MITSUBISHI ELECTRIC

Changes for the Better

MR-E Super

EZ Motion E series

S U P E R

User-friendly servo with easy operation

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001(standards for quality assurance managememt systems)

Empowering Industries

SSCNET SERVO SYSTEM CONTROLLER NETWORK

MELSOFT

ISO 14001 JACO EC97J1113 UKAS ENVIRONMENTAL MANAGEMENT 051

ISO 9001 BUREAU VERITAS Certification UKAS QUALITY MANAGEMENT 008

Reducing workload with high performance and *Enhancing the system cost*

1. High Performance

- High-accuracy positioning
  (Resolution per servo motor: 131072)
- High responsiveness
- Vibration can be suppressed by the adaptive vibration suppression control function.
- Optimum tuning is possible with a personal computer and optional setup software (MR Configurator).
- 2 types of interface:
  - · Pulse train interface for position control and internal speed control (MR-E-A-QW003)
  - · Analog input interface for speed control and torque control (MR-E-AG-QW003)

2. Easy To Use

- Connectors have been adapted for the servo amplifier terminal block, thereby reducing the time required for wiring.
- Connectors are located on the front of the servo amplifier, thereby connecting the cables easily.
- Gain settings can be performed easily by real-time auto-tuning function.

easy operation

performance

EZ Motion E series

S U P E R

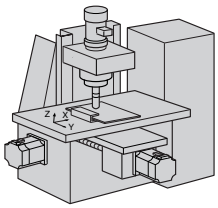
3. Global Standard Products

- Compatible with global standards.
- MR-E Super conforms to EN, UL and cUL standards.

TÜV Rheinland

Extensive Applications

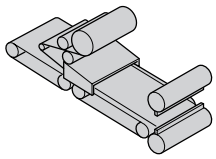
Processing machines or machine tools



- Grinding machines
- Transfer machines
- Loaders/unloaders
- Wood working machines
- Dedicated machines

Various positioning can be completed easily with pulse trains.

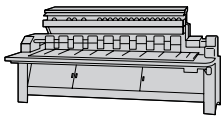
Food processing machines, packing machines or feeders



- Pillow packing machines
- Filling machines
- Label printing, label attaching machines
- Bag manufacturing machines
- Press feeders
- Roll feeders

The IP65 rated motor can be used safely for food processing applications.

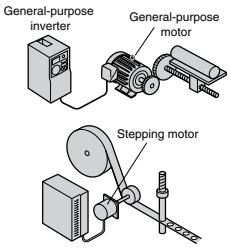
Textile machines



- Weaving machines
- Embroidery machines
- Knitting machines
- Winding machines
- Stranding machines
- Paper manufacturing machines

High-speed and high-accuracy applications are possible, enabling easy replacement with conventional devices.

Enhancing machine performance



- Replacement of inverters, stepping motors or DC servos
- Replacement from clutch, mechanical structure systems or hydraulic/air cylinders

By using the servo as an alternative to legacy products, higher quality can be achieved.

Servo Motor Series

Motor series		Rated speed (maximum speed) (r/min)	Rated output (kW)	With electro-magnetic brake (B)	Global standards		Protection level	Feature	Application examples
					EN	UL cUL			
Small capacity series	●HF-KEW1-S100 	3000 (4500)	4 types 0.1, 0.2, 0.4, 0.75	✓	✓	✓	IP55 **Excluding the shaft-through portion** and connector	Stable control from low to high speeds allows compliance with a variety of applications.	● Belt drive ● Robots ● Mounters ● Sewing machines ● X-Y tables ● Food processing machines
Medium capacity series	●HF-SEJW1-S100 	2000 (3000)	4 types 0.5, 1.0, 1.5, 2.0	✓	✓	✓	IP65 Excluding the shaft-through portion		● Material handling systems ● Robots ● X-Y tables

Model Configurations

■For servo amplifier

MR-E- 10 A -QW003

MR-E Super

A : Pulse train interface
AG : Analog input interface

List of compatible motors

Symbol	HF-KE□(B)W1-S100	HF-SE□(B)JW1-S100
10	13	—
20	23	—
40	43	—
70	73	52
100	—	102
200	—	152, 202

● **Conforms to following standards: EN, UL and cUL**

■For servo motor

HF-KE 1 3 B □ □ W1-S100

Symbol	Motor series
HF-KE	Low inertia, small capacity
HF-SE	Medium inertia, medium capacity

Symbol	Rated output (kW)
1 to 7	0.1 to 0.75
10 to 20	1.0 to 2.0

Symbol	Rated speed (r/min)
2	2000 (Note 1)
3	3000 (Note 2)

Notes: 1. 2000r/min is only for the HF-SE□JW1-S100.
2. 3000r/min is only for the HF-KE□W1-S100.

