

M-YS5120GN001 (standard type motor)

M-YS2020GN011 (with knock-pin holes)

For dimensions marked *, an extra 2–3 mm allowance is required for your workspace due to their variations.

Unit: mm

For dimensions marked *, an extra 2–3 mm allowance is required for your workspace due to their variations.

Unit: mm

For dimensions marked *, an extra 2–3 mm allowance is required for your workspace due to their variations.

Unit: mm

For dimensions marked *, an extra 2–3 mm allowance is required for your workspace due to their variations.

Unit: mm
Motor Dimensions

M-YS3040GN511 (with knock-pin holes)

M-YS5120GN011 (with knock-pin holes)

For dimensions marked *, an extra 2–3 mm allowance is required for your workspace due to their variations.

M-YS4080GN011 (with knock-pin holes)

M-YS5240GN011 (with knock-pin holes)

For dimensions marked *, an extra 2–3 mm allowance is required for your workspace due to their variations.
**Motor Dimensions**

The figures on pages 10–11 show the external dimensions of the four motors in the YS Series with an integral brake. Please check that the motors you plan to order will fit your workspace specifications.

### M-YS2020GG001 (with brake)

For dimensions marked *, an extra 2–3 mm allowance is required for your workspace due to their variations.

### M-YS3040GG001 (with brake)

For dimensions marked *, an extra 2–3 mm allowance is required for your workspace due to their variations.

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**Motors with Brakes**

The Megatorque Motors’ YS Series includes four motors with an integral brake that is actuated by an external power supply.

For detail of brake power supply, see page 19.

### Principal Specifications

Four motors with knock-pin holes in the YS Series

If your requirements differ from the standard specifications, please contact NSK.

<table>
<thead>
<tr>
<th>Motors with brakes</th>
<th>M-YS2020GG001</th>
<th>M-YS3040GG001</th>
<th>M-YS4080GG001</th>
<th>M-YS5120GG001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum torque(1) (Nm)</td>
<td>20</td>
<td>40</td>
<td>80</td>
<td>120</td>
</tr>
<tr>
<td>Maximum stall torque (Nm)</td>
<td>15</td>
<td>35</td>
<td>70</td>
<td>105</td>
</tr>
<tr>
<td>Maximum current/phase (A)</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Allowable axial load(2) (N)</td>
<td>3700</td>
<td>4500</td>
<td>9500</td>
<td>19600</td>
</tr>
<tr>
<td>Allowable moment load(3) (N•m)</td>
<td>60</td>
<td>80</td>
<td>160</td>
<td>400</td>
</tr>
<tr>
<td>Axial rigidity(3) (mm/N)</td>
<td>4.0×10⁻⁶</td>
<td>3.0×10⁻⁶</td>
<td>1.4×10⁻⁶</td>
<td>1.0×10⁻⁶</td>
</tr>
<tr>
<td>Moment rigidity(3) (rad/N•m)</td>
<td>3.5×10⁻⁶</td>
<td>2.5×10⁻⁶</td>
<td>1.5×10⁻⁶</td>
<td>3.0×10⁻⁶</td>
</tr>
<tr>
<td>Rotor moment of inertia (kg•m²)</td>
<td>0.008</td>
<td>0.023</td>
<td>0.072</td>
<td>0.240</td>
</tr>
<tr>
<td>Rotor inertia GD² (kgf•m²)</td>
<td>0.032</td>
<td>0.092</td>
<td>0.288</td>
<td>0.960</td>
</tr>
<tr>
<td>Brake output torque (N•m)</td>
<td>20</td>
<td>40</td>
<td>80</td>
<td>120</td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>12</td>
<td>20</td>
<td>36</td>
<td>66</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating conditions</th>
<th>Temperature: 0–40°C, Humidity: 20–80%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum speed (rad/s)</td>
<td>3</td>
</tr>
<tr>
<td>Resolver resolution (p/rev)</td>
<td>614400</td>
</tr>
<tr>
<td>Resolver accuracy (sec)</td>
<td>150</td>
</tr>
<tr>
<td>Resolver repeatability (sec)</td>
<td>±0.1</td>
</tr>
</tbody>
</table>

### Notes:

(1) unit system: 1N = 0.225 lb; 1N•m = 0.738 ft•lb
(2) These values assume that the motor is mounted on a rigid base.
(3) For details of how to calculate axial and moment loads, see page 21.
(4) For the compatible Driver Units, see pages 14–17.

