

Contents

| | |
|--|------------|
| 1. Installation and Operation | 1-1 |
| 1-1 General installation and operation | 1-1 |
| 1-2 Precautions when installing the unit | 1-2 |
| 1-3 Inspection at delivery | 1-4 |
| 1-4 Installation | 1-6 |
| 1-5 Making start up easier | 1-9 |
| 2. Outline of Wiring and Operation | 2-1 |
| 2-1 Connection of the power supply and servo motor | 2-1 |
| 2-1.1 Connection systems | 2-1 |
| 2-1.2 Servo motor connection precautions | 2-2 |
| 2-1.3 Servo motor terminal details | 2-2 |
| 2-1.4 Wiring the servo amplifier terminal block | 2-5 |
| 2-2 Power supply | 2-6 |
| 2-2.1 Power and main control circuit wiring | 2-6 |
| 2-2.2 Emergency stop circuit | 2-7 |
| 2-2.3 Alarm occurrence timing chart | 2-7 |
| 2-2.4 Electromagnetic brake operation | 2-8 |
| 2-3 Servo amplifier display operation | 2-9 |
| 3. Start Up and Operation of Position Servo | 3-1 |
| 3-1 Wiring | 3-1 |
| 3-2 Checking wiring | 3-1 |
| 3-3 Switching power on and setting parameters | 3-3 |
| 3-4 Operation | 3-6 |
| 3-5 The display and setting functions | 3-7 |
| 3-5.1 Display flow chart | 3-7 |
| 3-5.2 Status display | 3-8 |
| 3-5.3 Diagnosis mode | 3-9 |
| 3-5.4 Alarm mode | 3-10 |
| 3-5.5 Parameters | 3-11 |
| 3-6 Wiring | 3-18 |
| 3-6.1 Standard connection diagram | 3-19 |
| 3-6.2 Common line diagram for position servo | 3-21 |
| 3-6.3 Interface power supply | 3-22 |
| 3-7 Explanation of signals | 3-23 |
| 4. Start Up and Operation of Speed Servo | 4-1 |
| 4-1 Wiring | 4-1 |
| 4-2 Checking wiring | 4-1 |
| 4-3 Switching power on and setting parameters | 4-2 |
| 4-4 Operation | 4-4 |
| 4-5 Display and setting function | 4-5 |
| 4-5.1 Display flow chart | 4-5 |
| 4-5.2 Status display | 4-6 |

| | | |
|-----------|---|------------|
| 4-5.3 | Diagnosis mode | 4-7 |
| 4-5.4 | Alarm mode | 4-8 |
| 4-5.5 | Parameters | 4-9 |
| 4-6 | Wiring | 4-19 |
| 4-6.1 | Standard connection diagram | 4-20 |
| 4-6.2 | Common line diagram for speed servo | 4-22 |
| 4-6.3 | Interface power supply | 4-23 |
| 4-7 | Explanation of signals | 4-24 |
| 5. | Adjustments and Application Operations | 5-1 |
| 5-1 | Adjustments | 5-1 |
| 5-1.1 | Start-up adjustment sequence | 5-1 |
| 5-1.2 | Automatic tuning | 5-3 |
| 5-1.3 | Adjustment of the loop gain | 5-6 |
| 5-1.4 | Clever usage of the ultracompact HA-ME servo motor | 5-9 |
| 5-2 | Adjustments and application operations | 5-10 |
| 5-2.1 | Rotation trouble display mode | 5-11 |
| 5-2.2 | Do (output signal) check mode | 5-12 |
| 5-2.3 | Test mode operation 1 (operation with no commands) | 5-14 |
| 5-2.4 | Test mode operation 2 (operation without motor) | 5-16 |
| 5-2.5 | Alarm history clear (H2 display) | 5-19 |
| 5-2.6 | Offset adjustment mode (speed servo) | 5-20 |
| 5-2.7 | Check of digital input/output signal (external input/output signal) mode | 5-20 |
| 6. | Methods for Using the Auxiliary Equipment and Options | 6-1 |
| 6-1 | Regenerative option | 6-1 |
| 6-2 | Dynamic brake option | 6-4 |
| 6-3 | Power factor improvement reactor FR-BAL | 6-6 |
| 6-4 | Cables and connectors | 6-7 |
| 6-4.1 | Options list | 6-7 |
| 6-4.2 | Connector diagrams | 6-8 |
| 6-4.3 | Cable specifications | 6-10 |
| 6-4.4 | Connection diagram for option cables | 6-11 |
| 6-5 | Junction terminal block (Model: A6TBXY36) | 6-15 |
| 6-6 | Electrical wires, breakers and magnetic contactors | 6-18 |
| 6-7 | Selection of relays | 6-18 |
| 6-8 | Selection of the external speed command and external torque limit command potentiometers (pof) | 6-19 |
| 6-9 | Noise reduction techniques | 6-20 |
| 6-10 | Selection of power supply and surge absorber for electromagnetic brake .. | 6-25 |
| 6-11 | Leakage current breaker | 6-26 |
| 6-12 | External power for interface devices | 6-27 |
| 7. | Setting | 7-1 |
| 7-1 | List of control variables | 7-1 |
| 7-2 | Position resolution and parameter setting | 7-2 |
| 7-3 | Servo motor speed and command pulse frequency | 7-4 |

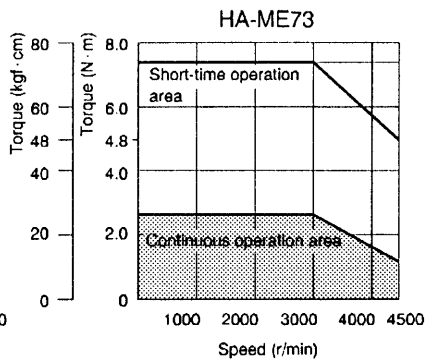
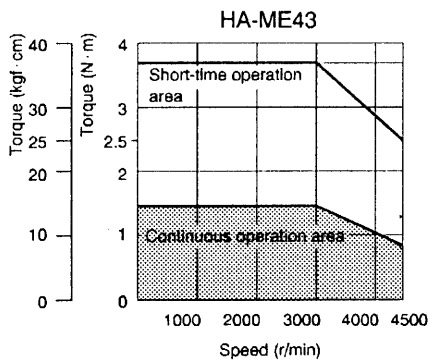
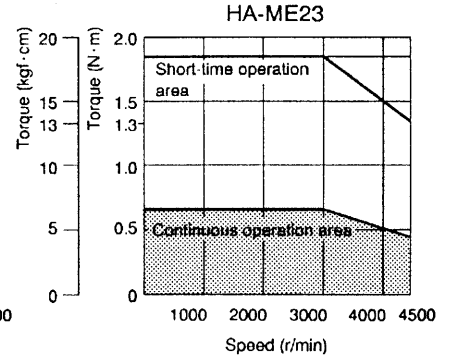
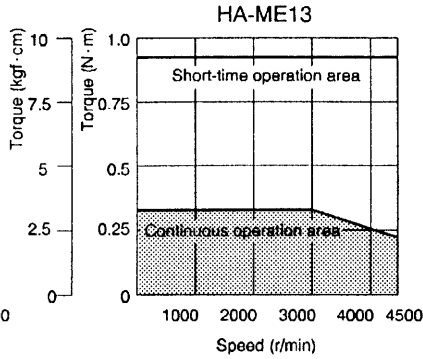
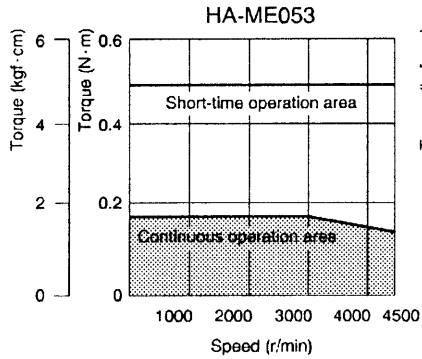
| | | |
|------------|---|-------------|
| 7-4 | Stopping characteristics of the servo motor | 7-5 |
| 7-5 | Servo motor selection | 7-6 |
| 7-6 | Load torque equations | 7-9 |
| 7-7 | Load inertia equations | 7-10 |
| 7-8 | Procedure for setting the mechanical origin | 7-11 |
| 7-9 | Example of servo motor selection | 7-12 |
| 8. | Troubleshooting | 8-1 |
| 8-1 | Troubles shooting points | 8-1 |
| 8-2 | How to measure the voltage and current of the servo | 8-2 |
| 8-3 | Periodic inspection and maintenance | 8-3 |
| 8-4 | Alarms | 8-6 |
| 8-5 | Determining the cause of a position offset | 8-12 |
| 9. | Data | 9-1 |
| 9-1 | Torque characteristics | 9-1 |
| 9-2 | Servo amplifier overload protection characteristics | 9-3 |
| 9-3 | Losses generated in servo amplifier | 9-4 |
| 9-4 | Regenerative brake characteristics | 9-6 |
| 9-5 | Electromagnetic brake characteristics | 9-9 |
| 9-6 | Dynamic brake characteristics | 9-12 |
| 9-7 | Mechanical characteristics of the servo motor | 9-13 |
| | 9-7-1 Vibration rank | 9-13 |
| | 9-7-2 Flex life of the encoder cable | 9-13 |
| 9-8 | Servo Motor with reduction gear | 9-13 |
| | 9-8-1 HA-ME series | 9-13 |
| | 9-8-2 HA-FE series | 9-14 |
| | 9-8-3 HA-SE series | 9-14 |
| 9-9 | Servo motor with tapered shaft | 9-16 |
| 9-10 | Servo motor with special shaft | 9-16 |
| 10. | Specifications | 10-1 |
| 10-1 | Model configuration | 10-1 |
| 10-2 | Standard specifications | 10-2 |
| 10-3 | Outer dimensions of servo amplifier | 10-5 |
| 10-4 | Outer dimensions of servo motor | 10-6 |
| 10-5 | Outer dimensions of UL listed and CSA certified servo motor | 10-14 |
| 10-6 | Protective functions | 10-22 |

| | |
|--|-----------|
| Installation and Operation | 1 |
| Outline of Wiring and Operation | 2 |
| Start Up and Operation of Position Servo | 3 |
| Start Up and Operation of Speed Servo | 4 |
| Adjustments and Application Operations | 5 |
| Methods for Using the Auxiliary Equipment and Options | 6 |
| Setting | 7 |
| Troubleshooting | 8 |
| Data | 9 |
| Specifications | 10 |

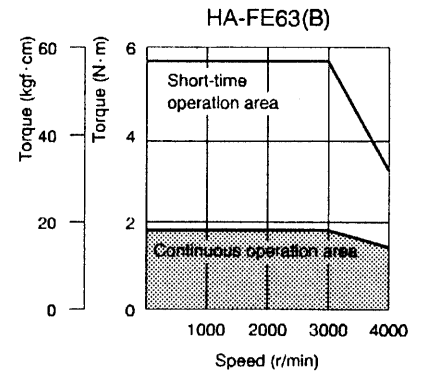
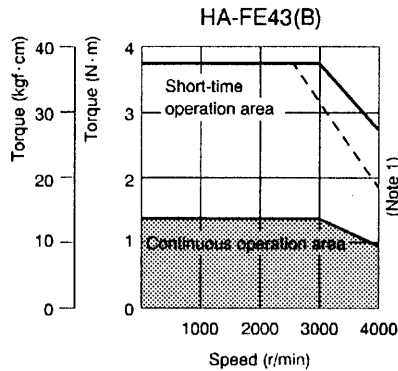
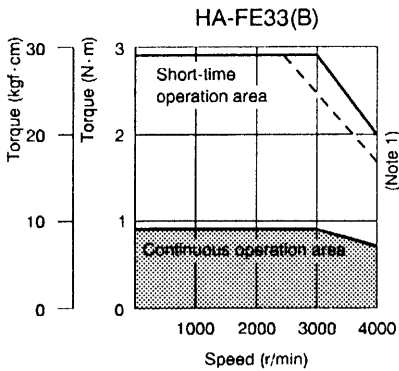
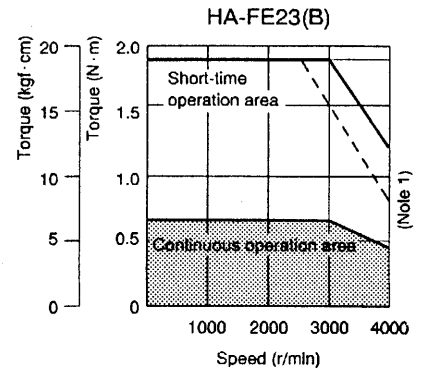
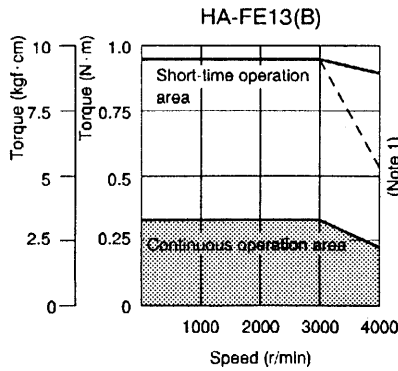
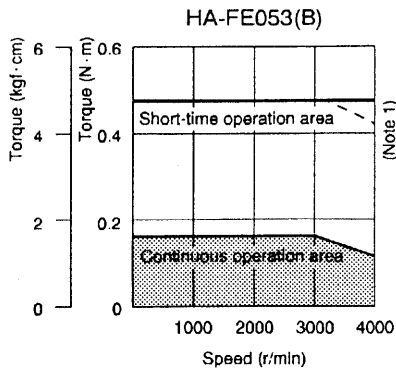
9. Data

9-1 Torque characteristics

HA-ME Series

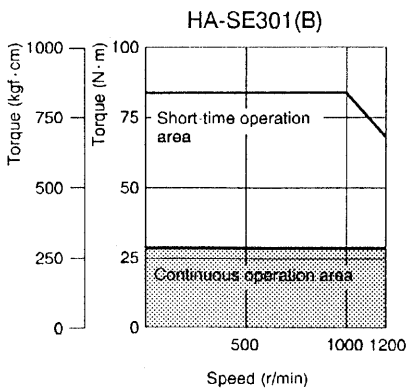
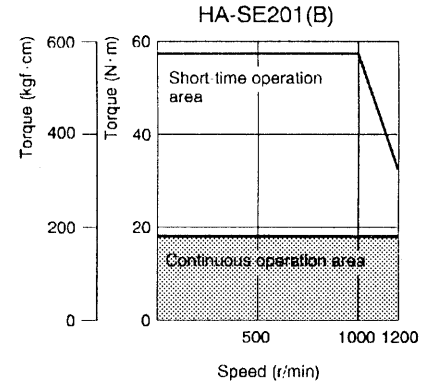
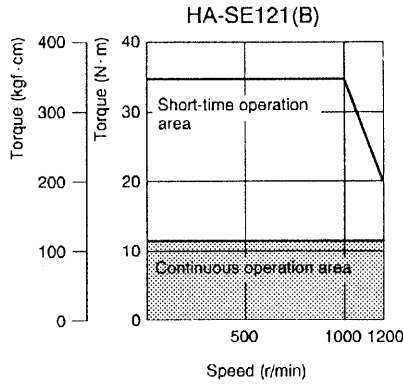
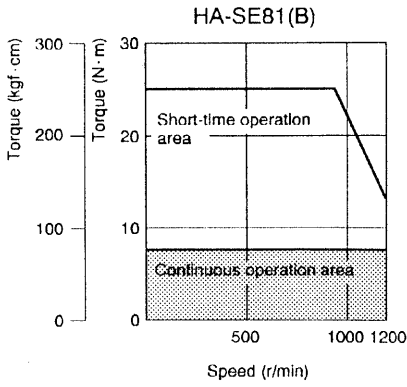


HA-FE Series

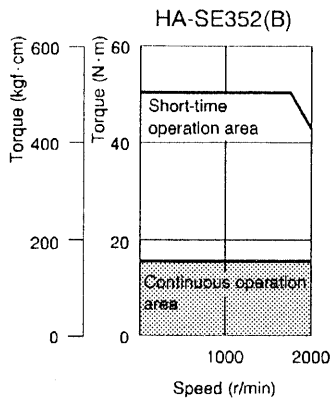
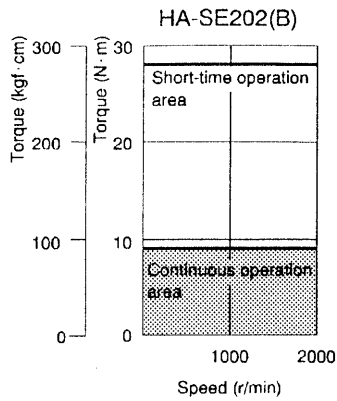
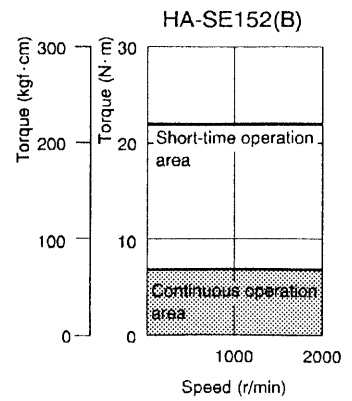
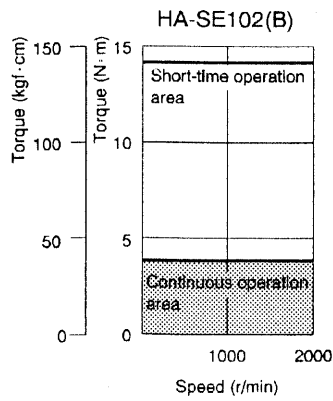
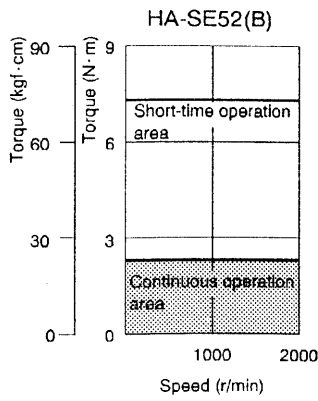


9. Data

HA-SE1000 r/min Series

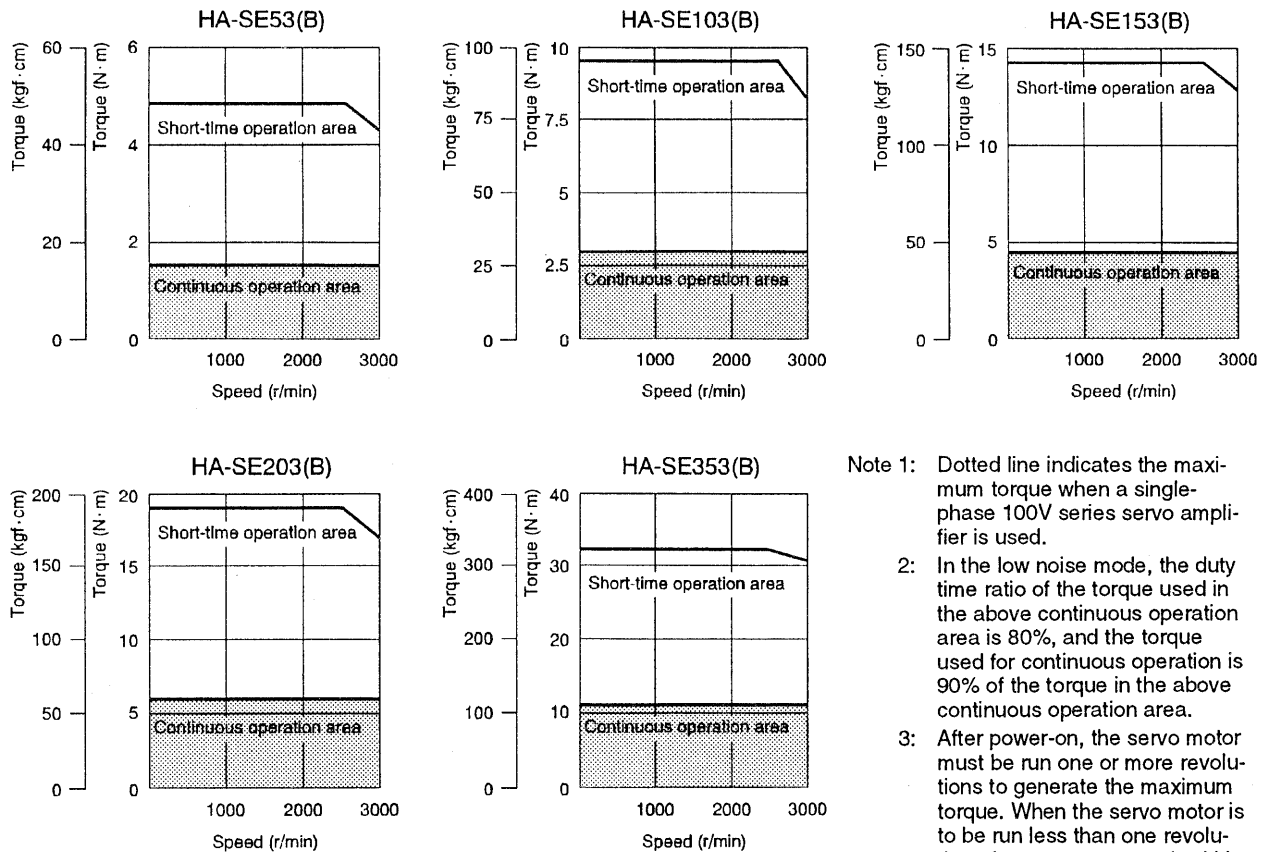


HA-SE2000 r/min Series



9. Data

HA-SE3000 r/min Series



9-2 Servo amplifier overload protection characteristics

An electronic thermal relay is built into the servo amplifier to protect the servo motor and servo amplifier from overloads. The operation characteristics of the electronic thermal relay are shown at the right.

If the machine strikes something and the maximum current flows, the protective circuit will operate (alarm code 50) in the area on the right side of the solid line in the chart.

How to view the diagram:

The electronic thermal relay's overload protection characteristics will differ with each model. The characteristics A and B in Fig. 9-1 correspond to the following models. Values in parentheses indicate load ratios in the low acoustic noise mode.

- A: HA-FE053, HA-ME13 servo motors
- B: HA-FE13, 23, 43, 63 motors,
HA-SE servo motors, HA-ME053, 23,
43, 73 servo motors

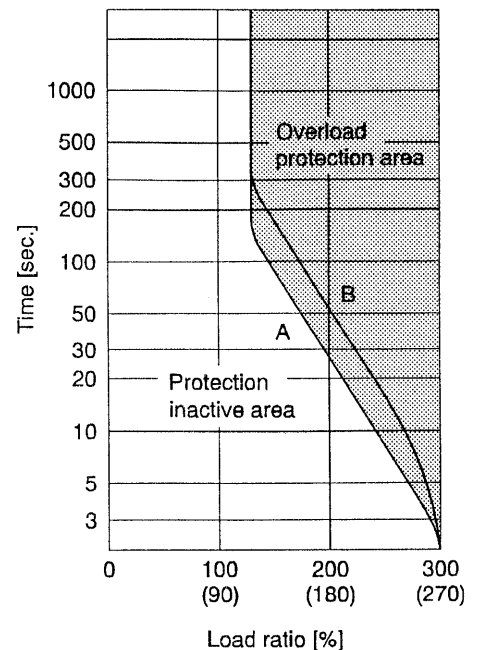


Fig. 9-1 Overload protection characteristics of electronic thermal relay

9. Data

9-3 Losses generated in servo amplifier

(1) Amount of heat generated by servo amplifier

The losses generated during the servo amplifier's rated load operation, and power capacities are shown below. Use the size of closed-type control box under the worst usage conditions. The actual amount of generated heat will be a value between the rated output and zero torque according to the duty used. The motor's nominal output will decrease when the motor is not used at maximum speed. The power capacity will be lower than the values given below. However, the servo amplifier's generated heat will not change.

