One-touch Servo
MELSERVO-JN
Easy Operation and High Performance, with Small Body!!

One-touch Servo MELSERVO-JN

The one-touch servo MELSERVO-JN, produced to offer you a high-performance operation control with much simpler process! It brings the optimal operations to your factory line with the easiest operations like never before, such as one-touch tuning.

Let’s use One-touch tuning!!

Products shown in actual size.

**Servo amplifier**

<table>
<thead>
<tr>
<th>Model</th>
<th>Command Interface</th>
<th>Control mode</th>
<th>Power supply voltage</th>
<th>Compatible servo motor capacity (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR-JN-10A (1)</td>
<td>Pulse train</td>
<td>- 1 2 3 4</td>
<td>Main circuit: 100VAC/100VAC, Control circuit: 24VDC</td>
<td>0.05 to 0.4*4</td>
</tr>
</tbody>
</table>

*1 Analog interface is not equipped. Internal setting only.  
*2 Positioning can be performed either with point table method or with program method.  
*3 MR-JN-10A1 and -20A1 are available.  
*4 The capacity is 0.5kW to 2.5kW for 3-phase 100VAC.

**Servo motor**

<table>
<thead>
<tr>
<th>Servo motor series</th>
<th>Rated speed (Maximum speed) (rpm)</th>
<th>Rated output capacity (kW)</th>
<th>Electromagnetic brake (kW)</th>
<th>Producer</th>
<th>IP rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-KN series</td>
<td>3000 (4500)</td>
<td>0.05, 0.1, 0.2, 0.4</td>
<td>-</td>
<td>-</td>
<td>IP85**</td>
</tr>
</tbody>
</table>

**Geared servo motor**

<table>
<thead>
<tr>
<th>Servo motor series</th>
<th>Rated speed (Maximum speed) (rpm)</th>
<th>Rated output capacity (kW)</th>
<th>Reducer for general industrial machine (G1)</th>
<th>Reducer for precision application (G5, G7)</th>
<th>IP rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-KP series</td>
<td>3000 (4500)*8</td>
<td>0.05, 0.1, 0.2, 0.4</td>
<td>1/5, 1/12, 1/20*7</td>
<td>1/5, 1/11, 1/21, 1/83, 1/45</td>
<td>IP44*5</td>
</tr>
</tbody>
</table>

*5 The shaft-through portion is excluded.  
*6 This speed is applicable when using the servo motor in combination with MR-JN series servo amplifier.  
*7 This reduction ratio is nominal value. For actual reduction ratio, refer to "Geared Servo Motor Specifications" in this catalog.
Is now available!

One-touch tuning
Servo tuning is completed just by pressing the AUTO button on the front of the servo amplifier.

Tough drive function
Operation will continue even when a temporal change in load, power supply or resonance frequency occurs.

Built-in Regenerative Resistor
A less wiring and a space-saving installation are realized by integrating the regenerative resistor to the 200W or larger servo amplifier as standard equipment (as compared to the external option)!

Separated power supply for main and control circuits
The main circuit power supply can be turned off separately to enhance your safety during maintenance.

Advanced Vibration Suppression Control
The auto tuning function enables the optimal operations!

Built-in positioning function
Built-in positioning function enables easy positioning operation without a controller!

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All steps from installation to wiring, setup and operation are easy!

**MELSERVO-JN**

1. Pursuing of "EASY" for both Operation and Support

- **Fuss-free Quick tuning with one-touch**
  Various adjustments for bringing out the full performance of the servo, such as estimation of load to motor inertia moment ratio, gain adjustment or machine resonance suppression, can be executed automatically with one-touch operation. (Patent pending)

- **1-phase 100VAC and 200VAC for main circuit power supply**
  Besides 1-phase 200VAC servo amplifier, 1-phase 100VAC servo amplifier is available.
  *100VAC servo amplifier is available in 200W or smaller.*

- **Easy power supply wiring without a screwdriver**
  All wiring can be completed without a driver.

- **Easy setting of electronic gear**
  Calculation of command pulse frequency and travel distance of the ball screw is simple since the number of command pulses per revolution of motor is set to 10000 by default. Additionally, rotation angle is controlled easily just by setting one parameter.

  **Setting Examples**
  In the case of the number of command pulses per revolution is set to 10000 (default):
  - 10mm lead ball screw moves 1μm per pulse. (10mm per 10000 pulses)

  In the case of the number of command pulses per revolution is set to 36000:
  - The servo motor rotates 0.01 degrees per pulse. (1 degree per 100 pulses)
  *This is when not using a reducer.

- **Support your installation totally**
  - Freeware for capacity calculation
    Capacity selection software (MRJW3-MOTSZ111E) enables optimal selections of servo motor and servo amplifier for your system. This software is available for free download. Contact your local sales office for more details.

  - **Quick installation guide**
    We provide "QUICK INSTALLATION GUIDE" (coming soon) which explains the processes from selection of the product to installation and adjustment. This guide helps you to complete the start up operation easily.
Pursuing "RELIABLE" from the Product Design Phase

Reliable operation with "tough drive function" *

- Overload tough drive function
  By using the overload tough drive function, machine operation is adjusted automatically to prevent an alarm occurrence when load changes in the machine are detected, and thereby reduces time losses caused by machine stops. (Patent pending)

- Instantaneous power failure tough drive function
  When an instantaneous power failure is detected, power charged on the main circuit capacitor is supplied to keep the system running.
  * Low voltage alarm may occur depending on the load conditions.

Vibration tough drive function
This function readjusts the machine resonance suppression filter automatically and prevents resonance when a machine resonance frequency is changed due to aging distortion.

Safe maintenance due to separated power supply for main and control circuits
Because each of the main circuit power supply (1-phase 200VAC or 1-phase 100VAC) and the control circuit power supply (24VDC) has the respective connectors, the main circuit power supply can be turned off separately. It makes the maintenance such as parameter setting or checking of machine status safer when a trouble occurs.

"Drive recorder function" for quick response to troubleshooting
- This function automatically records data before and after the alarm occurrence. The recorded data is available in graph even after the power is off. This enables identifying the cause of a trouble and finding its early solution.
- This function selects data automatically to be recorded corresponding to alarms. Information on the causes of alarm is extracted and monitored easily.

With fanless body
The maintenance performance is improved by eliminating a cooling fan from the servo amplifier. There is no need to worry about the life of the cooling fan.

Example: When error excessive alarm occurs.

* MR Configurator is required to display data in the drive recorder in graph.
Along with easiness!
**MELSEROV-JN** has a variety of advanced functions.

3. "Reduced Setting Space" Makes Your Manufacturing Floor More Comfortable

- **High performance with small body!**
  Even high-accuracy positioning can be done easily!!

  The servo motor is equipped with high-resolution encoder (131072pp/rev), enabling both high-accuracy positioning and speed stability in low speed. The servo amplifier supports 1MHz command pulse frequency, realizing high-accuracy positioning. MELSEROV-JN can be used for various applications.

- **The servo amplifier can be installed closely with each other.**
  The MR-JN servo amplifiers can be installed closely with each other.
  - The operation environment differs when mounted closely. For details, refer to "Servo Amplifier Specifications" and "Cautions concerning use" in this catalog.

- **MR-C series servo amplifier can be replaced easily by the MR-JN.**
  Both of these servo amplifiers have the same mounting dimensions.

  **Equipped with built-in regenerative resistor**
  200W or larger servo amplifier has a built-in regenerative resistor. This space-saving servo amplifier contributes to smaller system configurations.

4. Large Selection of Servo Motors

- **Compact high-performance servo motor HF-KN series**
  - Capacity: 50W to 400W
  - By mounting the high-resolution incremental encoder (131072pp/rev), both "high-accuracy positioning" and "speed stability in low speed" are enabled.
  - Servo motors with electromagnetic brake are also available.
  - Cables can be led out either in the direction or in opposite direction of the motor shaft according to the selected cables.
  - The HF-KN series servo motor is rated IP65 as standard, (excluding the shaft-through portion)

- **Geared servo motors, HF-KP series, are also available**
  - Capacity: 50W to 400W
  - HF-KP series with reducer are available.
    - G1: for general industrial machines
    - G5: flange output type reducer for precision applications
    - G7: shaft output type reducer for precision applications
    - These servo motors are flange mounting type.
  - Servo motors with electromagnetic brake are also available.
  - The HF-KP series with reducer is rated IP44 as standard, (excluding the shaft-through portion)
5 Equipped with MR-J3-level High Functionality

- Extended adjustment functions by the auto tuning
  - Advanced vibration suppression control
    The residual vibration with low frequency (up to 100Hz) is suppressed automatically.
    * An optimal filter is set automatically by the auto tuning function.
  - Adaptive filter
    High frequency machine resonance can be suppressed automatically by the one-touch tuning. Furthermore, by using the vibration tough drive function, the filter is readjusted automatically when a machine resonance is detected even after the tuning.

- Vibration suppression tuning ON
  - Vibration is easily suppressed!

- Various control modes
  - Speed/torque control operation
    The speed control mode and the torque control mode are supported. (The speed and the torque commands are set internally by parameters.)
  - Torque limit
    The torque generated by the servo motor can be controlled by setting parameters.

- Setup software “MR Configurator”
  MR Configurator enables high-speed sampling and long-time waveform measurement. It makes start-up and adjustments of the servo system easier. A personal computer can be connected to the servo amplifier via USB.

6 Conformity with Global Standards

- Complied with EN, UL and CSA standards
  MELSERVO-JN conforms to the global standards.
  *1. This product is not a subject of China Compulsory Certification (CCC).
  *2. HF-JN servo motor series will be compatible with EN, UL, and CSA standards.

- Complied with Restriction of Hazardous Substances Directive (RoHS)
  MELSERVO-JN is human and environmental-friendly AC servo compliant with RoHS directive.
  Additionally, our optional cables and connectors comply with "Measures for Administration of the Pollution Control of Electronic Information Products" (Chinese RoHS).
  About RoHS Directive
  RoHS Directive requires member nations to guarantee that new electrical and electronic equipment sold in the market after July 1, 2006 do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. "RoHS" mark indicating RoHS Directive compliance is printed on the package.
Positioning operation with easiness!
MELSERVO-JN!

7 Built-in positioning function (Note 1)

■ Positioning without a controller
A simple positioning system can be configured without a controller since the positioning function (point table and program methods) is built into the servo amplifier, saving cost and space.

■ Point table method
Setting position data (target position), servo motor speed, and acceleration and deceleration time constants in the point table is as easy as setting parameters.
Up to seven points are available for positioning. Positioning operation is performed after selecting the point table number with an external interface signal.

Point table setting example

<table>
<thead>
<tr>
<th>Point table No.</th>
<th>Position data</th>
<th>Servo motor speed</th>
<th>Acceleration time constant</th>
<th>Deceleration time constant</th>
<th>Dwell time</th>
<th>Auxiliary function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000</td>
<td>2000</td>
<td>200</td>
<td>200</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2000</td>
<td>1600</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>7</td>
<td>3000</td>
<td>3000</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Operation example

Program method (Note 2)
Simple positioning program can be created using dedicated commands.
A program is executed with a start signal after selecting the program number with an external interface signal. Program method enables more complex positioning operation than point table method. Up to eight programs can be stored in the memory.

Program example

Notes: 1. Servo amplifier with software version B0 or above is required for the positioning function.
2. MR Configurator is required to create a program. MR Configurator with software version C4 or above is compatible with creating a program.
Easy to use in various situations.

MELSERVO-JN, a compact servo amplifier which enables both "high-accuracy positioning" and "speed stability in low speed" satisfies control needs in various applications.

**X-Y tables**
For X-Y positioning system for machine tools, inspection machines, etc.
- The high-performance servo system enables high-speed positioning.
- 17-bit encoder enables high-accuracy positioning.
- Shorter tact time is achieved by suppressing vibrations.

**Conveyors**
For conveyance between processes of each work, etc.
- High acceleration/deceleration and high-speed conveyance are enabled by the servo system.
- Constant-speed feed is available with a highly stable speed.
- Optimal gain can be set by the auto tuning function when using various works.

**Food processing machines**
For food processing, positioning of liquid filling nozzle, unwinding of wrapping material, etc.
- The high-performance servo system enables shorter tact time.
- The tough drive function improves machine operating rate.
- HF-KN series is rated IP65 as standard (excluding the shaft-through portion).

**Loaders/unloaders, feeders and sliders**
Work positioning and conveyance for automated warehouse, press machines, etc.
- The high speed and accurate positioning improves productivity.
- Compact machine can be achieved by the small-size servo amplifier and servo motor.

**Textile machines**
For string unwinding, traversing, etc.
- Compact machine can be achieved by the small-size servo amplifier and servo motor.
- High acceleration/deceleration and high-speed conveyance are enabled by the servo system.
- HF-KN series is rated IP65 as standard (excluding the shaft-through portion).

**Robots**
For picking up and transferring processing work
- Shorter tact time is achieved by suppressing vibrations.
- Optimal gain can be set by the auto tuning function when using various works.
- Compact machine can be achieved by the small-size servo amplifier and servo motor.

**Semiconductor/liquid crystal/solar battery producing equipment**
For peripheral axes of board, panel conveyance, etc.
- Easy maintenance with the separated power supply for main and control circuits.
- The tough drive function improves machine operating rate.
- Compact machine can be achieved by the small-size servo amplifier and servo motor.

**Replacement of stepping motors, DC motors, air actuator or inverters**
By introducing the servo system, the driving section of the legacy products can be faster and more accurate.
- Replacement of the air actuator enables more accurate driving section.
- Step-out occurred with the stepping motor is no longer an issue.
- Replacement of the Inverter improves speed and accuracy.
Servo Support Software (Easy introduction support)

Enter the machine specifications and the operation pattern into machine-specific windows of the capacity selection software then execute the software.

The most suitable servo amplifier, servo motor, and optional regeneration unit will be selected automatically.

Capacity selection software

MRZJW3-MOTSZ111E

You don’t need complex calculations anymore by using the capacity selection software (MRZJW3-MOTSZ111E). Machine-specific windows which apply to each machine are prepared. The most suitable servo amplifier, servo motor (including the one with electromagnetic brake or with reducer), and optional regeneration unit can be selected automatically just by entering the constants and the operation pattern of the machine.

Features

(1) User-defined operation patterns can be set. The operation pattern can be selected from the position control mode operation or speed control mode operation. The selected operation pattern can be also displayed in the graph.

(2) The feedrate (or motor speed) and torque can be displayed in the graph during the selection process.

* For details of the specifications, refer to p.36 of this catalog.