Symbol	Electromagnetic brake
None	None
B	Installed

Note: Refer to "Electromagnetic brake specifications" in this catalog for the compatible models and detailed specifications.

Symbol	Oil seal
None	None (Note 1)
J	Installed (Note 2)

Notes: 1. For HF-KE□W1-S100, the servo motor with an oil seal is not available.
2. An oil seal is attached for HF-SE□JW1-S100 as a standard.

Encoder resolution: 131,072p/rev

MR-E Super

Symbol	Shaft end
None	Standard (Straight shaft)
K	Key way or with key (Note 1)
D	D-cut (Note 1)

Notes: 1. Refer to "Special shaft end specifications" in this catalog for the compatible models and detailed specifications.

● **Conforms to following standards: EN, UL and cUL**

Motor Specifications and Characteristics

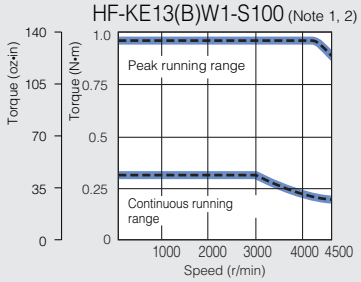
HF-KE□(B)W1-S100 servo motor specifications

Servo motor series			HF-KE□(B)W1-S100 (Low inertia, small capacity)			
Servo motor model			HF-KE13(B)W1-S100	HF-KE23(B)W1-S100	HF-KE43(B)W1-S100	HF-KE73(B)W1-S100
Servo amplifier model			MR-E-10A/AG-QW003	MR-E-20A/AG-QW003	MR-E-40A/AG-QW003	MR-E-70A/AG-QW003
Servo motor	Power facility capacity (Note 1) (kVA)		0.3	0.5	0.9	1.3
	Continuous running duty	Rated output (W)	100	200	400	750
		Rated torque (N·m [oz·in])	0.32 (45.3)	0.64 (90.6)	1.3 (184)	2.4 (340)
	Maximum torque (N·m [oz·in])		0.95 (135)	1.9 (269)	3.8 (538)	7.2 (1020)
	Rated speed (r/min)		3000			
	Maximum speed (r/min)		4500			
	Permissible instantaneous speed (r/min)		5175			
	Power rate at continuous rated torque (kW/s)		11.5	16.9	38.6	39.9
	Rated current (A)		0.8	1.4	2.7	5.2
	Maximum current (A)		2.4	4.2	8.1	15.6
	Regenerative braking frequency (times/min) (Note 2, 3)	With no options	(Note 4)	(Note 4)	249	140
		MR-RB032 (30W)	(Note 4)	(Note 4)	747	210
		MR-RB12 (100W)	—	(Note 4)	2490	700
		MR-RB32 (300W)	—	—	—	2100
	Moment of inertia J (×10^{-4}kg·m^2) [J (oz·in^2)]	Standard	0.088 (0.481)	0.24 (1.31)	0.42 (2.30)	1.43 (7.82)
		With electromagnetic brake	0.090 (0.492)	0.31 (1.69)	0.50 (2.73)	1.63 (8.91)
	Recommended load/motor inertia moment ratio		Maximum of 15 times the servo motor's inertia moment (Note 5)			
	Speed/position detector		Incremental encoder (resolution per servo motor rotation: 131072 p/rev)			
	Attachments		—			
	Structure		Totally enclosed non ventilated (protection level: IP55) (Note 6)			
	Environment	Ambient temperature	0 to 40°C (32 to 104°F) (non freezing), storage: –15 to 70°C (5 to 158°F) (non freezing)			
		Ambient humidity	80% RH maximum (non condensing), storage: 90% RH maximum (non condensing)			
		Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
		Elevation/vibration (Note 7)	1000m or less above sea level; X: 49m/s^2 Y: 49m/s^2			
	Mass (kg [lb])	Standard	0.56 (1.3)	0.94 (2.1)	1.5 (3.3)	2.9 (6.4)
		With electromagnetic brake	0.86 (1.9)	1.6 (3.6)	2.1 (4.7)	3.9 (8.6)