Table 9-1 Power capacity and generated heat amount per servo amplifier

| Servo amplifier | Servo motor | Power facility capacity (kVA) | Servo amplifier's generated heat | | Total surface area required for heat dissipation (m ²) | Enclosure outline dimensions (mm) |
|-----------------------|---------------|-------------------------------|----------------------------------|------------------------|--|-----------------------------------|
| | | | During rated output (W) | During zero torque (W) | | |
| MR-J10MA MR-J10MA1 | HA-ME053, 13 | 0.3 | 25 | 15 | 0.5 | 280W × 300D × 300H |
| MR-J20MA MR-J20MA1 | HA-ME23 | 0.5 | 25 | 15 | 0.5 | 280W × 300D × 300H |
| MR-J40MA MR-J40MA1 | HA-ME43 | 0.9 | 35 | 15 | 0.7 | 350W × 400D × 300H |
| MR-J70MA | HA-ME73 | 1.3 | 50 | 15 | 1.0 | 400W × 400D × 500H |
| MR-J10A MR-J10A1 | HA-FE053, 13 | 0.3 | 25 | 15 | 0.5 | 280W × 300D × 300H |
| MR-J20A MR-J20A1 | HA-FE23 | 0.5 | 25 | 15 | 0.5 | 280W × 300D × 300H |
| MR-J40A MR-J40A1 | HA-FE33 | 0.7 | 35 | 15 | 0.7 | 350W × 400D × 300H |
| | HA-FE43 | 0.9 | 35 | 15 | 0.7 | 350W × 400D × 300H |
| MR-J60A | HA-FE63 | 1.1 | 40 | 15 | 0.8 | 400W × 400D × 300H |
| MR-J70A | HA-SE52, 53 | 1.0 | 40 | 15 | 0.8 | 400W × 400D × 300H |
| MR-J100A | HA-SE102, 103 | 1.7 | 50 | 15 | 1.0 | 400W × 400D × 500H |
| | HA-SE81 | 1.5 | 50 | 15 | 1.0 | 400W × 400D × 500H |
| | HA-SE121 | 2.1 | 50 | 15 | 1.0 | 400W × 400D × 500H |
| MR-J200A | HA-SE152, 153 | 2.5 | 90 | 20 | 1.8 | 400W × 400D × 1000H |
| | HA-SE202, 203 | 3.5 | 90 | 20 | 1.8 | 400W × 400D × 1000H |
| | HA-SE201 | 3.5 | 90 | 20 | 1.8 | 400W × 400D × 1000H |
| MR-J350A | HA-SE352, 353 | 5.5 | 130 | 20 | 2.7 | 400W × 400D × 1500H |
| | HA-SE301 | 4.8 | 120 | 20 | 2.7 | 400W × 400D × 1500H |

- Note: 1. The heat related power capacity (kVA) is as shown above. However, peak power that is 2 to 2.5 times higher than the rated will be required during the servo motor acceleration. Therefore, select a power supply which shows minimum voltage fluctuation so that the voltage range 180 to 253V for the 200V class or 95 to 127V for the 100V class can be attained. The necessary power facility capacity will change according to the impedance.
2. When using multi-axes, add the power capacity per axis.
3. The heat generated during regeneration is not included in the servo amplifier's generated heat amount. The brake resistivity heat amount is shown with the following equation. Secure a heat dissipation area including this value when start/stop is frequent, and the resistor heat generation cannot be ignored.

$$P_{RB} = \frac{(J_M + J_L) \times N^2 \times f_s}{1.37 \times 10^8} \text{ [W]}$$

- Here: J_L : Load inertia converted into motor shaft [kgf·cm²]
 J_M : Servo motor inertia [kgf·cm²]
 N : Servo motor speed [r/min]
 f_s : No. of decelerations [times/min]

9. Data

(2) Heat dissipation area for enclosed servo amplifier

An enclosure for the servo amplifier should be designed to operate in an ambient temperature of 40°C and allow no more than a temperature rise of 10°C. With a 5°C safety margin, the system should operate within a maximum 55°C limit. The necessary enclosure heat dissipation area can be calculated using the following equation.

$$A = \frac{P}{K \times \Delta T} \dots\dots\dots (9-1)$$

- Here, A : Heat dissipation area [m²]
P : Losses generated in storage box [W]
 ΔT : Difference inside and ambient temperature [°C]
K : Heat dissipation coefficient (5 to 6)

The heat dissipation area calculated in equation (9-1) should be calculated so that P is the sum of all losses generated in the enclosure.

'A' indicates the effective area for heat dissipation, but if the enclosure is directly installed on an insulated wall, that extra amount must be added into the enclosure's surface area.

The required heat dissipation area will differ according to the conditions in the enclosure. If the convection in the enclosure is poor, and the heat builds up, effective heat dissipation will not be possible. Therefore, arrangement of the equipment in the enclosure and the use of a fan should be considered .

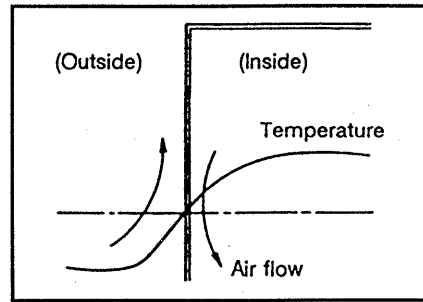


Fig. 9-2 Distribution of temperature in enclosure

If air is flowed along the outer wall of the enclosure, effective heat exchange will be possible, because the temperature slope inside and outside the enclosure will be large.

Table 9-1 lists the required enclosure surface area required for each servo amplifier when the servo amplifier is operated at rated load in an ambient of 40°C.

9. Data

9-4 Regenerative brake characteristics

(1) Regenerative brake torque

The regenerative brake torque is applied by the regenerative resistor or capacitor regeneration.

| | | |
|---------------------|---|--|
| | MR-J10A, 20A MR-J10A1, 20A1 MR-J10MA, 20MA MR-J10MA1, 20MA1 | MR-J40A to 350A, MR-J40A1 MR-J40MA, 70MA, MR-J40MA1 |
| Method | Capacitor regeneration | External installation of the regenerative resistor (The resistor is not built-in, so always install the regenerative option) |
| Regenerative option | Refer to the Regenerative option combination specifications in Section 6-1 Regenerative Option. | |

(2) Regenerative brake duty

1) Tolerance duty for regenerative operation from rated speed to stopping

Tolerable duty for servo motor at no load value noted in standard specifications (Section 10-2)
When a load is applied, the tolerable duty will change according to the inertia calculate the duty with the following equation.

$$\text{Tolerable duty (n)} = \frac{\text{Tolerable duty for servo motor at no load (value noted in Section 10 - 2)}}{(m + 1)} \quad [\text{times/min}] \quad \dots \dots \dots (9-2)$$

Here, m = load inertia/servo motor inertia

2) Tolerable duty for regenerative operation from other than rated speed

When performing regenerative operation with a speed other than the rated speed, multiply the value in Section 10-2 by (rated speed/operation speed)².

- For servo motor with no load

$$\text{Tolerable duty} = (\text{Value noted in Section 10 - 2}) \times \left[\frac{\text{Rated speed}}{\text{Operation speed}} \right]^2 \quad (\text{times/min}) \quad \dots \dots \dots (9-3)$$

- When load is applied

$$\text{Tolerable duty} = \frac{(\text{Value noted in Section 10 - 2})}{(m + 1)} \times \left[\frac{\text{Rated speed}}{\text{Operation speed}} \right]^2 \quad (\text{times/min}) \quad \dots \dots \dots (9-4)$$

(3) Necessity of regenerative option

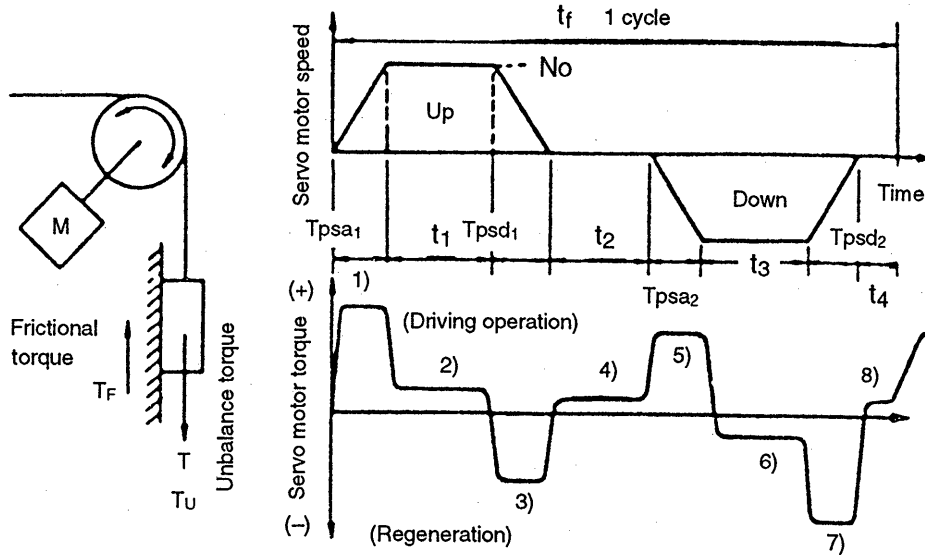
When the tolerable duty (equation 9-4) is greater than the required number of positioning times (cycles), then the regeneration option is not necessary. However, if the number of cycles is greater or unknown, then the regeneration option must be used.

9. Data

(4) Calculation of regenerative power

1) Calculation of regenerative energy

Calculate the regenerative energy according to the table shown below.



Example of the vertical drive shaft operation pattern

Calculation formulas for torque and energy in respective operation section

| Operation section | Torque applied to the servo motor [N·m] | Energy [J] |
|------------------------------------|--|---|
| 1) | $T_1 = \frac{(J_L + J_M) \cdot No}{9.55 \times 10^4} \cdot \frac{1}{Tpsa1} + T_U + T_F$ | $E_1 = \frac{0.1047}{2} \cdot No \cdot T_1 \cdot Tpsa1$ |
| 2) | $T_2 = T_U + T_F$ | $E_2 = 0.1047 \cdot No \cdot T_2 \cdot t_1$ |
| 3) | $T_3 = -\frac{(J_L + J_M) \cdot No}{9.55 \times 10^4} \cdot \frac{1}{Tpsd1} + T_U + T_F$ | $E_3 = \frac{0.1047}{2} \cdot No \cdot T_3 \cdot Tpsd1$ |
| 4), 8) | $T_4 = T_U$ | $E_4 \geq 0$ (no regeneration) |
| 5) | $T_5 = \frac{(J_L + J_M) \cdot No}{9.55 \times 10^4} \cdot \frac{1}{Tpsa2} - T_U + T_F$ | $E_5 = \frac{0.1047}{2} \cdot No \cdot T_5 \cdot Tpsa2$ |
| 6) | $T_6 = -T_U + T_F$ | $E_6 = 0.1047 \cdot No \cdot T_6 \cdot t_3$ |
| 7) | $T_7 = -\frac{(J_L + J_M) \cdot No}{9.55 \times 10^4} \cdot \frac{1}{Tpsd2} - T_U + T_F$ | $E_7 = \frac{0.1047}{2} \cdot No \cdot T_7 \cdot Tpsd2$ |
| Total of regenerative energy E_s | | Total of - energy in 1 to 8 E_s |

9. Data

2) Loss of the motor and amplifier in regenerative operation

Efficiency, etc. of the motor and amplifier in regenerative operation are listed below.

| Servo motor | Reverse efficiency (%) | Amplifier loss (W) | C charging (J) | Servo motor | Reverse efficiency (%) | Amplifier loss (W) | C charging (J) |
|----------------|------------------------|--------------------|----------------|-------------|------------------------|--------------------|----------------|
| HA-FE053/ME053 | 35 | 5 | 11 | HA-SE52 | 80 | 5 | 18 |
| HA-FE13/ME13 | 55 | | | HA-SE102 | 85 | | |
| HA-FE23/ME23 | 70 | | | HA-SE152 | 85 | 7 | 33 |
| HA-FE33 | 75 | | | HA-SE202 | 85 | | |
| HA-FE43/ME43 | 85 | | | HA-SE352 | 90 | 5 | 40 |
| HA-FE63 | 85 | | | HA-SE53 | 80 | | |
| HA-ME73/SE81 | 80 | | 18 | HA-SE103 | 85 | 7 | 33 |
| HA-SE121 | 85 | | | HA-SE153 | 85 | | |
| HA-SE201 | 85 | 7 | 33 | HA-SE203 | 85 | 7 | 33 |
| HA-SE301 | 90 | | 40 | HA-SE353 | 85 | | |

- (1) Reverse efficiency (η) : Efficiency including the servo motor and part of the servo amplifier when the rated (regenerative) torque is generated at the rated speed. Since the efficiency varies according to the speed and generated torque, consider a 10% tolerance.
- (2) Servo amplifier loss (EA) : Loss consumed within the servo amplifier. Conversion to the regenerative energy is as follows.

$$EA \text{ (Joule)} = P \text{ (W)} \times t \text{ (sec)}$$

t: Regenerative operation time excluding the driving operation time

- (3) C charging (E_c) : Energy charged to the electrolytic capacitors in the servo amplifier.

Heat generation of the regenerative option

The amount of energy obtained in 1) less the loss obtained in 2) gives the amount of energy consumed by the regenerative option.

$$ER \text{ (Joule)} = \eta \times E_s - EA - E_c$$

Calculate the power consumption of the regenerative option on the basis of a single operation cycle t_f (sec), and select necessary options.

$$PR \text{ (W)} = ER/t_f$$

9. Data

9-5 Electromagnetic brake characteristics

An electromagnetic brake is used in vertical motion applications to hold the load when power is removed from the drive. It is also used in conjunction with dynamic braking during an emergency stop. Do not use this brake for any other stopping situations. The characteristics of the electromagnetic brake are shown in the table below.

(1) Characteristics

Table 9-2 Electromagnetic brake characteristics

| Item | HA-ME series | | | HA-FE series | | | HA-SE series | | |
|---|--|---|---|--|---|---|--|---|--------------|
| | HA-ME053B HA-ME13B | HA-ME23B HA-ME43B | HA-ME73B | HA-FE053B HA-FE13B | HA-FE23B HA-FE33B | HA-FE43B HA-FE63B | HA-SE52B to 152B HA-SE53B to 153B HA-SE81B, 121B | HA-SE202B, 352B HA-SE203B, 353B HA-SE201B, 301B | |
| (Note 2) Model | Spring braking type safety brake | | | | | | | | |
| Rated voltage | 24VDC | | | | | | | | |
| Exciter coil resistance (Ω) | When cooled (20°C) | 90 | 63 | 47 | 111 | 78 | 52 | 38 | 23 |
| | When hot (95°C) | 117 | 82 | 61 | 144 | 101 | 67 | 49 | 30 |
| Capacity (W) | 6.4 | 9.1 | 12.3 | 7 | 7.4 | 11 | 15 | 25 | |
| Brake release current (A) (Note 5) | 0.12 | 0.15 | 0.22 | 0.15 | 0.2 | 0.3 | 0.25 | 0.4 | |
| Brake active current (A) | 0.04 | 0.06 | 0.07 | 0.06 | 0.06 | 0.1 | 0.14 | 0.2 | |
| Static friction torque (TB) (N.m{kgf.cm}) | 0.32 {3.2} | 1.3 {13} | 2.4 {24} | 0.39 {4} | 1.18 {12} | 2.3 {23.5} | 7.84 {80} | 29.5 {300} | |
| (Note 3) Inertia moment J (kg·cm ² {kgf·cm ² }) | 0.0031 {0.012} | 0.04 {0.16} | 0.2 {0.8} | 0.02 {0.07} | 0.13 {0.53} | 0.34 {1.4} | 0.68 {2.7} | 4.25 {17} | |
| (Note 4) Release delay time (t ₂) (S) | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 | 0.03 | 0.07 | 0.10 | |
| Braking delay time (Note 4) (S) | AC off (Fig. a) | 0.08 | 0.10 | 0.12 | 0.08 | 0.10 | 0.12 | 0.12 | 0.12 |
| | DC off (Fig. b, c) | 0.01 | 0.02 | 0.02 | 0.01 | 0.03 | 0.03 | 0.03 | 0.03 |
| Tolerable braking amount (N.m {kgf.m}) | Per braking | 5.6 {0.6} | 22 {2.2} | 64 {6.5} | 3.9 {0.4} | 18 {1.8} | 46 {4.7} | 390 {40} | 4400 {450} |
| | Per hour | 56 {6} | 220 {22} | 640 {65} | 39 {4.0} | 180 {18} | 460 {47} | 3900 {400} | 44000 {4500} |
| Degree of brake looseness in motor shaft (degree) | 0.19 to 2.2 | 0.12 to 1.01 | 0.088 to 1.01 | 0.3 to 3.5 | 0.2 to 2.0 | 0.2 to 1.3 | 0.2 to 0.6 | | |
| Brake life (Note 1) (cycles) | 20,000 with 4 (N.m) braking amount per braking | 20,000 with 15 (N.m) braking amount per braking | 20,000 with 32 (N.m) braking amount per braking | 30,000 with 4 (N.m) braking amount per braking | 30,000 with 18 (N.m) braking amount per braking | 30,000 with 47 (N.m) braking amount per braking | 20,000 with 200 (N.m) braking amount per braking | 20,000 with 2000 (N.m) braking amount per braking | |

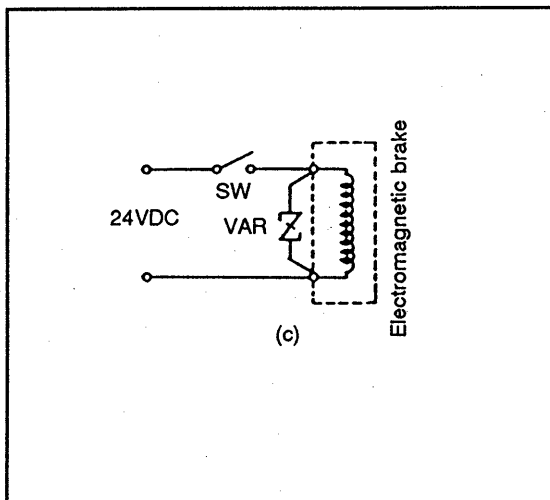
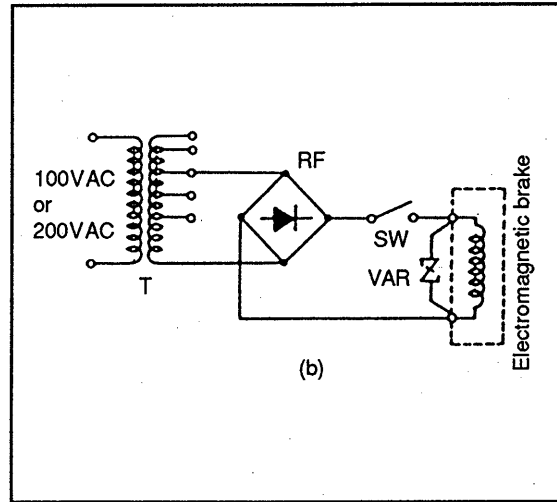
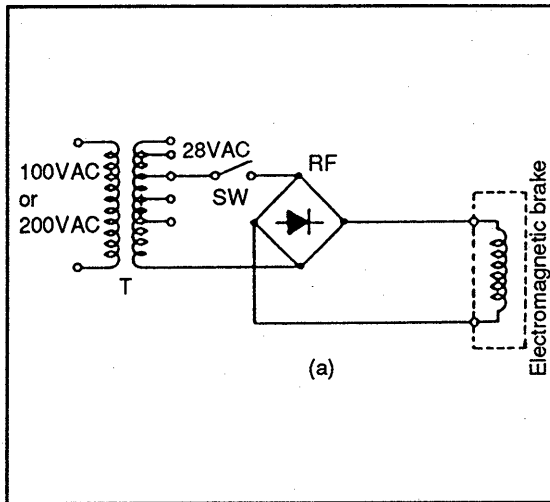
Note 1. The brake gap will increase due to the wear of the brake lining. The brake gap cannot be adjusted. The life of 20,000 cycles is equivalent to 5 cycles/day for 10 years.

- A manual release mechanism is not installed. When the servo motor shaft is required to turn for core alignment of the machine, etc., use a separate 24VDC power, and open the brake electrically.
- For the servo motor with electromagnetic brake, this value is added to inertia moment of the servo motor without a brake.
- The value for initial suction gap at 20°C (t₂).
- The interface power in the servo amplifier's (VDD+24V) cannot be used. Always use a separate power source.
- A leakage magnetic flux will occur at the shaft end of the servo motor with electromagnetic brake. (For HA-FE motor)
- The brake lining may chatter during low-speed operation. However, this does not pose functional problems.

9. Data

(2) External connections (Refer to Section 2-2.4)

- 1) Examples of connection of the brake power supply are shown in Fig. 9-3(a) to (c). (a) is for AC off, and (b) and (c) for DC off.
- 2) When the DC is off, the braking delay time will be shortened, but a surge absorber must be installed onto the brake terminal.
- 3) Use the ERZ-C10DK221 (Matsushita Electric Co., Ltd.) or equivalent as the surge absorber. (Refer to Section 6-10.)
- 4) Connect the lead (blue) of the magnetic brake to the power supply regardless of the polarity.



T : Transformer

RF : Rectifier

VAR: Surge absorber (Varister)

- Refer to Section 6-10 for selection of the peripheral equipment.

Fig. 9-3 Examples of connection

9. Data

(3) Coasting distance

If the dynamic brake is used during emergency stop, the coasting distance will not be shortened even if the electromagnetic brake is used. If the dynamic brake does not operate due to trouble, the motor will decelerate with the following pattern. Here, the maximum coasting distance (during fast feed), L_{max} , will be the area shown with the diagonal line in the figure, and can be calculated with the following equation.

The effect of the load torque is great near the stopping area. When the load torque is large, the motor will stop faster than the value obtained in the equation.

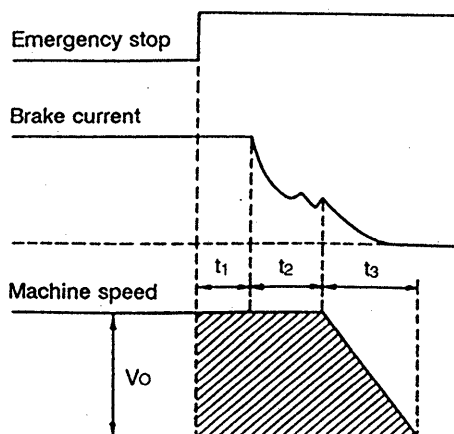


Fig. 9-4 Coasting distance during emergency stop

$$L_{max} = \frac{V_o}{60} \times \left(t_1 + t_2 + \frac{t_3}{2} \right) \dots\dots\dots (9-5)$$

Here,

- L_{max} : Maximum coasting distance [mm]
- V_o : Machine's fast feed speed [mm/min]
- t_1 : Delay time of control section [sec]
- t_2 : Braking delay time of brake * [sec]
- t_3 : Braking time [sec]

$$t_3 = \frac{(J_L + J_M) \times N_o}{9.55 \times 10^4 (T_L + 0.8T_B)}$$

- J_L : Load inertia converted into equivalent value on servo motor shaft [kg.cm²]
- J_M : Servo motor inertia [kg.cm²]
- N_o : Servo motor speed during fast feed [r/min]
- T_L : Load torque converted into equivalent value on servo motor shaft [N.m]
- T_B : Brake static friction torque * [N.m]

* t_2 and T_B are the values noted in Table 9-2 Characteristics.
 J_M is the sum of the electromagnetic brake's inertia (Table 9-2) and the motor's inertia.

9. Data

9-6 Dynamic brake characteristics

The servo motor coasts to a stop during a power failure or when an alarm occurs. If the motor must be stopped suddenly, use the dynamic brake option.

Table 9-3 Application of dynamic brake option

| Servo amplifier | Dynamic brake option model |
|--|----------------------------|
| MR-J10A to 60A MR-J10A1 to 40A1 MR-J10MA to 40MA MR-J10MA1 to 40MA1 | MR-SDBU-1C |
| MR-J100A, MR-J70A | MR-SDBU-1A |
| MR-J150A | MR-SDBU-2A |
| MR-J200A | |
| MR-J350A | |

The coasting amount during dynamic brake is shown below. The maximum coasting distance L_{max} at this time, is the area of the diagonal selection in the diagram, and can be calculated with the equation (9-6).

The effect of the load torque is greater near the stopping area. The larger the load torque is, the earlier the motor will stop than obtained value. The brake time constant, τ , in equation (9-6) will be the value shown in Table 9-4.

Refer to page 6-4 for the external wiring and operation sequence, etc.

$$L_{max} = \frac{V_o}{60} \times \left\{ t_e + \tau \left(1 + \frac{J_L}{J_M} \right) \right\} \dots (9-6)$$

Here,

- L_{max} : Maximum coasting distance [mm]
 - V_o : Machine's fast feed speed [mm/min]
 - J_L : Load inertia converted into equivalent value on servo motor shaft [kg.cm²]
 - J_M : Servo motor inertia [kg.cm²]
 - τ : Brake time constant (Table 9-4) [sec]
 - t_e : Delay time of control section (diagram below) [sec]
- (The delay of the inner relay is approximately 15msec.)

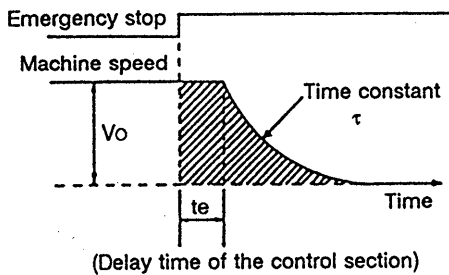


Fig. 9-5 Coasting distance during emergency stop

Table 9-4 Dynamic brake time constant

| Servo motor | Brake time constant τ (sec) |
|-------------------|----------------------------------|
| HA-ME053 | 0.02 |
| HA-ME13 | 0.03 |
| HA-ME23 | 0.04 |
| HA-ME43 | 0.06 |
| HA-ME73 | 0.05 |
| HA-FE053, 13 | 0.02 |
| HA-FE23 | 0.05 |
| HA-FE33 | 0.07 |
| HA-FE43 | 0.09 |
| HA-FE63 | 0.12 |
| HA-SE52, 102, 152 | 0.06 |
| HA-SE202 | 0.14 |
| HA-SE53, 103, 153 | 0.1 |
| HA-SE203 | 0.2 |

9. Data

9-7 Mechanical characteristics of the servo motor

9-7-1 Vibration rank

The servo motor vibration rank is V-10 with the rated speed. The servo motor installation orientation and measurement position are shown on Section 1-4.