1. Select the type of the machine.
2. Click the “Amplifier” button and select “MR-JN”.
3. Click the “Motor” button and select the motor.
4. Click the “Operation pattern” button to create the operation pattern.
5. Input the specifications of the machine.
6. Click the “Calculate capacity” button.
7. The selected servo amplifier/servo motor model will be displayed.

* These are reference screens. They may differ from the actual screens.

Note: Capacity selection software (MRZJW3-MOTSZ111E) is available for free download. Contact your local sales office for more details.
MR Configurator

MRZJW3-SETUP221E (Setup software)

The MR Configurator makes it easy to perform, tuning, monitor display, diagnostics, reading and writing parameters, and test operations with a personal computer. This software realizes a stable machine system, optimum control and short setup time.

**Features**

1. This software allows easy set up and tuning of the servo system with a personal computer.
2. Multiple monitor functions
   - Graphic display functions are provided to display the servo motor status with the input signal triggers, such as the command pulse, droop pulse and speed.
3. Test operations with a personal computer
   - Test operation of the servo motors can be performed with a personal computer using multiple test mode menus.

*For details of the specifications, refer to p.36 of this catalog.

---

**MR Configurator**

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**Graph** window

Powerful graph functions with 3 analog channels and 4 digital channels support tuning. User-friendly functions such as [Over write] and [Graph history] and a diverse waveform selection powerfully support user's work. Also, the [Gray display] function is provided for easy reading of printed data. Data can be saved either in CSV or JPEG format.

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**Note:** The screens on this page are for reference. They may differ from the actual screens.
Model Designation

Servo amplifiers

MR-JN - 10 A

Mitsubishi general-purpose AC servo amplifier MELSERVO-JN series

List of compatible servo motors

<table>
<thead>
<tr>
<th>Symbol</th>
<th>HF-KN</th>
<th>HF-KP (with reducer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>053, 13</td>
<td>053, 13</td>
</tr>
<tr>
<td>20</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>40</td>
<td>43</td>
<td>43</td>
</tr>
</tbody>
</table>

A: General-purpose interface

Notes:
1. Refer to "Special Shaft End Specifications" in this catalog for the available models and detailed specifications.

Standard (straight shaft)
With key (Note 1)

D-cut (Note 1)

Note: HF-KN series does not have a geared servo motor. The geared servo motor is available in HF-KP series.

HF-KN series servo motors

HF-KN 05 3 B

Servo motor series
HF-KN Low inertia, small capacity

Rated output (kW)

- 05: 0.05
- 1: 0.1
- 2: 0.2
- 4: 0.4

Symbols:
- 05
- 1
- 2
- 4

Electromagnetic brake
None
B Installed

Rated speed (r/min)
3 3000

Reducer
G1 For general industrial machines
G5 Flange output type for precision application, flange mounting
G7 Shaft output type for precision application, flange mounting

Note: Refer to "Geared Servo Motor Specifications" in this catalog for the available models and detailed specifications.

Shaft end
None Standard (straight shaft)
K With key (Note 1)
D D-cut (Note 1)

Note: Refer to "Special Shaft End Specifications" in this catalog for the available models and detailed specifications.

HF-KP series geared servo motors

HF-KP 05 3 B

Servo motor series
HF-KP Low inertia, small capacity

Rated output (kW)

- 05: 0.05
- 1: 0.1
- 2: 0.2
- 4: 0.4

Symbols:
- 05
- 1
- 2
- 4

Electromagnetic brake
None
B Installed

Rated speed (r/min)
3 3000

Reducer
G1 For general industrial machines
G5 Flange output type for precision application, flange mounting
G7 Shaft output type for precision application, flange mounting

Note: Refer to "Geared Servo Motor Specifications" in this catalog for the available models and detailed specifications.

Shaft end
None Standard (straight shaft)
K With key (Note 1)

Note: Refer to "Special Shaft End Specifications" in this catalog for the available models and detailed specifications.

* The servo motors above are under application for EN, UL and CSA standards. Contact your local sales office for more details.
Connections with Peripheral Equipment (Note 1)

Peripheral equipment is connected to MR-JN-□A as described below. Connectors, options, and other necessary equipment are available so that users can set up MR-JN-□A easily and begin using it right away.

- Power supply: 1-phase 200VAC to 230VAC or 1-phase 100VAC to 120VAC
- Charge lamp: Illuminates when the main circuit power supply is charged.
- Circuit breaker (NFB): Used to protect the power supply line.
- Magnetic contactor (MC): Used to turn off the servo amplifier's power when an alarm has been triggered.
- Power factor improvement reactor (FR-HAL): Optional regeneration unit (option)
  - Install this unit in situations involving frequent regeneration and large load inertia moments.
- One-touch tuning button: Servo tuning is executed just by pressing this button.
- Display panel: Displays monitoring data, parameter and alarm.
- Setting section: Parameter settings and monitoring etc. are executed with push buttons.
- Motor power supply cable (option)
- Encoder cable (option)
- USB communication (CN3) (option)
  - Monitoring, batch parameter entry and saving, graph display and test operation can be performed with MR Configurator (setup software) when connecting to user's personal computer.
  - Optional USB cable (MR-J3USBCBL3M) is necessary.
- Circuit protector
- Control circuit power supply 24VDC
- USB communication (CN3)
- Junction terminal block (option)
  - All signals can be wired via this terminal block.
- Controllers
  - MR-JN can be connected to a Mitsubishi controller or any pulse train output controller.
- Encoder cable (option)
- Circuits with Peripheral Equipment (Note 1)
- Peripheral Equipment
- Servo Support Software
- Components
- Dimensions
- CAUTIONS

Notes: 1. Refer to "MR-JN-□A INSTRUCTION MANUAL" for the actual connections.
## Servo Amplifier Specifications

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>2.4</td>
<td>3.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>0.7</td>
<td>1.5</td>
<td>2.8</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Main circuit power supply</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage/frequency (Note 1, 2)</td>
<td>1-phase 200VAC to 230VAC 50/60Hz</td>
<td>1-phase 200VAC to 230VAC 50/60Hz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>0.6 (1.3)</td>
<td>0.6 (1.3)</td>
<td>0.7 (1.5)</td>
<td>0.6 (1.3)</td>
<td>0.6 (1.3)</td>
</tr>
<tr>
<td>Permissible voltage fluctuation</td>
<td>1-phase 200VAC to 230VAC 50/60Hz</td>
<td>1-phase 200VAC to 230VAC 50/60Hz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permissible frequency fluctuation</td>
<td>±5% maximum</td>
<td>±5% maximum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control circuit power supply</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>24VDC</td>
<td>24VDC</td>
<td>24VDC</td>
<td>24VDC</td>
<td>24VDC</td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Permissible voltage fluctuation</td>
<td>±10% maximum</td>
<td>±10% maximum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption (W)</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Interface power supply</td>
<td>24VDC ±10% (required current capacity: 0.2A (Note 5))</td>
<td>24VDC ±10% (required current capacity: 0.2A (Note 5))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control system</strong></td>
<td>Sine-wave PWM control/current control system</td>
<td>Sine-wave PWM control/current control system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dynamic brake</strong></td>
<td>Built-in (Note 6)</td>
<td>Built-in (Note 6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety features</td>
<td>Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servo motor overheat protection, encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection</td>
<td>Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servo motor overheat protection, encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Position control mode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum input pulse frequency</td>
<td>1Mpps (when using differential receiver), 200kpps (when using open collector)</td>
<td>1Mpps (when using differential receiver), 200kpps (when using open collector)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command pulse multiple</td>
<td>Electronic gear A/B multiple, A: 1 to 65535, B: 1 to 65535, 1/50 &lt; A/B &lt; 500</td>
<td>Electronic gear A/B multiple, A: 1 to 65535, B: 1 to 65535, 1/50 &lt; A/B &lt; 500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning complete width setting</td>
<td>0 to ± 65535 pulses (command pulse unit)</td>
<td>0 to ± 65535 pulses (command pulse unit)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excess error</td>
<td>±3 rotations</td>
<td>±3 rotations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque limit</td>
<td>Set by parameters</td>
<td>Set by parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal speed control mode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed command input</td>
<td>Internal speed command 1:5000</td>
<td>Internal speed command 1:5000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed fluctuation rate</td>
<td>±0.01% maximum (load fluctuation 0 to 100%)</td>
<td>±0.01% maximum (load fluctuation 0 to 100%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque limit</td>
<td>Set by parameters</td>
<td>Set by parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal torque control mode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque command input</td>
<td>Set by parameters</td>
<td>Set by parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed limit</td>
<td>Set by parameters</td>
<td>Set by parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Positioning mode (Note 8)</strong></td>
<td>Point table method, Program method</td>
<td>Point table method, Program method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>Natural-cooling open (IP rating: IP20)</td>
<td>Natural-cooling open (IP rating: IP20)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature (Note 7)</td>
<td>0 to 55°C (32 to 131°F) (non freezing), storage: -20 to 65°C (-4 to 149°F) (non freezing)</td>
<td>0 to 55°C (32 to 131°F) (non freezing), storage: -20 to 65°C (-4 to 149°F) (non freezing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>90% RH maximum (non condensing), storage: 90% RH maximum (non condensing)</td>
<td>90% RH maximum (non condensing), storage: 90% RH maximum (non condensing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atmosphere</td>
<td>Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust</td>
<td>Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevation</td>
<td>1000m or less above sea level</td>
<td>1000m or less above sea level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>5.9m/s² or less at 10 to 55Hz (directions of X, Y and Z axes)</td>
<td>5.9m/s² or less at 10 to 55Hz (directions of X, Y and Z axes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass (kg [lb])</td>
<td>0.6 (1.3)</td>
<td>0.6 (1.3)</td>
<td>0.7 (1.5)</td>
<td>0.6 (1.3)</td>
<td>0.6 (1.3)</td>
</tr>
</tbody>
</table>

**Notes:**
1. Rated output and speed of a servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency. Torque drops when the power supply voltage is below the specified value.
2. For torque characteristics when combined with a servo motor, refer to “Servo Motor Torque Characteristics” in this catalog.
3. Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.
4. Refer to “Options ● Optional regeneration unit” in this catalog for the tolerable regenerative power (W).
5. 0.2A is the value when all of the input/output points are used. The current capacity can be stepped down according to the number of input/output points in use. Refer to MR-JN-CQ INSTRUCTION MANUAL for details.
6. When using the built-in dynamic brake, refer to “MR-JN-CQ INSTRUCTION MANUAL” for the permissible load to motor inertia moment ratio.
7. The servo amplifier can be installed closely. In this case, keep the ambient temperature within 0 to 45°C (32 to 113°F), or use the servo amplifier at 75% or less of the effective load ratio.
8. Servo amplifier with software version B0 or above is required for the positioning function.
Standard Wiring Diagram: Position Control Operation

Connection example to FX3u

Notes:

1. Disconnect the wires for the built-in regenerative resistor (P and C) and remove the resistor from the servo amplifier when connecting the optional regeneration unit externally.

2. This is for the servo motor with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.

3. Connect the ground wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal for grounding.

4. Do not connect the 0V of 24VDC power supply to the servo amplifier protective earth (PE) terminal.

5. The signals shown are applicable when using a two-wire type encoder cable. Refer to “MR-JN-4A INSTRUCTION MANUAL” for four-wire type.

6. Do not reverse the diode’s direction. Connecting it backwards may cause the servo amplifier to malfunction such that the signals are not output, and the forced stop and emergency stop switch (MBR) signal turns off.

7. Use the power supply 24VDC ±10% (required current capacity: 0.2A). 0.2A is the value when all of the input/output points are used. Note that the current capacity can be stepped down according to the number of input/output points in use. Refer to “MR-JN-4A INSTRUCTION MANUAL” for details.

8. Use the enhanced insulation power supply for the external power supply 24VDC. Do not use the 24VDC interface and control circuit power supplies for the electromagnetic brake. Provide a power supply designed exclusively for the electromagnetic brake.

9. Always turn on the forced stop (EM1) signal (normally closed contact) or the electromagnetic brake interlock (MBR) when the servo on (SON) signal turns on. Contacts must be open by an external emergency stop switch.

10. Always turn on the forward and reverse rotation stroke end (LSP/LSN) signals (normally closed contact) before starting the operation. If not, the commands will not be accepted.

11. The malfunction (ALM) signal (normally closed contact) is conducted to DOCOM in normal alarm-free condition.

12. Connect the shield wire securely to the plate inside the connector (ground plate).

13. This is applicable when the setting of the programmable controller is for the first axis. For the second or third axis, the number changes.

14. It is recommended that the connection be 2m or shorter because an open-collector system is used.

15. Signal names are different for FX3u-16MT/ES: COM1 will be COM0 and COM2 will be COM4.

Notes:

- Main circuit power supply: 1-phase 200 to 230VAC or 1-phase 100 to 120VAC
- Optional regeneration unit: (Note 1)
- Built-in regenerative resistor: (Note 2)
- 24VDC power supply: (Note 3)
- 10m maximum
- 10m maximum
- 2m (Note 4)
- Encoder A-phase pulse (differential line driver)
- Encoder B-phase pulse (differential line driver)
- Encoder Z-phase pulse (differential line driver)
- 10m maximum
- USB cable: MR-J3USBBL3M
- Personal computer
- Servo amplifiers
- Servo motors
- Peripheral Equipment
- Servo Support Software
- Dimensions
- Cautions
Notes:

1. Disconnect the wires for the built-in regenerative resistor (P and C) and remove the resistor from the servo amplifier when connecting the optional regeneration unit externally.

2. This is for the servo motor with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.

3. Connect the ground wire to the cabinet protective earth (PE) terminal for grounding.

4. Do not connect the 0V of 24VDC power supply to the servo amplifier protective earth (PE) terminal.

5. The signals shown are applicable when using a two-wire type encoder cable. Refer to “MR-JN-A INSTRUCTION MANUAL” for four-wire type.

6. Do not reverse the diode’s direction. Connecting it backwards may cause the servo amplifier to malfunction such that the signals are not output, and the forced stop and other safety circuits are inoperable.

7. Use the power supply 24VDC ±10% (required current capacity: 0.2A). 0.2A is the value when all of the input/output points are used.

8. Use the enhanced insulation power supply for the external power supply 24VDC. Do not use the 24VDC interface and control circuit power supplies for the electromagnetic brake.

9. Always turn on the forced stop (EM1) signal (normally closed contact) when the servo on (SON) or the electromagnetic brake terminals (MBR) signal turns off.

10. Always turn off the forward and reverse rotation stroke end (LSP, LSN) signals (normally closed contact) before starting the operation. If not, the commands will not be accepted.

11. The malfunction (ALM) signal (normally closed contact) is connected to DOCOM in normal alarm-free condition.

12. Connect the shield wire securely to the plate inside the connector (ground plate).

13. This connection is not necessary for QD75D positioning module. Note that the connection between LG and control common terminal is recommended for some positioning modules to improve noise immunity.