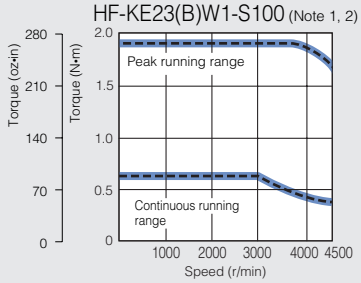
Notes:1. The power facility capacity varies depending on the power supply's impedance.
2. The regenerative braking frequency shows the permissible frequency when the motor, without a load and the optional regeneration unit, decelerates from the rated speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m=the load inertia moment/the motor inertia moment. When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (operating speed/rated speed). If the operating speed changes frequently or when the regeneration is constant (as with vertical feeds), find the regenerative heating value (W) in operation. Provisions must be made to keep this heating value below the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Refer to the section "Options ● Optional regeneration unit" in this catalog for details on the tolerable regenerative power (W).
3. The regenerative braking frequency of the 600W or smaller servo amplifier may fluctuate due to the affect of the power voltage since the energy charged by the electrolytic capacitor in the servo amplifier is large.
4. There are no limits on regeneration frequency as long as the effective torque is within the rated torque range. However, the load/motor of inertia moment ratio must be 15 times or less.
5. Contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table.
6. The shaft-through portion and connector for cable terminal are excluded.
7. The vibration direction is shown in the right-side diagram. The numeric value indicates the maximum value of the component (commonly the bracket in the opposite direction of the motor shaft). Fretting of the bearing occurs easily when the motor stops, so maintain vibration to approximately one-half of the allowable value.

HF-KE□(B)W1-S100 servo motor torque characteristics

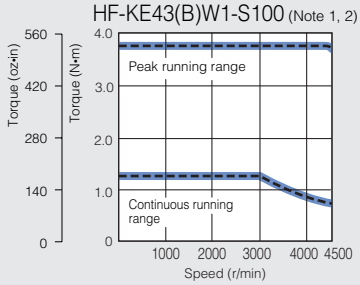
HF-KE13(B)W1-S100 (Note 1, 2)



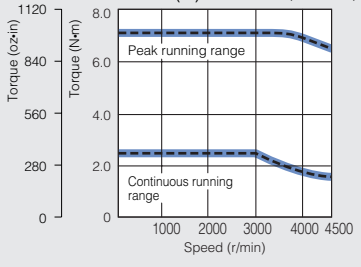
HF-KE23(B)W1-S100 (Note 1, 2)



HF-KE43(B)W1-S100 (Note 1, 2)



HF-KE73(B)W1-S100 (Note 1, 2)



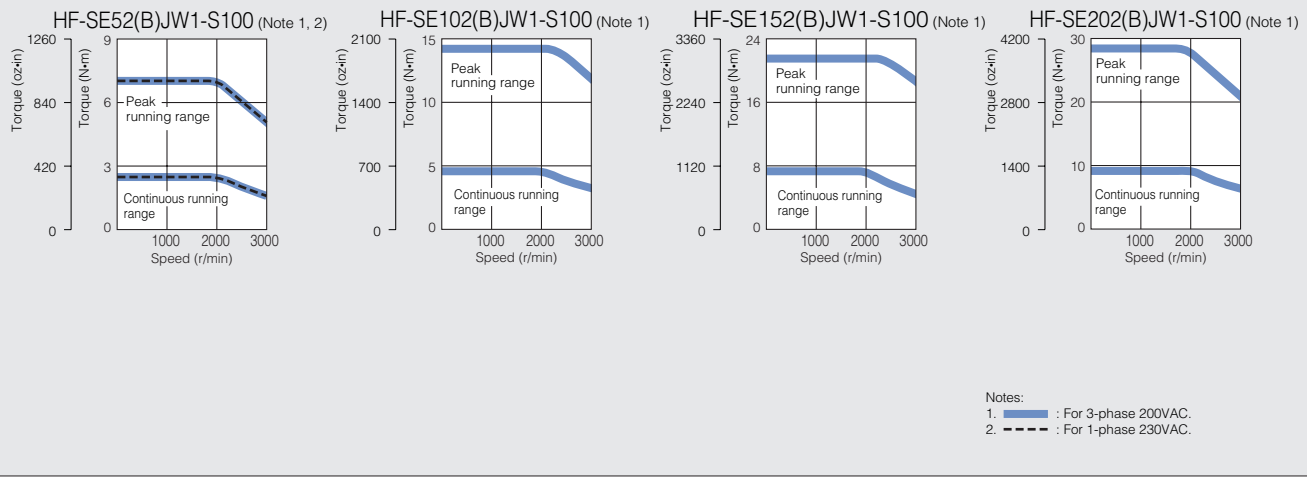
Notes:
1. ▬▬ : For 3-phase 200VAC.
2. - - - - : For 1-phase 230VAC.