9-7-2 Flex life of the encoder cable

The flex life of the encoder cable supplied with the HA-FE type servo motors is approximately 20,000 bends with a bending radius of 25mm, and 30,000 bends at 50mm. When installed on a machine where the servo motor moves, the bending radius should be as large as possible. If the life poses a problem, use an extension cable, and replace the cable periodically. Special connector parts for the encoder cable are available.

9-8 Servo motor with reduction gear

Servo motors are available with integral gear reducers as listed below. Flange or foot mounting are possible.

The gear ratio is determined by the application. The installation position and lubrication methods may differ with each model. To select the correct motor and reducer, consider all mechanical requirements, then select the correct motor (HA-ME, HA-FE, or HA-SE) and reducer from the following charts.

9-8.1 HA-ME series

| | | | | |
|--|---|-----|------|------|
| Reduction gear | For high precision | | | |
| Reduction ratio | 1/5 | 1/9 | 1/20 | 1/29 |
| Backlash | 3 minutes or less | | | |
| Method of mounting | Flange mounting | | | |
| Output shaft rotating direction | The servo motor shaft and the reduction gear output shaft rotate in the same direction. | | | |
| Allowable speed (of the reduction gear input shaft) | 3000 r/min | | | |
| Allowable load inertia moment ratio | 25 times or less | | | |
| Lubrication method | Grease (Recommended grease: LDR101BV made by America Oil Center Research) | | | |
| Mounting direction | In any direction | | | |

9. Data

9-8.2 HA-FE series

| | | | |
|---|---|------|------|
| Reduction ratio | 1/5 | 1/10 | 1/30 |
| HA-FE(B) series | ○ | ○ | ○ |
| Backlash | 40 minutes to 1.5° | | |
| Method of mounting | Flange mounting | | |
| Output shaft rotating direction | The servo motor shaft and the reduction gear output shaft rotate in the same direction. However, the HA-FE053(B)G 1/30 and the HA-FE13(B)G 1/30 servo motors rotate in the direction opposite to that of the reduction gear output shaft. | | |
| Allowable speed (of the reduction gear input shaft) | 3000 r/min | | |
| Allowable load inertia moment ratio | 5 times or less | | |
| Lubrication method | Grease (Recommended grease: BIHUCK UNIVERSAL No. 000 of Japan oil Note that Moricoat Grease is used for the HA-FH053G and 13G.) | | |
| Mounting direction | In any direction | | |

The reduction ratios in the chart are nominal values. Actual values are listed below.

| Motor model | HA-FE053G | HA-FE13G | HA-FE23G | HA-FE33G | HA-FE43G | HA-FE63G |
|-------------------------|-----------|----------|----------|----------|----------|----------|
| Nominal reduction ratio | | | | | | |
| 1/5 | 9/44 | | 57/280 | 19/94 | | 10/49 |
| 1/10 | 3/29 | | 39/400 | 39/376 | | 243/2401 |
| 1/30 | 144/4205 | | 1/30 | 11/329 | | 27/784 |

9-8.3 HA-SE series

| Reduction gear | | For high precision | | | | | For general industrial machines | | | | | | |
|---|------------------------|---|-----|------|------|------|--|------|------|------|------|------|------|
| | | 1/5 | 1/9 | 1/20 | 1/29 | 1/45 | 1/6 | 1/11 | 1/17 | 1/29 | 1/35 | 1/43 | 1/59 |
| Applicable motor type | HA-SE52(B)G to 202(B)G | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | HA-SE352(B)G | ○ | ○ | ○ | — | — | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Backlash | | 3 minutes or less | | | | | 40 minutes to 2° | | | | | | |
| Method of mounting | | Flange mounting | | | | | As in (1) and (2) of this section | | | | | | |
| Output shaft rotating direction | | The servo motor shaft and the reduction gear output shaft rotate in the same direction. | | | | | The servo motor shaft and the reduction gear output shaft rotate in the opposite directions. | | | | | | |
| Allowable speed (of the reduction gear input shaft) | | 2000 r/min | | | | | | | | | | | |
| Allowable load inertia moment ratio | | 5 times or less | | | | | 3 times or less | | | | | | |
| Lubrication method | | Grease (Recommended grease: LDR101BJ made by America Oil Center Research) | | | | | As in (1) and (3) of this section | | | | | | |
| Mounting direction | | In any direction | | | | | As in (1) of this section | | | | | | |

Note: ○ in the table indicates that the motor is available.

9. Data

(1) Lubrication methods for reduction gears for general industrial machines

| Mounting direction Reduction gear type (Note 1) Reduction gear frame No. | Shaft vertical | | | | Shaft downward | | | Shaft upward | | |
|---|----------------|-----|-----|-----|----------------|---------------|-----|--------------|-----|-----|
| | HM | HMS | HMV | HMF | VMH | VM | VMF | WMH | WMV | WMF |
| 210 | Grease | | | | | | | | | |
| 211 | Grease | | | | | | | | | |
| 213 | Oil or grease | | | | | | | Grease | | |
| 216 | Oil or grease | | | | Grease | Oil or grease | | Grease | | |
| 217 | Oil | | | | | | | X | | |

Note: 1. The reduction gear frame numbers are as follows:

| Motor type | Reduction ratio | | | | | | |
|--------------|-----------------|------|------|------|------|------|------|
| | 1/6 | 1/11 | 1/17 | 1/29 | 1/35 | 1/43 | 1/59 |
| HA-SH52(B)G | 210 | | | 211 | | | 213 |
| HA-SH102(B)G | 211 | | | | 213 | 216 | |
| HA-SH152(B)G | 211 | | 213 | 216 | | | |
| HA-SH202(B)G | 211 | | 216 | | | | |
| HA-SH352(B)G | 213 | | 217 | | | | |

2. The oil lubrication method cannot be used in applications where the servo motor moves. For such applications, specify grease lubrication.

(2) Mounting of servo motors with reduction gears for general industrial machines

| Reduction gear type | HM | HMS | VMH | WMH | HMV | VM | WMV | HMF | VMF | WMF |
|---------------------|---------------|-----|-----|---------------|-----|----|-----------------|-----|-----|-----|
| Mounting | Foot mounting | | | Mounting base | | | Flange mounting | | | |

(3) Recommended lubricants

1) Grease: Albania grease RA of Showa Shell Sekiyu
(Changing interval: 20000 hours or 4 to 5 years)

2) Lubricating oil

| Ambient temperature (°C) | COSMO OIL | Japan Oil | IDEMITSU KOSAN CO., LTD | GENERAL OIL | Showa Shell Sekiyu | ESSO OIL | Mobil Oil | MITSUBISHI OIL | Japan Energy |
|--------------------------|-----------------------------|----------------------|--|------------------------------|-----------------------|-----------------------|--|---------------------------------|--------------------------|
| -10 to 5 | COSMO GEAR SE 68 | BONNOC SP 68 | DAPHNE CE 68S DAPHNE SUPER GEAR OIL 68 | | Omala Oils 68 | SPARTAN EP 68 | Mobilgear 626 (ISO VG68) | DIAMOND GEAR LUBE SP 68 | JOMO Reductus 68 |
| 0 to 35 | COSMO GEAR SE 100, 150 | BONNOC SP 100, 150 | DAPHNE CE 100S, 150S DAPHNE SUPER GEAR OIL 100, 150 | GENERAL SP GEAROL 100, 150 | Omala Oils 100, 150 | SPARTAN EP 150 | Mobilgear 629 (ISO VG150) | DIAMOND GEAR LUBE SP 100, 150 | JOMO Reductus 100, 150 |
| 30 to 50 | COSMO GEAR SE 200, 320, 460 | BONNOC SP 200 to 460 | DAPHNE CE 220S to 460S | GENERAL SP GEAROL 220 to 460 | Omala Oils 220 to 460 | SPARTAN EP 220 to 460 | Mobilgear 630 to 634 (ISO VG 220 to 460) | DIAMOND GEAR LUBE SP 220 to 460 | JOMO Reductus 220 to 460 |

Lubrication amount

| Reduction gear frame number | | 213 | 216 | 217 |
|-----------------------------|-----------------|-----|-----|-----|
| Lubrication amount | Horizontal type | 0.7 | 1.4 | 1.9 |
| | Vertical type | 1.1 | 1.0 | 1.9 |

9. Data

9-9 Servo motor with tapered shaft

The standard servo motor shaft has a straight shaft without key groove. A tapered shaft motor with the dimensions shown in Fig. 9-7 can be manufactured as special order for the 0.5 to 1.0kW servo motors. The dimensions other than the servo motor shaft end are the same as the standard specifications. Since the radial load capacity differs between the tapered shaft and straight shaft, determine the loading before using.

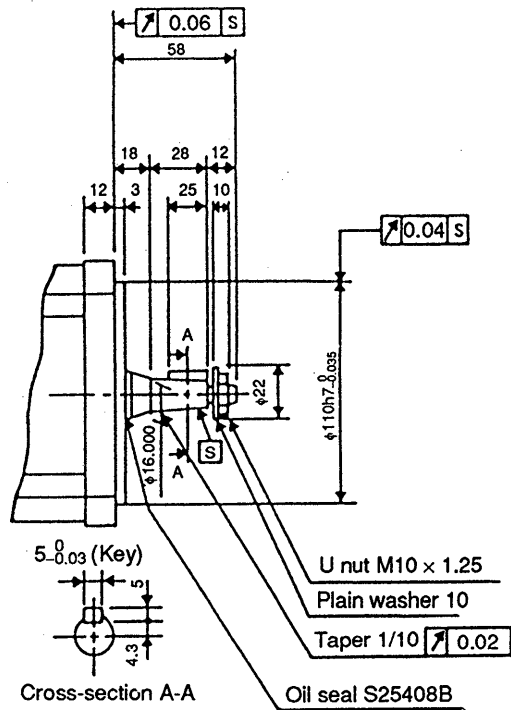
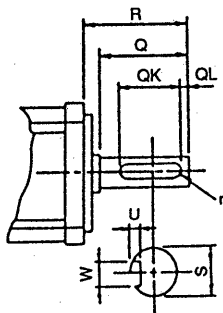


Fig. 9-6 Tapered shaft dimension diagram

9-10 Servo motor with special shaft

The standard servo motor shaft has a straight shaft without a key groove. The following dimensions are for the servo motor shaft with key groove.

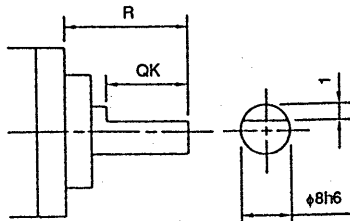
This is not appropriate for applications where the servo motor is started and stopped frequently. For these applications, use a compression coupling.



Unit: mm

| Servo motor (kW) | Variable dimensions | | | | | | | | |
|------------------|---------------------|----------------------------------|----|----|-----------------------------------|----|---|--------------------------------|-----|
| | S | R | Q | W | QK | QL | U | r | |
| HA-SE | 0.5 to 1.5 | 24h6 | 55 | 50 | 8 ⁰ _{-0.036} | 36 | 5 | 4 ^{+0.2} ₀ | 4 |
| | 2.0, 3.5 | 35 ^{+0.01} ₀ | 79 | — | 10 ⁰ _{-0.036} | 55 | 5 | 5 ^{+0.2} ₀ | 5 |
| HA-ME | 0.2, 0.4 | 14h6 | 30 | 27 | 5 | 20 | 3 | 3 | 2.5 |
| | 0.7 | 19h6 | 40 | 37 | 6 | 25 | 5 | 3.5 | 3 |

Note: The key is not included, and must be supplied by the user.



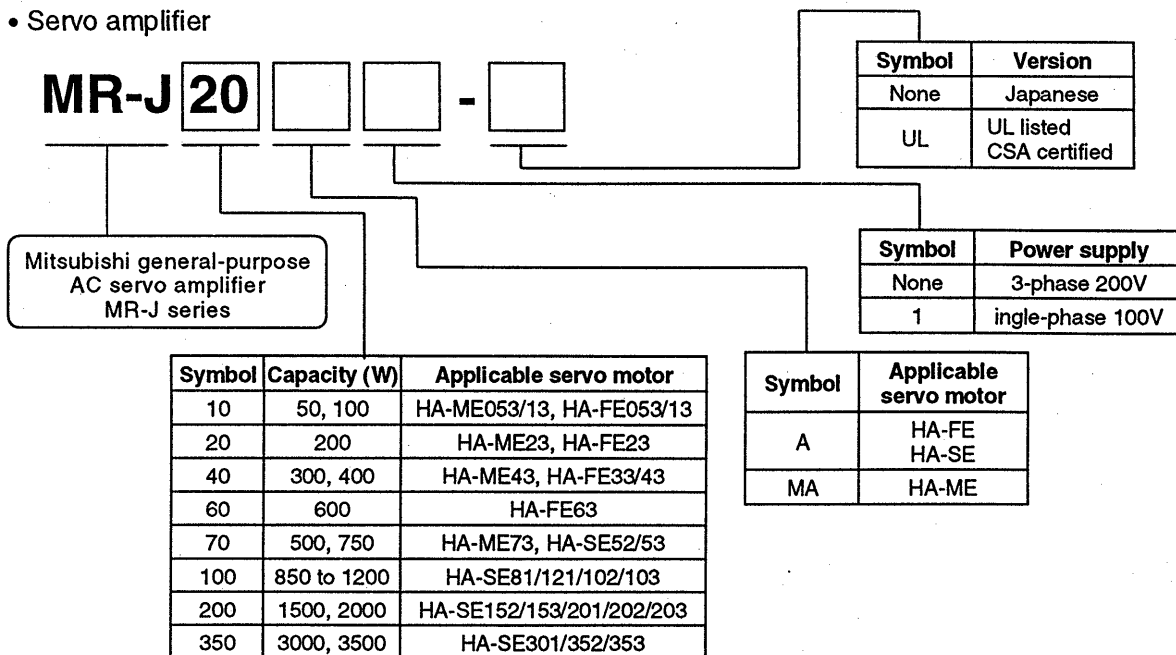
Unit: mm

| Servo motor (kW) | Variable dimensions | |
|------------------|---------------------|------|
| | R | QK |
| HA-ME 0.05, 0.1 | 25 | 20.5 |
| HA-FE 0.05, 0.1 | 30 | 25.5 |

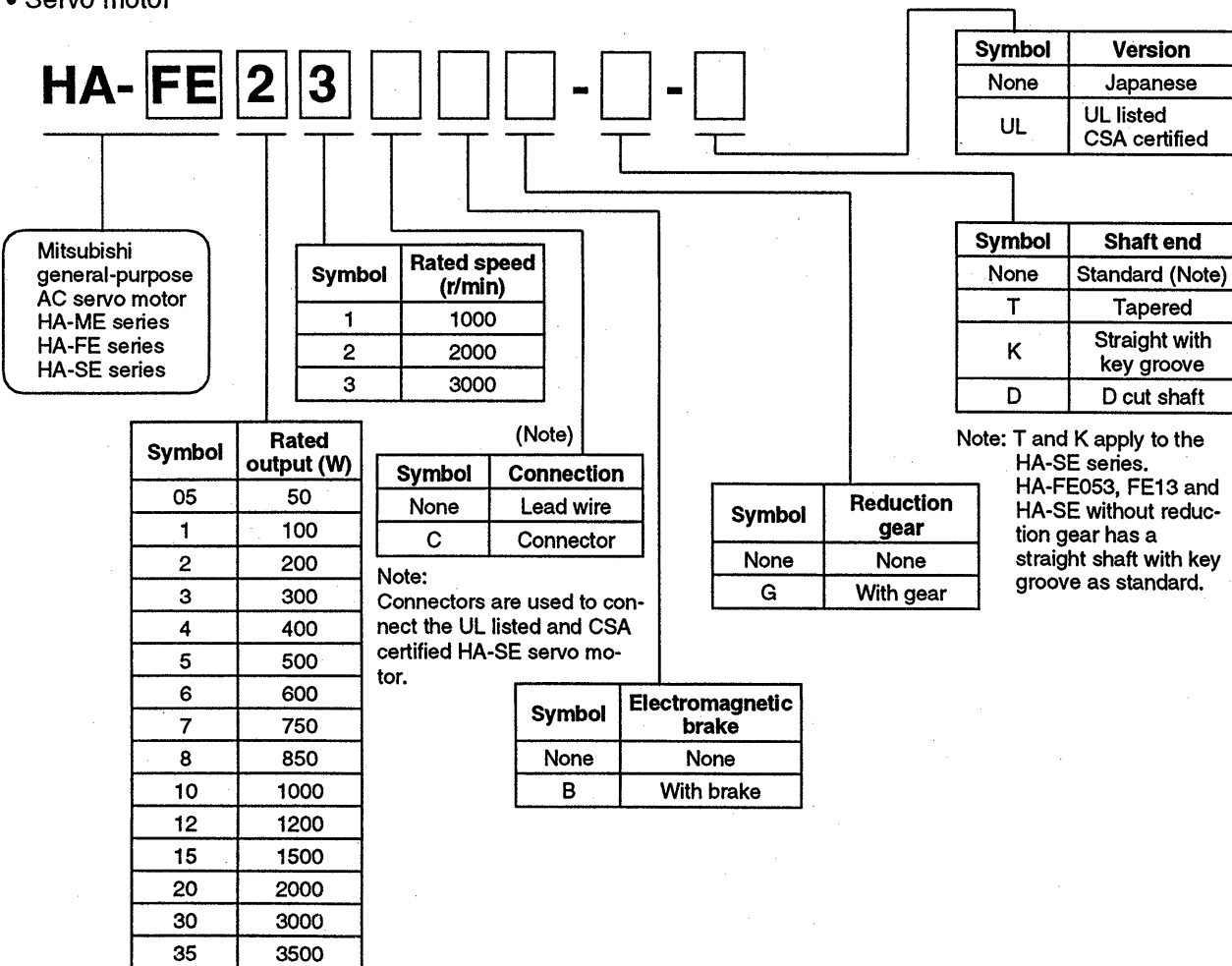
10. Specifications

10-1 Model configuration

• Servo amplifier



• Servo motor



10. Specifications

10-2 Standard specifications (3-phase 200V series)

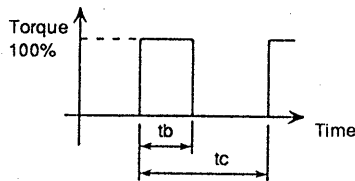
| Model | Servo motor series | | HA-ME Series | | | | | HA-FE Series | | | | | | |
|--|---|---|---|-------------------------------|-------------|------------|-----------------|--------------|-------------|------------|------------|------------|------------|-----|
| | Servo motor model | | HA-ME053 | HA-ME13 | HA-ME23 | HA-ME43 | HA-ME73 | HA-FE053 | HA-FE13 | HA-FE23 | HA-FE33 | HA-FE43 | HA-FE63 | |
| | Servo amplifier model | | MR-J10MA | | MR-J20MA | MR-J40MA | MR-J70MA | MR-J10A | | MR-J20A | MR-J40A | | MR-J60A | |
| Specifications | Continuous | Rated output (W) | 50 | 100 | 200 | 400 | 750 | 50 | 100 | 200 | 300 | 400 | 600 | |
| | | Rated torque (N·m [kgf·cm]) | 0.16 [1.62] | 0.32 [3.25] | 0.64 [6.49] | 1.3 [13.0] | 2.4 [24.4] | 0.16 [1.62] | 0.32 [3.25] | 0.64 [6.5] | 0.95 [9.7] | 1.3 [13.0] | 1.9 [19.3] | |
| | Max. torque (N·m [kgf·cm]) | | 0.48 [4.86] | 0.95 [9.74] | 1.9 [19.5] | 3.8 [39.0] | 7.2 [73.1] | 0.48 [4.86] | 0.95 [9.74] | 1.9 [19.5] | 2.9 [29.2] | 3.8 [39.0] | 5.7 [58.5] | |
| | | Rated speed (r/min) | 3000 | | | | | 3000 | | | | | | |
| | Max. speed (r/min) | | 4500 | | | | | 4000 | | | | | | |
| | | Absolute maximum speed (r/min) | 5400 | | | | | 4600 | | | | | | |
| | Power rate (kW/s) | | 12.19 | 29.25 | 37.23 | 93.88 | 78.24 | 4.0 | 10.2 | 11.7 | 18.1 | 17.2 | 30.1 | |
| | | Moment of inertia | J (kg·cm ²) | 0.021 | 0.035 | 0.11 | 0.18 | 0.73 | 0.063 | 0.10 | 0.35 | 0.50 | 0.98 | 1.2 |
| | | | GD ² (kgf·cm ²) | 0.084 | 0.14 | 0.44 | 0.72 | 2.92 | 0.25 | 0.38 | 1.4 | 2.0 | 3.9 | 4.8 |
| | Servo motor (Note 1) | Speed/position encoder | | Encoder 1000 P/rev. | | | | | | | | | | |
| Accessories | | Encoder | | | | | Encoder, V-ring | | | | | | | |
| Structure | | Totally enclosed, natural air cooling | | | | | | | | | | | | |
| Ambient temperature | | 0 to 40°C | | | | | | | | | | | | |
| Weight (kg) | | 0.4 | 0.55 | 1.2 | 1.8 | 3.5 | 1.3 | 1.5 | 2.3 | 2.6 | 4.2 | 4.8 | | |
| Power (Note 3) | | Voltage/frequency | | 3-phase 200 to 230VAC 50/60Hz | | | | | | | | | | |
| | | Tolerable voltage fluctuation | | 170 to 253V | | | | | | | | | | |
| | | Tolerable frequency fluctuation | | Less than ±5% | | | | | | | | | | |
| | | Power facility capacity (kVA) | | 0.3 | 0.3 | 0.5 | 0.9 | 1.3 | 0.3 | 0.3 | 0.5 | 0.7 | 0.9 | 1.1 |
| Control method | | Sinusoidal PWM control, current controlled method | | | | | | | | | | | | |
| Rated output current (A) | | 1.2 | 1.2 | 1.7 | 2.8 | 5.3 | 0.6 | 1.1 | 1.3 | 1.9 | 2.5 | 3.6 | | |
| Max. output current (A) | | 3.6 | 3.6 | 5.1 | 8.4 | 15.9 | 1.8 | 3.3 | 3.9 | 5.7 | 7.5 | 10.8 | | |
| Regenerative brake duty (Note 4) (times/min) | Δ: Those of 200W or less are not provided with a restriction on the regenerative frequency if the effective torque is smaller than the rated torque. x: Impossible combination | MR-RB013 | Δ | Δ | Δ | 803 | 197 | Δ | Δ | Δ | 315 | 145 | 120 | |
| | | MR-RB033 | Δ | Δ | Δ | 2410 | 592 | Δ | Δ | Δ | 945 | 440 | 360 | |
| | | MR-RB064 Serial two | Δ | Δ | Δ | 1250 | 1200 | Δ | Δ | Δ | 1818 | 1250 | 1200 | |
| | | MR-RB064 | x | x | x | x | x | x | x | x | x | x | x | |
| | | MR-RB10 Serial two | x | x | x | x | x | x | x | x | x | x | x | |
| | | MR-RB30 Serial two | x | x | x | x | x | x | x | x | x | x | x | |
| | | MR-RB10 | x | x | x | x | x | x | x | x | x | x | x | |
| | | MR-RB30 | x | x | x | x | x | x | x | x | x | x | x | |
| Tolerable load inertia ratio (Note 5) | | Under 30 times | | | | | Under 10 times | | | | | | | |
| Protective functions | | Overcurrent shut off, regenerative overvoltage shut off, overload shut off (electronic thermal relay), undervoltage protection, regenerative brake resistor overheating protection, overspeed protection, excessive difference protection | | | | | | | | | | | | |
| Torque limit command input | | 0 to +10VDC (+10V/Max. current) | | | | | | | | | | | | |
| Speed control specifications | Speed control range | | 1:1000 | | | | | | | | | | | |
| | Speed command input | | 0 to ±10VDC | | | | | | | | | | | |
| | Speed fluctuation ratio | | -0.03% or less (load fluctuation 0 to 100%) ±0.02% or less (power fluctuation ±10%) ±0.2% or less (ambient temperature 25°C±10°C) Only for external speed setting | | | | | | | | | | | |
| Position control specifications | Max. input pulse frequency | | Max. 200 kpps | | | | | | | | | | | |
| | Positioning feedback pulses | | 4000 p/rev servo motor revolution | | | | | | | | | | | |
| | Command pulse multiplication | | Electronic gear A, B: 1 to 9999 1/50<A/B<20 (input pulse frequency after multiplication is 200 kpps or less) | | | | | | | | | | | |
| | Positioning complete width setting | | 0 to ±9999 pulse | | | | | | | | | | | |
| | Excessive difference | | ±65K pulse | | | | | | | | | | | |
| Structure | | Opened | | | | | | | | | | | | |
| Environment | Ambient temperature | | 0 to ±55°C (with no freezing), storage -20 to +65°C | | | | | | | | | | | |
| | Ambient humidity | | 90%RH or less (with no dew condensation) | | | | | | | | | | | |
| | Atmosphere | | With no corrosive gases or dust | | | | | | | | | | | |
| | Altitude | | 1000m or lower | | | | | | | | | | | |
| Vibration | | 5.9 m/s ² (0.6G) or less | | | | | | | | | | | | |
| Weight (kg) | | 0.8 | | 1.0 | | 1.5 | | 0.8 | | 1.0 | | | | |

- Note:
- Special specifications will be required when using the motor in a site where oil or rain may contact the motor.
 - The output torque and rated speed are not guaranteed during power voltage drops. The current values are the rated and maximum output currents of the servo amplifiers.
 - The necessary power facility capacity will differ according to the impedance.
 - The regenerative brake duty is for the servo motor at no load, and indicates the tolerable duty for decelerating and stopping from the rated speed. There are no limits to the regenerative duty for the models below 200W if the effective torque is not more than the rated torque. When load is applied, the value becomes 1/(m+1) of the value in the table. (m = load inertia moment/motor inertia moment) If the speed exceeds the rated speed, the allowable number of times is in inverse proportion to the square of (operation speed/rated speed). When the operation speed frequently varies or when the regeneration state is constantly used as in up and down motions, calculate the amount of regenerative heat generated during the operation. The amount of heat generation must not be larger than the allowable value.
 - Please consult Mitsubishi when exceeding the tolerable load inertia ratio.

