



General-Purpose AC Servo

MELSERVO

MODEL

Servo Motor



INSTRUCTION MANUAL

● Safety Instructions ●

(Always read these instructions before using the equipment.)





Do not attempt to install, operate, maintain or inspect the servo amplifier and servo motor until you have read through this Instruction Manual, MELSERVO Servo Amplifier Installation Guide/Instruction Manual and appended documents carefully and can use the equipment correctly. Do not use the servo amplifier and servo motor until you have a full knowledge of the equipment, safety information and instructions.

In this Instruction Manual, the safety instruction levels are classified into "WARNING" and "CAUTION".

 WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
 CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight injury to personnel or may cause physical damage.

Note that the CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety.


What must not be done and what must be done are indicated by the following diagrammatic symbols:

 : Indicates what must not be done. For example, "No Fire" is indicated by  .
 : Indicates what must be done. For example, grounding is indicated by  .

In this Instruction Manual, instructions at a lower level than the above, instructions for other functions, and so on are classified into "POINT".

After reading this installation guide, always keep it accessible to the operator.


1. To prevent electric shock, note the following:

 WARNING
<ul style="list-style-type: none">• Before wiring or inspection, switch power off and wait for more than 10 minutes. Then, confirm the voltage is safe with voltage tester. Otherwise, you may get an electric shock.• Connect the servo amplifier and servo motor to ground.• Any person who is involved in wiring and inspection should be fully competent to do the work.• Do not attempt to wire the servo amplifier and servo motor until they have been installed. Otherwise, you may get an electric shock.• Operate the switches with dry hand to prevent an electric shock.• The cables should not be damaged, stressed loaded, or pinched. Otherwise, you may get an electric shock.

2. To prevent fire, note the following:

 CAUTION
<ul style="list-style-type: none">• Do not install the servo motor on or near combustibles. Otherwise a fire may cause.

3. To prevent injury, note the follow

 CAUTION
<ul style="list-style-type: none">• Only the voltage specified in the Instruction Manual should be applied to each terminal, Otherwise, a burst, damage, etc. may occur.• Connect the terminals correctly to prevent a burst, damage, etc.• Ensure that polarity (+, -) is correct. Otherwise, a burst, damage, etc. may occur.• During power-on or for some time after power-off, do not touch or close a parts (cable etc.) to the servo motor, etc. Their temperatures may be high and you may get burnt or a parts may damaged.

4. Additional instructions

The following instructions should also be fully noted. Incorrect handling may cause a fault, injury, electric shock, etc.

(1) Transportation and installation

⚠ CAUTION

- Transport the products correctly according to their weights.
- Use the eye-bolt of the servo motor to only transport the servo motor and do not use it to transport in the condition to have installed a servo motor on the machine.
- Stacking in excess of the specified number of products is not allowed.
- Do not carry the motor by the cables, shaft or encoder.
- Install the servo amplifier in a load-bearing place in accordance with the Instruction Manual.
- Do not climb or stand on servo equipment. Do not put heavy objects on equipment.
- The servo motor must be installed in the specified direction.
- Do not install or operate the servo motor which has been damaged or has any parts missing.
- Do not block the intake/exhaust port of the servo motor which has a cooling fan.
- Provide adequate protection to prevent screws and other conductive matter, oil and other combustible matter from entering the servo motor.
- Do not drop or strike servo motor. Isolate from all impact loads.
- Use the servo motor under the following environmental conditions:

Environment		Conditions			
Ambient temperature	Operation	[°C]	0 to +40 (non-freezing)		
		[°F]	32 to 104 (non-freezing)		
	Storage	[°C]	-15 to 70 (non-freezing)		
		[°F]	5 to 158 (non-freezing)		
Ambient humidity	Operation	80%RH or less (non-condensing)			
	Storage	90%RH or less (non-condensing)			
Ambience		Indoors (no direct sunlight) Free from corrosive gas, flammable gas, oil mist, dust and dirt			
Altitude		Max. 1000m (3280 ft) above sea level			
(Note) Vibration	[m/s ²]	HC-KFS series H-MFS series	HC-UFS13 to 73	X,Y:49	
		HC-SFS81 HC-SFS52 to 152 HC-SFS53 to 153	HC-RFS series HC-UFS72 • 152	X,Y:24.5	
		HC-SFS121 • 201 HC-SFS202 • 352 HC-SFS203 • 353	HC-UFS202 to 502	X:24.5 Y:49	
		HC-SFS301 HC-SFS502 • 702		X:24.5 Y:29.4	
		HC-AQ series HC-KF series HC-MF series	HA-FF series HC-UF13 to 73	X,Y:19.6	
		HC-SF81 HC-SF52 to 152 HC-SF53 to 153	HC-RF series HC-UF72 • 152 HC-LFS52 to 152	X:9.8 Y:24.5	
		HC-SF121 • 201 HC-SF202 • 352 HC-SF203 • 353	HC-UF202 to 502 HC-LFS202 • 302	X:19.6 Y:49	
		HA-LFS502 • 702 HA-LFS601 to 12K1 HA-LFS701M to 15K1M HA-LH11K2 to 22K2	HA-LH11K2 to 22K2 HC-SF301 HC-SF502 • 702	X:11.7 Y:29.4	
		HA-LFS15K1 to 37K1 HA-LFS22K1M to 37K1M HA-LFS30K2 • 37K2	HA-LF series	X,Y:9.8	
		[ft/s ²]	HC-KFS series HC-MFS series	HC-UFS13 to 73	X,Y:161
			HC-SFS81 HC-SFS52 to 152 HC-SFS53 to 153	HC-RFS series HC-UFS72 • 152	X,Y:80
			HC-SFS121 • 201 HC-SFS202 • 352 HC-SFS203 • 353	HC-UFS202 to 502	X:80 Y:161