HF-SE□(B)JW1-S100 servo motor specifications

Servo motor series			HF-SE□(B)JW1-S100 (Medium inertia, medium capacity)			
Servo motor model			HF-SE52(B)JW1-S100	HF-SE102(B)JW1-S100	HF-SE152(B)JW1-S100	HF-SE202(B)JW1-S100
Servo amplifier model			MR-E-70A/AG-QW003	MR-E-100A/AG-QW003	MR-E-200A/AG-QW003	
Servo motor	Power facility capacity (Note 1) (kVA)		1.0	1.7	2.5	3.5
	Continuous running duty	Rated output (kW)	0.5	1.0	1.5	2.0
		Rated torque (N·m [oz·in])	2.39 (338)	4.77 (675)	7.16 (1010)	9.55 (1350)
	Maximum torque (N·m [oz·in])		7.16 (1010)	14.3 (2020)	21.5 (3040)	28.6 (4050)
	Rated speed (r/min)		2000			
	Maximum speed (r/min)		3000			
	Permissible instantaneous speed (r/min)		3450			
	Power rate at continuous rated torque (kW/s)		9.34	19.2	28.8	23.8
	Rated current (A)		2.9	5.3	8.0	10
	Maximum current (A)		8.7	15.9	24	30
	Regenerative braking frequency (times/min) (Note 2, 3)	With no options	120	62	152	71
		MR-RB032 (30W)	180	93	—	—
		MR-RB12 (100W)	600	310	—	—
		MR-RB30 (300W)	—	—	456	213
		MR-RB32 (300W)	1800	930	—	—
		MR-RB50 (500W)	—	—	760	355
	Moment of inertia J ($\times 10^{-4}$kg·m^2) [J (oz·in^2)]	Standard	6.1 (33.4)	11.9 (65.1)	17.8 (97.3)	38.3 (209)
		With electromagnetic brake	8.3 (45.4)	14.0 (76.5)	20.0 (109)	47.9 (262)
	Recommended load/motor inertia moment ratio		Maximum of 15 times the servo motor's inertia moment (Note 4)			
	Speed/position detector		Incremental encoder (resolution per servo motor: 131072 p/rev)			
	Attachments		Oil seal			
	Structure		Totally enclosed non ventilated (protection level: IP65) (Note 5)			
	Environment	Ambient temperature	0 to 40°C (32 to 104°F) (non freezing), storage: –15 to 70°C (5 to 158°F) (non freezing)			
		Ambient humidity	80% RH maximum (non condensing), storage: 90% RH maximum (non condensing)			
		Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
		Elevation	1000m or less above sea level			
		Vibration (Note 6)	X : 24.5m/s^2 Y : 24.5m/s^2			X : 24.5m/s^2 Y : 49m/s^2
	Mass (kg [lb])	Standard	4.8 (11)	6.5 (15)	8.3 (19)	12 (27)
		With electromagnetic brake	6.7 (15)	8.5 (19)	11 (25)	18 (40)

Notes: 1. The power facility capacity varies depending on the power supply's impedance.
2. The regenerative braking frequency shows the permissible frequency when the motor, without a load and the optional regeneration unit, decelerates from the rated speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m=the load inertia moment/the motor inertia moment. When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (operating speed/rated speed). If the operating speed changes frequently or when the regeneration is constant (as with vertical feeds), find the regenerative heating value (W) in operation. Provisions must be made to keep this heating value below the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Refer to the section "Options ● Optional regeneration unit" in this catalog for details on the tolerable regenerative power (W).
3. The regenerative braking frequency of the 600W or smaller servo amplifier may fluctuate due to the affect of the power voltage since the energy charged by the electrolytic capacitor in the servo amplifier is large.
4. Contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table.
5. The shaft-through portion is excluded.
6. The vibration direction is shown in the right-side diagram. The numeric value indicates the maximum value of the component (commonly the bracket in the opposite direction of the motor shaft). Fretting of the bearing occurs easily when the motor stops, so maintain vibration to approximately one-half of the allowable value.