10. Specifications

| HA-SE 1000 r/min Series | | | | HA-SE 2000 r/min Series | | | | | HA-SE 3000 r/min Series | | | | | |
|---|------------|------------|------------|-------------------------|------------|-------------|------------|------------|-------------------------|-------------|-------------|-------------|------------|--|
| HA-SE81 | HA-SE121 | HA-SE201 | HA-SE301 | HA-SE52 | HA-SE102 | HA-SE152 | HA-SE202 | HA-SE352 | HA-SE53 | HA-SE103 | HA-SE153 | HA-SE203 | HA-SE353 | |
| MR-J100A | | MR-J200A | MR-J350A | MR-J70A | MR-J100A | MR-J200A | | MR-J350A | MR-J70A | MR-J100A | MR-J200A | | MR-J350A | |
| 850 | 1200 | 2000 | 3000 | 500 | 1000 | 1500 | 2000 | 3500 | 500 | 1000 | 1500 | 2000 | 3500 | |
| 8.12 (82.8) | 11.5 (117) | 19.1 (195) | 28.6 (292) | 2.4 (24.4) | 4.8 (48.7) | 7.16 (73.1) | 9.5 (97.4) | 16.7 (170) | 1.59 (16.2) | 3.18 (32.5) | 4.78 (48.7) | 6.37 (65.0) | 11.1 (114) | |
| 24.4 (248) | 34.4 (351) | 57.3 (585) | 85.9 (877) | 7.16 (73.1) | 14.4 (146) | 21.6 (219) | 28.5 (292) | 50.1 (510) | 4.77 (48.7) | 9.55 (97.4) | 14.3 (146) | 19.1 (195) | 33.4 (341) | |
| 1000 | | | | 2000 | | | | | 3000 | | | | | |
| 1200 | | | | 2000 | | | | | 3000 | | | | | |
| 1380 | | | | 2300 | | | | | 3450 | | | | | |
| 22.3 | 19.3 | 27.8 | 42.6 | 5.8 | 11.8 | 17.6 | 13.2 | 21.3 | 2.6 | 5.2 | 7.7 | 5.9 | 9.4 | |
| 29.5 | 68.5 | 131 | 192 | 9.80 | 19.6 | 29.5 | 68.5 | 131 | 9.80 | 19.6 | 29.5 | 68.5 | 131 | |
| 118 | 274 | 525 | 768 | 39.2 | 78.4 | 118 | 274 | 525 | 39.2 | 78.4 | 118 | 274 | 525 | |
| Encoder 1000 P/rev. | | | | | | | | | | | | | | |
| Encoder, oil seal | | | | | | | | | | | | | | |
| Totally enclosed, natural air cooling | | | | | | | | | | | | | | |
| 0 to 40°C | | | | | | | | | | | | | | |
| 16 | 21 | 32 | 43 | 8.8 | 12 | 16 | 21 | 32 | 8.8 | 12 | 16 | 21 | 32 | |
| 3-phase 200 to 230VAC 50/60Hz | | | | | | | | | | | | | | |
| 170 to 253V | | | | | | | | | | | | | | |
| Less than ±5% | | | | | | | | | | | | | | |
| 1.5 | 2.1 | 3.5 | 4.8 | 1.0 | 1.7 | 2.5 | 3.5 | 5.5 | 1.0 | 1.7 | 2.5 | 3.5 | 5.5 | |
| Sinusoidal PWM control, current controlled method | | | | | | | | | | | | | | |
| 4.5 | 6 | 9.5 | 14 | 3 | 5.5 | 8 | 10 | 16 | 3 | 5 | 8 | 9 | 16 | |
| 13.5 | 18 | 28.5 | 42 | 9 | 16.5 | 24 | 30 | 48 | 9 | 15 | 24 | 27 | 48 | |
| 43 | 18 | x | x | 33 | 16 | x | x | x | 14 | 7 | x | x | x | |
| 130 | 55 | x | x | 100 | 48 | x | x | x | 44 | 22 | x | x | x | |
| 438 | 188 | x | x | 330 | 160 | x | x | x | 147 | 73 | x | x | x | |
| x | x | 55 | x | x | x | 67 | 29 | x | x | x | 27 | 11 | x | |
| x | x | 139 | x | x | x | 159 | 69 | x | x | x | 69 | 29 | x | |
| x | x | 417 | x | x | x | 348 | 199 | x | x | x | 154 | 88 | x | |
| x | x | x | 60 | x | x | x | x | 23 | x | x | x | x | 9 | |
| x | x | x | 180 | x | x | x | x | 67 | x | x | x | x | 29 | |
| x | x | x | 300 | x | x | x | x | 110 | x | x | x | x | 48 | |
| Under 5 times | | | | | | | | | | | | | | |
| Overcurrent shut off, regenerative overvoltage shut off, overload shut off (electronic thermal relay), undervoltage protection, regenerative brake resistor overheating protection, overspeed protection, excessive difference protection | | | | | | | | | | | | | | |
| 0 to +10VDC (+10V/Max. current) | | | | | | | | | | | | | | |
| 1:1000 | | | | | | | | | | | | | | |
| 0 to ±10VDC | | | | | | | | | | | | | | |
| -0.03% or less (load fluctuation 0 to 100%) | | | | | | | | | | | | | | |
| ±0.02% or less (power fluctuation ±10%) | | | | | | | | | | | | | | |
| ±0.2% or less (ambient temperature 25°C±10°C) Only for external speed setting | | | | | | | | | | | | | | |
| Max. 200 kpps | | | | | | | | | | | | | | |
| 4000 p/rev servo motor revolution | | | | | | | | | | | | | | |
| Electronic gear A, B: 1 to 9999 1/50<A/B<20 (input pulse frequency after multiplication is 200 kpps or less) | | | | | | | | | | | | | | |
| 0 to ±9999 pulse | | | | | | | | | | | | | | |
| ±65K pulse | | | | | | | | | | | | | | |
| Opened | | | | | | | | | | | | | | |
| 0 to ±55°C (with no freezing), storage -20 to +65°C | | | | | | | | | | | | | | |
| 90%RH or less (with no dew condensation) | | | | | | | | | | | | | | |
| With no corrosive gases or dust | | | | | | | | | | | | | | |
| 1000m or lower | | | | | | | | | | | | | | |
| 5.9 m/s ² (0.6G) or less | | | | | | | | | | | | | | |
| 1.5 | 3.3 | 3.6 | 1.5 | 3.3 | 3.6 | 1.5 | 3.3 | 3.6 | 1.5 | 3.3 | 3.6 | 1.5 | 3.6 | |

80%ED: Operation time at the rated torque is 80% of one operation cycle time and the no-load operation time is remaining 20%.



$t_b < 60$ seconds (continuous operation time)

$$\%ED = \frac{t_b}{t_c} \times 100$$

10. Specifications

Standard specifications (single-phase 100V series)

| Model | | Servo motor model | HA-ME053 | HA-ME13 | HA-ME23 | HA-ME43 | HA-FE053 | HA-FE13 | HA-FE23 | HA-FE33 | HA-FE43 | |
|--------------------------|---------------------------------------|---|---|-------------|------------------------------------|------------|-----------------|-------------|------------|------------|------------|------|
| Specifications | | Servo amplifier model | MR-J10MA1 | | MR-J20MA1 | MR-J40MA1 | MR-J10A1 | | MR-J20A1 | MR-J40A1 | | |
| Servo motor (Note 1) | Continuous | Rated output (W) | 50 | 100 | 200 | 400 | 50 | 100 | 200 | 300 | 400 | |
| | | Rated torque (N·m (kgf·cm)) | 0.16 (1.62) | 0.32 (3.25) | 0.54 (6.49) | 1.3 (13.0) | 0.16 (1.62) | 0.32 (3.25) | 0.64 (6.5) | 0.95 (9.7) | 1.3 (13.0) | |
| | | Max. torque (N·m (kgf·cm)) | 0.48 (4.86) | 0.95 (9.74) | 1.9 (19.5) | 3.8 (39.0) | 0.48 (4.86) | 0.95 (9.74) | 1.9 (19.5) | 2.9 (29.2) | 3.8 (39.0) | |
| | | Rated speed (r/min) | 3000 | | | | | 3000 | | | | |
| | | Max. speed (r/min) | 4500 | | | | | 4000 | | | | |
| | | Absolute maximum speed (r/min) | 5400 | | | | | 4600 | | | | |
| | | Power rate (kW/s) | 12.19 | 29.25 | 37.23 | 93.88 | 4.0 | 10.2 | 11.7 | 18.1 | 17.2 | |
| | | Moment of inertia | J (kg·cm ²) | 0.021 | 0.035 | 0.11 | 0.18 | 0.063 | 0.10 | 0.35 | 0.50 | 0.98 |
| | | | GD ² (kgf·cm ²) | 0.084 | 0.14 | 0.44 | 0.72 | 0.25 | 0.38 | 1.4 | 2.0 | 3.9 |
| | | Speed/position encoder | Encoder 1000 P/rev. | | | | | | | | | |
| | Accessories | Encoder | | | | | Encoder, V-ring | | | | | |
| | Structure | Totally enclosed, natural air cooling | | | | | | | | | | |
| | Ambient temperature | 0 to 40°C | | | | | | | | | | |
| | Weight (kg) | 0.4 | 0.55 | 1.2 | 1.8 | 1.3 | 1.5 | 2.3 | 2.6 | 4.2 | | |
| Servo amplifier (Note 2) | Power (Note 3) | Voltage/frequency | Japanese | | Single-phase AC100 to 115V 50/60Hz | | | | | | | |
| | | | UL listed CSA certified | | Single-phase AC100 to 120V 50/60Hz | | | | | | | |
| | | Tolerable voltage fluctuation | 85 to 127V | | | | | | | | | |
| | | Tolerable frequency fluctuation | Less than ±5% | | | | | | | | | |
| | | Power facility capacity (kVA) | 0.3 | 0.3 | 0.5 | 0.9 | 0.3 | 0.3 | 0.5 | 0.7 | 0.9 | |
| | | Control method | Sinusoidal PWM control, current controlled method | | | | | | | | | |
| | | Rated output current (A) | 1.2 | 1.2 | 1.7 | 2.8 | 0.6 | 1.1 | 1.3 | 1.9 | 2.5 | |
| | | Max. output current (A) | 3.6 | 3.6 | 5.1 | 8.4 | 1.8 | 3.3 | 3.9 | 5.7 | 7.5 | |
| | | Regenerative brake duty (times/min) (Note 4) | MR-RB013 | Δ | Δ | Δ | 803 | Δ | Δ | Δ | 315 | 145 |
| | | | MR-RB033 | Δ | Δ | Δ | 2410 | Δ | Δ | Δ | 945 | 440 |
| | MR-RB064 Serial two | | Δ | Δ | Δ | 1250 | Δ | Δ | Δ | 1818 | 1250 | |
| | Tolerable load inertia ratio (Note 5) | Under 30 times | | | | | Under 10 times | | | | | |
| | Protective functions | Overcurrent shut off, regenerative overvoltage shut off, overload shut off (electronic thermal relay), undervoltage protection, regenerative brake resistor overheating protection, overspeed protection, excessive difference protection | | | | | | | | | | |
| | Torque limit command input | DC 0 to +10V (+10V/Max. current) | | | | | | | | | | |
| | Speed control specifications | Speed control range | 1:1000 | | | | | | | | | |
| | | Speed command input | DC 0 to ±10V | | | | | | | | | |
| | | Speed fluctuation ratio | -0.03% or less (load fluctuation 0 to 100%) ±0.02% or less (power fluctuation ±10%) ±0.2% or less (ambient temperature 25°C ± 10°C) Only for external speed | | | | | | | | | |
| | Position control specifications | Max. input pulse frequency | Max. 200 kpps | | | | | | | | | |
| | | Positioning feedback pulses | 4000 p/per servo motor revolution | | | | | | | | | |
| | | Command pulse multiplication | Electronic gear A, B: 1 to 9999 1/50<A/B<20 (input pulse frequency after multiplication is 200 kpps or less) | | | | | | | | | |
| | | Positioning complete width setting | 0 to ±9999 pulse | | | | | | | | | |
| | | Excessive difference | ±65K pulse | | | | | | | | | |
| | Structure | Opened | | | | | | | | | | |
| | Environment | Ambient temperature | 0 to ±55°C (with no freezing), storage -20°C to +65°C | | | | | | | | | |
| | | Ambient humidity | 90%RH or less (with no dew condensation) | | | | | | | | | |
| | | Atmosphere | With no corrosive gases or dust | | | | | | | | | |
| | | Altitude | 1000m or lower | | | | | | | | | |
| | | Vibration | 5.9 m/s ² (0.6G) or less | | | | | | | | | |
| | Weight (kg) | 0.8 | | | 1.0 | | 0.8 | | | 1.0 | | |

- Note: 1. Special considerations will be required when using the motor in a site where oil or rain may contact the motor.
2. The output torque and rated speed are not guaranteed during power voltage drops. The current values are the rated and maximum output currents of the amplifiers.
3. The necessary power facility capacity will differ according to the impedance.
4. The regenerative brake duty is for the motor at no load, and indicates the tolerable duty for decelerating and stopping from the rated speed. There are no limits to the regenerative duty for the models below 200W if the effective torque is not more than the rated torque.
When load is applied, the value becomes 1/(m+1) of the value in the table. (m = load inertia moment/motor inertia moment)
If the speed exceeds the rated speed, the allowable number of times is in inverse proportion to the square of (operation speed/rated speed). When the operation speed frequently varies or when the regeneration state is constantly established as in up and down motions, calculate the amount of regenerative heat generated during the operation. The amount of heat generation must not be larger than the allowable value.
5. Please consult Mitsubishi when exceeding the tolerable load inertia moment ratio.

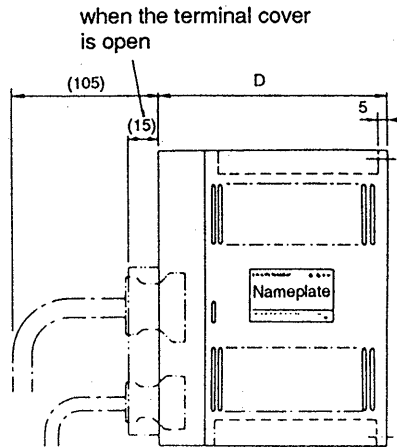
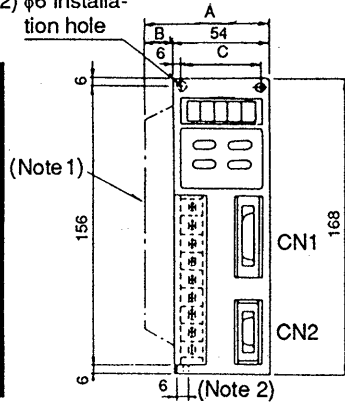
10. Specifications

10-3 Outer dimensions of servo amplifier

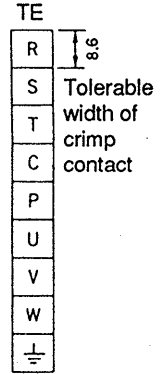
- 3-phase 200V series
MR-J10A(-UL) to MR-J100A(-UL)
MR-J10MA(-UL) to MR-J70MA(-UL)

(Note 2) $\phi 6$ installation hole

| Model | Change dimensions | | | |
|--|-------------------|----|----|-----|
| | A | B | C | D |
| MR-J10A(-UL), 20A(-UL) MR-J10MA(-UL), 20MA(-UL) | - | - | - | 130 |
| MR-J40A(-UL), 60A(-UL) MR-J40MA(-UL) | 70 | 16 | - | 130 |
| MR-J70A(-UL), 100A(-UL) MR-J70MA(-UL) | 70 | 16 | 42 | 190 |



Unit: mm



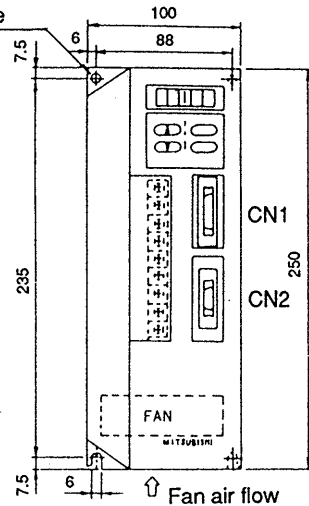
Terminal block
Screws M4 x 0.7

Note: 1. MR-J40□A(-UL), J60A(-UL), J70MA(-UL) and J100A(-UL) have a cooling fan.

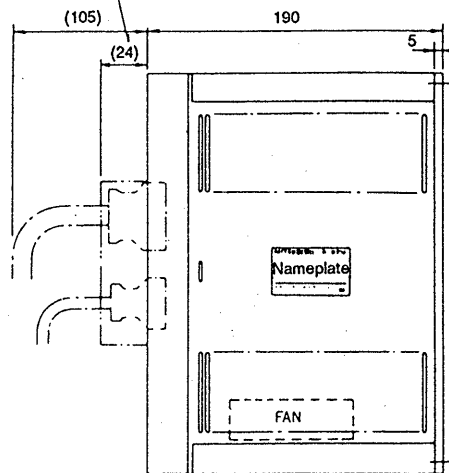
2. The mounting holes for the MR-J10□A and J20□A are at two places indicated by the arrows.

MR-J200A(-UL), MR-J350A(-UL)

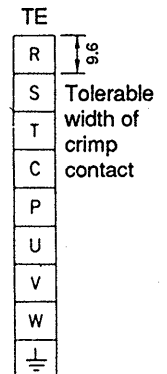
2- $\phi 6$ installation hole



When the terminal cover is open



Unit: mm

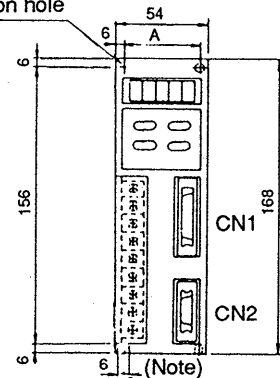


Terminal block
Screws M4 x 0.7

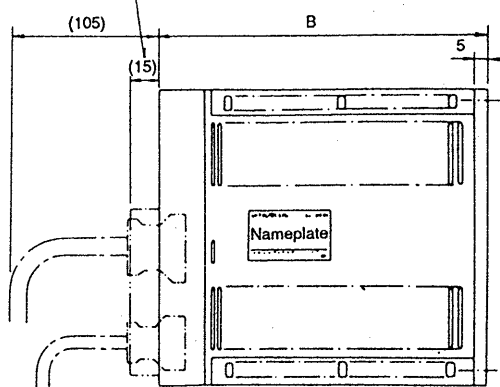
- Single-phase 100V series
MR-J10A1(-UL) to MR-J40A1(-UL)
MR-J10MA1(-UL) to MR-J40MA1(-UL)

(Note) $\phi 6$ installation hole

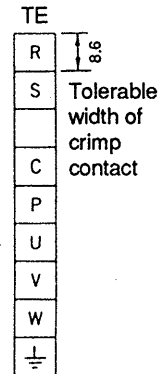
| Model | Change dimensions | |
|--|-------------------|-----|
| | A | B |
| MR-J10A1(-UL), 20A1(-UL) MR-J10MA1(-UL), 20MA1(-UL) | - | 130 |
| MR-J40A1(-UL) MR-J40MA1(-UL) | 42 | 190 |



When the terminal cover is open



Unit: mm



Terminal block
Screws M4 x 0.7

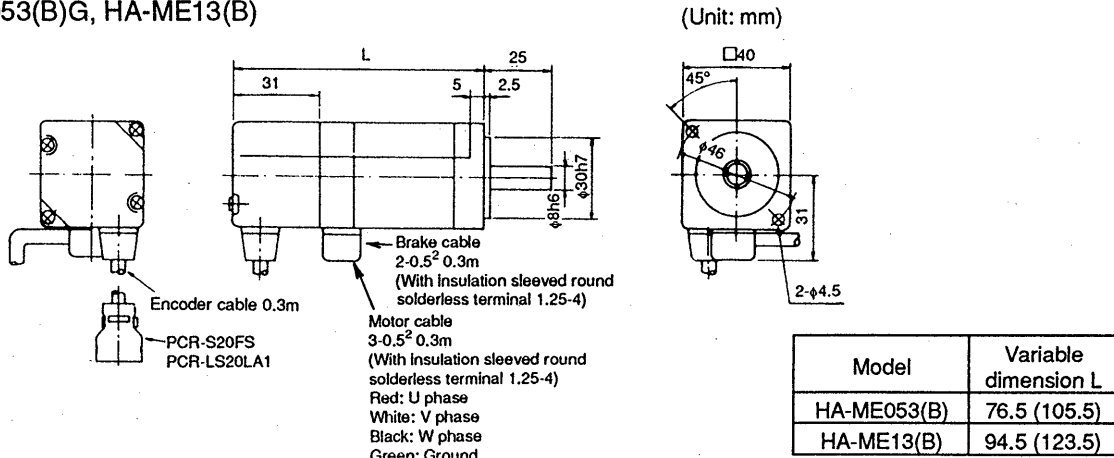
Note: The mounting holes for the MR-J10□A(-UL) 1 and J20□A(-UL) 1 are only at two places indicated by the arrows.

10. Specifications

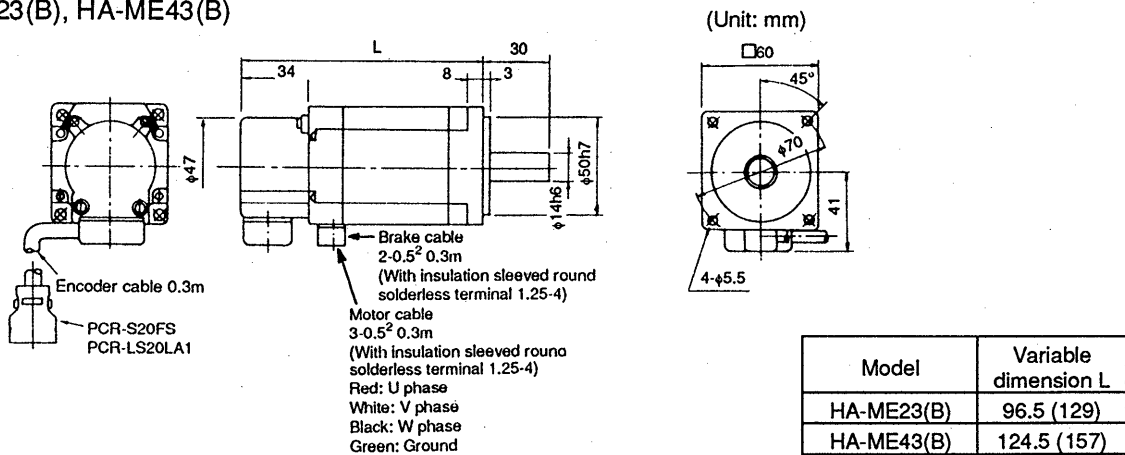
10-4 Outer dimensions of servo motor

Standard HA-ME servo motor series

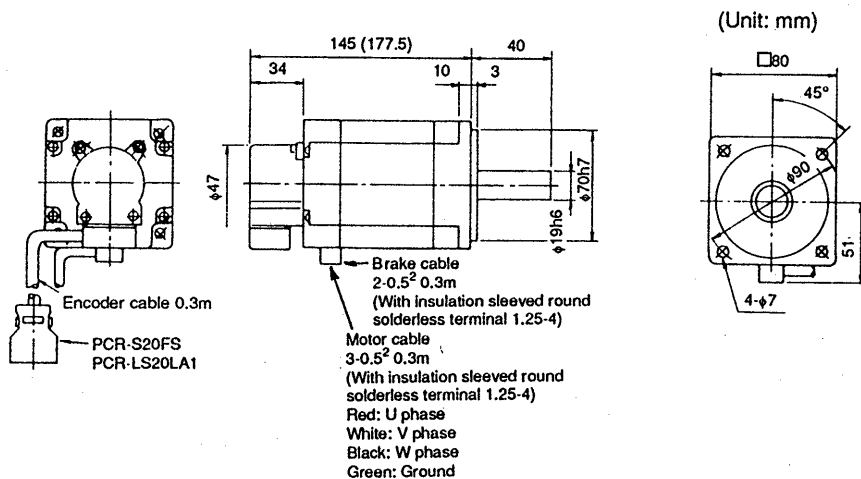
- HA-ME053(B)G, HA-ME13(B)



- HA-ME23(B), HA-ME43(B)



- HA-ME73(B)

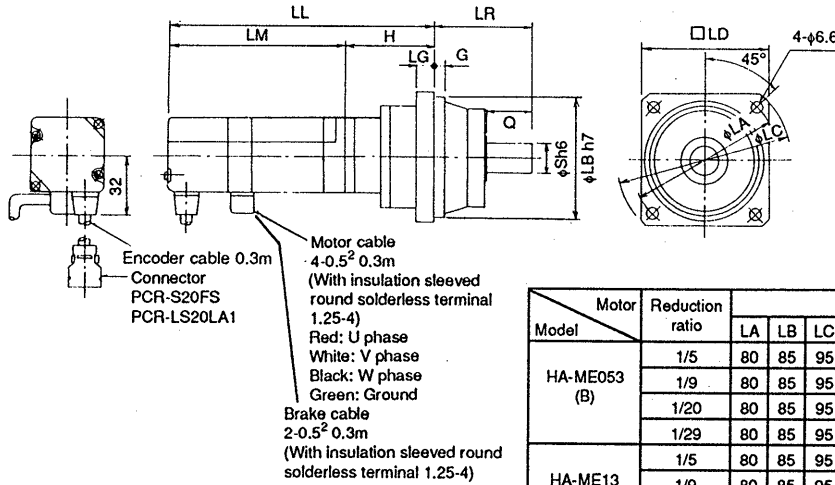


Note: 1. The dimensions in parentheses apply when the electromagnetic brake is provided.
2. Use a compression coupling for connection with the load.