Megatorque Motors’ YS Series can be run on either 200/220V or 100/110V AC.

For order numbers of compatible Driver Units, cables and other accessories, see pages 25–26.

(5) Please consult NSK if the application requires more than 2(s⁻¹) continuous revolutional speed in the same direction.
Low-profile Motors

The Megatorque Motors’ YS Series includes two motors with an extra-low profile for use in conditions where space is at a premium.

Principal Specifications

The two low-profile motors in the YS Series

If your requirements differ from the standard specifications, please contact NSK.

<table>
<thead>
<tr>
<th>Low-profile motors</th>
<th>M-YS2005GN001</th>
<th>M-YS3008GN001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum torque(2) (N•m)</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Maximum stall torque (N•m)</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Maximum current/phase (A)</td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td>Allowable axial load(3) (N)</td>
<td>3700</td>
<td>4500</td>
</tr>
<tr>
<td>Allowable moment load(3) (N•m)</td>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>Axial rigidity(1) (mm/N)</td>
<td>2.8 × 10^-5</td>
<td>2.6 × 10^-5</td>
</tr>
<tr>
<td>Moment rigidity(1) (rad/N•m)</td>
<td>1.8 × 10^-5</td>
<td>1.5 × 10^-5</td>
</tr>
<tr>
<td>Rotor moment of inertia (kg•m²)</td>
<td>0.003</td>
<td>0.006</td>
</tr>
<tr>
<td>Rotor inertia GD² (kgf•m²)</td>
<td>0.012</td>
<td>0.024</td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

Operating conditions

Temperature: 0–40°C, Humidity: 20–80% Use indoors, free from dust, condensation and corrosive gases

Maximum speed [s⁻¹ (rps)]

- 32 (5)/3 (6)

Resolver resolution (p/rev)

- 614400

Resolver accuracy (sec)

- 150

Resolver repeatability (sec)

- ±2.1

Compatible driver units(4)

- M-ESA-Y2005T23
- M-ESA-Y2005V23
- M-ESA-Y2005T25
- M-ESA-Y2005V25
- M-ESA-Y3008T23
- M-ESA-Y3008V23
- M-ESA-Y3008T25
- M-ESA-Y3008V25

Notes:

SI unit system: 1N = 0.225 lb; 1N•m = 0.738 ft•lb
(1) These values assume that the motor is mounted on a rigid base.
(2) For speed-torque characteristics, see page 20.
(3) For details of how to calculate axial and moment loads, see page 21.
(4) For the compatible Driver Units, see pages 14–17.
(5) On 100/110V AC
(6) On 200/220V AC
Megatorque Motor’s YS Series can be run on either 200/220V or 100/110V AC.
For order numbers of compatible Driver Units, cables and other accessories, see pages 25–26.
(7) Please consult NSK if the application requires more than 2(s⁻¹) continuous revolulutinal speed in the same direction.
Megatorque Motor®

Motor Dimension

The figures on this page show the external dimensions of the two low-profile motor in the YS Series. Please check that the motors you plan to order will fit your workspace specifications.

M-YS2005GN001 (low-profile)

These figures show the external dimensions of the ESA Driver Units.

ESA Driver Units

The compact low-cost ESA Driver Units are specially designed for use with YS and Megatorque Motors’ YS Series. They feature a built-in auto-tuning function to eliminate the time-consuming task of gain compensation and a new analog speed or torque command function.

There are seven basic ESA Driver Units, one to suit the maximum torque of each size of Megatorque Motor. Each is available in two version, the ESA23 version having a wider range of functions than the ESA23 version, and available in either 100/110V or 200/220V AC types (except for the M-ESAYS240 models which run only on 200/220V), giving a total of 26 standard models (see table below).

When ordering, please specify the power supply and motor model you plan to use as some Driver Units may be incompatible with some motors.

Driver Unit Dimensions

These figures show the external dimensions of the ESA Driver Units.