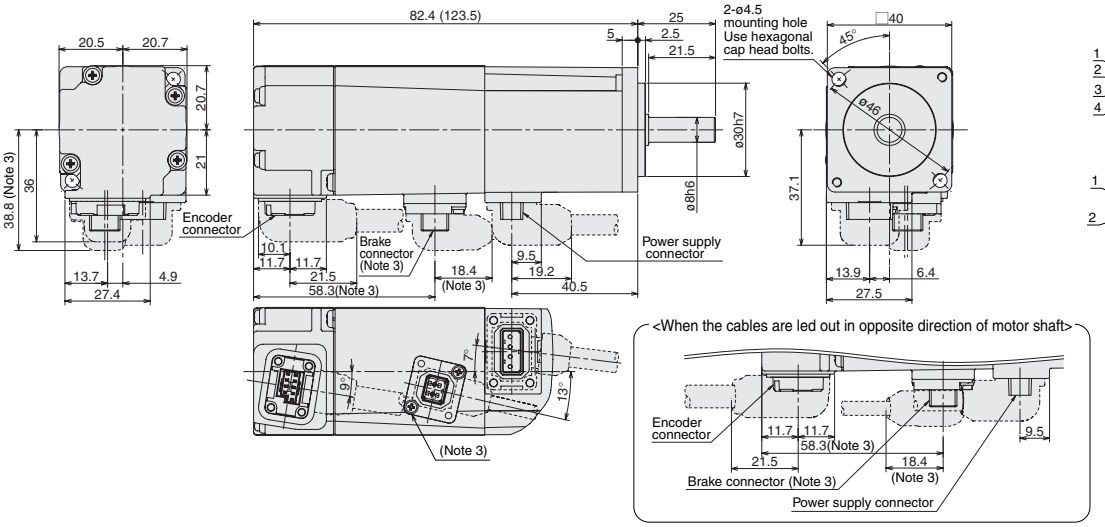
HF-SE□(B)JW1-S100 servo motor torque characteristics



Motor Dimensions

●HF-KE13(B)W1-S100

(Unit: mm)



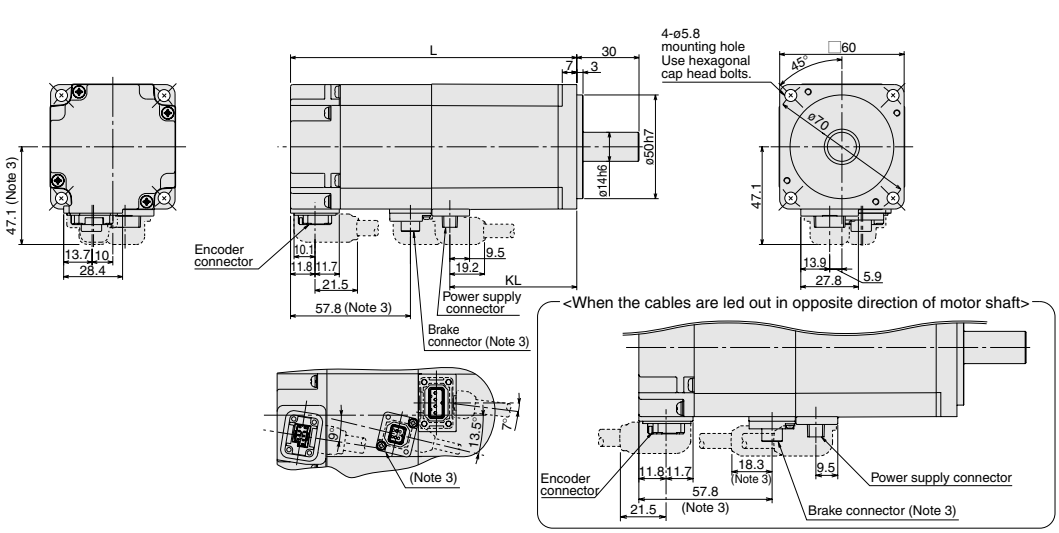
Power supply connector pin assignment

Pin No.	Signal name
1	Earth
2	U
3	V
4	W

Brake connector pin assignment (Note 3)