10. Specifications

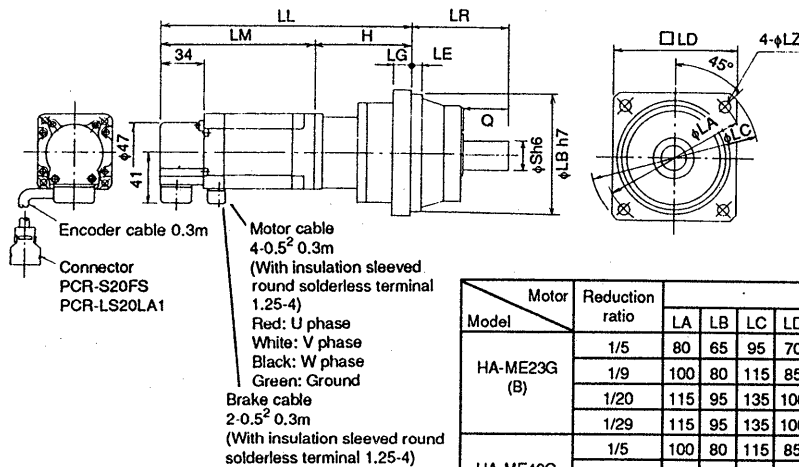
HA-ME servo motor series with reduction gear

• HA-ME053(B)G, HA-ME13(B)G



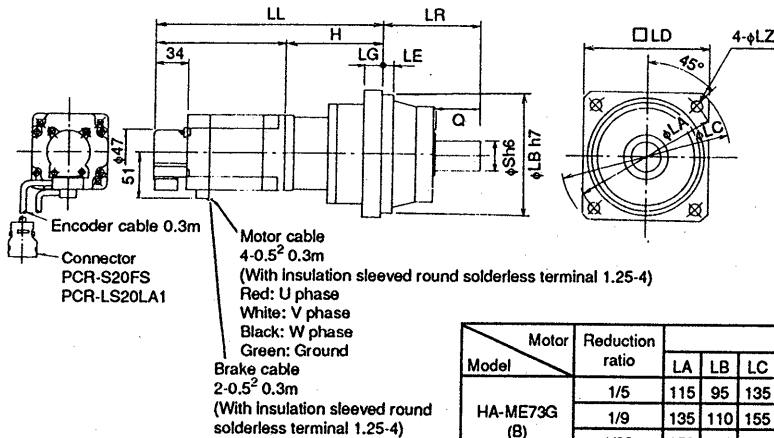
| Motor Model | Reduction ratio | Variable dimension L | | | | | | | | | | |
|--------------|-----------------|----------------------|----|-----|----|----|---------------|----|--------------|----|----|----|
| | | LA | LB | LC | LD | LG | LL | LR | LM | H | Q | S |
| HA-ME053 (B) | 1/5 | 80 | 85 | 95 | 70 | 8 | 124.5 (153.5) | 55 | 76.5 (105.5) | 48 | 25 | 18 |
| | 1/9 | 80 | 85 | 95 | 70 | 8 | 140.5 (168.5) | 55 | | 64 | 25 | 18 |
| | 1/20 | 80 | 85 | 95 | 70 | 8 | 140.5 (169.5) | 55 | | 64 | 25 | 18 |
| | 1/29 | 80 | 85 | 95 | 70 | 8 | 140.5 (169.5) | 55 | | 64 | 25 | 18 |
| HA-ME13 (B) | 1/5 | 80 | 85 | 95 | 70 | 8 | 142.5 (171.5) | 55 | 94.5 (123.5) | 48 | 25 | 18 |
| | 1/9 | 80 | 85 | 95 | 70 | 8 | 158.5 (187.5) | 55 | | 64 | 25 | 18 |
| | 1/20 | 100 | 80 | 115 | 85 | 10 | 164.5 (193.5) | 75 | | 70 | 25 | 20 |
| | 1/29 | 100 | 80 | 115 | 85 | 10 | 164.5 (193.5) | 75 | | 70 | 25 | 20 |

• HA-ME23(B)G, HA-ME43(B)G



| Motor Model | Reduction ratio | Variable dimension L | | | | | | | | | | | | |
|--------------|-----------------|----------------------|-----|-----|-----|----|----|-------------|-----|-------------|-----|----|----|----|
| | | LA | LB | LC | LD | LE | LG | LL | LR | LM | LZ | H | Q | S |
| HA-ME23G (B) | 1/5 | 80 | 65 | 95 | 70 | 8 | 8 | 153.5 (186) | 55 | 98.5 (129) | 8.8 | 57 | 25 | 18 |
| | 1/9 | 100 | 80 | 115 | 85 | 8 | 10 | 171.5 (204) | 75 | | 8.8 | 75 | 35 | 20 |
| | 1/20 | 115 | 95 | 135 | 100 | 8 | 10 | 175.5 (209) | 85 | | 9 | 80 | 40 | 25 |
| | 1/29 | 115 | 95 | 135 | 100 | 8 | 10 | 175.5 (209) | 85 | | 9 | 80 | 40 | 25 |
| HA-ME43G (B) | 1/5 | 100 | 80 | 115 | 85 | 8 | 10 | 183.5 (218) | 75 | 124.5 (157) | 8.8 | 59 | 35 | 20 |
| | 1/9 | 115 | 95 | 135 | 100 | 8 | 10 | 204.5 (237) | 85 | | 9 | 80 | 40 | 25 |
| | 1/20 | 135 | 110 | 155 | 115 | 8 | 12 | 210.5 (243) | 100 | | 11 | 88 | 50 | 32 |
| | 1/29 | 135 | 110 | 155 | 115 | 8 | 12 | 210.5 (243) | 100 | | 11 | 88 | 50 | 32 |

• HA-ME73(B)G



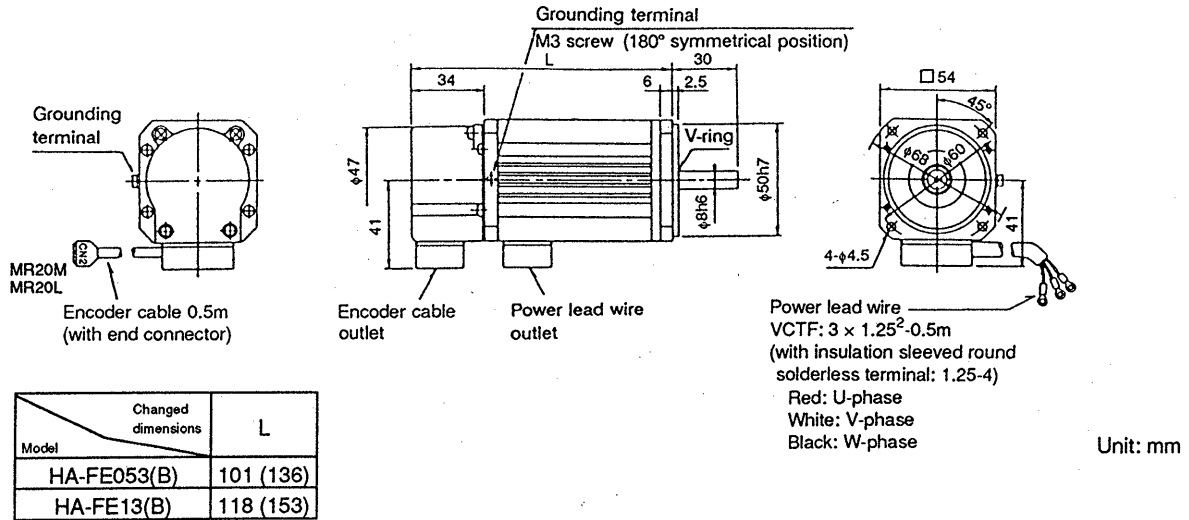
| Motor Model | Reduction ratio | Variable dimension L | | | | | | | | | | | | |
|--------------|-----------------|----------------------|-----|-----|-----|----|----|-------------|-----|-------------|----|-----|----|----|
| | | LA | LB | LC | LD | LE | LG | LL | LR | LM | LZ | H | Q | S |
| HA-ME73G (B) | 1/5 | 115 | 95 | 135 | 100 | 8 | 10 | 215 (247.5) | 85 | 145 (177.5) | 9 | 70 | 40 | 25 |
| | 1/9 | 135 | 110 | 155 | 115 | 8 | 12 | 251 (283.5) | 100 | | 11 | 106 | 50 | 32 |
| | 1/20 | 150 | 125 | 175 | 130 | 10 | 15 | 251 (283.5) | 115 | | 14 | 106 | 60 | 40 |
| | 1/29 | 150 | 125 | 175 | 130 | 10 | 15 | 251 (283.5) | 115 | | 14 | 106 | 60 | 40 |

- Note: 1. The reduction gear shaft rotation direction is the same as the motor rotation direction.
 2. Backlash is 3 minutes.
 3. The dimensions in parentheses apply when the electromagnetic brake is provided.
 4. Use a compression coupling for connection with the load.

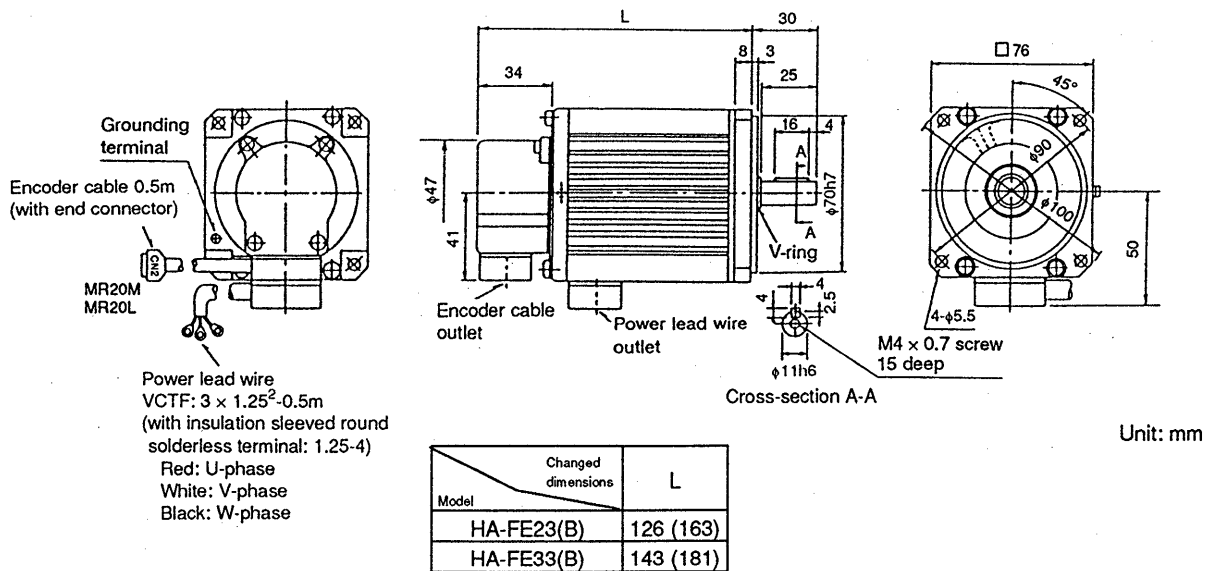
10. Specifications

Standard HA-FE servo motor series

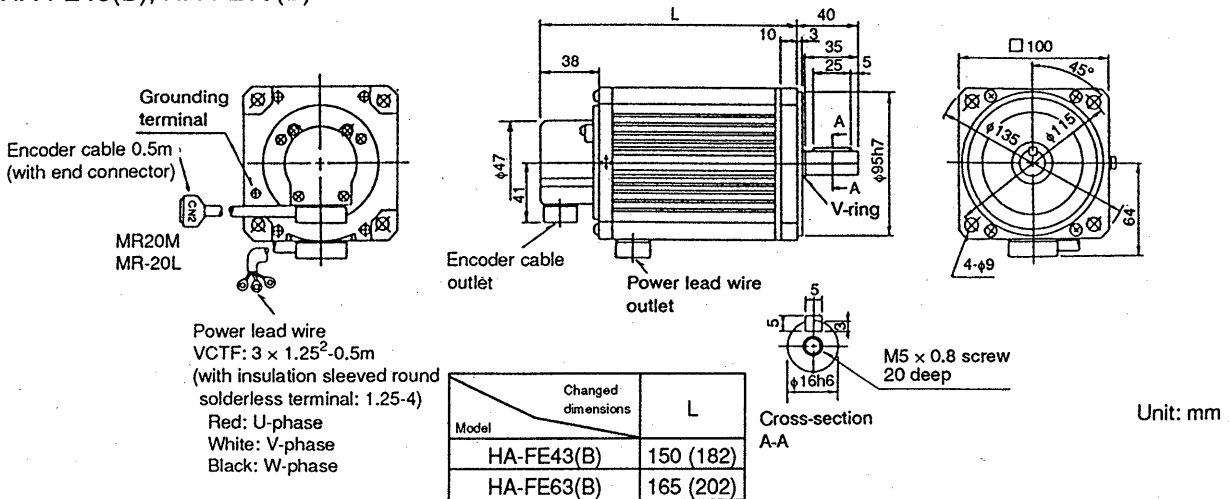
- HA-FE053(B), HA-FE13(B)



- HA-FE23(B), HA-FE33(B)



- HA-FE43(B), HA-FE63(B)



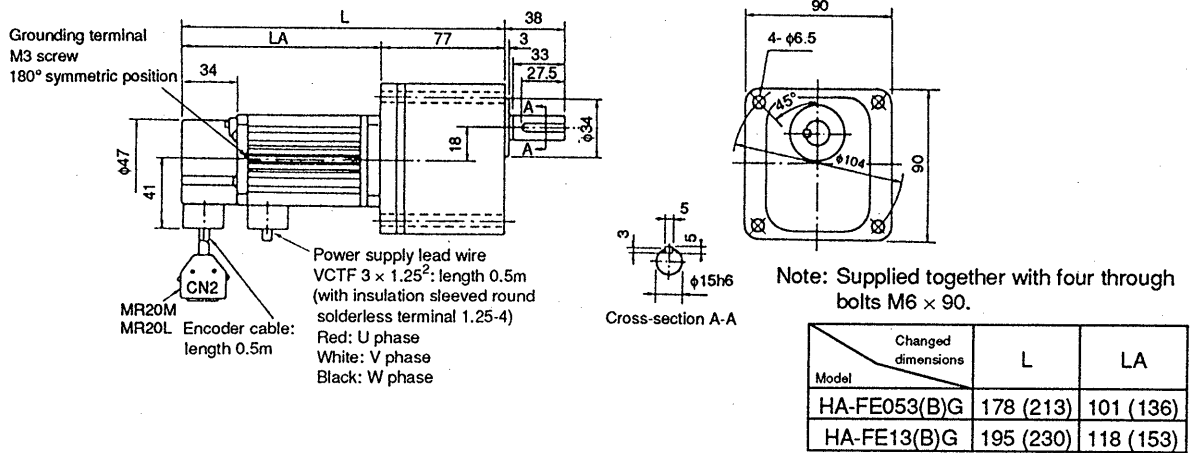
Note: 1. The dimensions in parentheses apply when the electromagnetic brake is provided.
 2. Use a compression coupling for connection with the load.

10. Specifications

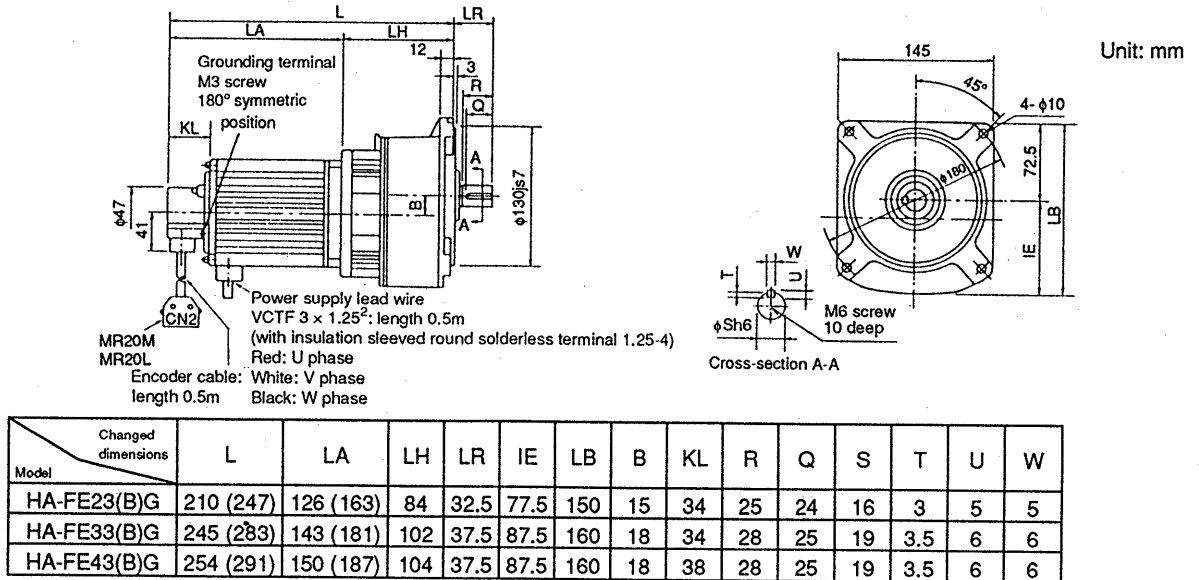
HA-FE servo motor series with reduction gear

- HA-FE053(B)G (1/5, 1/10, 1/30), HA-FE13(B)G (1/5, 1/10, 1/30)

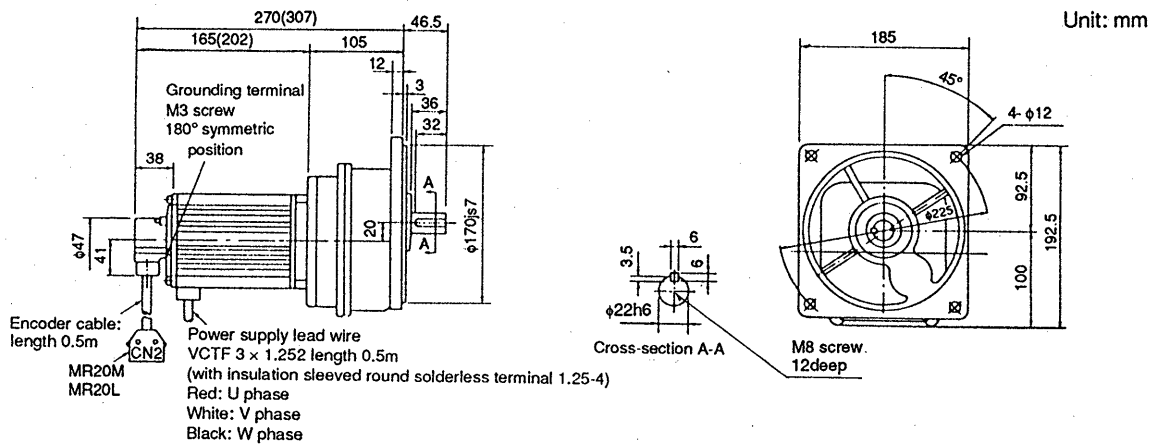
Unit: mm



- HA-FE23(B)G (1/5, 1/10, 1/30), HA-FE33(B)G (1/5, 1/10, 1/30), HA-FE43(B)G (1/5, 1/10, 1/30)



- HA-FE63(B)G (1/5, 1/10, 1/30)



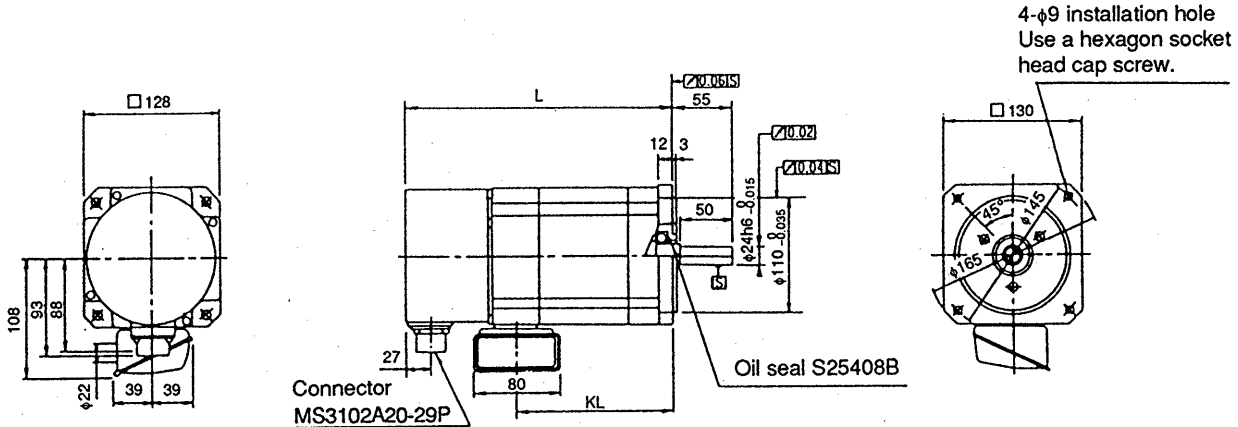
- Note:
1. The reduction ratios in the charts are nominal values and are slightly different from actual values.
 2. The reduction gear shaft rotation direction is the same as the servo motor rotation direction. However, HA-FE053(B)G 1/30 and HA-FE13(B)G 1/30 rotate in the direction opposite to the servo motor rotation direction.
 3. Backlash is 40 minutes to 1.5.
 4. The dimensions in parentheses apply when the electromagnetic brake is provided.
 5. Use a compression coupling for connection with the load.

10. Specifications

Standard HA-SE servo motor series

- HA-SE81(B), HA-SE52(B) to HA-SE152(B), HA-SE53(B) to HA-SE153(B)

Unit: mm



With electromagnetic brake
(Non-excitation operation safety brake,
24VDC, 7.8N·m)

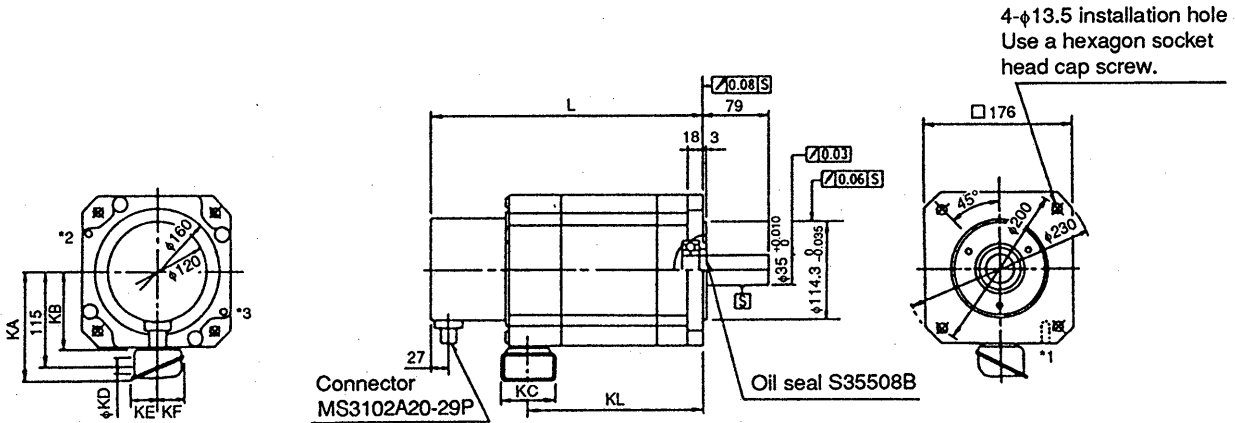
Note:
Use a compression coupling for
connection with the load.

| Changed dimensions | | | L | KL |
|--------------------|-------------------|-------------------|-----------|-----|
| Model | 1000 r/min series | 2000 r/min series | | |
| — | HA-SE52(B) | HA-SE53(B) | 223 (273) | 124 |
| — | HA-SE102(B) | HA-SE103(B) | 263 (313) | 164 |
| HA-SE81(B) | HA-SE152(B) | HA-SE153(B) | 303 (353) | 204 |

Note: The L dimension in () parentheses applies when the electromagnetic brake is provided.