14. This is for sink wiring. Source wiring is also possible. Refer to “MR-JN-A INSTRUCTION MANUAL” for details.
Standard Wiring Diagram: Speed Control Operation (Note 1)

- **Connection example**

![Connection diagram](image)

Notes:
1. MR-JN- A supports only operations by internal speed command.
2. Disconnect the wires for the built-in regenerative resistor (P and C) and remove the resistor from the servo amplifier when connecting the optional regeneration unit externally.
3. This is for the servo motor with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
4. Connect the ground wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal for grounding.
5. Do not connect the 0V of 24VDC power supply to the servo amplifier protective earth (PE) terminal.
6. The signals shown are applicable when using a two-wire type encoder cable. Refer to "MR-JN- A INSTRUCTION MANUAL" for four-wire type.
7. Do not reverse the diode's direction. Connecting it backwards may cause the servo amplifier to malfunction such that the signals are not output, and the forced stop and other safety circuits are inoperable.
8. Use the power supply 24VDC ±10% (required current capacity: 0.2A). 0.2A is the value when all of the input/output points are used. Note that the current capacity can be stepped down according to the number of input/output points in use. Refer to "MR-JN- A INSTRUCTION MANUAL" for details.
9. Use the enhanced insulation power supply for the external power supply 24VDC. Do not use the 24VDC interface and control circuit power supplies for the electromagnetic brake. Provide a power supply designed exclusively for the electromagnetic brake.
10. Always turn on the forced stop (EM1) signal (normally closed contact) before starting the operation. If not, the operation will not start.
11. The malfunction (ALM) signal (normally closed contact) is conducted to DOCOM in normal alarm-free condition.
12. Connect the shield wire securely to the plate inside the connector (ground plate).
13. This is for sink wiring. Source wiring is also possible. Refer to "MR-JN- A INSTRUCTION MANUAL" for details.
Standard Wiring Diagram: Torque Control Operation (Note 1)

Notes:
1. MR-JN-□A supports only operations by internal torque command.
2. Disconnect the wires for the built-in regenerative resistor (P and C) and remove the resistor from the servo amplifier when connecting the optional regeneration unit externally.
3. This is for the servo motor with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
4. Connect the ground wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal for grounding.
5. Do not connect the 0V of 24VDC power supply to the servo amplifier protective earth (PE) terminal.
6. The signals shown are applicable when using a two-wire type encoder cable. Refer to "MR-JN-□A INSTRUCTION MANUAL" for four-wire type.
7. Do not reverse the diode's direction. Connecting it backwards may cause the servo amplifier to malfunction such that the signals are not output, and the forced stop and other safety circuits are inoperable.
8. Use the power supply 24VDC ±10% (required current capacity: 0.2A). 0.2A is the value when all of the input/output points are used. Note that the current capacity can be stepped down according to the number of input/output points in use. Refer to "MR-JN-□A INSTRUCTION MANUAL" for details.
9. Use the enhanced insulation power supply for the external power supply 24VDC. Do not use the 24VDC interface and control circuit power supplies for the electromagnetic brake. Provide a power supply designed exclusively for the electromagnetic brake.
10. Always turn on the forced stop (EM1) signal (normally closed contact) before starting the operation. If not, the operation will not start.
11. The malfunction (ALM) signal (normally closed contact) is conducted to DOCOM in normal alarm-free condition.
12. Connect the shield wire securely to the plate inside the connector (ground plate).
13. This is for sink wiring. Source wiring is also possible. Refer to "MR-JN-□A INSTRUCTION MANUAL" for details.
Positioning function: Point table method (Note 1)

Set position and speed data in the point table beforehand. Positioning operation is performed after selecting the point table number with an external interface signal.

**Point table:** The following two types of point tables are available.

1. **Absolute value command method:** Moves to the address (absolute value) based on the home position.

   - **Position data:**
     - Setting range: -999999 to 999999
     - Unit: x 10^6 µm
     - Description:
     - Absolute value command method
       - Sets the address. STM is the ratio for the data.
       - Incremental value command method
       - Sets the movement amount. STM is the ratio for the data.

   - **Servo motor speed:**
     - Setting range: 0 to permissible
     - Unit: r/min
     - Description: Sets the command speed for the servo motor used for positioning.

   - **Acceleration time constant:**
     - Setting range: 0 to 20000
     - Unit: ms
     - Description: Sets the acceleration time constant. (Note 2)

   - **Deceleration time constant:**
     - Setting range: 0 to 20000
     - Unit: ms
     - Description: Sets the deceleration time constant. (Note 2)

   - **Dwell time:**
     - Setting range: 0 to 20000
     - Unit: ms
     - Description: Runs the next point table after the set dwell time.

   - **Auxiliary function:**
     - Setting range: 0 to 3
     - Description:
     - Absolute value command method
       - 0: Positions and stops (waits for start signal).
       - 1: Continues operation for the next point table without stopping.
     - Incremental value command method
       - 0: Positions and stops (waits for start signal).
       - 1: Continues operation for the next point table without stopping.

2. **Incremental value command method:** Moves from the current value according to the set position data.

   - **Position data:**
     - Setting range: 0 to 999999
     - Unit: x 10^6 µm
     - Description: Sets the movement amount. STM is the ratio for the data.

   - **Servo motor speed:**
     - Setting range: 0 to permissible
     - Unit: r/min
     - Description: Sets the command speed for the servo motor used for positioning.

   - **Acceleration time constant:**
     - Setting range: 0 to 20000
     - Unit: ms
     - Description: Sets the acceleration time constant. (Note 2)

   - **Deceleration time constant:**
     - Setting range: 0 to 20000
     - Unit: ms
     - Description: Sets the deceleration time constant. (Note 2)

   - **Dwell time:**
     - Setting range: 0 to 20000
     - Unit: ms
     - Description: Runs the next point table after the set dwell time.

   - **Auxiliary function:**
     - Setting range: 0 and 1
     - Description:
     - 0: Positions and stops (waits for start signal).
     - 1: Continues operation for the next point table without stopping.

**Notes:**
1. Servo amplifier with software version 80 or above is required for the positioning function.
2. S-pattern acceleration/deceleration time constant is set by the servo amplifier's parameter.
### Command and Operation Mode

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command interface</strong></td>
<td>DIO (Note 1)</td>
</tr>
<tr>
<td><strong>Operating specification</strong></td>
<td>Positions according to the specification of the point table No. (7 points)</td>
</tr>
<tr>
<td><strong>Input positioning command</strong></td>
<td>Set in point table. One-point feed length setting range: ±1µm to ±999999 x10^STM µm. (Note 2)</td>
</tr>
<tr>
<td><strong>System</strong></td>
<td>Signed absolute value command system, increment value command system</td>
</tr>
<tr>
<td><strong>Point table number input</strong></td>
<td>Point table number input</td>
</tr>
<tr>
<td><strong>Each positioning operation based on position and speed commands.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>JOG</strong></td>
<td>Inches upon input based on speed commands set by a parameter.</td>
</tr>
<tr>
<td><strong>Manual pulse generator</strong></td>
<td>Manual feed by manual pulse generator, Command pulse multiplication: x1, x10 or x100 is selectable by the parameter.</td>
</tr>
<tr>
<td><strong>Dog type</strong></td>
<td>Returns to home position upon Z-phase pulse count after passing through proximity dog. Direction for return to home position selectable. Home position shift amount and home position address settable. Automatic retreat on dog back to home position and automatic stroke retreat function.</td>
</tr>
<tr>
<td><strong>Count type</strong></td>
<td>Returns to home position upon Z-phase pulse count after touching proximity dog. Direction for return to home position selectable. Home position shift amount and home position address settable. Automatic retreat on dog back to home position and automatic stroke retreat function.</td>
</tr>
<tr>
<td><strong>Data set type</strong></td>
<td>Returns to home position without dog. Sets any position as home position using manual operation, etc. Home position address settable.</td>
</tr>
<tr>
<td><strong>Stopper type</strong></td>
<td>Returns to home position upon hitting end of stroke. Direction for return to home position selectable. Home position address settable.</td>
</tr>
<tr>
<td><strong>Ignore home</strong></td>
<td>Uses position where the servo on (SON) signal turns ON as home position. Home position address settable.</td>
</tr>
<tr>
<td><strong>Dog type rear end reference</strong></td>
<td>Returns to home position with respect to the rear end of a proximity dog. Direction for return to home position selectable. Home position shift amount and home position address settable. Automatic retreat on dog back to home position and automatic stroke retreat function.</td>
</tr>
<tr>
<td><strong>Count type front end reference</strong></td>
<td>Returns to home position with respect to the front end of a proximity dog. Direction for return to home position selectable. Home position shift amount and home position address settable. Automatic retreat on dog back to home position and automatic stroke retreat function.</td>
</tr>
<tr>
<td><strong>Dog cradle type</strong></td>
<td>Returns to home position upon the first Z-phase pulse with respect to the front end of a proximity dog. Direction for return to home position selectable. Home position shift amount and home position address settable. Automatic retreat on dog back to home position and automatic stroke retreat function.</td>
</tr>
</tbody>
</table>

**Notes:**
1. The command interface will be compatible with pulse train command by using manual pulse generator (MR-HDP01).
2. STM is the ratio for the data. It can be changed by parameter.
Connection example

Notes:
1. Disconnect the wires for the built-in regenerative resistor (P and C) and remove the resistor from the servo amplifier when connecting the optional regeneration unit externally.
2. This is for the servo motor with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Connect the ground wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal for grounding.
4. Do not connect the 0V of 24VDC power supply to the servo amplifier protective earth (PE) terminal.
5. The signals shown are applicable when using a two-wire type encoder cable. Refer to “MR-JN CA INSTRUCTION MANUAL” for four-wire type.
6. Do not reverse the diode’s direction. Connecting it backwards may cause the servo amplifier to malfunction such that the signals are not output, and the forced stop and other safety circuits are inoperative.
7. Use the power supply 24VDC±10% (required current capacity: 0.2A). 0.2A is the value when all of the input/output points are used.
8. Note that the current capacity can be stepped down according to the number of input/output points in use. Refer to “MR-JN CA INSTRUCTION MANUAL” for details.
9. Use the enhanced insulation power supply for the external power supply 24VDC. Do not use the 24VDC interface and control circuit power supplies for the electromagnetic brake. Provide a power supply designed exclusively for the electromagnetic brake.
10. Always turn on the forced stop (EM1) signal (normally closed contact) before starting the operation. If not, the operation will not start.
11. The malfunction (ALM) signal (normally closed contact) is conducted to DOCOM in normal alarm-free condition.
12. Connect the shield wire securely to the plate inside the connector (ground plate).
13. This is for sink wiring. Source wiring is also possible. Refer to “MR-JN CA INSTRUCTION MANUAL” for details.
14. Manual pulse generator can be used by setting a parameter. Refer to “MR-JN CA INSTRUCTION MANUAL” for details.
Create position data, servo motor speed, acceleration and deceleration time constants and so on as programs beforehand. Positioning operation is performed by selecting the created Program No. with an external interface signal. Program method enables more complex positioning operation than point table method. MR Configurator (Setup software) is required to create a program. (Note 7)

**Command list (Note 6)**

<table>
<thead>
<tr>
<th>Command</th>
<th>Name</th>
<th>Setting</th>
<th>Setting range</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPN (Note 1)</td>
<td>Servo motor speed</td>
<td>SPN (setting)</td>
<td>0 to permissible speed</td>
<td>r/min</td>
<td>Sets the command speed of the servo motor for positioning. The setting value must not exceed the permissible speed of the servo motor used.</td>
</tr>
<tr>
<td>STA (Note 2)</td>
<td>Acceleration time constant</td>
<td>STA (setting)</td>
<td>0 to 20000</td>
<td>ms</td>
<td>Sets the acceleration time constant.</td>
</tr>
<tr>
<td>STB (Note 2)</td>
<td>Deceleration time constant</td>
<td>STB (setting)</td>
<td>0 to 20000</td>
<td>ms</td>
<td>Sets the deceleration time constant.</td>
</tr>
<tr>
<td>STC (Note 2)</td>
<td>Acceleration and deceleration time constants</td>
<td>STC (setting)</td>
<td>0 to 20000</td>
<td>ms</td>
<td>Sets the acceleration and deceleration time constants.</td>
</tr>
<tr>
<td>STD (Note 2)</td>
<td>S-pattern acceleration and deceleration time constants</td>
<td>STD (setting)</td>
<td>0 to 100</td>
<td>ms</td>
<td>Sets the S-pattern acceleration and deceleration time constants.</td>
</tr>
<tr>
<td>MOV</td>
<td>Absolute value move command</td>
<td>MOV (setting)</td>
<td>$999999$ to $999999$</td>
<td>$(10 \times 10^{STM}/\mu m)$</td>
<td>Moves according to the value set as an absolute value.</td>
</tr>
<tr>
<td>MOVA</td>
<td>Absolute value continuous move command</td>
<td>MOVA (setting)</td>
<td>$999999$ to $999999$</td>
<td>$(10 \times 10^{STM}/\mu m)$</td>
<td>Moves continuously according to the value set as an absolute value. Be sure to use this command together with the [MOV] command.</td>
</tr>
<tr>
<td>MOVI</td>
<td>Incremental value move command</td>
<td>MOVI (setting)</td>
<td>$999999$ to $999999$</td>
<td>$(10 \times 10^{STM}/\mu m)$</td>
<td>Moves according to the value set as an incremental value.</td>
</tr>
<tr>
<td>MOVIA</td>
<td>Incremental value continuous move command</td>
<td>MOVIA (setting)</td>
<td>$999999$ to $999999$</td>
<td>$(10 \times 10^{STM}/\mu m)$</td>
<td>Moves continuously according to the value set as an incremental value. Be sure to use this command together with the [MOVI] command.</td>
</tr>
<tr>
<td>SYNC (Note 3)</td>
<td>Waiting for external signal to switch ON</td>
<td>SYNC (setting)</td>
<td>1</td>
<td>—</td>
<td>Stops the next step until the program input 1 (P11) is turned ON after the synchronous output (SOUT) command is output.</td>
</tr>
<tr>
<td>OUTFON (Note 3)</td>
<td>External signal ON output</td>
<td>OUTFON (setting)</td>
<td>1</td>
<td>—</td>
<td>Turns ON the program output 1 (OUT1).</td>
</tr>
<tr>
<td>OUTFOFF (Note 3)</td>
<td>External signal OFF output</td>
<td>OUTFOFF (setting)</td>
<td>1</td>
<td>—</td>
<td>Turns OFF the program output 1 (OUT1) which was turned ON by the [OUTON] command.</td>
</tr>
<tr>
<td>TRIP (Note 3)</td>
<td>Absolute value passage point specification</td>
<td>TRIP (setting)</td>
<td>$999999$ to $999999$</td>
<td>$(10 \times 10^{STM}/\mu m)$</td>
<td>When the motor passes through the current position set, the next step is executed.</td>
</tr>
<tr>
<td>TRIPi (Note 3)</td>
<td>Incremental value passage point specification</td>
<td>TRIPi (setting)</td>
<td>$999999$ to $999999$</td>
<td>$(10 \times 10^{STM}/\mu m)$</td>
<td>When the motor moves for the moving distance set by the [TRIPi] command after the [MOVI] and/or [MOVIA] commands is performed, the next step is executed. Be sure to write this command after the [MOVI] and/or [MOVIA] commands.</td>
</tr>
<tr>
<td>ITP (Note 3, 4)</td>
<td>Interrupt positioning</td>
<td>ITP (setting)</td>
<td>0 to 999999</td>
<td>$(10 \times 10^{STM}/\mu m)$</td>
<td>When the interrupt signal is ON, the motor moves for the distance set by this command, and it stops. Use the command after the [SYNC] command in combination.</td>
</tr>
<tr>
<td>COUNT (Note 3)</td>
<td>External pulse count</td>
<td>COUNT (setting)</td>
<td>$999999$ to $999999$</td>
<td>pulse</td>
<td>When the value of the pulse counter exceeds the count value set in the [COUNT] command, the next step is executed. Setting [COUNT (03)] clears the pulse counter to zero.</td>
</tr>
<tr>
<td>FOR NEXT</td>
<td>Step repeat command</td>
<td>FOR (setting)</td>
<td>NEXT</td>
<td>0, 1 to 10000</td>
<td>times</td>
</tr>
<tr>
<td>TIM</td>
<td>Dwell</td>
<td>TIM (setting)</td>
<td>1 to 20000</td>
<td>ms</td>
<td>Waits for the next step until the set time passes.</td>
</tr>
<tr>
<td>ZRT</td>
<td>Home position return</td>
<td>ZRT</td>
<td>—</td>
<td>—</td>
<td>Executes a manual home position return.</td>
</tr>
<tr>
<td>TIMES</td>
<td>Program count command</td>
<td>TIMES (setting)</td>
<td>0, 1 to 10000</td>
<td>times</td>
<td>Sets the number of program execution by writing [TIMES (setting value)] command on the beginning of the program. If zero is set, the program is repeated unlimitedly.</td>
</tr>
<tr>
<td>STOP</td>
<td>Program stop</td>
<td>STOP</td>
<td>—</td>
<td>—</td>
<td>Stops the program being executed. Be sure to write this command in the final line.</td>
</tr>
</tbody>
</table>