CAUTION

Environment		Conditions	
(Note) Vibration	[ft/s ²]	HC-SFS301 HC-SFS502 · 702	X:80 Y:96
		HC-AQ series HC-KF series HC-MF series	HA-FF series HC-UF13 to 73 X,Y:64
		HC-SF81 HC-SF52 to 152 HC-SF53 to 153	HC-RF series HC-UFS72 - 152 HC-LFS52 to 152 X:32 Y:80
		HC-SF121 · 201 HC-SF202 · 352 HC-SF203 · 353	HC-UF202 to 502 HC-LFS202 - 302 X:64 Y:161
		HA-LFS502 · 702 HA-LFS601 to 12K1 HA-LFS701M to 15K1M HA-LH11K2 to 22K2	HA-LH11K2 to 22K2 HC-SF301 HC-SF502 · 702 X:38.4 Y:96.5
		HA-LFS15K1 to 37K1 HA-LFS22K1M to 37K1M HA-LFS30K2 · 37K2	HA-LF series X,Y:32

Note: Except the servo motor with reduction gear.

- Securely attach the servo motor to the machine. If attach insecurely, the servo motor may come off during operation.
- The servo motor with reduction gear must be installed in the specified direction to prevent oil leakage.
- For safety of personnel, always cover rotating and moving parts.
- Never hit the servo motor or shaft, especially when coupling the servo motor to the machine. The encoder may become faulty.
- Do not subject the servo motor shaft to more than the permissible load. Otherwise, the shaft may break.
- When the equipment has been stored for an extended period of time, consult Mitsubishi.

(2) Wiring

CAUTION

- Wire the equipment correctly and securely. Otherwise, the servo motor may misoperate.
- Do not install a power capacitor, surge absorber or radio noise filter (FR-BIF option) between the servo motor and servo amplifier.
- Connect the output terminals (U, V, W) correctly. Otherwise, the servo motor will operate improperly.
- Do not connect AC power directly to the servo motor. Otherwise, a fault may occur.

(3) Test run adjustment

CAUTION

- Before operation, check the parameter settings. Improper settings may cause some machines to perform unexpected operation.
- The parameter settings must not be changed excessively. Operation will be instable.

(4) Usage

⚠ CAUTION

- Provide an external emergency stop circuit to ensure that operation can be stopped and power switched off immediately.
- Any person who is involved in disassembly and repair should be fully competent to do the work.
- Do not modify the equipment.
- Use the servo amplifier with the specified servo motor.
- The electromagnetic brake on the servo motor is designed to hold the motor shaft and should not be used for ordinary braking.
- For such reasons as service life and mechanical structure (e.g. where a ballscrew and the servo motor are coupled via a timing belt), the electromagnetic brake may not hold the motor shaft. To ensure safety, install a stopper on the machine side.

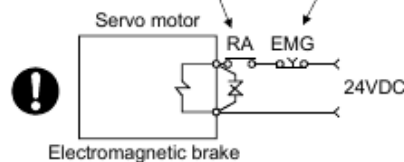
(5) Corrective actions

⚠ CAUTION

- When it is assumed that a hazardous condition may take place at the occur due to a power failure or a product fault, use a servo motor with electromagnetic brake or an external brake mechanism for the purpose of prevention.
- Configure the electromagnetic brake circuit so that it is activated not only by the servo amplifier signals but also by an external emergency (forced) stop signal.

Contacts must be open when servo-on signal is off, when an alarm (trouble) is present and when an electromagnetic brake signal.

Circuit must be opened during emergency (force) stop.



- When any alarm has occurred, eliminate its cause, ensure safety, and deactivate the alarm before restarting operation.
- When power is restored after an instantaneous power failure, keep away from the machine because the machine may be restarted suddenly (design the machine so that it is secured against hazard if restarted).

● About processing of waste ●

When you discard servo amplifier, a battery (primary battery), and other option articles, please follow the law of each country (area).