- HA-SE121(B) to HA-SE301(B), HA-SE202(B), HA-SE352(B), HA-SE203(B), HA-SE353(B)

Unit: mm



With electromagnetic brake
(Non-excitation operation safety brake,
24VDC, 29.4N·m)

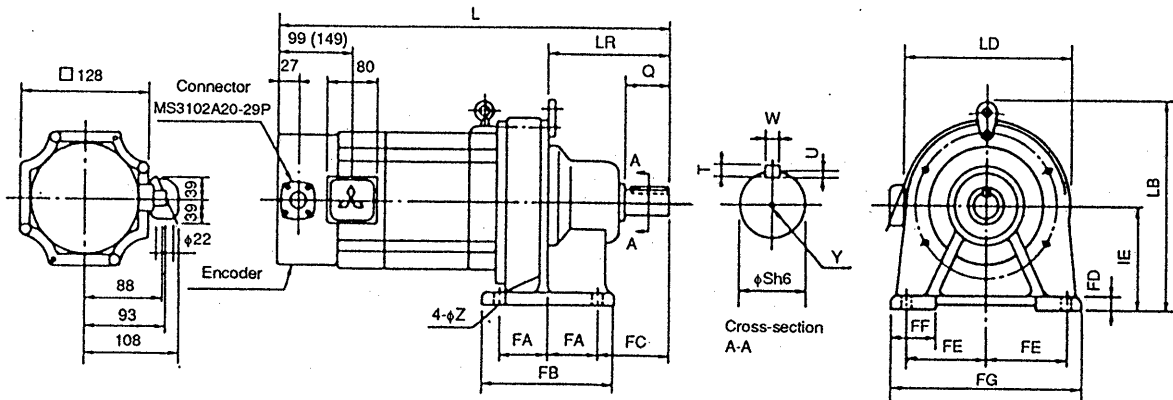
Note:
1. Use a compression coupling
for connection with the load.
2. *1 to *3 are screw holes
(M8) for the hangers.
Use *1 and *3 for horizontal
suspension.

| Changed dimensions | | | | L | KA | KB | KC | KD | KE | KF | KL |
|--------------------|-------------------|-------------------|-------------------|-----|-----|----|----|----|----|-----|----|
| Model | 1000 r/min series | 2000 r/min series | 3000 r/min series | | | | | | | | |
| HA-SE121(B) | HA-SE202(B) | HA-SE203(B) | 271 (338) | 135 | 115 | 80 | 22 | 39 | 39 | 168 | |
| HA-SE201(B) | HA-SE352(B) | HA-SE353(B) | 339 (406) | 144 | 119 | 93 | 27 | 61 | 43 | 236 | |
| HA-SE301(B) | — | — | 407 (474) | 144 | 119 | 93 | 27 | 61 | 43 | 301 | |

Note: The L dimension in () parentheses applies when the electromagnetic brake is provided.

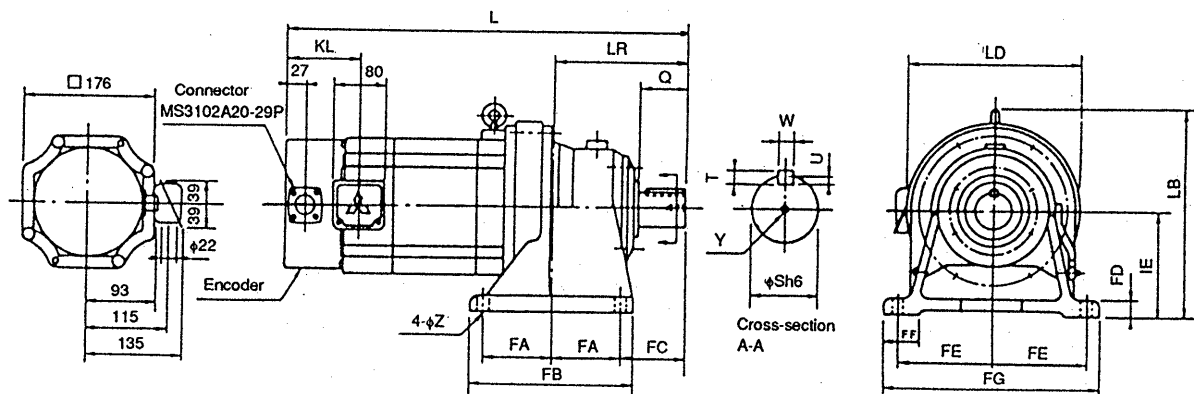
10. Specifications

HA-SE servo motor series with reduction gear (for general industrial machines, foot mounting type)
 • HA-SE52(B)G to HA-SE152(B)G



| Model | Gear ratio | Motor | | | | | | | | | | | | | | Shaft End | | | | | |
|---------------|--------------|-----------|-----|-----|-------|-----|----|------|-----|-----|----|-----|----|-----|----|-----------|----|-----|----|-------------------|--|
| | | L | LB | LD | LR | IE | Z | FA | FB | FC | FD | FE | FF | FG | Q | S | T | U | W | Y | |
| HA-SE 52(B)G | 1/6 to 1/17 | 404 (454) | 215 | 150 | 105 | 100 | 11 | 45 | 135 | 60 | 12 | 75 | 40 | 180 | 35 | 28 | 7 | 4 | 8 | — | |
| | 1/29 to 1/43 | 429 (479) | 257 | 204 | 139.5 | 120 | 14 | 57.5 | 155 | 82 | 15 | 95 | 55 | 230 | 55 | 38 | 8 | 5 | 10 | — | |
| | 1/59 | 480 (530) | 300 | 230 | 172.5 | 150 | 18 | 72.5 | 195 | 100 | 22 | 145 | 65 | 330 | 70 | 50 | 9 | 5.5 | 14 | M10 screw 18 deep | |
| HA-SE 102(B)G | 1/6 to 1/29 | 469 (519) | 257 | 204 | 139.5 | 120 | 14 | 57.5 | 155 | 82 | 15 | 95 | 55 | 230 | 55 | 38 | 8 | 5 | 10 | — | |
| | 1/35 | 520 (570) | 300 | 230 | 172.5 | 150 | 18 | 72.5 | 195 | 100 | 22 | 145 | 65 | 330 | 70 | 50 | 9 | 5.5 | 14 | M10 screw 18 deep | |
| | 1/43 to 1/59 | 598 (648) | 310 | 300 | 214 | 160 | | 75 | 238 | 139 | 25 | 185 | 75 | 410 | 90 | 60 | 11 | 7 | 18 | — | |
| HA-SE 152(B)G | 1/6 to 1/17 | 509 (559) | 257 | 204 | 139.5 | 120 | 14 | 57.5 | 155 | 82 | 15 | 95 | 55 | 230 | 55 | 38 | 8 | 5 | 10 | — | |
| | 1/29 | 560 (610) | 300 | 230 | 172.5 | 150 | 18 | 72.5 | 195 | 100 | 22 | 145 | 65 | 330 | 70 | 50 | 9 | 5.5 | 14 | M10 screw 18 deep | |
| | 1/35 to 1/59 | 638 (688) | 310 | 300 | 214 | 160 | | 75 | 238 | 139 | 25 | 185 | 75 | 410 | 90 | 60 | 11 | 7 | 18 | — | |

• HA-SE202(B)G to HA-SE352(B)G



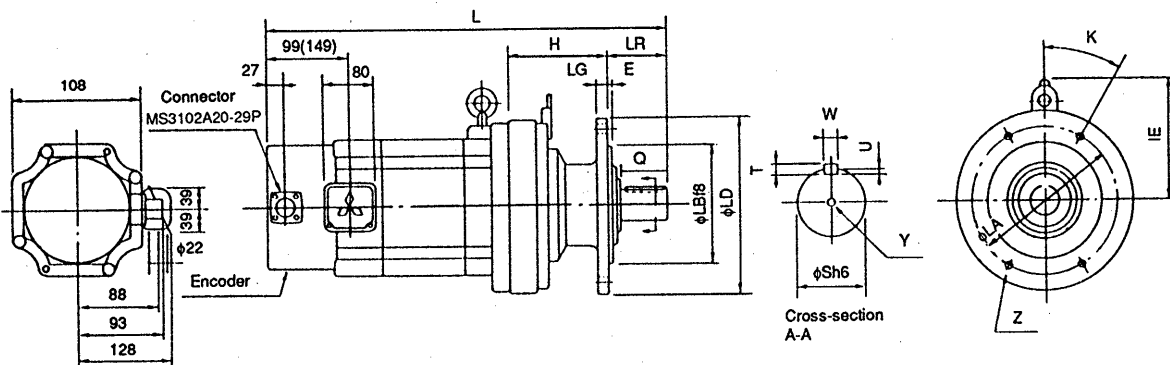
| Model | Gear ratio | Motor | | | | | | | | | | | | | | Shaft End | | | | | |
|---------------|--------------|-----------|-------|-----|-------|-----|-------|------|------|-----|-----|-----|-----|-----|-----|-----------|----|-----|-----|-------------------|-------------------|
| | | L | LB | LD | LR | IE | Z | FA | FB | FC | FD | FE | FF | FG | Q | S | T | U | W | Y | |
| HA-SE 202(B)G | 1/6 to 1/17 | 471 (538) | 261.5 | 204 | 139.5 | 120 | 14 | 57.5 | 155 | 82 | 15 | 95 | 55 | 230 | 55 | 38 | 8 | 5 | 10 | — | |
| | 1/29 to 1/59 | 588 (655) | 341 | 300 | 214 | 160 | 18 | 75 | 238 | 139 | 25 | 185 | 75 | 410 | 90 | 60 | 11 | 7 | 18 | M10 screw 18 deep | |
| HA-SE 352(B)G | 1/6 to 1/17 | 592 (659) | 300 | 230 | 172.5 | 150 | | 22 | 72.5 | 195 | 100 | 22 | 145 | 65 | 330 | 70 | 50 | 9 | 5.5 | 14 | M10 screw 18 deep |
| | 1/29 to 1/59 | 707 (774) | 380 | 340 | 262.5 | 200 | 137.5 | | 335 | 125 | 30 | 190 | 64 | 430 | 90 | 70 | 12 | 7.5 | 20 | M10 screw 4 deep | |

Note: 1. The dimension in () parentheses applies when the electromagnetic brake is provided.
 2. Use a compression coupling for connection with the load.

10. Specifications

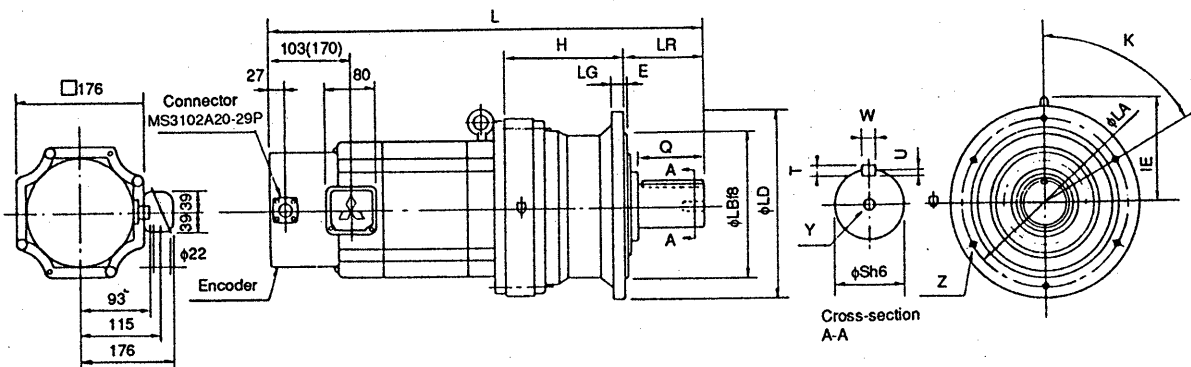
HA-SE servo motor series with reduction gear (for general industrial machines, flange mounting type)

- HA-SE52(B)G to HA-SE152(B)G



| Model | Changed dimensions Gear ratio | Motor | | | | | | | | | | | Shaft End | | | | | | | |
|---------------|----------------------------------|-----------|-----|-----|-----|----|----|-----|-------|----|---|-----|-----------|-----|----|----|---|-----|----|----------------------|
| | | L | LA | LB | LD | LG | LR | IE | Z | K | E | H | Q | S | T | U | W | Y | | |
| HA-SE 52(B)G | 1/6 to 1/17 | 404 (454) | 134 | 110 | 160 | 9 | 48 | 115 | 4-φ11 | 45 | 3 | 108 | 35 | 28 | 7 | 4 | 8 | — | | |
| | 1/29 to 1/43 | 429 (479) | 180 | 140 | 210 | 13 | 69 | 137 | | | | | 30 | 117 | 55 | 38 | 8 | 5 | 10 | M10 screw 18 deep |
| | 1/59 | 480 (530) | 230 | 200 | 260 | 15 | 76 | 150 | | | | | 60 | 164 | 70 | 50 | 9 | 5.5 | 14 | M10 screw 18 deep |
| HA-SE 102(B)G | 1/6 to 1/29 | 469 (519) | 180 | 140 | 210 | 13 | 69 | 137 | 6-φ11 | 30 | 4 | 108 | 35 | 28 | 7 | 4 | 8 | — | | |
| | 1/35 | 520 (570) | 230 | 200 | 260 | 15 | 76 | 150 | | | | | 60 | 117 | 55 | 38 | 8 | 5 | 10 | M8 screw 18 deep |
| | 1/43 to 1/59 | 598 (648) | 310 | 270 | 340 | 20 | 89 | 224 | | | | | 30 | 164 | 70 | 50 | 9 | 5.5 | 14 | M8 screw 18 deep |
| HA-SE 152(B)G | 1/6 to 1/17 | 509 (559) | 180 | 140 | 210 | 13 | 69 | 137 | 6-φ11 | 30 | 4 | 108 | 35 | 28 | 7 | 4 | 8 | — | | |
| | 1/29 | 560 (610) | 230 | 200 | 260 | 15 | 76 | 150 | | | | | 60 | 117 | 55 | 38 | 8 | 5 | 10 | M8 screw 18 deep |
| | 1/35 to 1/59 | 638 (688) | 310 | 270 | 340 | 20 | 89 | 224 | | | | | 30 | 164 | 70 | 50 | 9 | 5.5 | 14 | M8 screw 18 deep |

- HA-SE202(B)G to HA-SE352(B)G



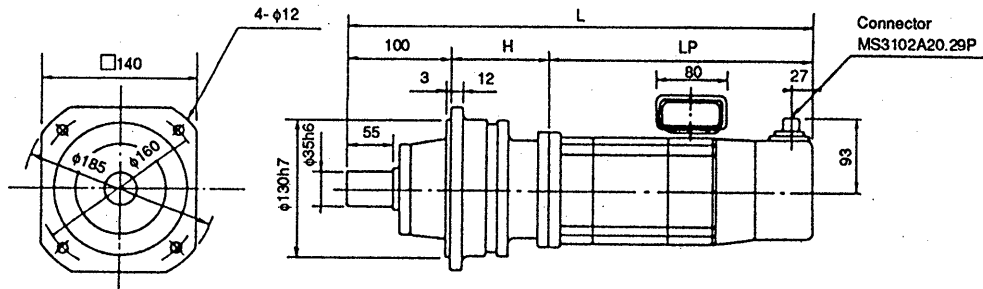
| Model | Changed dimensions Gear ratio | Motor | | | | | | | | | | | Shaft End | | | | | |
|---------------|----------------------------------|-----------|-----|-----|-----|----|----|-------|-------|----|---|-----|-----------|------|----|----|----|----|
| | | L | LA | LB | LD | LG | LR | IE | Z | K | E | H | Q | S | T | U | W | Y |
| HA-SE 202(B)G | 1/6 to 1/17 | 471 (538) | 180 | 140 | 210 | 13 | 69 | 141.5 | 6-φ11 | 30 | 4 | 108 | 55 | 38 | 8 | 5 | 10 | — |
| | 1/29 to 1/59 | 588 (655) | 310 | 270 | 340 | 20 | 89 | 181 | | | | | 60 | 80 | 60 | 11 | 7 | 18 |
| HA-SE 352(B)G | 1/6 to 1/17 | 592 (659) | 230 | 200 | 260 | 15 | 76 | 150 | 6-φ11 | 30 | 4 | 108 | 55 | 38 | 8 | 5 | 10 | — |
| | 1/29 to 1/59 | 707 (774) | 360 | 316 | 400 | 22 | 94 | 239 | | | | | 68-φ14 | 22.5 | 5 | 84 | 70 | 12 |

- Note: 1. The dimension in () parentheses applies when the electromagnetic brake is provided.
2. Use a compression coupling for connection with the load.

10. Specifications

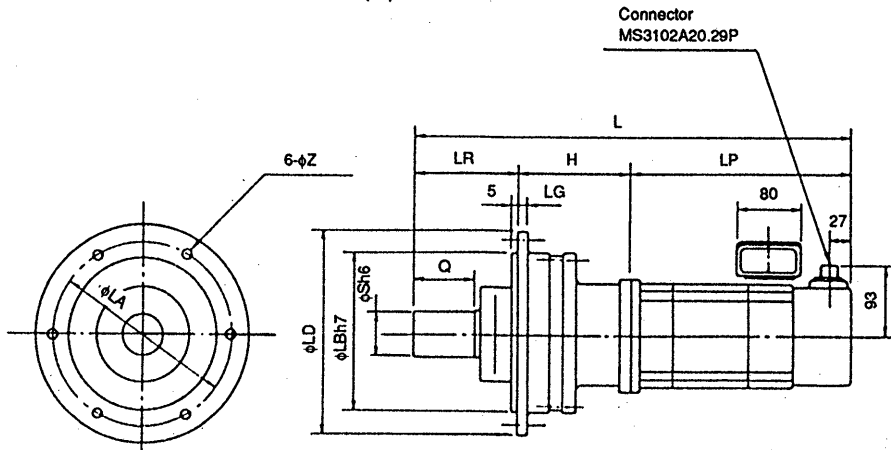
HA-SE servo motor series with reduction gear (for high precision operation)

- HA-SE52(B)G 1/5 to 1/20, HA-SE102(B)G 1/5, 1/9, HA-SE152(B)G 1/5



| Model | Changed dimensions | Motor | | |
|--------------|--------------------|-----------|-----|-----------|
| | Gear ratio | L | H | LP |
| HA-SE52(B)G | 1/5 | 479 (529) | 156 | 223 (273) |
| | 1/9 | 491 (541) | 168 | |
| | 1/20 | 512 (562) | 189 | |
| HA-SE102(B)G | 1/5 | 519 (569) | 156 | 263 (313) |
| | 1/9 | 531 (581) | 168 | |
| HA-SE152(B)G | 1/5 | 559 (609) | 156 | 303 (353) |

- HA-SE52(B)G 1/29, 1/45, HA-SE102(B)G 1/20 to 1/45, HA-SE152(B)G 1/9 to 1/45, HA-SE202(B)G 1/5 to 1/45, HA-SE352(B)G 1/5 to 1/20



| Model | Changed dimensions | Motor | | | | | | | | Shaft End | | |
|--------------|--------------------|-----------|-----|-----|-----|----|-----|----|-----------|-----------|----|----|
| | Gear ratio | L | LA | LB | LD | LG | H | Z | LP | LR | Q | S |
| HA-SE52(B)G | 1/29 | 580 (630) | 220 | 190 | 245 | 15 | 217 | 12 | 223 (273) | 140 | 75 | 50 |
| | 1/45 | 586 (636) | | | | | 223 | | | | | |
| HA-SE102(B)G | 1/20, 1/29 | 620 (670) | 220 | 190 | 245 | 15 | 217 | 12 | 263 (313) | 140 | 75 | 50 |
| | 1/45 | 667 (717) | | | | | 244 | | | | | |
| HA-SE152(B)G | 1/9 | 652 (702) | 220 | 190 | 245 | 15 | 209 | 12 | 303 (353) | 140 | 75 | 50 |
| | 1/20 | 660 (710) | | | | | 217 | | | | | |
| | 1/29 | 704 (754) | 280 | 240 | 310 | 18 | 241 | 14 | | 160 | 90 | 60 |
| | 1/45 | 707 (757) | | | | | 244 | | | | | |
| HA-SE202(B)G | 1/5 | 614 (681) | 220 | 190 | 245 | 15 | 203 | 12 | 271 (338) | 140 | 75 | 50 |
| | 1/9 | 641 (708) | | | | | 230 | | | | | |
| | 1/20 to 1/29 | 693 (760) | 280 | 240 | 310 | 18 | 262 | 14 | | 160 | 90 | 60 |
| | 1/45 | 696 (763) | | | | | 265 | | | | | |
| HA-SE352(B)G | 1/5 | 722 (789) | 280 | 240 | 310 | 18 | 223 | 14 | 339 (406) | 160 | 90 | 60 |
| | 1/9 | 754 (821) | | | | | 255 | | | | | |
| | 1/20 | 761 (828) | 262 | | | | | | | | | |

Note: 1. The dimension in () parentheses applies when the electromagnetic brake is provided.
 2. Use a compression coupling for connection with the load.

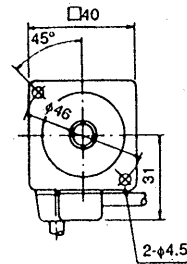
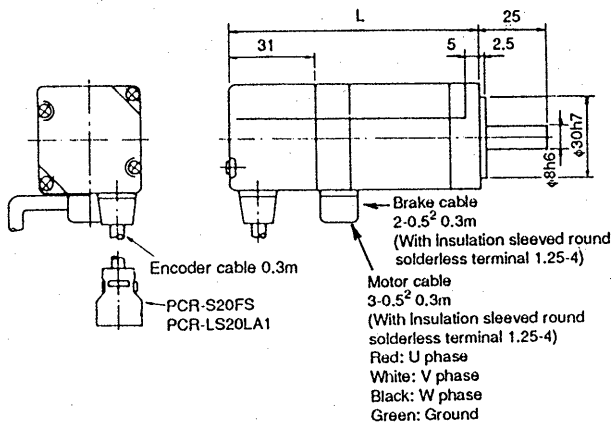
10. Specifications

10-5 Outer dimensions of UL listed and CSA certified servo motor

Standard HA-ME servo motor series

- HA-ME053(B)-UL, HA-ME13(B)-UL

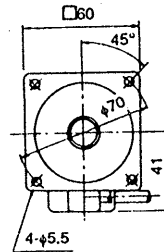
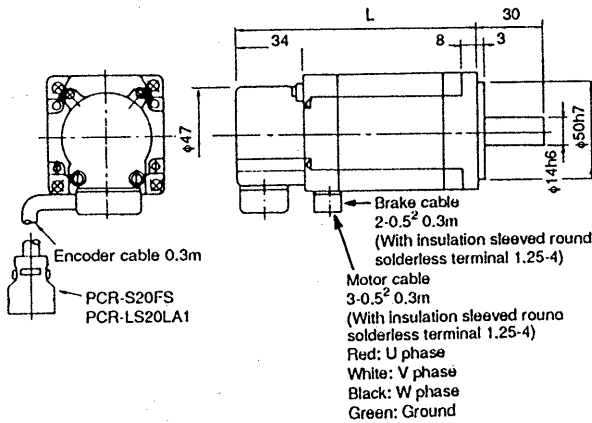
(Unit: mm)



| Model | Variable dimension L |
|----------------|----------------------|
| HA-ME053(B)-UL | 76.5 (105.5) |
| HA-ME13(B)-UL | 94.5 (123.5) |

- HA-ME23(B)-UL, HA-ME43(B)-UL

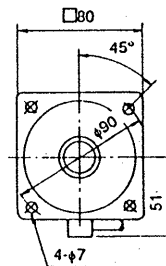
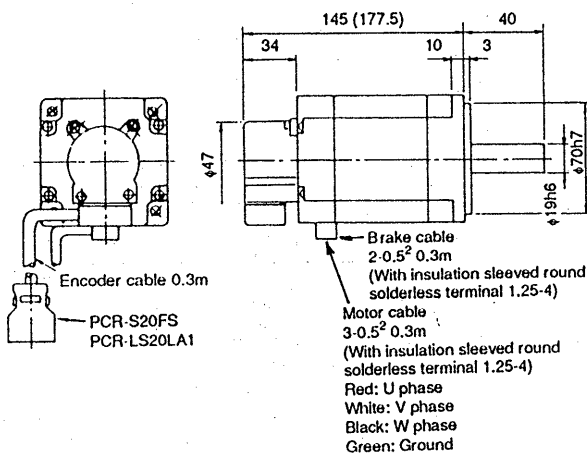
(Unit: mm)



| Model | Variable dimension L |
|---------------|----------------------|
| HA-ME23(B)-UL | 96.5 (129) |
| HA-ME43(B)-UL | 124.5 (157) |

- HA-ME73(B)-UL

(Unit: mm)

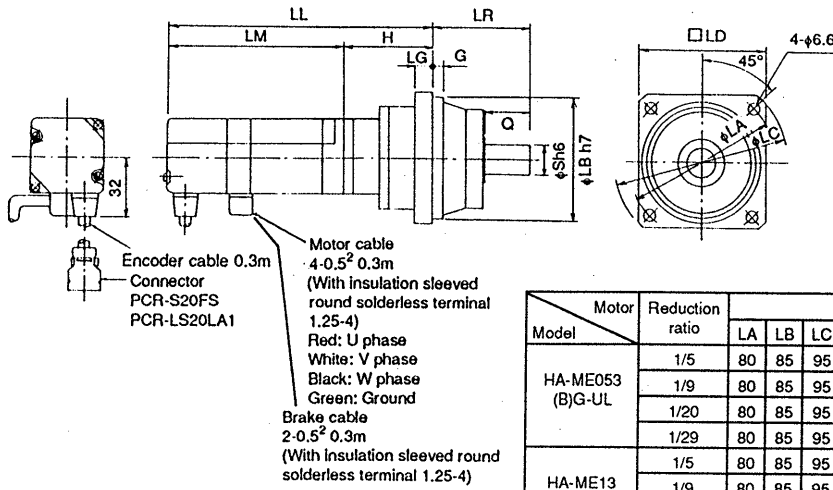


Note: 1. The dimensions in parentheses apply when the electromagnetic brake is provided.
2. Use a compression coupling for connection with the load.