**Notes:**
1. The [SPN] command is valid when the [MOV], [MOVA], [MOVI], or [MOVIA] command is executed.
2. The [STA], [STB], [STC], and [STD] commands are valid when the [MOV] or [MOVI] command is executed.
3. The [SYNC], [OUTON], [OUTOFF], [TRIP], [TRIPi], [ITP], and [COUNT] commands are valid even while an instruction is output.
4. If the remaining distance equals to the setting value or less, the servo motor is not running, or the servo motor is decelerating, the [ITP] command is skipped and control goes to the next step.
5. STM is the ratio for the data. It can be changed by parameter.
6. For the content of each command, refer to ‘MR-JN’ [A INSTRUCTION MANUAL].
7. MRJW3-SETUP221E with software version C4 or above is compatible with creating a program.
8. Servo amplifier with software version B0 or above is required for the positioning function.
Positioning Function: Program Examples

Example 1
When executing two types of operations which have the same servo motor speed, the same acceleration and deceleration time constants and the different move commands:

<table>
<thead>
<tr>
<th>Program</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPN (3000)</td>
<td>Servo motor speed 3000 (r/min)</td>
</tr>
<tr>
<td>STA (200)</td>
<td>Acceleration time constant 200 (ms)</td>
</tr>
<tr>
<td>STB (300)</td>
<td>Deceleration time constant 300 (ms)</td>
</tr>
<tr>
<td>MOV (1000)</td>
<td>Absolute value move command 1000 (x10^6µm)</td>
</tr>
<tr>
<td>TIM (100)</td>
<td>Dwell 100 (ms)</td>
</tr>
<tr>
<td>MOV (2500)</td>
<td>Absolute value move command 2500 (x10^6µm)</td>
</tr>
<tr>
<td>STOP</td>
<td>Program stop</td>
</tr>
</tbody>
</table>

Notes:
1. The values set as steps ①, ②, and ③ are valid as long as they are not set again.
2. The setting value is the time elapsing from the stop of the servo motor to the rated speed.
3. The setting value is the time elapsing from the rated speed to the stop of the servo motor.

Example 2
When repeating the steps between [FOR (setting value)] and [NEXT] commands for the number of times set:

<table>
<thead>
<tr>
<th>Program</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPN (3000)</td>
<td>Servo motor speed 3000 (r/min)</td>
</tr>
<tr>
<td>STC (20)</td>
<td>Acceleration and deceleration time constants 20 (ms)</td>
</tr>
<tr>
<td>MOV (1000)</td>
<td>Absolute value move command 1000 (x10^6µm)</td>
</tr>
<tr>
<td>TIM (100)</td>
<td>Dwell 100 (ms)</td>
</tr>
<tr>
<td>FOR (3)</td>
<td>Step repeat command start 3 (times)</td>
</tr>
<tr>
<td>MOVI (100)</td>
<td>Incremental value move command 100 (x10^6µm)</td>
</tr>
<tr>
<td>TIM (100)</td>
<td>Dwell 100 (ms)</td>
</tr>
<tr>
<td>NEXT</td>
<td>Step repeat command end</td>
</tr>
<tr>
<td>STOP</td>
<td>Program stop</td>
</tr>
</tbody>
</table>

Steps ④ and ⑤ are repeated for the number of times specified by step ③.

Notes:
1. The values set as steps ①, ②, and ③ are valid as long as they are not set again.
2. The setting value is the time elapsing from the stop of the servo motor to the rated speed.
3. The setting value is the time elapsing from the rated speed to the stop of the servo motor.
## Positioning function: Program method

### Command and Operation Mode

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command method</strong></td>
<td></td>
</tr>
<tr>
<td>Command interface</td>
<td>DIO (Note 1)</td>
</tr>
</tbody>
</table>
| Operating specification | Program language (programmed by MR Configurator (Setup software))  
Program capacity: 120 steps (8 programs) |
| Input positioning command | Set by the program language.  
One-point feed length setting range: ±1µm to ±999999 x 10^{STM} µm. (Note 2) |
| System | Signed absolute value command system, incremental value command system |
| **Program** |  |
| **Automatic operation mode** |  |
| Program method | Depends on the setting of the program language |
| **Manual operation mode** |  |
| JOG | Inches upon input based on speed commands set by a parameter. |
Command pulse multiplication: x1, x10 or x100 is selectable by the parameter. |
| **Operation mode** |  |
| Dog type | Returns to home position upon Z-phase pulse count after passing through proximity dog.  
Direction for return to home position selectable. Home position shift amount and home position address settable.  
Automatic retreat on dog back to home position and automatic stroke retreat function. |
| Count type | Returns to home position upon Z-phase pulse count after touching proximity dog.  
Direction for return to home position selectable. Home position shift amount and home position address settable.  
Automatic retreat on dog back to home position and automatic stroke retreat function. |
| Data set type | Returns to home position without dog. Sets any position as home position using manual operation, etc.  
Home position address settable. |
| Stopper type | Returns to home position upon hitting end of stroke.  
Direction for return to home position selectable. Home position address settable. |
| Ignore home (Servo-on position as home position) | Uses position where the servo on (SON) signal turns ON as home position. Home position address settable. |
| **Home position return mode** |  |
| Dog type rear end reference | Returns to home position with respect to the rear end of a proximity dog.  
Direction for return to home position selectable. Home position shift amount and home position address settable.  
Automatic retreat on dog back to home position and automatic stroke retreat function. |
| Count type front end reference | Returns to home position with respect to the front end of a proximity dog.  
Direction for return to home position selectable. Home position shift amount and home position address settable.  
Automatic retreat on dog back to home position and automatic stroke retreat function. |
| Dog cradle type | Returns to home position upon the first Z-phase pulse with respect to the front end of a proximity dog.  
Direction for return to home position selectable. Home position shift amount and home position address settable.  
Automatic retreat on dog back to home position and automatic stroke retreat function. |

**Notes:**
1. The command interface will be compatible with pulse train command by using manual pulse generator (MR-HDP01).
2. STM is the ratio for the data. It can be changed by parameter.
● Connection example

Notes: 1. Disconnect the wires for the built-in regenerative resistor (P and C) and remove the resistor from the servo amplifier when connecting the optional regeneration unit externally.
2. This is for the servo motor with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Connect the ground wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal for grounding.
4. Do not connect the 0V of 24VDC power supply to the servo amplifier protective earth (PE) terminal.
5. The signal shown are applicable when using a two-wire type encoder cable. Refer to “MR-JN-CA INSTRUCTION MANUAL” for four-wire type.
6. Do not reverse the idler’s direction. Connecting it backwards may cause the servo amplifier to malfunction such that the signals are not output, and the forced stop and other safety circuits are inoperable.
7. Use the power supply 24VDC±10% (required current capacity: 0.2A). 0.2A is the value when all of the input/output points are used.
8. Note that the current capacity can be stepped down according to the number of inputs/outputs in use. Refer to “MR-JN-CA INSTRUCTION MANUAL” for details.
9. Note that the current capacity can be stepped down according to the number of inputs/outputs in use. Refer to “MR-JN-CA INSTRUCTION MANUAL” for details.
10. Do not use the enhanced insulation power supply for the external power supply 24VDC. Do not use the 24VDC interface and control circuit power supplies for the electromagnetic brake. Provide a power supply designed exclusively for the electromagnetic brake.
11. Always turn on the forced stop (EM1) signal (normally closed contact) before starting the operation. If not, the operation will not start.
12. The malfunction (ALM) signal (normally closed contact) is conducted to DOCOM in normal alarm-free condition.
13. Connect the shield wire securely to the plate inside the connector (ground plate).
14. This is for sink wiring. Source wiring is also possible. Refer to “MR-JN-CA INSTRUCTION MANUAL” for details.
15. Manual pulse generator can be used by setting a parameter. Refer to “MR-JN-CA INSTRUCTION MANUAL” for details.
HF-KN Series Servo Motor Specifications

<table>
<thead>
<tr>
<th>Servo motor series</th>
<th>HF-KN053(B)</th>
<th>HF-KN13(B)</th>
<th>HF-KN23(B)</th>
<th>HF-KN43(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servo motor model</td>
<td>HF-KN053(B)</td>
<td>HF-KN13(B)</td>
<td>HF-KN23(B)</td>
<td>HF-KN43(B)</td>
</tr>
<tr>
<td>Compatible Servo amplifier model</td>
<td>MR-JN-10A (1)</td>
<td>MR-JN-20A (1)</td>
<td>MR-JN-40A</td>
<td></td>
</tr>
<tr>
<td>Power supply capacity (kVA) (Note 1)</td>
<td>0.3</td>
<td>0.3</td>
<td>0.5</td>
<td>0.9</td>
</tr>
<tr>
<td>Continuous running duty</td>
<td>Rated output (W)</td>
<td>50</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>Rated torque (N•m [oz•in]) (Note 5)</td>
<td>0.16 (22.7)</td>
<td>0.32 (45.3)</td>
<td>0.64 (90.6)</td>
<td>1.3 (184)</td>
</tr>
<tr>
<td>Maximum torque (N•m [oz•in])</td>
<td>0.48 (68.0)</td>
<td>0.95 (135)</td>
<td>1.9 (269)</td>
<td>3.8 (538)</td>
</tr>
<tr>
<td>Rated speed (r/min)</td>
<td>3000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum speed (r/min)</td>
<td>4500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permissible instantaneous speed (r/min)</td>
<td>5175</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power rate at continuous rated torque (kW/s)</td>
<td>4.87</td>
<td>11.5</td>
<td>16.9</td>
<td>38.6</td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>0.9</td>
<td>0.8</td>
<td>1.4</td>
<td>2.7</td>
</tr>
<tr>
<td>Maximum current (A)</td>
<td>2.7</td>
<td>2.4</td>
<td>4.2</td>
<td>8.1</td>
</tr>
<tr>
<td>Regenerative braking frequency (times/min) (Note 2)</td>
<td>(Note 3)</td>
<td>(Note 3)</td>
<td>470</td>
<td>261</td>
</tr>
<tr>
<td>Moment of inertia J [x10^-3[kg•m^2]] (oz•in^2)</td>
<td>0.052 (0.284)</td>
<td>0.088 (0.481)</td>
<td>0.24 (1.31)</td>
<td>0.42 (2.30)</td>
</tr>
<tr>
<td>With electromagnetic brake</td>
<td>0.054 (0.295)</td>
<td>0.090 (0.492)</td>
<td>0.31 (1.69)</td>
<td>0.50 (2.73)</td>
</tr>
<tr>
<td>Recommended load to motor inertia moment ratio (Note 4)</td>
<td>15 times maximum</td>
<td>24 times maximum</td>
<td>22 times maximum</td>
<td></td>
</tr>
<tr>
<td>Speed/position detector</td>
<td>Incremental 17-bit encoder (resolution: 131072 p/rev)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation class</td>
<td>Totally enclosed non ventilated (IP rating: IP65) (Note 5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment (Note 7)</td>
<td>Ambient temperature</td>
<td>0 to 40°C (32 to 104°F) (non freezing), storage: -15 to 70°C (5 to 158°F) (non freezing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>80% RH maximum (non condensing), storage: 90% RH maximum (non condensing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atmosphere</td>
<td>Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevation</td>
<td>1000m or less above sea level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration (Note 6)</td>
<td>X: 49m/s^2 Y: 49m/s^2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass (kg [lb])</td>
<td>Standard</td>
<td>0.4 (0.89)</td>
<td>0.5 (1.1)</td>
<td>1.0 (2.2)</td>
</tr>
<tr>
<td>With electromagnetic brake</td>
<td>0.6 (1.3)</td>
<td>0.7 (1.5)</td>
<td>1.4 (3.1)</td>
<td>1.8 (4.0)</td>
</tr>
</tbody>
</table>