ES23 version

Principal Specifications

The twenty-six standard models of ESA Driver Units

<table>
<thead>
<tr>
<th>Driver unit reference number</th>
<th>ESA23 models</th>
<th>ESA25 models</th>
<th>ESA23 models</th>
<th>ESA25 models</th>
</tr>
</thead>
</table>

Unit: mm

For dimensions marked *, an extra 2–3 mm allowance is required for your workspace due to their variations.
### ESA23 Driver Unit

**Input and Output Signals for CN2**

<table>
<thead>
<tr>
<th>Code</th>
<th>Pin No.</th>
<th>Name</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>CWP+</td>
<td>CW pulse train (+)</td>
<td>Turns rotor clockwise(^\text{1}) using a pulse train</td>
</tr>
<tr>
<td>21</td>
<td>CWP−</td>
<td>CW pulse train (−)</td>
<td>(Either pulse train or A-phase can be selected)</td>
</tr>
<tr>
<td>7</td>
<td>CCWP+</td>
<td>CCW pulse train (+)</td>
<td>Turns rotor counterclockwise(^\text{2}) using a pulse train</td>
</tr>
<tr>
<td>20</td>
<td>CCWP−</td>
<td>CCW pulse train (−)</td>
<td>(Either pulse train or B-phase can be selected)</td>
</tr>
<tr>
<td>25</td>
<td>SVON</td>
<td>Servo on</td>
<td>Turns the servo on</td>
</tr>
<tr>
<td>9</td>
<td>PRG0</td>
<td>Program/channel select (0)(^*)</td>
<td>In combination, internal program/channel selections 0–3 allow selection of functions shown in the four tables on the right.</td>
</tr>
<tr>
<td>10</td>
<td>PRG1</td>
<td>Program/channel select (1)(^*)</td>
<td>(2)0–15 execution channels</td>
</tr>
<tr>
<td>11</td>
<td>PRG2</td>
<td>Program/channel select (2)(^*)</td>
<td>In combination, internal program/channel selections 0–3 allow selection of functions shown in the four tables on the right.</td>
</tr>
<tr>
<td>12</td>
<td>PRG3</td>
<td>Program/channel select (3)(^*)</td>
<td>Input and Output Signals for CN2</td>
</tr>
</tbody>
</table>

### ESA25 Driver Unit

**Input and Output Signals for CN2**

<table>
<thead>
<tr>
<th>Code</th>
<th>Pin No.</th>
<th>Name</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>CWP+</td>
<td>CW pulse train (+)</td>
<td>Turns rotor clockwise(^\text{1}) using a pulse train</td>
</tr>
<tr>
<td>21</td>
<td>CWP−</td>
<td>CW pulse train (−)</td>
<td>(Either pulse train or A-phase can be selected)</td>
</tr>
<tr>
<td>7</td>
<td>CCWP+</td>
<td>CCW pulse train (+)</td>
<td>Turns rotor counterclockwise(^\text{2}) using a pulse train</td>
</tr>
<tr>
<td>20</td>
<td>CCWP−</td>
<td>CCW pulse train (−)</td>
<td>(Either pulse train or B-phase can be selected)</td>
</tr>
<tr>
<td>15</td>
<td>DRDY+</td>
<td>Driver Unit ready (+)</td>
<td>When closed, signal that Driver Unit is ready for commands</td>
</tr>
<tr>
<td>12</td>
<td>DRDY−</td>
<td>Driver Unit ready (−)</td>
<td>(Open if Driver Unit is not ready and during alarms)</td>
</tr>
<tr>
<td>10</td>
<td>CLR</td>
<td>Clear</td>
<td>Clears alarms and the positioning deviation counter</td>
</tr>
<tr>
<td>11</td>
<td>HLS</td>
<td>Home limit switch</td>
<td>Completes the return home operation</td>
</tr>
<tr>
<td>22</td>
<td>OTP</td>
<td>Overtravel limit (−)</td>
<td>Overtravel signal in counterclockwise direction</td>
</tr>
<tr>
<td>23</td>
<td>OTM</td>
<td>Overtravel limit (+)</td>
<td>Overtravel signal in counterclockwise direction</td>
</tr>
</tbody>
</table>

### Pin Arrangement

- **CN2 pin arrangement**
- **CN5 pin arrangement**

The brake output signal is intended to control the brake. Do not use it as the power supply. You can connect the CN2 or CN5 pins to suit the requirements of your application.