10. Specifications

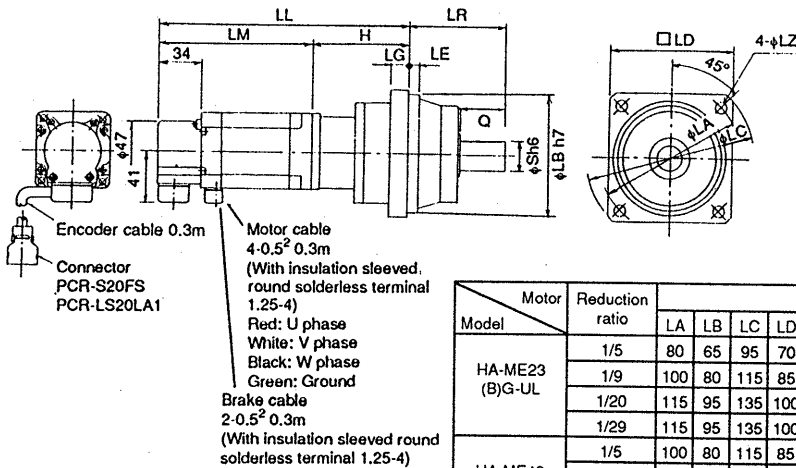
HA-ME servo motor series with reduction gear

- HA-ME053(B)G-UL, HA-ME13(B)G-UL



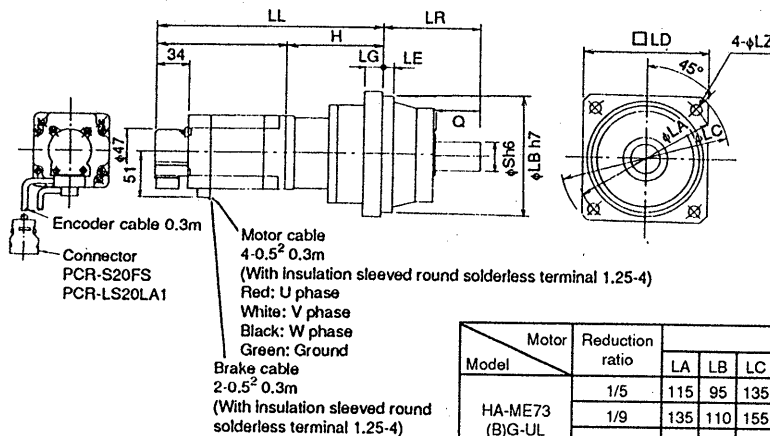
| Motor Model | Reduction ratio | Variable dimension L | | | | | | | | | | |
|------------------|-----------------|----------------------|----|-----|----|----|---------------|----|-----------------|----|----|----|
| | | LA | LB | LC | LD | LG | LL | LR | LM | H | Q | S |
| HA-ME053 (B)G-UL | 1/5 | 80 | 85 | 95 | 70 | 8 | 124.5 (153.5) | 55 | 76.5 (105.5) | 48 | 25 | 18 |
| | 1/9 | 80 | 85 | 95 | 70 | 8 | 140.5 (168.5) | 55 | | 64 | 25 | 18 |
| | 1/20 | 80 | 85 | 95 | 70 | 8 | 140.5 (169.5) | 55 | | 64 | 25 | 18 |
| | 1/29 | 80 | 85 | 95 | 70 | 8 | 140.5 (169.5) | 55 | | 64 | 25 | 18 |
| HA-ME13 (B)G-UL | 1/5 | 80 | 85 | 95 | 70 | 8 | 142.5 (171.5) | 55 | 94.5 (123.5) | 48 | 25 | 18 |
| | 1/9 | 80 | 85 | 95 | 70 | 8 | 158.5 (187.5) | 55 | | 64 | 25 | 18 |
| | 1/20 | 100 | 80 | 115 | 85 | 10 | 164.5 (193.5) | 75 | | 70 | 25 | 20 |
| | 1/29 | 100 | 80 | 115 | 85 | 10 | 164.5 (193.5) | 75 | | 70 | 25 | 20 |

- HA-ME23(B)G-UL, HA-ME43(B)G-UL



| Motor Model | Reduction ratio | Variable dimension L | | | | | | | | | | | | |
|-----------------|-----------------|----------------------|-----|-----|-----|----|----|-------------|-----|----------------|-----|----|----|----|
| | | LA | LB | LC | LD | LE | LG | LL | LR | LM | LZ | H | Q | S |
| HA-ME23 (B)G-UL | 1/5 | 80 | 65 | 95 | 70 | 8 | 8 | 153.5 (186) | 55 | 98.5 (129) | 8.8 | 57 | 25 | 18 |
| | 1/9 | 100 | 80 | 115 | 85 | 8 | 10 | 171.5 (204) | 75 | | 8.8 | 75 | 35 | 20 |
| | 1/20 | 115 | 95 | 135 | 100 | 8 | 10 | 175.5 (209) | 85 | | 9 | 80 | 40 | 25 |
| | 1/29 | 115 | 95 | 135 | 100 | 8 | 10 | 175.5 (209) | 85 | | 9 | 80 | 40 | 25 |
| HA-ME43 (B)G-UL | 1/5 | 100 | 80 | 115 | 85 | 8 | 10 | 183.5 (218) | 75 | 124.5 (157) | 8.8 | 59 | 35 | 20 |
| | 1/9 | 115 | 95 | 135 | 100 | 8 | 10 | 204.5 (237) | 85 | | 9 | 80 | 40 | 25 |
| | 1/20 | 135 | 110 | 155 | 115 | 8 | 12 | 210.5 (243) | 100 | | 11 | 88 | 50 | 32 |
| | 1/29 | 135 | 110 | 155 | 115 | 8 | 12 | 210.5 (243) | 100 | | 11 | 88 | 50 | 32 |

- HA-ME73(B)G-UL



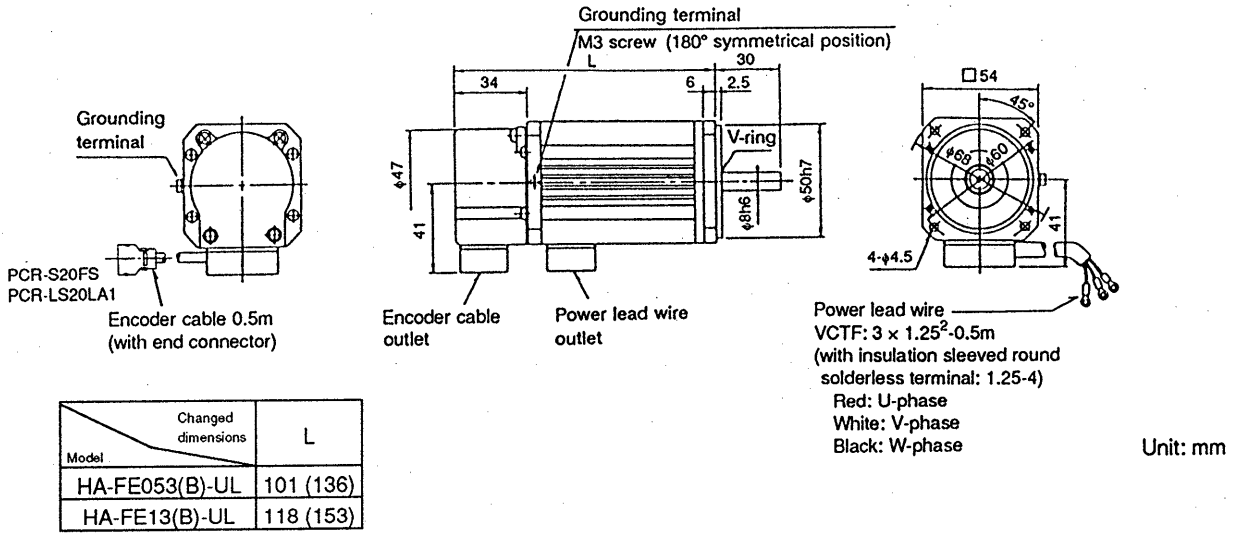
| Motor Model | Reduction ratio | Variable dimension L | | | | | | | | | | | | |
|-----------------|-----------------|----------------------|-----|-----|-----|----|----|-------------|-----|----------------|----|-----|----|----|
| | | LA | LB | LC | LD | LE | LG | LL | LR | LM | LZ | H | Q | S |
| HA-ME73 (B)G-UL | 1/5 | 115 | 95 | 135 | 100 | 8 | 10 | 215 (247.5) | 85 | 145 (177.5) | 9 | 70 | 40 | 25 |
| | 1/9 | 135 | 110 | 155 | 115 | 8 | 12 | 251 (283.5) | 100 | | 11 | 106 | 50 | 32 |
| | 1/20 | 150 | 125 | 175 | 130 | 10 | 15 | 251 (283.5) | 115 | | 14 | 106 | 60 | 40 |
| | 1/29 | 150 | 125 | 175 | 130 | 10 | 15 | 251 (283.5) | 115 | | 14 | 106 | 60 | 40 |

- Note: 1. The reduction gear shaft rotation direction is the same as the servo motor rotation direction.
2. Backlash is 3 minutes.
3. The dimensions in parentheses apply when the electromagnetic brake is provided.
4. Use a compression coupling for connection with the load.

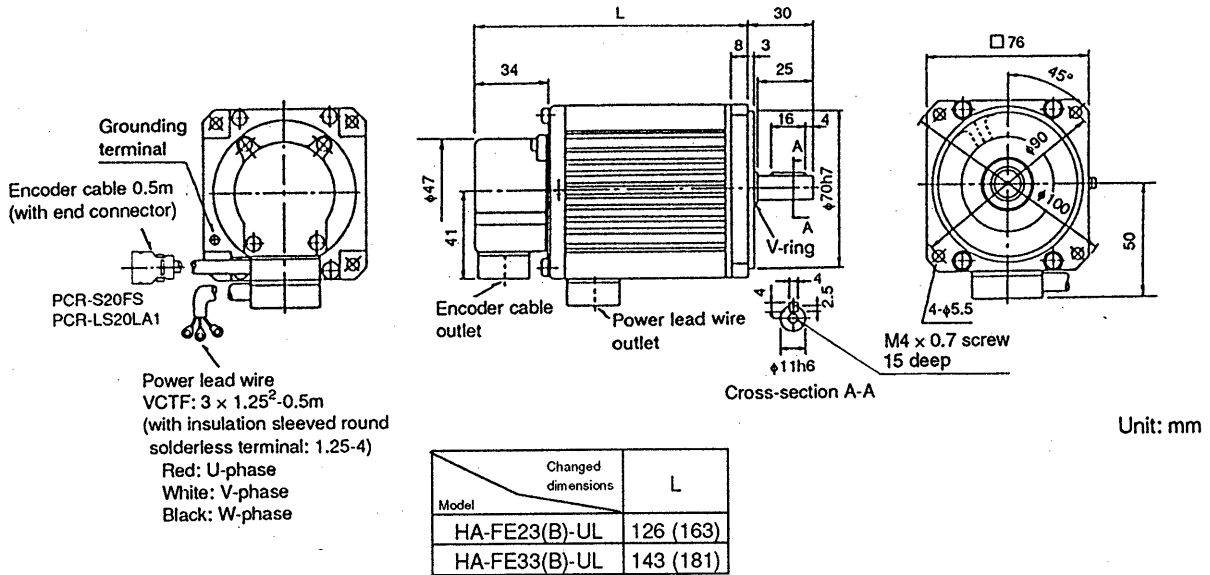
10. Specifications

Standard HA-FE servo motor series

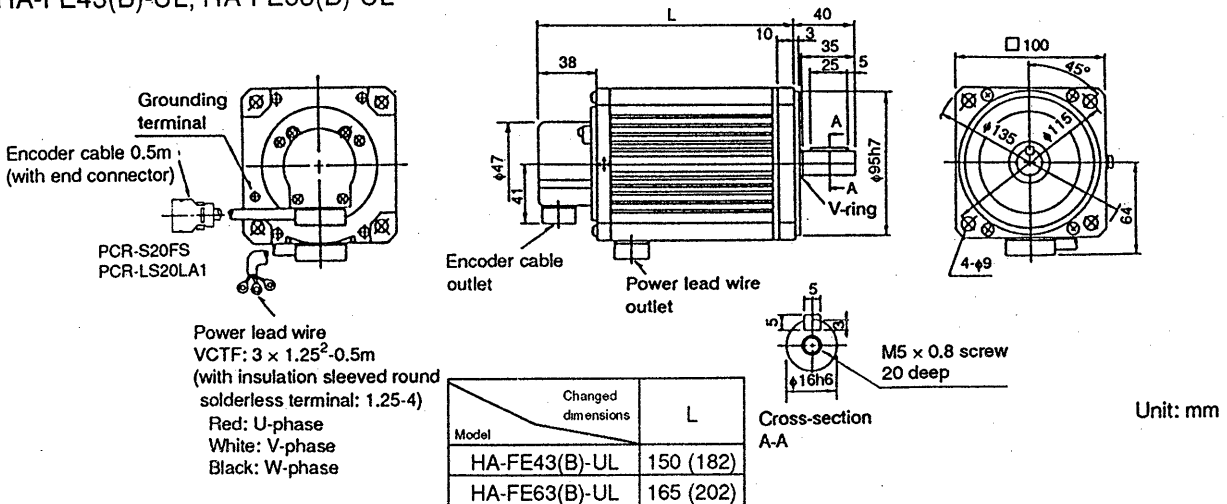
- HA-FE053(B)-UL, HA-FE13(B)-UL



- HA-FE23(B)-UL, HA-FE33(B)-UL



- HA-FE43(B)-UL, HA-FE63(B)-UL



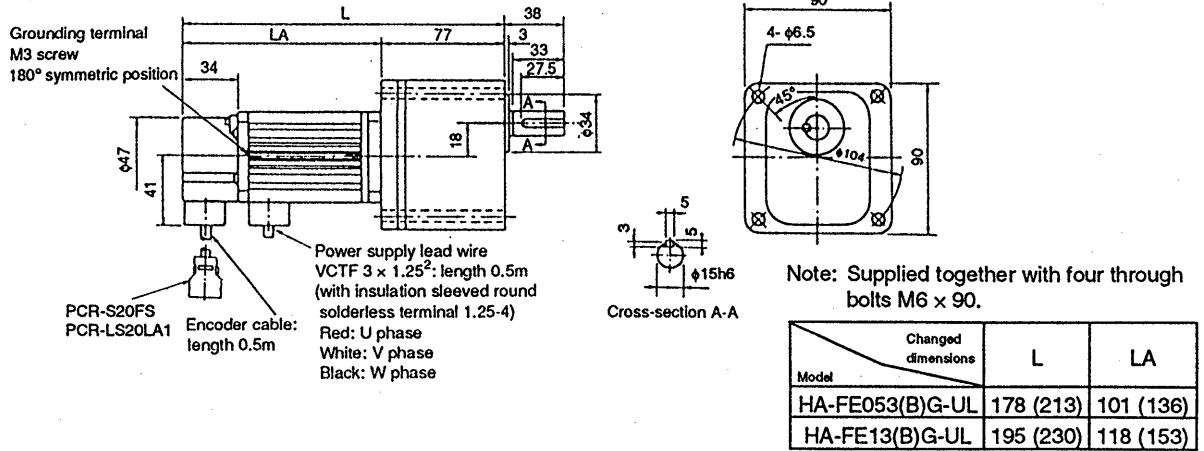
Note: 1. The dimensions in parentheses apply when the electromagnetic brake is provided.
2. Use a compression coupling for connection with the load.

10. Specifications

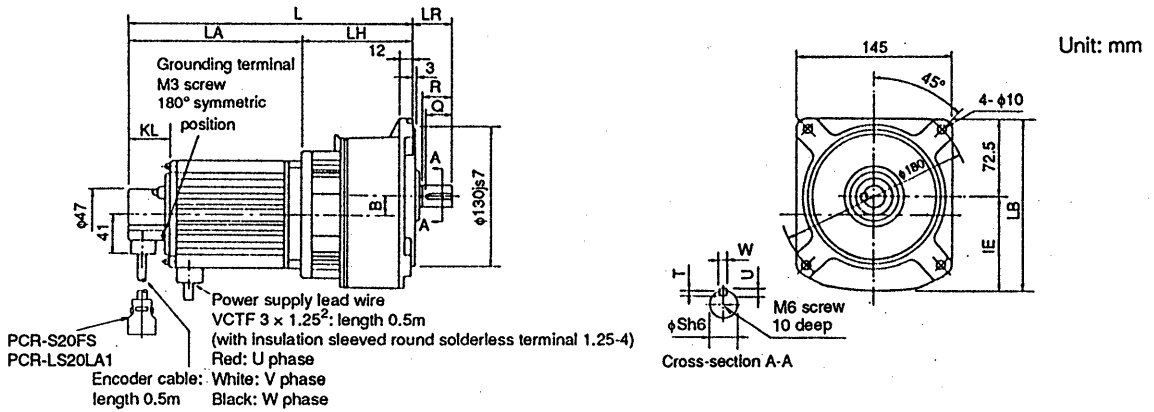
HA-FE servo motor series with reduction gear

- HA-FE053(B)G-UL (1/5, 1/10, 1/30), HA-FE13(B)G-UL (1/5, 1/10, 1/30)

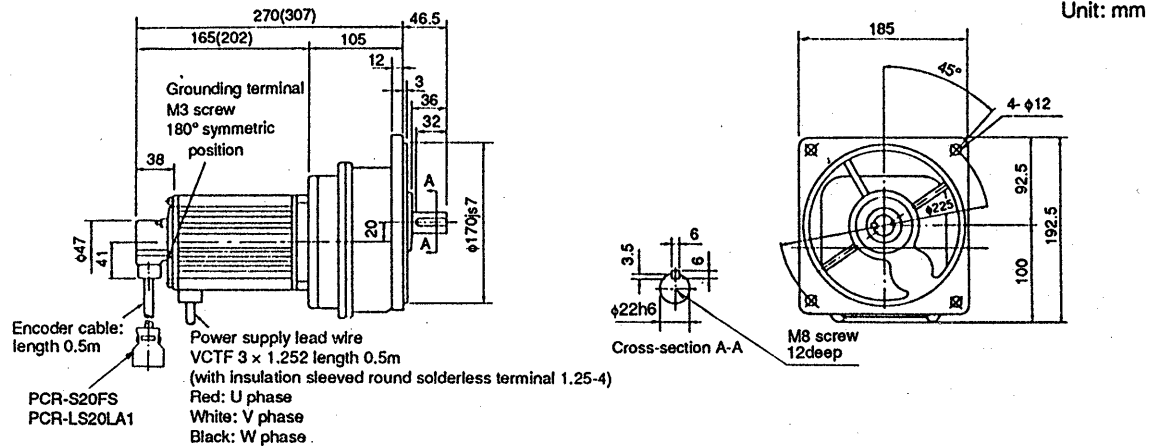
Unit: mm



- HA-FE23(B)G-UL (1/5, 1/10, 1/30), HA-FE33(B)G-UL (1/5, 1/10, 1/30), HA-FE43(B)G-UL (1/5, 1/10, 1/30)



- HA-FE63(B)G-UL (1/5, 1/10, 1/30)

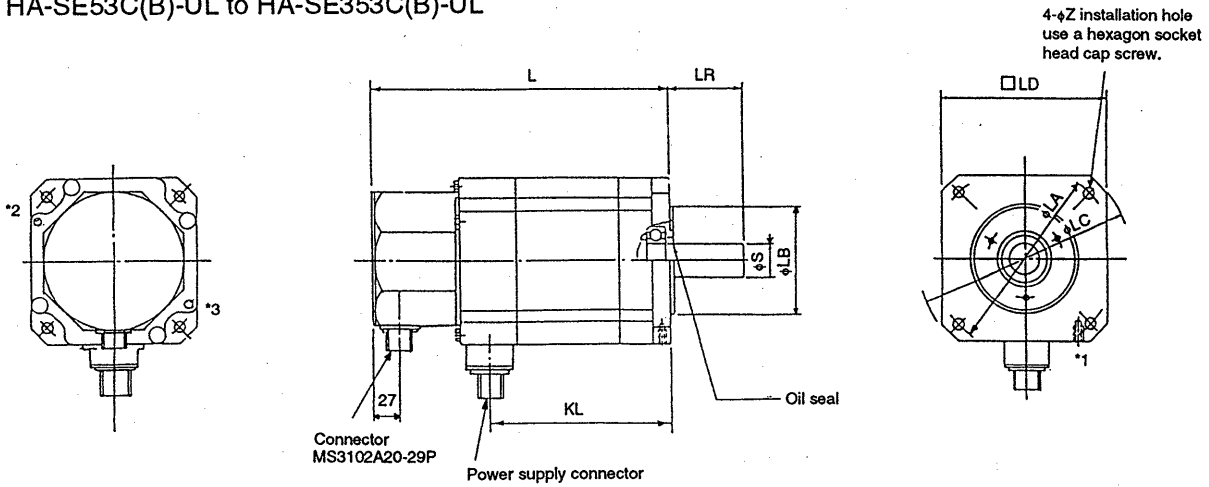


- Note: 1. The reduction ratios in the charts are nominal values and are slightly different from actual values.
 2. The reduction gear shaft rotation direction is the same as the servo motor rotation direction. However, HA-FE053(B)G 1/30 and HA-FE13(B)G 1/30 rotate in the direction opposite to the servo motor rotation direction.
 3. Backlash is 40 minutes to 1.5.
 4. The dimensions in parentheses apply when the electromagnetic brake is provided.
 5. Use a compression coupling for connection with the load.

10. Specifications

Standard HA-SE servo motor series

- HA-SE81C(B)-UL to HA-SE301C(B)-UL
 HA-SE52C(B)-UL to HA-SE352C(B)-UL
 HA-SE53C(B)-UL to HA-SE353C(B)-UL



| 1000 r/min series | 2000 r/min series | 3000 r/min series | L | LA | LB | LC | LD | KL | Z | LR | S | Oil seal | Power supply connector |
|-------------------|-------------------|-------------------|-----------|-----|-------|-----|-----|-----|------|----|-----------------------------------|----------|------------------------|
| | HA-SE52C(B)-UL | HA-SE53C(B)-UL | 223 (273) | 145 | 110 | 165 | 130 | 124 | 9 | 55 | 24h6 | S25408B | MS3102A22-23P |
| | HA-SE102C(B)-UL | HA-SE103C(B)-UL | 263 (313) | | | | | 164 | | | | | |
| HA-SE81C(B)-UL | HA-SE152C(B)-UL | HA-SE153C(B)-UL | 303 (353) | | | | | 204 | | | | | |
| HA-SE121C(B)-UL | HA-SE202C(B)-UL | HA-SE203C(B)-UL | 271 (338) | 200 | 114.3 | 230 | 176 | 168 | 13.5 | 79 | 35 ^{+0.010} ₀ | S35508B | MS3102A24-10P |
| HA-SE201C(B)-UL | HA-SE352C(B)-UL | HA-SE353C(B)-UL | 339(406) | | | | | 236 | | | | | |
| HA-SE301C(B)-UL | | | 407(474) | | | | | 301 | | | | | |

Note: 1. The L dimension in () parentheses applies when the electromagnetic brake is provided.