Notes: 1. The power supply capacity varies depending on the power supply’s impedance.
2. The regenerative braking frequency shows the permissible frequency when the motor, without a load and an optional regeneration unit, decelerates from the rated speed to a stop. When a load is connected; however, the value will be the table value(1/m+1), where m=load inertia moment/motor inertia moment. When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (operating speed/rated speed). If the operating speed changes frequently or when the regeneration is constant (as with vertical feeds), find the regenerative heating value (W) in operation. Provisions must be made to keep this heating value below the tolerable regenerative power (W).
3. When the motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited if the effective torque is within the rated torque range. When the motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the effective torque is within the rated torque range and if the load to motor inertia moment is 8 times or less for HF-KN053(B) or 4 time or less for HF-KN13(B).
4. Contact your local sales office if the load to motor inertia moment ratio exceeds the value in the table.
5. When unbalanced torque is generated, such as in a vertical lift machine, it is recommended that the unbalanced torque of the machine be kept under 70% of the motor’s rated torque.
6. The vibration direction is shown in the diagram to the right. The value indicates the maximum value of the component (normally the bracket in the opposite direction of the motor shaft). Fretting of the bearing occurs easily when the motor stops, so maintain vibration to approximately one-half of the allowable value.
7. In the environment where the servo motor is exposed to oil mist, oil and/or water, a standard specification servo motor may not be usable.
8. Optional regeneration unit” in this catalog for details on the tolerable regenerative power (W).
9. Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software. Refer to the section “Options — Optimal regeneration unit” in this catalog for details on the tolerable regenerative power (W).
10. Contact your local sales office for more details.
11. 470: For 1-phase 230VAC.
12. 261: For 1-phase 100VAC.
13. 221: For 1-phase 200VAC.
# HF-KP Series Geared Servo Motor Specifications

<table>
<thead>
<tr>
<th>Servo motor series</th>
<th>HF-KP series (Low inertia, small capacity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servo motor model</td>
<td>HF-KP053(B)G</td>
</tr>
<tr>
<td>Compatible Servo amplifier model</td>
<td>MR-JN-10A (1)</td>
</tr>
<tr>
<td>Power supply capacity (kVA) (Note 1)</td>
<td>0.3</td>
</tr>
<tr>
<td>Continuous running duty</td>
<td></td>
</tr>
<tr>
<td>Rated output (W)</td>
<td>50</td>
</tr>
<tr>
<td>Rated torque (N·m [oz·in]) (Note 8, 11)</td>
<td>0.16 (22.7)</td>
</tr>
<tr>
<td>Maximum torque (N·m [oz·in]) (Note 8)</td>
<td>0.48 (68.0)</td>
</tr>
<tr>
<td>Rated speed (r/min) (Note 9)</td>
<td>3000</td>
</tr>
<tr>
<td>Maximum speed (r/min) (Note 9)</td>
<td>4500 (Note 6)</td>
</tr>
<tr>
<td>Permissible speed (r/min)</td>
<td>Refer to “Geared Servo Motor Specifications” in this catalog.</td>
</tr>
<tr>
<td>Power rate at continuous rated torque (kW/la) (Note 8)</td>
<td>4.87</td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>0.9</td>
</tr>
<tr>
<td>Maximum current (A)</td>
<td>2.7</td>
</tr>
<tr>
<td>Regenerative braking frequency (times/min) (Note 2, 6) (Note 3)</td>
<td>(Note 3)</td>
</tr>
<tr>
<td>Moment of inertia J (x10^-3kg·m2) [oz·in^2]</td>
<td>Standard</td>
</tr>
<tr>
<td>With electromagnetic brake</td>
<td></td>
</tr>
<tr>
<td>Permissible load to motor inertia moment ratio</td>
<td>Refer to “HF-KP Series Geared Servo Motor Dimensions” in this catalog.</td>
</tr>
<tr>
<td>Speed/position detector</td>
<td>Absolute/incremental 18-bit encoder (resolution 262144 p/rev) (Note 10)</td>
</tr>
<tr>
<td>Attachments</td>
<td></td>
</tr>
<tr>
<td>Insulation class</td>
<td>Class B</td>
</tr>
<tr>
<td>Structure</td>
<td>Totally enclosed non ventilated (IP rating: IP44) (Note 4)</td>
</tr>
<tr>
<td>Environment (Note 7)</td>
<td>Ambient temperature: 0 to 40°C (32 to 104°F) (non freezing), storage: -15 to 70°C (5 to 158°F) (non freezing)</td>
</tr>
<tr>
<td></td>
<td>Ambient humidity: 80% RH maximum (non condensing), storage: 90% RH maximum (non condensing)</td>
</tr>
<tr>
<td></td>
<td>Atmosphere: Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust</td>
</tr>
<tr>
<td></td>
<td>Elevation: 1000m or less above sea level</td>
</tr>
<tr>
<td></td>
<td>Vibration (Note 5, 8) X: 49m/s^2; Y: 49m/s^2</td>
</tr>
<tr>
<td>Mass (kg [lb])</td>
<td>Standard</td>
</tr>
<tr>
<td>With electromagnetic brake</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. The power supply capacity varies depending on the power supply’s impedance.
2. The regenerative braking frequency shows the permissible frequency when the motor, without a load and an optional regeneration unit, decelerates from the rated speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m=load inertia moment/motor inertia moment. When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (operating speed/rated speed). If the operating speed changes frequently or when the regeneration is constant (as with vertical feeds), find the regenerative heating value (W) in operation. Provisions must be made to keep this heating value below the tolerable regenerative power (W).
3. Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software. Refer to the section “Options ● Optional regeneration unit” in this catalog for details on the tolerable regenerative power (W).
4. When the motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the effective torque is within the rated torque range and if the load to motor inertia moment is 8 times or less for HF-KP053(B)G or 4 time or less for HF-KP13(B)G.
5. The vibration direction is shown in the diagram to the right. The value indicates the maximum value of the component (normally the bracket in the opposite direction of the motor shaft). Fretting of the bearing occurs easily when the motor stops, so maintain vibration to approximately one-half of the allowable value.
6. The values are applicable when combining with MR-JH servo amplifier series.
7. In the environment where the servo motor is exposed to oil mist, oil and/or water, a standard specification servo motor may not be usable. Contact your local sales office for more details.
8. The values are applicable for the servo motor without reducer.
9. The values are applicable at the reducer input shaft.
10. When combined with MR-JH servo amplifier series, the detector performance is equivalent to an incremental 17-bit encoder.

# HF-KP Series Geared Servo Motor Torque Characteristics (Note 1)

<table>
<thead>
<tr>
<th>Servo motor series</th>
<th>HF-KP053(B)G</th>
<th>HF-KP13(B)G</th>
<th>HF-KP23(B)G</th>
<th>HF-KP43(B)G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous running range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque (N·m) (oz·in)</td>
<td>0.6</td>
<td>1.2</td>
<td>2.1</td>
<td>3.8</td>
</tr>
<tr>
<td>Speed (r/min)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Notes:
1. For the servo motor without reducer.
2. For 1-phase 230VAC.
3. For 1-phase 100VAC.
4. The line is drawn only where it differs from the other two lines.
Geared Servo Motor Specifications

● With reducer for general industrial machines (G1)

### Combination list (Note 1)

<table>
<thead>
<tr>
<th>Output (W)</th>
<th>HF-KP series (Note 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>1/5</td>
</tr>
<tr>
<td>100</td>
<td>1/12</td>
</tr>
<tr>
<td>200</td>
<td>1/19/96</td>
</tr>
<tr>
<td>400</td>
<td>1/25/88</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Servo motor model</th>
<th>HF-KP series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducer efficiency (Note 1)</td>
<td>45% to 75%</td>
</tr>
<tr>
<td>Mounting method</td>
<td>Flange mounting</td>
</tr>
<tr>
<td>Lubrication</td>
<td>Grease lubrication (already packed)</td>
</tr>
<tr>
<td>Output shaft rotating direction</td>
<td>Same as the servo motor output shaft direction</td>
</tr>
<tr>
<td>With electromagnetic brake</td>
<td>Available</td>
</tr>
<tr>
<td>Backlash</td>
<td>60 minutes or less at reducer output shaft</td>
</tr>
<tr>
<td>Permissible load to motor inertia moment ratio (Note 2)</td>
<td>For 50W or 100W: Maximum of 5 times the servo motor's inertia moment</td>
</tr>
<tr>
<td>Permissible speed (at reducer input shaft)</td>
<td>4500r/min (Note 4)</td>
</tr>
</tbody>
</table>

Notes:
1. The ○ mark in the table shows the manufacturing range. The servo motor can be mounted in any direction.
2. The values in ( ) are the actual reduction ratio.

### Specifications

- **Servo motor series:** HF-KP series
- **Mounting method:** Flange mounting
- **Lubrication:** Grease lubrication (already packed)
- **Output shaft rotating direction:** Same as the servo motor output shaft direction
- **With electromagnetic brake:** Available
- **Backlash:** 60 minutes or less at reducer output shaft
- **Permissible load to motor inertia moment ratio (Note 2):** For 50W or 100W: Maximum of 5 times the servo motor's inertia moment
- **Permissible speed (at reducer input shaft):** 4500r/min (Note 4)

Notes:
1. The reducer efficiency varies depending on the reduction ratio. It also changes depending on the conditions of use, such as output torque, speed, temperature. The values in the table represent typical values at the rated torque and speed and at the normal temperature. They are not guaranteed values.
2. Contact your local sales office if the load to motor inertia moment ratio exceeds the value in the table.

● With flange output type reducer for precision application, flange mounting (G5)

### Combination list (Note 1)

<table>
<thead>
<tr>
<th>Output (W)</th>
<th>HF-KP series</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>1/5</td>
</tr>
<tr>
<td>100</td>
<td>1/11</td>
</tr>
<tr>
<td>200</td>
<td>1/21</td>
</tr>
<tr>
<td>400</td>
<td>1/33</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Servo motor model</th>
<th>HF-KP series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducer efficiency (Note 1)</td>
<td>58% to 87% (Note 2)</td>
</tr>
<tr>
<td>Mounting method</td>
<td>Flange mounting</td>
</tr>
<tr>
<td>Lubrication</td>
<td>Grease lubrication (already packed)</td>
</tr>
<tr>
<td>Output shaft rotating direction</td>
<td>Same as the servo motor output shaft direction</td>
</tr>
<tr>
<td>With electromagnetic brake</td>
<td>Available</td>
</tr>
<tr>
<td>Backlash</td>
<td>3 minutes or less at reducer output shaft</td>
</tr>
<tr>
<td>Permissible load to motor inertia moment ratio (Note 3)</td>
<td>For 50W or 100W: Maximum of 10 times the servo motor's inertia moment</td>
</tr>
<tr>
<td>Permissible speed (at reducer input shaft)</td>
<td>4500r/min (Note 4)</td>
</tr>
</tbody>
</table>

Notes:
1. The ○ mark in the table shows the manufacturing range. The servo motor can be mounted in any direction.

### Specifications

- **Servo motor series:** HF-KP series
- **Mounting method:** Flange mounting
- **Lubrication:** Grease lubrication (already packed)
- **Output shaft rotating direction:** Same as the servo motor output shaft direction
- **With electromagnetic brake:** Available
- **Backlash:** 3 minutes or less at reducer output shaft
- **Permissible load to motor inertia moment ratio (Note 3):** For 50W or 100W: Maximum of 10 times the servo motor's inertia moment
- **Permissible speed (at reducer input shaft):** 4500r/min (Note 4)

Notes:
1. The reducer efficiency varies depending on the reduction ratio. It also changes depending on the conditions of use, such as output torque, speed, temperature. The values in the table represent typical values at the rated torque and speed and at the normal temperature. They are not guaranteed values.
2. The reducer efficiency of HF-KP053 is 22% to 41%.
3. Contact your local sales office if the load to motor inertia moment ratio exceeds the value in the table.
4. The value is applicable when combining with MR-JN servo amplifier series.

Electromagnetic Brake Specifications (Note 1)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Spring-action safety brake</td>
<td>Spring-action safety brake</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>24VDC 5%</td>
<td>24VDC 10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brake static friction torque (N•m)</td>
<td>0.32</td>
<td>0.32</td>
<td>1.3</td>
<td>1.3</td>
<td>0.32</td>
<td>0.32</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>(oz•in)</td>
<td>45.3</td>
<td>45.3</td>
<td>184</td>
<td>184</td>
<td>45.3</td>
<td>45.3</td>
<td>184</td>
<td>184</td>
</tr>
<tr>
<td>Power consumption (W) at 20°C (68°F)</td>
<td>6.3</td>
<td>6.3</td>
<td>7.9</td>
<td>7.9</td>
<td>6.3</td>
<td>6.3</td>
<td>7.9</td>
<td>7.9</td>
</tr>
<tr>
<td>braking work (J/hour)</td>
<td>56</td>
<td>56</td>
<td>220</td>
<td>220</td>
<td>56</td>
<td>56</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>Brake life Number of times (Note 2)</td>
<td>20000</td>
<td>20000</td>
<td>20000</td>
<td>20000</td>
<td>20000</td>
<td>20000</td>
<td>20000</td>
<td></td>
</tr>
<tr>
<td>Work per breaking</td>
<td>5.6</td>
<td>5.6</td>
<td>22</td>
<td>22</td>
<td>5.6</td>
<td>5.6</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

Notes:
1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. The brake gap cannot be adjusted. The brake life shows time until the readjustment is needed.
Special Shaft End Specifications

Motors with the following specifications are also available.

HF-KN series

- **D-cut shaft (Note 1)** (50W, 100W)

- **Keyway shaft with key (Note 1)** (200W, 400W)

<table>
<thead>
<tr>
<th>Servo motor model</th>
<th>Capacity (W)</th>
<th>Variable dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-KN20K</td>
<td>200, 400</td>
<td>T 14h6 30 27 5 20 3 3</td>
</tr>
<tr>
<td>HF-KN20K</td>
<td>200, 400</td>
<td>M4 screw Depth: 15mm</td>
</tr>
</tbody>
</table>

HF-KP series

The standard shaft for HF-KP(□)G1 (with reducer for general industrial machines) is straight. The shaft with key is available as a special specification. Contact your local sales office for more details.

The standard shaft for HF-KP(□)G7 (with shaft output type reducer for precision application, flange mounting) is straight. However, the shaft with key (HF-KP(□)G7K) is also available. Refer to the followings for the shaft-end shape.