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**Notes:**

1. Direction as seen from the output rotor.
2. These four signals can be changed to the functions shown in the four tables on the right by selecting the parameter setting code via the Handy Terminal.
When setting up a Megatorque Motor system for the first time or if the motor is not connected to a personal computer, you will need a Handy Terminal to input parameters and programs. The Handy Terminal uses an RS-232C interface.

**Handy Terminal**

When setting up a Megatorque Motor system for the first time or if the motor is not connected to a personal computer, you will need a Handy Terminal to input parameters and programs. The Handy Terminal uses an RS-232C interface.

**Order number** M-FHT11

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**Motor and Driver Unit Cable Set**

The motor and driver cable set is made of NSK’s special Robot Cable, which will stand up to repeated bending.

Please note that motors with a brake need a special cable (see table and diagrams below).

Cables are available in standard lengths of 2, 4, 8, 15 and 30 meters.

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**Accessories**

**Motor and Driver Unit Cable Set**

The motor and driver cable set is made of NSK’s special Robot Cable, which will stand up to repeated bending.

Please note that motors with a brake need a special cable (see table and diagrams below).

Cables are available in standard lengths of 2, 4, 8, 15 and 30 meters.

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**Handy Terminal**

When setting up a Megatorque Motor system for the first time or if the motor is not connected to a personal computer, you will need a Handy Terminal to input parameters and programs. The Handy Terminal uses an RS-232C interface.

**Order number** M-FHT11
### Choosing a Motor

When selecting a motor, please take note of the characteristics described on the next four pages.

### Speed-torque Characteristics

Each of the Megatorque Motors’ YS Series gives very high torque at low speeds. These graphs show the speed-torque characteristics at 200V and 100V AC.

#### Power supply: 200V AC

- **Ys Series**
  - M-YS2020
  - M-YS3040
  - M-YS4080
  - M-YS5120
- **Inductive load current (A)**
  - 0.36
  - 0.50
  - 0.66
  - 0.72

#### Power supply: 100V AC

- **Ys Series**
  - M-YS2005
  - M-YS3008
  - M-YS2020
  - M-YS3040
  - M-YS4080
  - M-YS5120
- **Inductive load current (A)**
  - 0.36
  - 0.50
  - 0.66

### Accuracy Standards

- The YS Series achieves small runout:
  - Axis runout (mm): 0.050 max.
  - Radial runout (mm): 0.050 max.

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**Accessories**

**Brake Power Supply (M-FZ063-1)**

The M-FZ063 brake power supply is specially designed for use with the YS Series motors with a brake. The power supply is of the overexcitation type, allowing it to be switched between full- and half-wave settings (overexcitation, full-wave rectification, retention, half-wave). It conforms to CE safety requirements.

### Specifications of the Brake Power Supply

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>200/220V AC, 50/60 Hz</td>
</tr>
<tr>
<td>Output voltage</td>
<td>180V DC, 4A (overexcitation)</td>
</tr>
<tr>
<td>Output voltage (full-wave)</td>
<td>90V DC, 2A (rated)</td>
</tr>
<tr>
<td>Overexcitation time</td>
<td>0.35 seconds</td>
</tr>
<tr>
<td>Mass</td>
<td>0.9 kg</td>
</tr>
</tbody>
</table>

### Connecting the Terminals

- **Motor No:** starting M-YS3020, M-YS3040, M-YS4080, M-YS5120
- **Inductive load current (A):** 0.36, 0.50, 0.66, 0.72

### Recommended Sequence Diagram

#### A case to increase holding rigidity

- Brake state:
  - Motor on: ON
  - Motor off: OFF
- IPOS input:
  - Close: ON
  - Open: OFF
  - Clamping time + α
  - Releasing time + α

#### A case for safety brake

- Brake state:
  - Close: ON
  - Open: OFF
  - Clamping time + α
  - Releasing time + α

- IPOS input:
  - Close: ON
  - Open: OFF
  - Clamping time + α
  - Releasing time + α