Pin No.	Signal name
1	B1
2	B2

●HF-KE23(B)W1-S100, HF-KE43(B)W1-S100



Power supply connector pin assignment

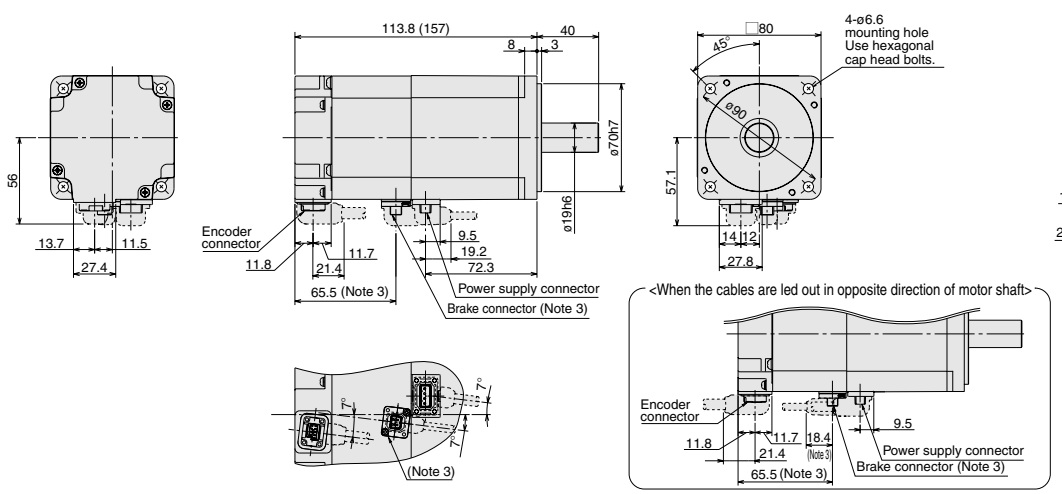
Pin No.	Signal name
1	Earth
2	U
3	V
4	W

Brake connector pin assignment (Note 3)

Pin No.	Signal name
1	B1
2	B2

Model	Variable dimensions	
	L	KL
HF-KE23(B)W1-S100	76.6 (116.1)	39.3
HF-KE43(B)W1-S100	98.5 (138)	61.2

●HF-KE73(B)W1-S100



Power supply connector pin assignment

Pin No.	Signal name
1	Earth
2	U
3	V
4	W

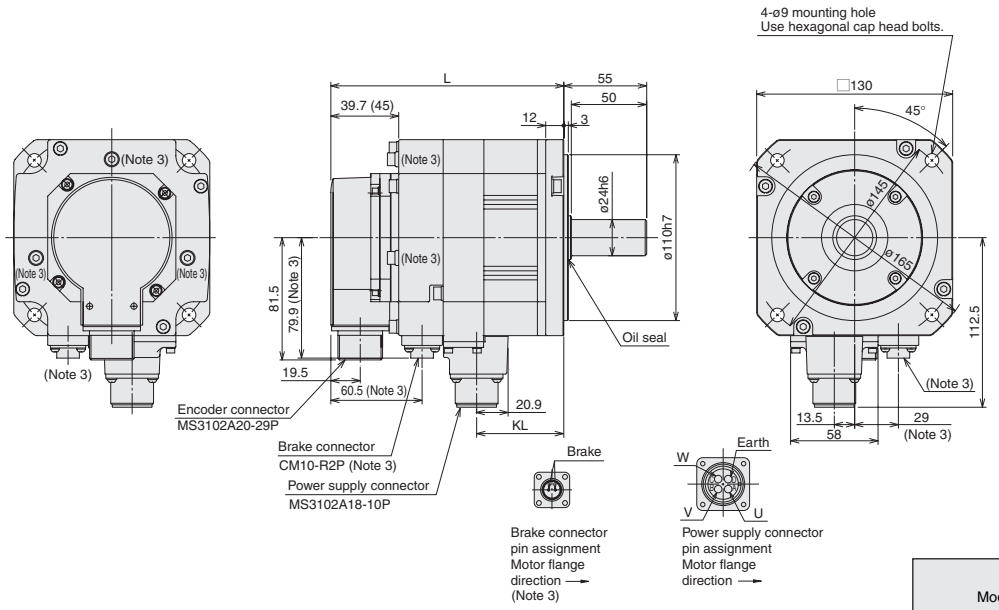
Brake connector pin assignment (Note 3)

Pin No.	Signal name
1	B1
2	B2

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

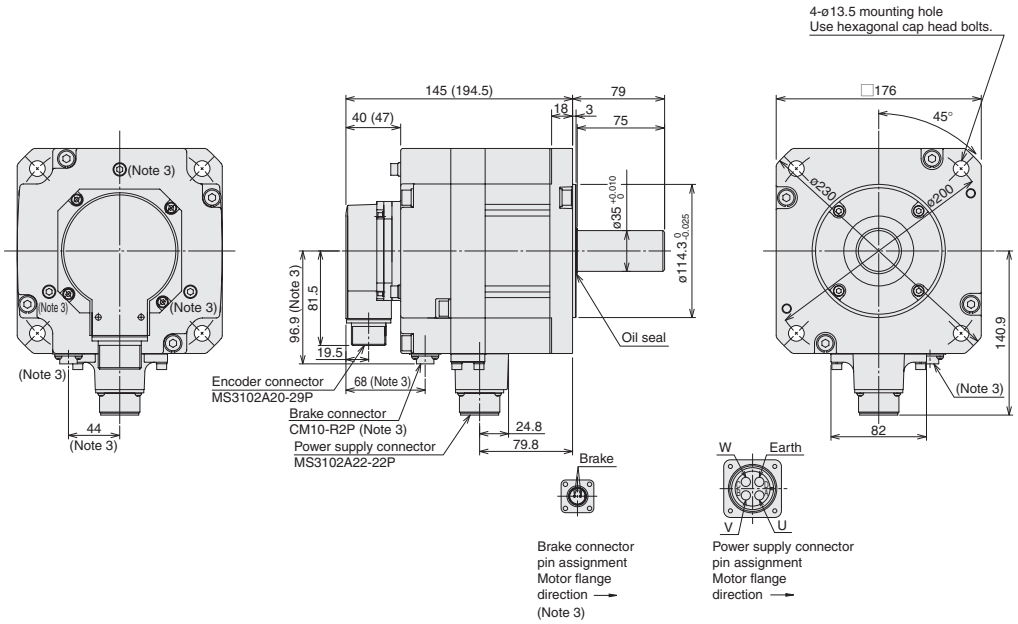
●HF-SE52(B)JW1-S100, HF-SE102(B)JW1-S100, HF-SE152(B)JW1-S100