- **Keyway shaft with key (Note 1, 2, 3)**

<table>
<thead>
<tr>
<th>Servo motor model</th>
<th>Reduction ratio</th>
<th>Variable dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-KP13G7K</td>
<td>1/5</td>
<td>S 25 16 28 5 25 3 3</td>
</tr>
<tr>
<td></td>
<td>1/11</td>
<td>M4 screw Depth: 8mm</td>
</tr>
<tr>
<td></td>
<td>1/21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/33</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/45</td>
<td></td>
</tr>
<tr>
<td>HF-KP33G7K</td>
<td>1/5</td>
<td>S 25 16 28 5 25 3 3</td>
</tr>
<tr>
<td></td>
<td>1/11</td>
<td>M4 screw Depth: 8mm</td>
</tr>
<tr>
<td></td>
<td>1/21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/33</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/45</td>
<td></td>
</tr>
<tr>
<td>HF-KP43G7K</td>
<td>1/5</td>
<td>S 40 20 40 82 12 70 5 8</td>
</tr>
<tr>
<td></td>
<td>1/11</td>
<td>M10 screw Depth: 20mm</td>
</tr>
<tr>
<td></td>
<td>1/21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/33</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/45</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. The servo motor with the keyway shaft or the D-cut shaft cannot be used in frequent start/stop applications.
2. A key (single-point key) is supplied.
3. The dimensions not mentioned in the drawings are the same as those of the straight shaft of HF-KP(□)G7. Refer to “HF-KP Series Geared Servo Motor Dimensions ● HF-KP(□)G7” in this catalog.
Cables and connectors

For encoder cable length 10m or shorter

1. This cable does not have a long bending life, so always fix the cable before using.
2. If the length exceeds 10m, relay a cable using MR-PWS2CBL03M-A1-L/-A2-L cable. This cable does not have a long bending life, so always fix the cable before using. Refer to "MR-JN-...A INSTRUCTION MANUAL" for details on manufacturing the relay cable.
3. If the length exceeds 10m, relay a cable using MR-BKS2CBL03M-A1-L/-A2-L cable. This cable does not have a long bending life, so always fix the cable before using. Refer to "MR-JN-...A INSTRUCTION MANUAL" for details on manufacturing the relay cable.
4. Cables for leading two different directions may be used for one servo motor.

For encoder cable length over 10m

Notes:
1. This cable does not have a long bending life, so always fix the cable before using.
2. If the length exceeds 10m, relay a cable using MR-PWS2CBL03M-A1-L/-A2-L cable. This cable does not have a long bending life, so always fix the cable before using. Refer to "MR-JN-...A INSTRUCTION MANUAL" for details on manufacturing the relay cable.
3. If the length exceeds 10m, relay a cable using MR-BKS2CBL03M-A1-L/-A2-L cable. This cable does not have a long bending life, so always fix the cable before using. Refer to "MR-JN-...A INSTRUCTION MANUAL" for details on manufacturing the relay cable.
4. Cables for leading two different directions may be used for one servo motor.
### Cables and connectors

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>IP rating (Note 2)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Encoder cable 10m or shorter  (Direct connection type)</td>
<td>MR-J3ENCBL[M-A1-H]</td>
<td>IP65</td>
<td>Encoder connector (Tyco Electronics) 1674320-1 Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M) or 54599-1019 (connector set, Molex)</td>
</tr>
<tr>
<td></td>
<td>MR-J3ENCBL[M-A2-H]</td>
<td>IP65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MR-J3ENCBL[M-A2-L]</td>
<td>IP65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MR-J3ENCBL[M-A2-H]</td>
<td>IP65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MR-J3ENCBL[M-A2-L]</td>
<td>IP65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MR-J3JCB03M-A2-L</td>
<td>IP20</td>
<td>Use this in combination of ② or ⑥.</td>
</tr>
<tr>
<td></td>
<td>MR-J3JCB03M-A2-L</td>
<td>IP20</td>
<td></td>
</tr>
<tr>
<td>5. Amplifier-side encoder cable Exceeding 10m (Relay type)</td>
<td>MR-EKCBM[H-M]</td>
<td>IP20</td>
<td>Junction connector (Tyco Electronics) 1-172161-9 (housing) 170359-1 (connector pin) MT1-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL) Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M) or 54599-1019 (connector set, Molex)</td>
</tr>
<tr>
<td></td>
<td>MR-EKCBM[L-M]</td>
<td>IP20</td>
<td>Use this in combination of ② or ⑥.</td>
</tr>
<tr>
<td>6. Junction connector set</td>
<td>MR-ECNM</td>
<td>IP20</td>
<td>Junction connector (Tyco Electronics) 1-172161-9 (housing) 170359-1 (connector pin) MT1-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL) Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M) or 54599-1019 (connector set, Molex)</td>
</tr>
<tr>
<td></td>
<td>MR-J3JSCBL03M-A2-L</td>
<td>IP65 (Note 3)</td>
<td>Use this in combination of ② or ⑨.</td>
</tr>
<tr>
<td></td>
<td>MR-J3JSCBL03M-A2-L</td>
<td>IP65 (Note 3)</td>
<td></td>
</tr>
<tr>
<td>9. Amplifier-side encoder cable Exceeding 10m (Relay type)</td>
<td>MR-J3ENCBL[M-H]</td>
<td>IP67</td>
<td>Junction connector (DDK) CM10-SP10S-M (D6) (straight plug) CM10-#22SC (S1) (D6) -100 (socket contact) Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M) or 54599-1019 (connector set, Molex)</td>
</tr>
<tr>
<td></td>
<td>MR-J3ENCBL[M-L]</td>
<td>IP67</td>
<td>Use this in combination of ② or ⑨.</td>
</tr>
<tr>
<td>10. Junction connector set</td>
<td>MR-J3SCNS</td>
<td>IP67</td>
<td>Junction connector (DDK) CM10-SP10S-M (D6) (straight plug) CM10-#22SC (S1) (D6) -100 (socket contact) Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M) or 54599-1019 (connector set, Molex)</td>
</tr>
</tbody>
</table>

Notes:
1. -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.
2. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo amplifier/servo motor. If the IP rating of the servo amplifier/servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
3. The encoder cable is rated IP65 while the junction connector is rated IP67.
4. For the ultra-long bending life cables and/or for unlisted lengths (available in the ultra-long bending life cables), contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsc.jp
### Options

#### Cables and connectors

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>IP rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply cable&lt;br&gt;Lead out in direction of motor shaft</td>
<td>MR-PWS1CBLM-A1-H&lt;br&gt;[(cable length: 2, 5, 10m (Note 1, 3))&lt;br&gt;(cable length: 2, 5, 10m (Note 1))]</td>
<td>IP65</td>
<td>Motor power supply connector (Japan Aviation Electronics Industry)&lt;br&gt;JN4PT04S1J-R (plug)&lt;br&gt;ST-TMH-S-C1B-100-(A534G) (socket contact)</td>
</tr>
<tr>
<td>Power supply cable&lt;br&gt;Lead out in opposite direction of motor shaft</td>
<td>MR-PWS1CBLM-A2-H&lt;br&gt;[(cable length: 2, 5, 10m (Note 1, 3))&lt;br&gt;(cable length: 2, 5, 10m (Note 1))]</td>
<td>IP65</td>
<td><em>This cable is not shielded.</em></td>
</tr>
<tr>
<td>Power supply cable&lt;br&gt;Lead out in direction of motor shaft</td>
<td>MR-PWS2CBL03M-A1-L&lt;br&gt;(cable length: 0.3m (Note 1))</td>
<td>IP65</td>
<td>Motor power supply connector (Japan Aviation Electronics Industry)&lt;br&gt;JN4PT04S2J-R (plug)&lt;br&gt;ST-TMH-S-C1B-100-(A534G) (socket contact)</td>
</tr>
<tr>
<td>Power supply cable&lt;br&gt;Lead out in opposite direction of motor shaft</td>
<td>MR-PWS2CBL03M-A2-L&lt;br&gt;(cable length: 0.3m (Note 1))</td>
<td>IP65</td>
<td><em>This cable is not shielded.</em></td>
</tr>
<tr>
<td>Brake cable&lt;br&gt;Lead out in direction of motor shaft</td>
<td>MR-BKSTCLM-A1-H&lt;br&gt;[(cable length: 2, 5, 10m (Note 1, 3))&lt;br&gt;(cable length: 2, 5, 10m (Note 1))]</td>
<td>IP65</td>
<td>Motor brake connector (Japan Aviation Electronics Industry)&lt;br&gt;JN4PT02S1J-R (plug)&lt;br&gt;ST-TMH-S-C1B-100-(A534G) (socket contact)</td>
</tr>
<tr>
<td>Brake cable&lt;br&gt;Lead out in opposite direction of motor shaft</td>
<td>MR-BKSTCLM-A2-H&lt;br&gt;[(cable length: 2, 5, 10m (Note 1, 3))&lt;br&gt;(cable length: 2, 5, 10m (Note 1))]</td>
<td>IP65</td>
<td><em>This cable is not shielded.</em></td>
</tr>
<tr>
<td>Brake cable&lt;br&gt;Lead out in direction of motor shaft</td>
<td>MR-BKSTCLM-A1-L&lt;br&gt;[(cable length: 2, 5, 10m (Note 1, 3))&lt;br&gt;(cable length: 2, 5, 10m (Note 1))]</td>
<td>IP65</td>
<td>Motor brake connector (Japan Aviation Electronics Industry)&lt;br&gt;JN4PT02S2J-R (plug)&lt;br&gt;ST-TMH-S-C1B-100-(A534G) (socket contact)</td>
</tr>
<tr>
<td>Brake cable&lt;br&gt;Lead out in opposite direction of motor shaft</td>
<td>MR-BKSTCLM-A2-L&lt;br&gt;[(cable length: 2, 5, 10m (Note 1, 3))&lt;br&gt;(cable length: 2, 5, 10m (Note 1))]</td>
<td>IP65</td>
<td><em>This cable is not shielded.</em></td>
</tr>
<tr>
<td>Servo amplifier power supply connector set&lt;br&gt;(Standard accessory: Insertion type)</td>
<td>—</td>
<td>—</td>
<td>CNP1 connector&lt;br&gt;CNP2 connector</td>
</tr>
<tr>
<td>CN1 connector set</td>
<td>MR-J2CMP2</td>
<td>—</td>
<td>Amplifier connector (3M or an equivalent product)&lt;br&gt;10126-3500PE (connector)&lt;br&gt;10326-52FS0-008 (shell kit)</td>
</tr>
<tr>
<td>Junction terminal block cable&lt;br&gt;[(cable length: 0.5, 1m)]</td>
<td>MR-TBNATEM-L&lt;br&gt;[(cable length: 0.5, 1m)]</td>
<td>—</td>
<td>Junction terminal block connector (3M or an equivalent product)&lt;br&gt;10126-6006EL (connector)&lt;br&gt;10326-3210-000 (shell kit)</td>
</tr>
<tr>
<td>Junction terminal block</td>
<td>MR-TB26A</td>
<td>—</td>
<td>Amplifier connector (3M or an equivalent product)&lt;br&gt;10126-6006EL (connector)&lt;br&gt;10326-3210-000 (shell kit)</td>
</tr>
<tr>
<td>Personal computer communication cable</td>
<td>USB cable</td>
<td>MR-J3USB1CBL15M&lt;br&gt;Cable length: 3m</td>
<td>Amplifier connector mini-B connector (5 pins)&lt;br&gt;Personal computer connector A connector</td>
</tr>
</tbody>
</table>

Notes:
1. -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.
2. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo amplifier/servo motor. If the IP rating of the servo amplifier/servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
3. For the ultra-long bending life cables and/or for unlisted lengths (available in the ultra-long bending life cables), contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsec.jp
### Encoder connectors

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>IP rating (Note 2)</th>
<th>Description</th>
<th>Applicable cable example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servo motor encoder connector</td>
<td>1674320-1</td>
<td>IP65</td>
<td>Manufacturer: Tyco Electronics Corporation</td>
<td>Wire size: 0.14mm² (AWG26) to 0.3mm² (AWG22)</td>
</tr>
<tr>
<td>Servo amplifier CN2 connector</td>
<td>54599-1019 (gray)</td>
<td>—</td>
<td>Manufacturer: Molex</td>
<td>Completed cable outer diameter: 7.1 mm + 0.3 mm</td>
</tr>
<tr>
<td></td>
<td>54599-1016 (black)</td>
<td>—</td>
<td></td>
<td>Crimping tool: 1596970-1 (for ground clip) and 1596847-1 (for receptacle contact)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wire example: Fluorocarbon resin wire ETFE - SVP 70/0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1674320-1 (connector set) (gray)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>54599-1019 (connector set) (black)</td>
</tr>
</tbody>
</table>

#### Notes:
1. 3M also manufactures a connector compatible with the servo amplifier's CN2 connector.
2. Model: 36210-01000PL (receptacle); 36310-32000-008 (shell kit).
3. The IP rating indicated is for the connector’s protection against ingress of dust and water when coupled to a servo amplifier/servo motor. If the IP rating of the servo amplifier/servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.

### Motor power supply connector

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>IP rating (Note 2)</th>
<th>Description</th>
<th>Applicable cable example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor power supply connector</td>
<td>JN4FT04S/J1-R</td>
<td>IP65</td>
<td>Manufacturer: Japan Aviation Electronics Industry, Ltd.</td>
<td>Wire size: 0.75mm² (AWG19)</td>
</tr>
<tr>
<td></td>
<td>ST-TMH-S-C1B-100-(A534G) (socket contact)</td>
<td></td>
<td></td>
<td>Completed cable outer diameter: 6.2 mm + 0.3 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Crimping tool (CT160-3-TMH5B) is required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wire example: Fluorocarbon resin wire RMFES-A (CL3X)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 cores</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DYDEN CORPORATION or an equivalent product</td>
</tr>
</tbody>
</table>

### Motor brake connector

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>IP rating (Note 2)</th>
<th>Description</th>
<th>Applicable cable example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor brake connector</td>
<td>JN4FT02SJ1-R</td>
<td>IP65</td>
<td>Manufacturer: Japan Aviation Electronics Industry, Ltd.</td>
<td>Wire size: 0.5mm² (AWG19)</td>
</tr>
<tr>
<td></td>
<td>ST-TMH-S-C1B-100-(A534G) (socket contact)</td>
<td></td>
<td></td>
<td>Completed cable outer diameter: 4.5 mm + 0.3 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Crimping tool (CT160-3-TMH5B) is required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wire example: Fluorocarbon resin wire RMFES-A (CL3X)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 cores</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DYDEN CORPORATION or an equivalent product</td>
</tr>
</tbody>
</table>
Options

● Optional regeneration unit

<table>
<thead>
<tr>
<th>Servo amplifier model</th>
<th>Tolerable regenerative power of built-in regenerative resistor (W)</th>
<th>Tolerable regenerative power of optional regeneration unit (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR-JN-10A (1)</td>
<td>—</td>
<td>30</td>
</tr>
<tr>
<td>MR-JN-20A (1)</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>MR-JN-40A</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

* Cautions when connecting the optional regeneration unit
1. The optional regeneration unit causes a temperature rise of 100°C or more relative to the ambient temperature. Fully examine heat dissipation, installation position, wires used, etc. before installing the unit. Use flame-resistant wires or apply flame retardant on wires. Keep the wires clear of the unit.
2. Always use twisted wires, maximum length of 5m, to connect the optional regeneration unit with the servo amplifier.
3. Always use twisted wires for a thermal sensor, and make sure that the sensor does not fail to work properly due to inducted noise.