- Motor type:
  - YS2020
  - YS3040
  - YS4080
  - YS5120
  - Brake model:
    - MNB3K
    - MNB4K
    - MNB5K
    - MNB6K
  - Brake static friction torque (N•m):
    - 30
    - 40
    - 80
    - 120
  - Torsional rigidity (sec./N•m):
    - 4.5
    - 4.9
    - 1.0
    - 1.9
  - Brake clamping time (msec):
    - 26
    - 31
    - 40
    - 74
  - Clamp releasing time (msec):
    - 10
    - 3
    - 20
    - 9
  - Capacity (W):
    - 17
    - 23
    - 20
    - 33

---

**Dimensions of Brake Power Supply**

---

**Recommended Sequence Diagram**

---

**Accuracy Standards**

- The YS Series achieves small runout:
  1. Axial runout (mm): 0.050 max.
  2. Radial runout (mm): 0.050 max.
Choosing a Motor

Maximum Speed-load Characteristics

This graph shows the maximum speed of each motor when rotated through 180° under a load.

Important: This graph does not show maximum inertia values. If you plan to use a YS Series motor at or near the inertia limit, please consult NSK before placing your order.

How to Calculate Axial and Moment Loads

Axial and moment loads

If $F$ is an external force, then
- Axial load $F_a = F - \text{weight of payload}$
- Moment load $M = 0$

If $F$ is an external force, then
- Axial load $F_a = F - \text{weight of payload}$
- Moment load $M = F \times L$

If $F$ is an external force, then
- Axial load $F_a = \text{weight of payload}$
- Moment load $M = F(L + A)$

Power supply:
- 200/220V AC
- 100/110V AC

Degrees rotated:
- 15°
- 30°
- 45°
- 90°
- 180°

How to Determine Minimum Positioning Time

For your reference, this page shows how to determine minimum positioning time with Megatorque Motors’ YS Series.

To determine minimum positioning time, find the total of the moment of inertia of the work or jig mounted on the motor and the moment of inertia of the motor itself, then read off the minimum positioning time from the appropriate graph below.

Example

Motor: M-YS3008
Total moment of inertia: 1.25 kg•m² (GD² = 5 kgf•m²)
Index angle: 30°
In this case, the minimum positioning time will be 0.5 sec. as shown by the arrow on page 23.
CE Marking

Outline

Before any item of machinery can be exported to a country in the European Union, it must conform to the new European system of safety requirements (CE Marking). The CE Marking certifies that a product conforms to EC directives. NSK has worked with specialist consultants, an EU Notified Body and an EU Competent Body to ensure that all products in the Megatorque Motors’ YS Series conform to the CE Marking Directives.

NSK positions the YS Series as “components” to be incorporated in any system that you, the user, may build and has published an “EC declaration of incorporation” to this effect. This is intended to facilitate their incorporation into your system and the CE Marking of the overall system.

The pertinent EC directives are as follows:

- **Machinery Directive**  
  Effective as of January 1, 1995
  A directive governing mechanical, electrical and human safety

- **Electromagnetic Compatibility Directive**  
  Effective as of January 1, 1996
  A directive governing the effect of electromagnetic waves on other devices

- **Low Voltage Directive**  
  Effective as of January 1, 1997
  A directive governing electrical safety

If you plan to incorporate a Megatorque Motor into your own system, you must:

- install an isolation transformer and circuit breaker in front of the main power supply
- install a noise filter(s) in front of the main power supply
- install a circuit that will shut down the main power supply on detecting output from the motor’s internal thermal sensor
- provide additional protection against water and foreign particles, depending on the specifications of the system into which the motor is to be incorporated (for more information, please contact NSK)

Example Wiring Diagram

For your convenience, we offer this example of a wiring diagram of a system incorporating a Megatorque Motor.
### Determining Your Requirements

These two pages give all the numbers you will need to order any product from the YS Series or a complete Megatorque Motor system. For your convenience, the numbers are grouped according to compatibility of components, the order numbers for the appropriate ESA Driver Unit and cable sets being shown next to the order numbers for the Megatorque Motors.