(Unit: mm)



Model	Variable dimensions	
	L	KL
HF-SE52(B)JW1-S100	120 (154.5)	57.8
HF-SE102(B)JW1-S100	142 (176.5)	79.8
HF-SE152(B)JW1-S100	164 (198.5)	101.8

●HF-SE202(B)JW1-S100



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

Motor Special Specifications

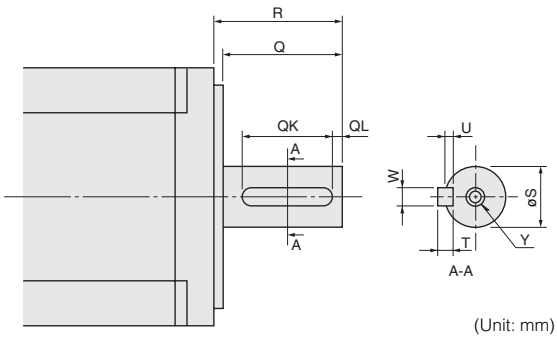
Special shaft end specifications

Motors with the following specifications are available.

HF-KE□(B)W1-S100

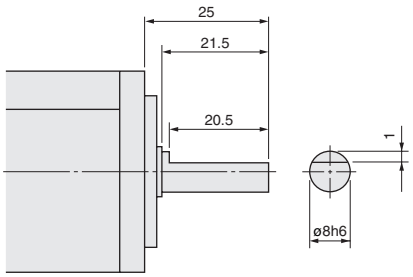
● With key (200, 400, 750W) (Note 1)

Motor model	Variable dimensions								
	T	S	R	Q	W	QK	QL	U	Y
HF-KE23(B)KW1-S100 HF-KE43(B)KW1-S100	5	14h6	30	27	5	20	3	3	M4 screw Depth: 15mm
HF-KE73(B)KW1-S100	6	19h6	40	37	6	25	5	3.5	M5 screw Depth: 20mm



(Unit: mm)

● D-cut (100W) (Note 1)
HF-KE13(B)DW1-S100

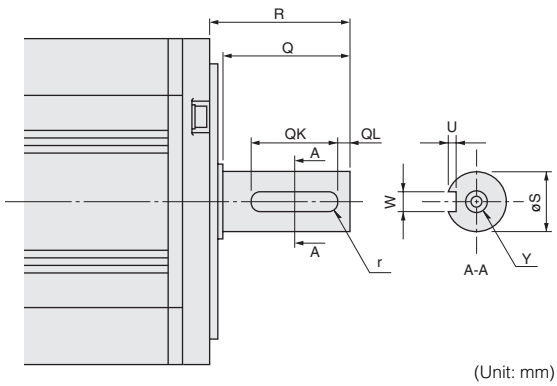


(Unit: mm)

HF-SE□(B)JW1-S100

● Key way (Note 1, 2)

Motor model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HF-SE52(B)JKW1-S100 HF-SE102(B)JKW1-S100 HF-SE152(B)JKW1-S100	24h6	55	50	$8^{0}_{-0.036}$	36	5	$4^{+0.2}_{0}$	4	M8 screw Depth: 20mm
HF-SE202(B)JKW1-S100	$35^{+0.01}_{0}$	79	75	$10^{0}_{-0.036}$	55	5	$5^{+0.2}_{0}$	5	M8 screw Depth: 20mm



(Unit: mm)

Notes: 1. The motors with the keyway shaft (with/without key) and the D-cut shaft cannot be used in frequent start/stop applications. Loose keys may damage the motor shaft.
2. A key is not supplied with the motor. The key shall be installed by the user.