Note: The power values in this table are resistor-generated powers, not rated powers.

External dimensions

- MR-RB032, MR-RB12

Connections

- Model: MR-RB032
  - LA: 30
  - LB: 119
  - LC: 99
  - LD: 1.6
  - Mass (kg): 0.5 (1.1)

- Model: MR-RB12
  - LA: 40
  - LB: 169
  - LC: 149
  - LD: 2
  - Mass (kg): 1.1 (2.4)

Notes: 1. Create a sequence circuit that turns off the magnetic contactor (MC) when abnormal overheating occurs.
2. The G3 and G4 terminals are thermal sensor. G3-G4 opens when the optional regeneration unit overheats abnormally.
3. Disconnect the wires for the built-in regenerative resistor (P and C) and remove the resistor from the servo amplifier when using the optional regeneration unit.

Junction terminal block (MR-TB26A)
All signals can be connected via this junction terminal block.

External dimensions (Note 1)

Specifications

- Rating: Max. 32VAC/32VDC, 0.5A
- Applicable wire (terminal side): 0.2mm² (AWG24) to 2.5mm² (AWG12)
- Solid wire: 0.32mm² to 1.2mm²
- Insulated outer diameter: 5mm to 6mm
- Strip length: 210-619 (Wago) or equivalent
- Operating tool: 210-119SB (Wago) or equivalent
- Strip length: 5mm to 6mm

Notes: 1. The length in ( ) apply when the junction terminal box is mounted on a 35mm wide DIN rail.

Manual Pulse Generator (MR-HDP01): For point table method and program method

Dimensions

- Panel cutting: 3-4.8 equally divided
- Mounting: Only M3 can be mounted.
Peripheral Equipment

Electrical wires, circuit breakers, magnetic contactors (example of selection)
The following are examples of wire sizes when 600V polyvinyl chloride insulated wires (IV wires) with a length of 30m are used. Smaller size of wires may be applied by using 600V grade heat-resistant polyvinyl chloride insulated wires (HIV wires).

Refer to "MR-JN-JA INSTRUCTION MANUAL" when using HIV wires.

<table>
<thead>
<tr>
<th>Servo amplifier</th>
<th>Circuit breaker</th>
<th>Magnetic contactor (Note 4)</th>
<th>Electrical wire size (mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR-JN-10A</td>
<td>30A frame 5A</td>
<td>S-N10</td>
<td>2 (AWG14)</td>
</tr>
<tr>
<td>MR-JN-20A</td>
<td>30A frame 10A</td>
<td></td>
<td>1.25 (AWG16)</td>
</tr>
<tr>
<td>MR-JN-40A</td>
<td>30A frame 15A</td>
<td></td>
<td>1.25 (AWG16)</td>
</tr>
<tr>
<td>MR-JN-30A1</td>
<td></td>
<td></td>
<td>2 (AWG14)</td>
</tr>
</tbody>
</table>

Notes: 1. Connect a reactor or an optional regeneration unit using the 5m or shorter length electrical wire.
2. Use a fluoric resin wire (0.75mm² (AWG19)) when connecting to motor power supply connector. Refer to "MR-JN-JA INSTRUCTION MANUAL" for details on wiring cables.
3. Use a fluoric resin wire (0.5mm² (AWG20)) when connecting to the motor electromagnetic brake connector. Refer to "MR-JN-JA INSTRUCTION MANUAL" for details on wiring cables.
4. Be sure to use a magnetic contactor (MC) with an operation delay time of 80ms or less. The operation delay time is the time interval between current being applied to the coil until closure of contacts.

Radio noise filter (FR-BIF)
This filter effectively controls noise emitted from the power supply side of the servo amplifier, and is especially effective for radio frequency bands 10MHz or lower. The FR-BIF is designed for the input only.

Line noise filter (FR-BSF01)
This filter is effective in suppressing radio noise emitted from the power supply side or output side of the servo amplifier, and also in suppressing high-frequency leakage current (zero-phase current), especially within 0.5MHz to 5MHz band.

Data line filter
Noise can be prevented by attaching a data line filter to the pulse output cable of the pulse train output controller or the motor encoder cable.

Example
Data line filter: ESD-SR-250 (manufactured by NEC Tokin Corporation) or ZCAT3035-1330 (manufactured by TDK Corporation)

Surge killer
Attach surge killers to AC relays and AC valves around the servo amplifier. Attach diodes to DC relays and DC valves.

Example
Surge killer: CR-50500 (manufactured by Okaya Electric Industries Co., Ltd.)
Diode: A diode with breakdown voltage 4 or more times greater than the relay's drive voltage, and with current capacity 2 or more times greater than the relay's drive current.
Peripheral Equipment

★ EMC filter
The following filter is recommended as a filter compliant with the EMC directive for the power supply of the servo amplifier.

<table>
<thead>
<tr>
<th>Model</th>
<th>Applicable servo amplifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF3010A-UN</td>
<td>MR-JN-10A (1), MR-JN-20A (1), MR-JN-40A</td>
</tr>
</tbody>
</table>

External dimensions (Unit: mm)

<table>
<thead>
<tr>
<th>Model</th>
<th>Leakage current (mA)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF3010A-UN</td>
<td>5</td>
<td>3 (6.6)</td>
</tr>
</tbody>
</table>

Notes:
1. Manufactured by SOSHIN ELECTRIC CO., LTD.
2. A surge protector is separately required to use this EMC filter. Refer to "EMC Installation Guidelines".

★ Power factor improvement AC reactor (FR-HAL)
This reactor enables users to boost the servo amplifier’s power factor and reduce its power supply capacity.

<table>
<thead>
<tr>
<th>Model</th>
<th>Applicable servo amplifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR-HAL-0.75K</td>
<td>MR-JN-10A (1)</td>
</tr>
<tr>
<td>FR-HAL-1.5K</td>
<td>MR-JN-20A</td>
</tr>
</tbody>
</table>

External dimensions (Unit: mm)

<table>
<thead>
<tr>
<th>Model</th>
<th>Terminal screw size</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR-HAL-0.75K</td>
<td>0.8 (1.8)</td>
<td></td>
</tr>
<tr>
<td>FR-HAL-1.5K</td>
<td>1.1 (2.4)</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Use the front right mounting hole for grounding.
2. Maximum dimensions (The dimension varies depending on the bending degree of the input/output line.)
Servo Support Software

Capacity selection software MRZJW3-MOTSZ111E (Note 1, 2)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of machine component</td>
<td>Horizontal ball screws, vertical ball screws, rack and pinions, roll feeds, rotating tables, carts, elevators, conveyors, and other (direct inertia input) devices</td>
</tr>
<tr>
<td>Output of results</td>
<td>Selected servo amplifier, selected servo motor, selected optional regeneration unit model, load inertia moment, load to motor inertia moment ratio, peak torque, peak torque ratio, effective torque, effective torque ratio, regenerative power, regenerative power ratio</td>
</tr>
<tr>
<td>Printing</td>
<td>Prints input specifications, operation pattern, calculation process, graph of selection process feedrate (or motor speed) and torque, and selection results.</td>
</tr>
<tr>
<td>Data storage</td>
<td>Entered specifications, operation patterns and selection are saved with a file name.</td>
</tr>
<tr>
<td>Inertia moment calculation function</td>
<td>Cylinder, core alignment column, variable speed, linear movement, suspension, conical, truncated cone</td>
</tr>
</tbody>
</table>

Notes: 1. MRZJW3-MOTSZ111E with software version C3 or above is compatible with MELSERVO-JN series. However, C4 or above will be compatible with MR-JN-CJA1.

MR Configurator (Setup software) MRZJW3-SETUP221E (Note 1)

Compatible personal computer

When using the capacity selection software or the MR Configurator (setup software), use an IBM PC/AT compatible model running with the following operation conditions.

Operating conditions

<table>
<thead>
<tr>
<th>Components</th>
<th>Capacity selection software MRZJW3-MOTSZ111E (Note 4)</th>
<th>MR Configurator (Setup software) MRZJW3-SETUP221E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Pentium® 133MHz or more (Windows® 98, Windows® 2000 Professional)</td>
<td></td>
</tr>
<tr>
<td>Memory</td>
<td>24MB or more (Windows® 98)</td>
<td>130MB or more</td>
</tr>
<tr>
<td>Monitor</td>
<td>Resolution 800 x 600 or more, 16-bit high color</td>
<td>Resolution 1024 x 768 or more, 16-bit high color</td>
</tr>
<tr>
<td>Keyboard</td>
<td>Compatible with above personal computers.</td>
<td></td>
</tr>
<tr>
<td>Mouse</td>
<td>Compatible with above personal computers.</td>
<td></td>
</tr>
<tr>
<td>Printer</td>
<td>Compatible with above personal computers.</td>
<td></td>
</tr>
<tr>
<td>Communication cable</td>
<td>Not required</td>
<td>MR-JUSB3CBL3M</td>
</tr>
</tbody>
</table>

Notes: 1. Pentium is a registered trademark of Intel Corporation. Windows and Windows Vista are registered trademarks of Microsoft Corporation in the United States and other countries.
2. Positioning data is available with software version C4 or above. Servo amplifier with software version B5 or above is required for the positioning function.
3. MRZJW3-MOTSZ111E with software version C3 or above is compatible with MELSERVO-JN series. However, C4 or above will be compatible with MR-JN-CJA1.
MR-JN-□A Servo Amplifier Dimensions


- Built-in regenerative resistor (lead wires) is mounted only in MR-JN-20A (1).

**MR-JN-40A**
HF-KN Series Servo Motor Dimensions

(Unit: mm)

● HF-KN053(B), HF-KN13(B)

<When the cables are led out in opposite direction of motor shaft>

Model | Variable dimensions |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-KN053 (B)</td>
<td>72 (108.9) ( \times ) 25.4</td>
</tr>
<tr>
<td>HF-KN13 (B)</td>
<td>87 (123.9) ( \times ) 40.4</td>
</tr>
</tbody>
</table>

Power supply connector pin assignment

- Pin No. | Signal name |
- 1 | U |
- 2 | V |
- 3 | W |
- 4 | B1 |
- 5 | B2 |

Notes:
1. Use a friction coupling to fasten a load.
2. Dimensions inside ( ) are for the models with electromagnetic brake.
3. Only for the models with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
4. For dimensions where there is no tolerance listed, use general tolerance.

● HF-KN23(B), HF-KN43(B)

<When the cables are led out in opposite direction of motor shaft>

Model | Variable dimensions |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-KN23 (B)</td>
<td>88.2 (116.8) ( \times ) 40</td>
</tr>
<tr>
<td>HF-KN43 (B)</td>
<td>110.2 (138.8) ( \times ) 62</td>
</tr>
</tbody>
</table>
With reducer for general industrial machines

HF-KP□(B)G1

The following is a schematic diagram. The actual shapes or the mounting screws may differ from the following. Refer to the table below and "Servo Motor INSTRUCTION MANUAL (Vol.2)" for details.

Notes: 1. Use a friction coupling to fasten a load.
2. Dimensions inside ( ) are for the models with electromagnetic brake.
3. Only for the models with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
4. The moments of inertia in the table are the values that are converted into motor shaft for the motor with reducer (and with electromagnetic brake).
5. For dimensions where there is no tolerance listed, use general tolerance. The actual dimensions may be 1mm to 3mm larger than the dimensions listed since the outer frame of the reducer is made by casting. Design a machine in order to make allowances.
6. Lead out the power supply cable in opposite direction of the motor shaft for the following servo motors:
   • All gear ratios for HF-KP053(B)G1 and HF-KP13(B)G1

<table>
<thead>
<tr>
<th>Model</th>
<th>Reduction ratio</th>
<th>Moment of inertia</th>
<th>Variable dimensions</th>
<th>Meas.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>LA</td>
</tr>
<tr>
<td>HF-KP053(B)G1</td>
<td>1/5</td>
<td>&lt;19/66&gt;</td>
<td>0.400 (0.470)</td>
<td>2.19 (2.57)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/12</td>
<td>&lt;25/56&gt;</td>
<td>0.450 (0.520)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/20</td>
<td>&lt;25/100&gt;</td>
<td>0.420 (0.490)</td>
</tr>
<tr>
<td>HF-KP13(B)G1</td>
<td>1/5</td>
<td>&lt;19/66&gt;</td>
<td>0.400 (0.470)</td>
<td>2.19 (2.57)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/12</td>
<td>&lt;25/56&gt;</td>
<td>0.450 (0.520)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/20</td>
<td>&lt;25/100&gt;</td>
<td>0.420 (0.490)</td>
</tr>
<tr>
<td>HF-KP23(B)G1</td>
<td>1/5</td>
<td>&lt;19/66&gt;</td>
<td>0.400 (0.470)</td>
<td>2.19 (2.57)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/12</td>
<td>&lt;25/56&gt;</td>
<td>0.450 (0.520)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/20</td>
<td>&lt;25/100&gt;</td>
<td>0.420 (0.490)</td>
</tr>
<tr>
<td>HF-KP43(B)G1</td>
<td>1/5</td>
<td>&lt;19/66&gt;</td>
<td>0.400 (0.470)</td>
<td>2.19 (2.57)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/12</td>
<td>&lt;25/56&gt;</td>
<td>0.450 (0.520)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/20</td>
<td>&lt;25/100&gt;</td>
<td>0.420 (0.490)</td>
</tr>
</tbody>
</table>

Notes:
1. Use a friction coupling to fasten a load.
2. Dimensions inside ( ) are for the models with electromagnetic brake.
3. Only for the models with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
4. The moments of inertia in the table are the values that are converted into motor shaft for the motor with reducer (and with electromagnetic brake).
5. For dimensions where there is no tolerance listed, use general tolerance. The actual dimensions may be 1mm to 3mm larger than the dimensions listed since the outer frame of the reducer is made by casting. Design a machine in order to make allowances.
6. Lead out the power supply cable in opposite direction of the motor shaft for the following servo motors:
   • All gear ratios for HF-KP053(B)G1 and HF-KP13(B)G1

---

HF-KP Series Geared Servo Motor Dimensions

(Unit: mm)
With flange output type reducer for precision application, flange mounting

HF-KP□(B)G5

The following is a schematic diagram. The actual shapes or the mounting screws may differ from the following. Refer to the table below and “Servo Motor INSTRUCTION MANUAL (Vol.2)” for details.