## Order Numbers

### Systems based on a YS motor in standard inventory

#### Combinations with ESA23 Driver Units

<table>
<thead>
<tr>
<th>Motor order no.</th>
<th>Cable set order no.</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-YS3000G001</td>
<td>M-C015SS29</td>
<td>15m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C030SS29</td>
<td>30m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C008SS29</td>
<td>8m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C004SS29</td>
<td>4m</td>
</tr>
</tbody>
</table>

**Note:** M-YS240 motors are available only in 200V AC versions.

#### Combinations with ESA25 Driver Units

<table>
<thead>
<tr>
<th>Motor order no.</th>
<th>Cable set order no.</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-YS3000G001</td>
<td>M-C015SS29</td>
<td>15m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C030SS29</td>
<td>30m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C008SS29</td>
<td>8m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C004SS29</td>
<td>4m</td>
</tr>
</tbody>
</table>

**Note:** M-YS240 motors are available only in 200V AC versions.

#### System based a YS motor with knock-pin holes

#### Combinations with ESA23 Driver Units

<table>
<thead>
<tr>
<th>Motor order no.</th>
<th>Cable set order no.</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-YS3000G001</td>
<td>M-C015SS29</td>
<td>15m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C030SS29</td>
<td>30m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C008SS29</td>
<td>8m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C004SS29</td>
<td>4m</td>
</tr>
</tbody>
</table>

**Note:** M-YS240 motors are available only in 200V AC versions.

#### Combinations with ESA25 Driver Units

<table>
<thead>
<tr>
<th>Motor order no.</th>
<th>Cable set order no.</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-YS3000G001</td>
<td>M-C015SS29</td>
<td>15m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C030SS29</td>
<td>30m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C008SS29</td>
<td>8m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C004SS29</td>
<td>4m</td>
</tr>
</tbody>
</table>

**Note:** M-YS240 motors are available only in 200V AC versions.

#### System based on a YS motor with a brake

#### Combinations with ESA25 Driver Units

<table>
<thead>
<tr>
<th>Motor order no.</th>
<th>Brake set order no.</th>
<th>Brake power supply</th>
<th>Supply voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-YS3000G001</td>
<td>M-C002SS29</td>
<td>M-EDA-Y3002V25</td>
<td>100V AC</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C002SS29</td>
<td>M-EDA-Y3002V25</td>
<td>100V AC</td>
</tr>
</tbody>
</table>

**Note:** The external brake power supply runs only on 200V AC. If you plan to use a 100V AC power supply, you will need a voltage transformer.

## System based on a low-profile YS motor

#### Combinations with ESA23 Driver Units

<table>
<thead>
<tr>
<th>Motor order no.</th>
<th>Cable set order no.</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-YS3000G001</td>
<td>M-C015SS29</td>
<td>15m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C030SS29</td>
<td>30m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C008SS29</td>
<td>8m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C004SS29</td>
<td>4m</td>
</tr>
</tbody>
</table>

#### Combinations with ESA25 Driver Units

<table>
<thead>
<tr>
<th>Motor order no.</th>
<th>Cable set order no.</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-YS3000G001</td>
<td>M-C015SS29</td>
<td>15m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C030SS29</td>
<td>30m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C008SS29</td>
<td>8m</td>
</tr>
<tr>
<td>M-YS3000G01</td>
<td>M-C004SS29</td>
<td>4m</td>
</tr>
</tbody>
</table>

### Handy Terminal

The Handy Terminal is compatible with all motors and Driver Units.

- **Caution:**
  - Do not use these units in environments prone to fire or explosion.
  - Please read the instruction manual carefully before using these units.

## Order Form

Please use this form to list your system requirements. The information you give us will help to ensure that the components selected provide the optimum performance for your needs. If you would like more information about any aspect of the Megatorque Motor system, please contact your NSK representative at one of our worldwide offices listed on the back cover.

### Your name and title

### Address

### Phone:  
Fax:

<table>
<thead>
<tr>
<th>Motor load capacity required</th>
<th>Axial load_______(N)</th>
<th>How many ESA Driver Units do you need? _______of model M-ESA _____</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. motor speed required</td>
<td>____ (rps)</td>
<td>How many Handy Terminals do you need? _____of model M-FHT11</td>
</tr>
<tr>
<td>Power supply to be used</td>
<td>100V or 200V AC</td>
<td>How many cables do you need? ****of model M-C0 _______</td>
</tr>
<tr>
<td>How many Megatorque Motors do you need? _______of model M-YS _______</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Please complete order number)