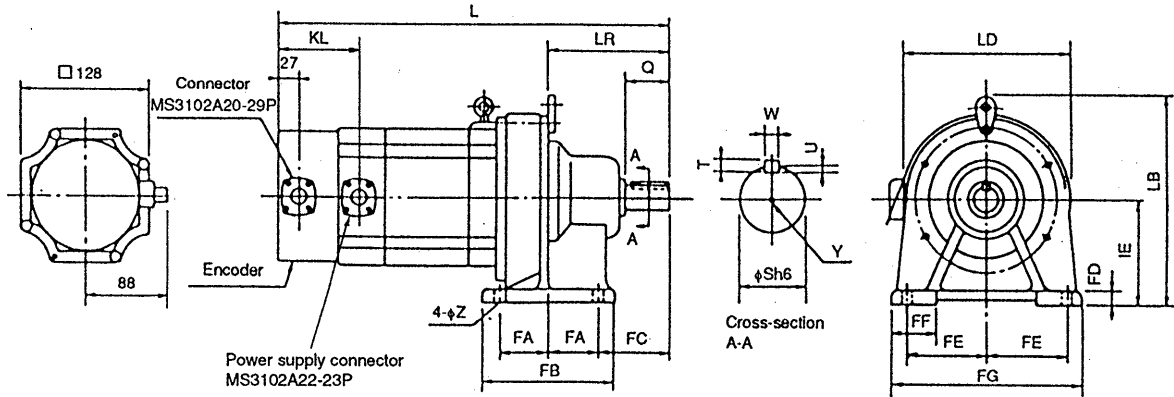
2. Use a compression coupling for connection with the load.

3. For HA-SE121C(B)-UL to HA-SE301C(B)-UL, HA-SE202C(B)-UL or more, HA-SE203C(B)-UL or more, *1 to *3 are screw holes (M8) for the hangers. Use *1 and for horizontal suspension.

10. Specifications

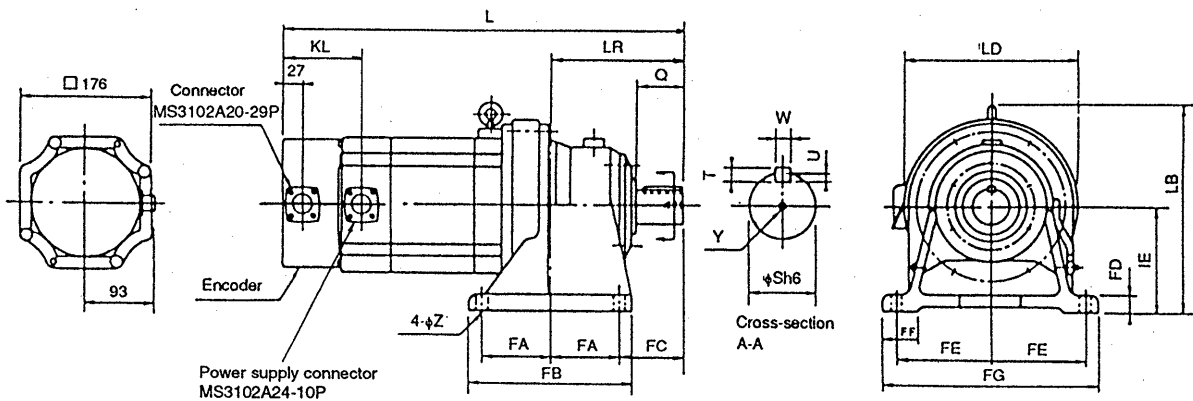
HA-SE servo motor series with reduction gear (for general industrial machines, foot mounting type)

- HA-SE52C(B)G-UL to HA-SE152C(B)G-UL



| Model | Gear ratio | Motor | | | | | | | | | | | | | | Shaft End | | | | | |
|--------------------------|--------------|-----------|-----|-----|-------|-----|----|------|-----|-----|----|-----|----|-----|-------------|-----------|----|----|-----|----|----------------------|
| | | L | LB | LD | LR | IE | Z | FA | FB | FC | FD | FE | FF | FG | KL | Q | S | T | U | W | Y |
| HA-SE 52C(B)G -UL | 1/6 to 1/17 | 404 (454) | 215 | 150 | 105 | 100 | 11 | 45 | 135 | 60 | 12 | 75 | 40 | 180 | 99 (149) | 35 | 28 | 7 | 4 | 8 | — |
| | 1/29 to 1/43 | 429 (479) | 257 | 204 | 139.5 | 120 | 14 | 57.5 | 155 | 82 | 15 | 95 | 55 | 230 | | 55 | 38 | 8 | 5 | 10 | — |
| | 1/59 | 480 (530) | 300 | 230 | 172.5 | 150 | 18 | 72.5 | 195 | 100 | 22 | 145 | 65 | 330 | | 70 | 50 | 9 | 5.5 | 14 | M10 screw 18 deep |
| HA-SE 102C(B)G -UL | 1/6 to 1/29 | 469 (519) | 257 | 204 | 139.5 | 120 | 14 | 57.5 | 155 | 82 | 15 | 95 | 55 | 230 | | 55 | 38 | 8 | 5 | 10 | — |
| | 1/35 | 520 (570) | 300 | 230 | 172.5 | 150 | 18 | 72.5 | 195 | 100 | 22 | 145 | 65 | 330 | | 70 | 50 | 9 | 5.5 | 14 | M10 screw 18 deep |
| | 1/43 to 1/59 | 598 (648) | 310 | 300 | 214 | 160 | 18 | 75 | 238 | 139 | 25 | 185 | 75 | 410 | | 90 | 60 | 11 | 7 | 18 | — |
| HA-SE 152C(B)G -UL | 1/6 to 1/17 | 509 (559) | 257 | 204 | 139.5 | 120 | 14 | 57.5 | 155 | 82 | 15 | 95 | 55 | 230 | | 55 | 38 | 8 | 5 | 10 | — |
| | 1/29 | 580 (610) | 300 | 230 | 172.5 | 150 | 18 | 72.5 | 195 | 100 | 22 | 145 | 65 | 330 | | 70 | 50 | 9 | 5.5 | 14 | M10 screw 18 deep |
| | 1/35 to 1/59 | 638 (688) | 310 | 300 | 214 | 160 | 18 | 75 | 238 | 139 | 25 | 185 | 75 | 410 | | 90 | 60 | 11 | 7 | 18 | — |

- HA-SE202C(B)G-UL to HA-SE352C(B)G-UL



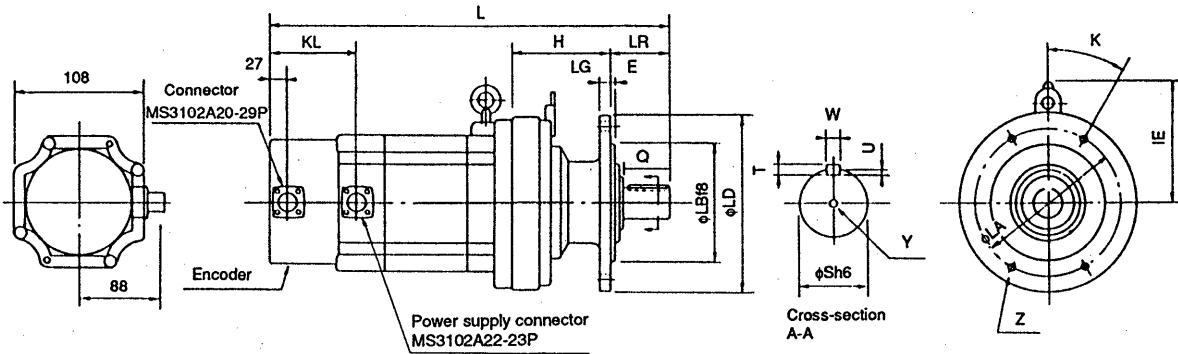
| Model | Gear ratio | Motor | | | | | | | | | | | | | | Shaft End | | | | | |
|--------------------------|--------------|-----------|-------|-----|-------|-----|----|-------|-----|-----|----|-----|----|-----|--------------|-----------|----|----|-----|----|----------------------|
| | | L | LB | LD | LR | IE | Z | FA | FB | FC | FD | FE | FF | FG | KL | Q | S | T | U | W | Y |
| HA-SE 202C(B)G -UL | 1/6 to 1/17 | 471 (538) | 261.5 | 204 | 139.5 | 120 | 14 | 57.5 | 155 | 82 | 15 | 95 | 55 | 230 | 103 (170) | 55 | 38 | 8 | 5 | 10 | — |
| | 1/29 to 1/59 | 588 (655) | 341 | 300 | 214 | 160 | 18 | 75 | 238 | 139 | 25 | 185 | 75 | 410 | | 90 | 60 | 11 | 7 | 18 | M10 screw 18 deep |
| HA-SE 352C(B)G -UL | 1/6 to 1/17 | 592 (659) | 300 | 230 | 172.5 | 150 | 18 | 72.5 | 195 | 100 | 22 | 145 | 65 | 330 | | 70 | 50 | 9 | 5.5 | 14 | — |
| | 1/29 to 1/59 | 707 (774) | 380 | 340 | 262.5 | 200 | 22 | 137.5 | 335 | 125 | 30 | 190 | 64 | 430 | | 90 | 70 | 12 | 7.5 | 20 | M10 screw 4 deep |

Note: 1. The dimension in () parentheses applies when the electromagnetic brake is provided.
2. Use a compression coupling for connection with the load.

10. Specifications

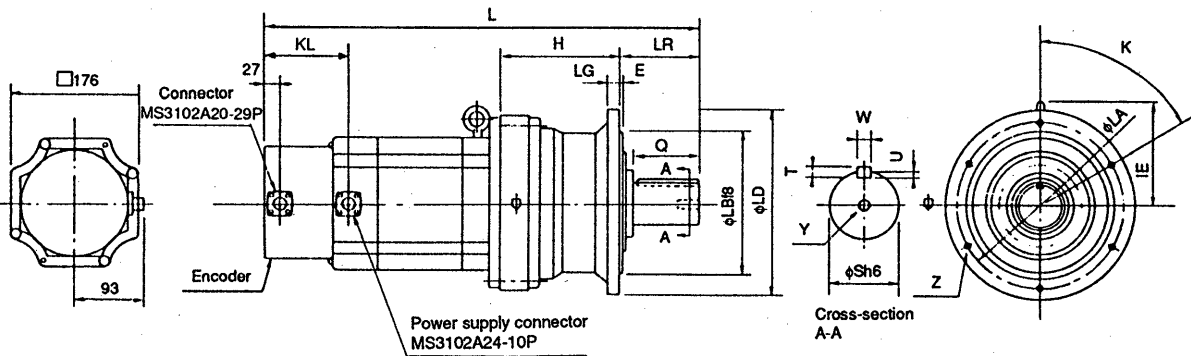
HA-SE servo motor series with reduction gear (for general industrial machines, flange mounting type)

- HA-SE52C(B)G-UL to HA-SE152C(B)G-UL



| Model | Gear ratio | Motor | | | | | | | | | | | Shaft End | | | | | | | | |
|--------------------------|--------------|-----------|-----|-----|-----|----|----|-----|-------|----|---|-----|-------------|----|-----|----|----|----|-----|----|----------------------|
| | | L | LA | LB | LD | LG | LR | IE | Z | K | E | H | KL | Q | S | T | U | W | Y | | |
| HA-SE 52C(B)G -UL | 1/6 to 1/17 | 404 (454) | 134 | 110 | 160 | 9 | 48 | 115 | 4-φ11 | 45 | 3 | 108 | 99 (149) | 35 | 28 | 7 | 4 | 8 | — | | |
| | 1/29 to 1/43 | 429 (479) | 180 | 140 | 210 | 13 | 69 | 137 | | | | | | 30 | 117 | 55 | 38 | 8 | 5 | 10 | — |
| | 1/59 | 480 (530) | 230 | 200 | 260 | 15 | 76 | 150 | | | | | | 60 | 164 | 70 | 50 | 9 | 5.5 | 14 | M10 screw 18 deep |
| HA-SE 102C(B)G -UL | 1/6 to 1/29 | 469 (519) | 180 | 140 | 210 | 13 | 69 | 137 | 6-φ11 | 30 | 4 | 117 | 99 (149) | 55 | 38 | 8 | 5 | 10 | — | | |
| | 1/35 | 520 (570) | 230 | 200 | 260 | 15 | 76 | 150 | | | | | | 60 | 164 | 70 | 50 | 9 | 5.5 | 14 | M8 screw 18 deep |
| | 1/43 to 1/59 | 598 (648) | 310 | 270 | 340 | 20 | 89 | 224 | | | | | | 60 | 219 | 80 | 60 | 11 | 7 | 18 | — |
| HA-SE 152C(B)G -UL | 1/6 to 1/17 | 509 (559) | 180 | 140 | 210 | 13 | 69 | 137 | 6-φ11 | 30 | 4 | 117 | 99 (149) | 55 | 38 | 8 | 5 | 10 | — | | |
| | 1/29 | 560 (610) | 230 | 200 | 260 | 15 | 76 | 150 | | | | | | 60 | 164 | 70 | 50 | 9 | 5.5 | 14 | M8 screw 18 deep |
| | 1/35 to 1/59 | 638 (688) | 310 | 270 | 340 | 20 | 89 | 224 | | | | | | 60 | 219 | 80 | 60 | 11 | 7 | 18 | — |

- HA-SE202C(B)G-UL to HA-SE352C(B)G-UL



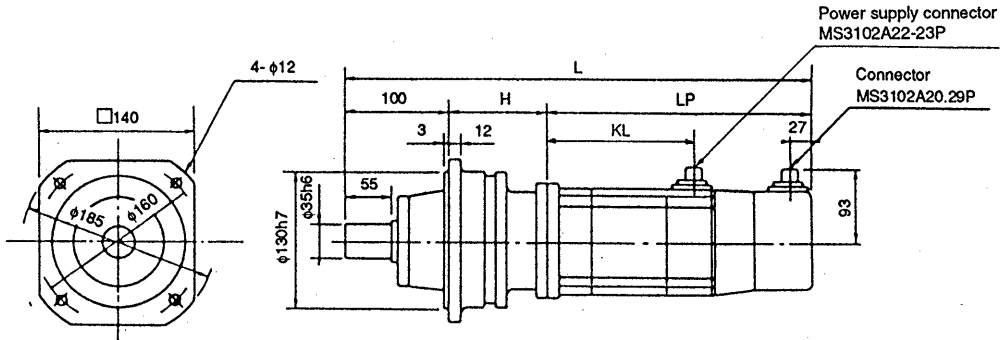
| Model | Gear ratio | Motor | | | | | | | | | | | Shaft End | | | | | |
|--------------------------|--------------|-----------|-----|-----|-----|----|----|-------|-------|------|---|--------------|-----------|------|----|-----|----|----|
| | | L | LA | LB | LD | LG | LR | IE | Z | K | E | KL | Q | S | T | U | W | Y |
| HA-SE 202C(B)G -UL | 1/6 to 1/17 | 471 (538) | 180 | 140 | 210 | 13 | 69 | 141.5 | 6-φ11 | 30 | 4 | 103 (170) | 55 | 38 | 8 | 5 | 10 | — |
| | 1/29 to 1/59 | 588 (655) | 310 | 270 | 340 | 20 | 89 | 181 | | | | | 60 | 164 | 80 | 60 | 11 | 7 |
| HA-SE 352C(B)G -UL | 1/6 to 1/17 | 592 (659) | 230 | 200 | 260 | 15 | 76 | 150 | 6-φ11 | 22.5 | 5 | 103 (170) | 70 | 50 | 9 | 5.5 | 14 | — |
| | 1/29 to 1/59 | 707 (774) | 360 | 316 | 400 | 22 | 94 | 239 | | | | | 68-φ14 | 22.5 | 5 | 84 | 70 | 12 |

- Note: 1. The dimension in () parentheses applies when the electromagnetic brake is provided.
 2. Use a compression coupling for connection with the load.

10. Specifications

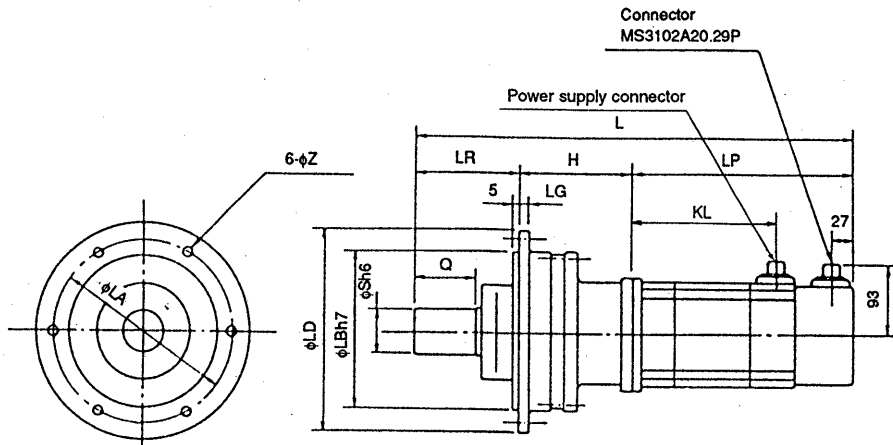
HA-SE servo motor series with reduction gear (for high precision operation)

- HA-SE52C(B)G-UL 1/5 to 1/20, HA-SE102C(B)G-UL 1/5, 1/9, HA-SE152C(B)G-UL 1/5



| Model | Changed dimensions | | Motor | | |
|------------------|--------------------|-----------|-------|-----------|-----|
| | Gear ratio | L | H | LP | KL |
| HA-SE52C(B)G-UL | 1/5 | 479 (529) | 156 | 223 (273) | 124 |
| | 1/9 | 491 (541) | 168 | | |
| | 1/20 | 512 (562) | 189 | | |
| HA-SE102C(B)G-UL | 1/5 | 519 (569) | 156 | 263 (313) | 164 |
| | 1/9 | 531 (581) | 168 | | |
| HA-SE152C(B)G-UL | 1/5 | 559 (609) | 156 | 303 (353) | 204 |

- HA-SE52C(B)G-UL 1/29, 1/45, HA-SE102C(B)G-UL 1/20 to 1/45, HA-SE152C(B)G-UL 1/9 to 1/45, HA-SE202C(B)G-UL 1/5 to 1/45, HA-SE352C(B)G-UL 1/5 to 1/20



| Model | Changed dimensions | | Motor | | | | | | | | Shaft End | | | Power supply connector |
|------------------|--------------------|-----------|-------|-----|-----|----|-----|----|-----------|-----|-----------|----|----|------------------------|
| | Gear ratio | L | LA | LB | LD | LG | H | Z | LP | KL | LR | Q | S | |
| HA-SE52C(B)G-UL | 1/29 | 580 (630) | 220 | 190 | 245 | 15 | 217 | 12 | 223 (273) | 124 | 140 | 75 | 50 | MS3102A22-23P |
| | 1/45 | 586 (636) | | | | | 223 | | | | | | | |
| HA-SE102C(B)G-UL | 1/20, 1/29 | 620 (670) | 220 | 190 | 245 | 15 | 217 | 12 | 263 (313) | 164 | 140 | 75 | 50 | |
| | 1/45 | 667 (717) | | | | | 280 | | | | | | | |
| HA-SE152C(B)G-UL | 1/9 | 652 (702) | 220 | 190 | 245 | 15 | 209 | 12 | 303 (353) | 204 | 140 | 75 | 50 | |
| | 1/20 | 660 (710) | | | | | 217 | | | | | | | |
| | 1/29 | 704 (754) | | | | | 241 | | | | | | | |
| | 1/45 | 707 (757) | | | | | 244 | | | | | | | |
| HA-SE202C(B)G-UL | 1/5 | 614 (681) | 220 | 190 | 245 | 15 | 203 | 12 | 271 (338) | 168 | 140 | 75 | 50 | |
| | 1/9 | 641 (708) | | | | | 230 | | | | | | | |
| | 1/20 to 1/29 | 693 (760) | | | | | 262 | | | | | | | |
| | 1/45 | 696 (763) | | | | | 265 | | | | | | | |
| HA-SE352C(B)G-UL | 1/5 | 722 (789) | 280 | 240 | 310 | 18 | 223 | 14 | 339 (406) | 236 | 160 | 90 | 60 | MS3102A24-10P |
| | 1/9 | 754 (821) | | | | | 255 | | | | | | | |
| | 1/20 | 761 (828) | | | | | 262 | | | | | | | |
| | 1/45 | 761 (828) | | | | | 262 | | | | | | | |

Note: 1. The dimension in () parentheses applies when the electromagnetic brake is provided.
 2. Use a compression coupling for connection with the load.

10. Specifications

10-6 Protective functions

The following protective functions are built into the servo amplifier to protect the servo motor and servo amplifier. When a protective function is triggered, the transistor base current is switched off, and the drive coasts to a stop.

To reset the alarm, eliminate the cause, then either reset by closing the contact to terminals RES and SG, or switch off, then on the external control power.

| Alarm code | Protective function | Operation details |
|------------|--------------------------------|--|
| AL 10 | Undervoltage | If the power voltage drops below a certain level or if an instantaneous power failure occurs, this function will operate. This will also operate if the power is switched OFF and then ON before the display goes out. |
| AL 12 | Memory error 1 | This operates if a memory error is detected when the power is switched ON. |
| AL 15 | Memory error 2 | This operates if a memory error is detected during operation. |
| AL 16 | Polarity detection error | This operates if an error is found in the PLG servo motor polarity detection signal when the power is switched on. |
| AL 17 | Card error 3 | This operates if a card error is detected when the power is switched ON. |
| AL 30 | Over-regeneration | This operates if overheating of the regenerative brake option is detected due to frequent regeneration. |
| AL 31 | Overspeed | This operates if the servo motor speed exceeds allowable speed. |
| AL 32 | Overcurrent | This operates if an overcurrent is detected due to grounding or short-circuit problems. |
| AL 33 | Overvoltage | This operates if an excessive converter voltage is detected due to insufficient regeneration capacity. |
| AL 35 | Command frequency error | This operates if the command pulse frequency is too high. |
| AL 37 | Parameter setting error | This operates if a setting error is detected during parameter setting. |
| AL 45 | Fin overheating | This operates when the servo amplifier's cooling fin overheats. |
| AL 50 | Overload | This operates if an overload is detected in the servo motor or servo amplifier. |
| AL 52 | Excessive difference | This operates if the difference between the input pulse and feedback pulse is 65K pulses or more during position control mode operation. |
| AL 90 | Screen changed during servo ON | This displays if the diagnosis screen has been selected when the servo is ON, and erroneous operation is anticipated. This will appear when the SET key is pressed in the TEST 1, H3 screen with the servo ON. |
| AL CPU | CPU error | This operates if an error in the servo amplifier CPU is detected. |
| AL Co | Communication error | This operates when a communication error occurs between the cards in the servo amplifier. (Note) An alarm is not output, and the servo motor will operate correctly. |

REVISIONS

* The manual number is given on the bottom left of the back cover.

| Print Date | *Manual Number | Revision |
|------------|-----------------|---|
| Jun., 1992 | IB (NA) 67138-A | First edition Translated from IB67105-D |
| Jan., 1994 | IB (NA) 67138-B | <p>Partial Correction</p> <p>Section 1-4: Explanation of air purging added.</p> <p>Section 3-7 and 4-24: Detailed explanation of phase relationships of the pulse train output interface added.</p> <p>Section 4-5.2: Effective load ratio and relationship diagram in the table added.</p> <p>Section 4-5.5: Explanation of presence/absence of servo lock added for Pr. 7.</p> <p>Chapter 5: Expressions used for operating methods corrected.</p> <p>Section 6-9: Correction: data line filter changed from a model made by Mitsubishi Electric to one made by TDK.</p> <p>Section 7-1: Specification symbols added.</p> <p>Section 8-3: Tables for daily and periodic inspections added.</p> <p>Section 9-1: Figure for point of inflection added to torque characteristic graph.</p> <p>Section 9-8: Allowable speed and allowable moment of load inertia added to the specifications for the motor with reduction gear.</p> <p>Section 10-4: Incorrect servo motor external dimensions corrected.</p> <p>Section 10-6: List of makers from which peripheral devices were purchased added.</p> <p>Section 10-6.1: List of makers from which peripheral devices were purchased added.</p> <p>Revised to conform to IB-67105-D</p> |
| Dec., 1994 | IB (NA) 67138-C | <p>● CAUTION added.</p> <p>Servo amplifiers for HA-ME servo motors added. MR-J10MA, 20MA, 40MA, 100MA, 10MA1, 20MA1, 40MA1</p> <p>HA-ME servo motors added HA-ME053, 13, 23, 43, 73</p> <p>UL listed and CSA certified servo amplifiers added MR-J□-UL</p> <p>UL listed and CSA certified servo motors added HA-ME□-UL, HA-FE□-UL, HA-SE□-UL</p> <p>Section 1-3: UL listed and CSA certified models added.</p> <p>Section 2-1.4: Wiring the servo amplifier terminal block added.</p> <p>Chapter 5: Adjustments and Application Operations; chapter name and make-up changed.</p> <p>Section 5-1.1: Start-up adjustment sequence added.</p> <p>Section 5-1.4: Clever usage of the ultracompact HA-ME servo motor added.</p> <p>Section 6-1: Regenerative option models and definition added.</p> |

| Print Date | *Manual Number | Revision |
|------------|----------------|---|
| | | <p>Section 6-4.2: Connectors, cases and power supply connector made by Honda added.</p> <p>Section 6-4.5: MR-JMCBL□M option cables added</p> <p>Section 6-10: TNR-12G221K (Marcon Electronics) added as a surge absorber.</p> <p>Section 8-5: Checking the cause of a position offset added.</p> <p>Section 10-5: Outer demensions of UL listed and CSA certified servo motor added.</p> <p>In addition, corrections have been made to errors in writing.</p> <p>Revised to conform to IB-67105-E</p> |
| | | |