<table>
<thead>
<tr>
<th>Model</th>
<th>Reduction ratio</th>
<th>Moment of inertia J (10⁻⁴ kg·m²)</th>
<th>Variable dimensions</th>
<th>Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-KP□53□□□□□□□□□□□□□□□□□ (Note 5)</td>
<td>1/5</td>
<td>1.1 (0.12)</td>
<td>3 8 56</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>1/11</td>
<td>0.991 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>1/21</td>
<td>0.961 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>1/46</td>
<td>0.931 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
<td>HF-KP□15□□□□□□□□□□□□□□□□□ (Note 5)</td>
<td>1/5</td>
<td>1.1 (0.12)</td>
<td>3 8 56</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>1/11</td>
<td>0.991 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>1/21</td>
<td>0.961 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>1/46</td>
<td>0.931 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
<td>HF-KP□23□□□□□□□□□□□□□□□□□ (Note 5)</td>
<td>1/5</td>
<td>1.1 (0.12)</td>
<td>3 8 56</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>1/11</td>
<td>0.991 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
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<td>1/21</td>
<td>0.961 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
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<td>1/46</td>
<td>0.931 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
<td>HF-KP□43□□□□□□□□□□□□□□□□□ (Note 5)</td>
<td>1/5</td>
<td>1.1 (0.12)</td>
<td>3 8 56</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>1/11</td>
<td>0.991 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>1/21</td>
<td>0.961 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>1/46</td>
<td>0.931 (0.109)</td>
<td>14H7 21</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Notes:
1. Dimensions inside ( ) are for the models with electromagnetic brake.
2. Only for the models with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. The moments of inertia in the table are the values that are converted into motor shaft for the motor with reducer (and with electromagnetic brake).
4. For dimensions where there is no tolerance listed, use general tolerance. The actual dimensions may be 1mm to 3mm larger than the dimensions listed since the outer frame of the reducer is made by casting. Design a machine in order to make allowances.
5. Lead out the power supply cable in opposite direction of the motor shaft for the following servo motors:
   - All gear ratios for HF-KP□□□□□□□□□□□□□□□ and HF-KP□□□□□□□□□□□□□□□
   - Gear ratios of 1/21, 1/33 and 1/45 for HF-KP□□□□□□□□□□□□□□□
With shaft output type reducer for precision application, flange mounting

### HF-KP□(B)G7

The following is a schematic diagram. The actual shapes or the mounting screws may differ from the following. Refer to the table below and "Servo Motor INSTRUCTION MANUAL (Vol.2)" for details.

![Schematic Diagram](image)

#### Notes:
1. Use a friction coupling to fasten a load.
2. Dimensions inside ( ) are for the models with electromagnetic brake.
3. All gear ratios for HF-KP053(B)G7 and HF-KP13(B)G7.
4. Moments of inertia in the table are the values that are converted into motor shaft for the motor with reducer (and with electromagnetic brake).
5. For dimensions where there is no tolerance listed, use general tolerance. The actual dimensions may be 1mm to 3mm larger than the dimensions listed since the outer frame of the reducer is made by casting. Design a machine in order to make allowances.
6. Lead out the power supply cable in opposite direction of the motor shaft for the following servo motors:
   - All gear ratios for HF-KP053(B)G7 and HF-KP13(B)G7
   - Gear ratios of 1/21, 1/33 and 1/45 for HF-KP23(B)G7

![Variable Dimensions](image)

<table>
<thead>
<tr>
<th>Model</th>
<th>Reduction rate</th>
<th>Moment of inertia J (×10^3 kg·m²)</th>
<th>L</th>
<th>LA</th>
<th>LC</th>
<th>LD</th>
<th>LE</th>
<th>L5</th>
<th>S</th>
<th>LG</th>
<th>LH</th>
<th>Q</th>
<th>LR</th>
<th>LE</th>
<th>LM</th>
<th>KL</th>
<th>M</th>
<th>KA</th>
<th>KB</th>
<th>LT</th>
<th>LP</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-KP053(B)G7 (Note 6)</td>
<td>1/5</td>
<td>0.120 (0.128)</td>
<td>0.397 (0.409)</td>
<td>0.343 (0.341)</td>
<td>70</td>
<td>558h7</td>
<td>60</td>
<td>40</td>
<td>16h7</td>
<td>21</td>
<td>3</td>
<td>28</td>
<td>58</td>
<td>8</td>
<td>56</td>
<td>55</td>
<td>88.5</td>
<td>46</td>
<td>37.1</td>
<td>(38.6)</td>
<td>11.7</td>
</tr>
<tr>
<td>HF-KP13(B)G7 (Note 6)</td>
<td>1/5</td>
<td>0.145 (0.151)</td>
<td>0.850 (0.869)</td>
<td>0.714 (0.711)</td>
<td>105</td>
<td>858h7</td>
<td>90</td>
<td>59</td>
<td>25h7</td>
<td>27</td>
<td>8</td>
<td>42</td>
<td>80</td>
<td>10</td>
<td>55.5</td>
<td>107</td>
<td>9</td>
<td>1.5</td>
<td>(1.8)</td>
<td>3.3</td>
<td>(4.0)</td>
</tr>
<tr>
<td>HF-KP23(B)G7 (Note 6)</td>
<td>1/5</td>
<td>0.105 (0.112)</td>
<td>0.462 (0.467)</td>
<td>0.384 (0.381)</td>
<td>146.4</td>
<td>(187.5)</td>
<td>105</td>
<td>858h7</td>
<td>90</td>
<td>59</td>
<td>25h7</td>
<td>27</td>
<td>8</td>
<td>42</td>
<td>80</td>
<td>10</td>
<td>61</td>
<td>110</td>
<td>3.0</td>
<td>(3.3)</td>
<td>8.7</td>
</tr>
<tr>
<td>LF-KP053(B)G7 (Note 6)</td>
<td>1/5</td>
<td>0.120 (0.128)</td>
<td>0.397 (0.409)</td>
<td>0.343 (0.341)</td>
<td>142.6</td>
<td>(183.1)</td>
<td>70</td>
<td>558h7</td>
<td>60</td>
<td>40</td>
<td>16h7</td>
<td>21</td>
<td>3</td>
<td>28</td>
<td>58</td>
<td>8</td>
<td>56</td>
<td>103.9</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LF-KP13(B)G7 (Note 6)</td>
<td>1/5</td>
<td>0.150 (0.164)</td>
<td>0.866 (0.887)</td>
<td>0.730 (0.727)</td>
<td>142.6</td>
<td>(183.1)</td>
<td>105</td>
<td>858h7</td>
<td>90</td>
<td>59</td>
<td>25h7</td>
<td>27</td>
<td>8</td>
<td>42</td>
<td>80</td>
<td>10</td>
<td>61</td>
<td>110</td>
<td>3.3</td>
<td>(3.5)</td>
<td>8.4</td>
</tr>
<tr>
<td>LF-KP23(B)G7 (Note 6)</td>
<td>1/5</td>
<td>0.105 (0.112)</td>
<td>0.462 (0.467)</td>
<td>0.384 (0.381)</td>
<td>161.5</td>
<td>(221)</td>
<td>135</td>
<td>115h7</td>
<td>120</td>
<td>84</td>
<td>40h7</td>
<td>35</td>
<td>13</td>
<td>82</td>
<td>133</td>
<td>13</td>
<td>70</td>
<td>144.2</td>
<td>11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Unit: mm**

Notes:
1. Use a friction coupling to fasten a load.
2. Dimensions inside ( ) are for the models with electromagnetic brake.
3. Only for the models with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
4. The moments of inertia in the table are the values that are converted into motor shaft for the motor with reducer (and with electromagnetic brake).
5. For dimensions where there is no tolerance listed, use general tolerance. The actual dimensions may be 1mm to 3mm larger than the dimensions listed since the outer frame of the reducer is made by casting. Design a machine in order to make allowances.
6. Lead out the power supply cable in opposite direction of the motor shaft for the following servo motors:
   - All gear ratios for HF-KP053(B)G7 and HF-KP13(B)G7
   - Gear ratios of 1/21, 1/33 and 1/45 for HF-KP23(B)G7
To ensure safe use

To use the products given in this catalog properly, always read the “Installation Guide” and “MR-JN-CDA INSTRUCTION MANUAL” before starting to use them.

Cautions concerning use

Transportation and installation of servo motor

- Protect the servo motor or encoder from impact during handling. When installing a pulley or a coupling to the shaft, do not hammer on the shaft-end. Impact may damage the encoder.
- When installing the pulley or the coupling to the servo motor which has a key way on the shaft, use the screw hole on the shaft-end.
- Use a pulley extractor when removing the pulley.
- Do not apply a load exceeding the tolerable load onto the servo motor shaft. The shaft may break.

Installation

- Avoid installation in an environment in which oil mist, dust, etc. are in the air. When using in such an environment, enclose the servo amplifier in a sealed cabinet.
- Mount the servo amplifier vertically on a wall.
- Do not block intake and exhaust areas of the servo amplifier. Doing so may cause the servo amplifier to malfunction.
- When installing several servo amplifiers in a row in a sealed cabinet, leave 10mm or more open between each servo amplifier. Servo amplifier can be installed closely. In this case, keep the ambient temperature within 0°C to 45°C (32°F to 113°F), or use them with 75% or less of the effective load rate. When using one servo amplifier, always leave 40mm or more open in the upward and downward directions.
- To ensure the life and reliability, keep space as open as possible toward the top plate so that heat does not build up.
- Take special care, especially when installing several amplifiers in a row.
- Be sure to use the servo motor within the specified ambient temperature. Torque may drop due to temperature increase of the servo motor.
- The servo motor without reducer can be mounted in any direction. Note that the mounting direction of some geared motor is predetermined. When mounting vertically (shaft-up), take measures on the machine-side to ensure that oil from the gear box does not get into the servo motor.
- Do not touch the servo motor during or after operation until it has had sufficient time to cool. The motor can be very hot, and severe burns may result from touching the motor.
- The optional regeneration unit becomes hot (the temperature rise of 100°C or more) with frequent use. Do not install within flammable objects or objects subject to thermal deformation. Take care to ensure that electrical wires do not come into contact with the unit.
- Carefully consider the cable clamping method, and make sure that bending stress and stress of the cable's own weight are not applied on the cable connection section.
- If using in an application where the servo motor moves, select the cable bending radius according to the required bending life and wire type.

Grounding

- Securely ground to prevent electric shocks and to stabilize the potential in the control circuit.
- To ground the servo motor and servo amplifier at one point, connect the grounding terminals of each unit, and ground from the servo amplifier side.
- Faults such as position mismatch may occur if the grounding is insufficient.

Wiring

- When a commercial power supply is applied to the servo amplifier’s output terminals (U, V, W), the servo amplifier will be damaged. Before switching the power on, perform thorough wiring and sequence checks to ensure that there are no wiring errors, etc.
- When a commercial power supply is applied to the servo motor’s input terminals (U, V, W), the servo motor will be burned. Connect the servo motor to the servo amplifier’s output terminals (U, V, W).
- Match the phase of the servo motor’s input terminals (U, V, W) to the servo amplifier’s output terminals (U, V, W) when connecting. If they do not match, the servo motor cannot be controlled.
- Validate the stroke end signals (LSP, LSN) in position control or speed control mode.
- The servo motor will not start if the signals are invalid.
- Do not use the 24VDC interface and control circuit power supplies for the electromagnetic brake. Provide a power supply designed exclusively for the electromagnetic brake.

Factory settings

- All available combinations of servo motor and servo amplifier are predetermined. Confirm the models of the servo motor and the servo amplifier to be used before installation.
- Select a control mode with parameter PA01. Position control mode is selected as default. Change the parameter setting when using the other control modes.
- When using the optional regeneration unit, change parameter No. PA02. The optional regeneration unit is disabled as default, so the parameter must be changed to increase the regeneration performance.

Operation

- When a magnetic contactor (MC) is installed on the servo amplifier’s primary side, do not perform frequent starts and stops with the MC. Doing so may cause the servo amplifier to fail.
- When an error occurs, the servo amplifier’s safety features activate, halting output, and the dynamic brake instantly stops the servo motor.
- The dynamic brake is a function for emergency stop. Do not use it for stopping the servo motor in normal operations.
- As a rough guide, the dynamic brake can be used approximately 1000 times when a machine that has load to motor inertia moment ratio equals to or lower than the recommended ratio stops from the rated speed every 10 minutes.
- When using the servo motor with an electromagnetic brake, do not apply the electromagnetic brake when the servo is on. Doing so may cause the servo amplifier overload or shorten the electromagnetic brake life. Apply the electromagnetic brake when the servo is off.

Cautions concerning model selection

- Select a servo motor with a rated torque above the continuous effective load torque.
- When unbalanced torque is generated, such as in a vertical lift machine, it is recommended that the unbalanced torque of the machine be kept under 70% of the motor’s rated torque.
- Design the operation pattern in the command section so that positioning can be completed, taking the stop setting time (ts) into account.

- The load inertia moment should be below the recommended load inertia moment ratio of the servo motor being used.
- If it is too large, desired performance may not be attainable.
**Warranty**

1. **Warranty period and coverage**
   We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is repaired or replaced.

   **[Term]**
   The term of warranty for Product is twelve (12) months after your purchase or delivery of the Product to a place designated by you or eighteen (18) months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

   **[Limitations]**
   (1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule. It can also be carried out by us or our service company upon your request and the actual cost will be charged. However, it will not be charged if we are responsible for the cause of the failure.

   (2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.

   (3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
   (i) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
   (ii) a failure caused by any alteration, etc. to the Product made on your side without our approval
   (iii) a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
   (iv) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
   (v) any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
   (vi) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
   (vii) a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
   (viii) any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. **Term of warranty after the stop of production**
   (1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.
   (2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. **Service in overseas countries**
   Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA Center for details.

4. **Exclusion of responsibility for compensation against loss of opportunity, secondary loss, etc.**
   Whether under or after the term of warranty, we assume no responsibility for any damages arisen from causes for which we are not responsible, any losses of opportunity and/or profit incurred by you due to a failure of the Product, any damages, secondary damages or compensation for accidents arisen under a specific circumstance that are foreseen or unforeseen by our company, any damages to products other than the Product, and also compensation for any replacement work, readjustment, start-up test run of local machines and the Product and any other operations conducted by you.

5. **Change of Product specifications**
   Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. **Application and use of the Product**
   (1) For the use of our General-Purpose AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in General-Purpose AC Servo, and a backup or fail-safe function should operate on an external system to General-Purpose AC Servo when any failure or malfunction occurs.

   (2) Our General-Purpose AC Servo is designed and manufactured as a general purpose product for use at general industries. Therefore, applications substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.

   In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.

   We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.
Safety Warning
To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.