⚠ FOR MAXIMUM SAFETY

- This product is not designed or manufactured to be used in equipment or systems in situations that can affect or endanger human life.
- When considering this product for operation in special applications such as machinery or systems used in passenger transportation, medical, aerospace, atomic power, electric power, or submarine repeating applications, please contact your nearest Mitsubishi sales representative.
- Although this product was manufactured under conditions of strict quality control, you are strongly advised to install safety devices to forestall serious accidents when it is used in facilities where a breakdown in the product is likely to cause a serious accident.

COMPLIANCE WITH EC DIRECTIVES

1. WHAT ARE EC DIRECTIVES?

The EC Directives were issued to standardize the regulations of the EU countries and ensure smooth distribution of safety-guaranteed products. In the EU countries, the Machinery Directive (effective in January, 1995), EMC Directive (effective in January, 1996) and Low Voltage Directive (effective in January, 1997) of the EC Directives require that products to be sold should meet their fundamental safety requirements and carry the CE marks (CE marking). CE marking applies to machines and equipment into which servo amplifiers have been installed.

The servo amplifiers do not function independently but are designed for use with machines and equipment.

Therefore, the CE marking does not apply to the servo amplifiers but applies to the machines and equipment into which the servo amplifiers are installed.

This servo amplifier conforms to the standards related to the Low Voltage Directive to facilitate CE marking on machines and equipment into which the servo amplifiers will be installed. To ensure ease of compliance with the EMC Directive, Mitsubishi Electric prepared the "EMC INSTALLATION GUIDELINES" (IB(NA)67310) which provides servo amplifier installation, control box making and other procedures. Please contact your sales representative.

2. PRECAUTIONS FOR COMPLIANCE

Use the servo motor compatible with the EN Standard.

Unless otherwise specified, the handling, performance, specifications and others of the EN Standard-compatible models are the same as those of the standard models.

To comply with the EN Standard, also observe the following items strictly.

(1) Wiring

- (a) Use a fixed terminal block to connect the power supply lead of the servo motor to the servo amplifier. Do not connect cables directly.



Terminal block



- (b) Use the servo motor side power connector which complies with the EN Standard. The EN Standard-compliant power connector sets are available from us as options.

Power Connector Set Model	Servo Motor Model
MR-PWCF	HC-FF□C(B)-UE
MR-PWCNS1	HC-SF81(B) HC-SF52(B) to 152(B) HC-SF53(B) to 153(B) HC-RF103(B) to 203(B) HC-UF72(B) · 152(B) HC-SFS81(B) HC-SFS52(B) to 152(B) HC-SFS53(B) to 153(B) HC-RFS103(B) to 203(B) HC-UFS72(B) · 152(B) HC-LFS52(B) to 152(B)
MR-PWCNS2	HC-SF121(B) to 301(B) HC-SF202(B) to 502(B) HC-SF203(B) · 353(B) HC-RF353(B) · 503(B) HC-UF202(B) to 502(B) HC-SFS121(B) to 301(B) HC-SFS202(B) to 502(B) HC-SFS203(B) · 353(B) HC-RFS353(B) · 503(B) HC-UFS202(B) to 502(B) HA-LFS502 HC-LFS202(B) · 302(B)
MR-PWCNS3	HC-SFS702(B) · HC-SF702(B) HA-LFS702

(2) Installation

The flange of the machine mounted with the HC-MF (HC-MF-UE)/HC-KF (HC-KF-UE)/HC-AQ/HC-MFS/HC-KFS must be connected to the earth.

CONFORMANCE WITH UL/C-UL STANDARD

Use the UL/C-UL Standard-compliant model of servo motor.

Unless otherwise specified, the handling, performance, specifications, etc. of the UL/C-UL Standard-compliant models are the same as those of the standard models.

Strictly observe the following items to conform to the UL/C-UL Standard.

The flange sizes in this table assume that the flanges are made of aluminum.

The rated torque of the servo motor indicates the continuous permissible torque value that can be generated when it is mounted on the flange specified in the following table and used in the environment of 40°C ambient temperature.

Flange Size [mm]	Servo Motor								
	HC-KF(-UE) HC-KFS	HC-MF(-UE) HC-MFS	HA-FF□C -UE	HC-SF HC-SFS	HC-RF HC-RFS	HC-UF HC-UFS	HA-LF HA-LFS	HC-LFS	HC-AQ
150 × 150 × 3									0135 to 0335
150 × 150 × 6	053 · 13	053 · 13	053 · 13			13			
250 × 250 × 6	23	23	23 · 33			23			
250 × 250 × 12	43	43	43 · 63	81 52 to 152 53 to 153	103 to 203	43		52 to 152	
300 × 300 × 12	(Note)73	73				73			
300 × 300 × 20				121 · 201 202 · 352 203 · 353				202 · 302	
550 × 550 × 30					353 · 503	72 · 152			
650 × 650 × 35				301 502 · 702		202 to 502	601 to 12K 1 701M to 15K 1M 502 to 22K 2		
950 × 950 × 35							15K 1 to 37K 1 22K 1M to 37K 1M 30K 2 · 37K 2		

Note: 73 is not available for the HC-KF(-UE) series.