Electromagnetic brake specifications (Note 1)

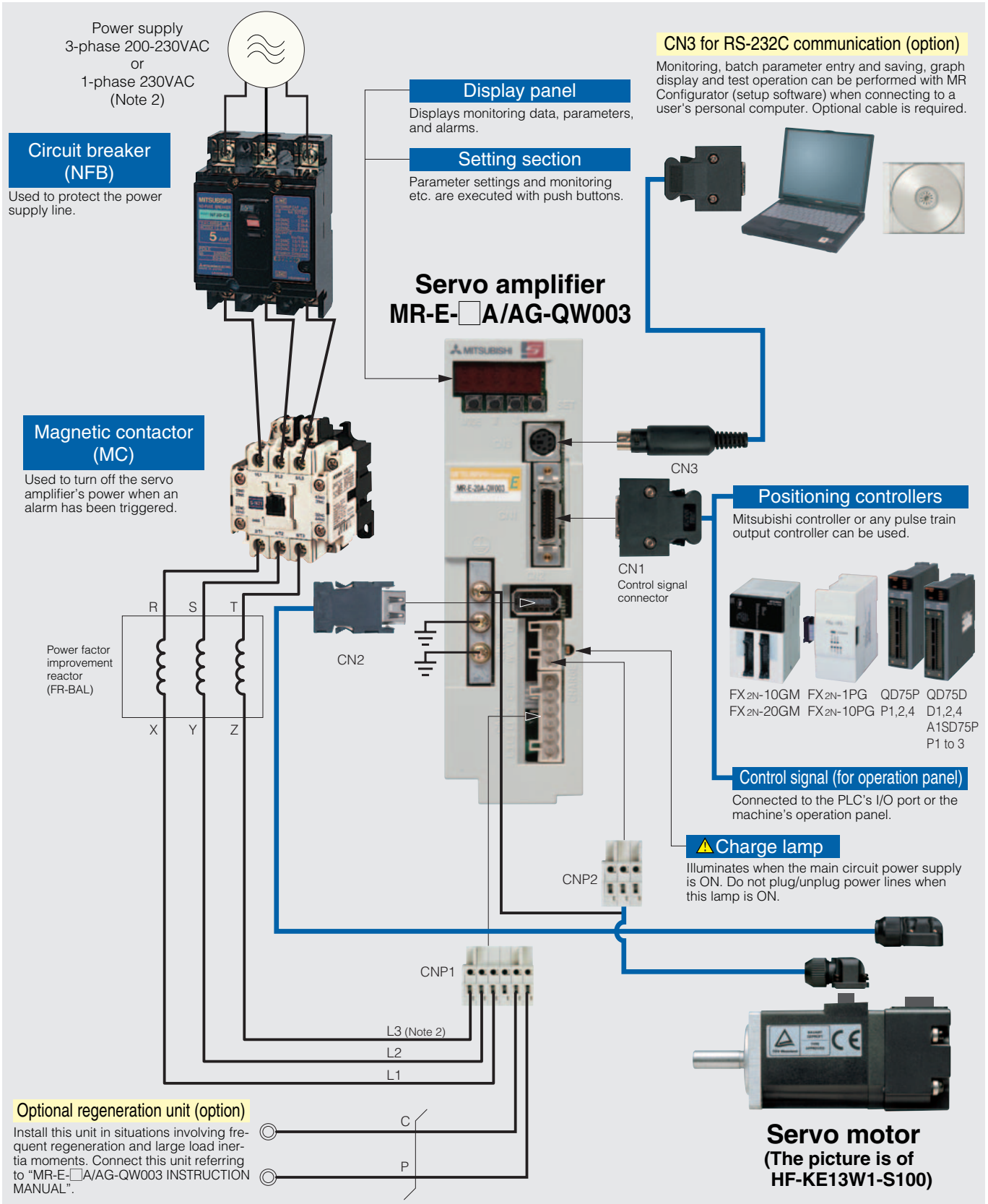
Motor model		HF-KE□W1-S100				HF-SE□JW1-S100			
		13B	23B	43B	73B	52B	102B	152B	202B
Type		Spring-action safety brake				Spring-action safety brake			
Rated voltage		24VDC$^{0}_{-10}$%				24VDC$^{0}_{-10}$%			
Brake static friction torque	(N·m)	0.32	1.3	1.3	2.4	8.5	8.5	8.5	44
	(oz.in)	45.3	184	184	340	1200	1200	1200	6230
Power consumption (W) at 20°C (68°F)		6.3	7.9	7.9	10	20	20	20	34
Permissible braking work	(J)/time	5.6	22	22	64	400	400	400	4500
	(J)/hour	56	220	220	640	4000	4000	4000	45000
Brake life (Note 2) (Braking work per braking action)	Times	20000 (5.6J)	20000 (22J)	20000 (22J)	20000 (64J)	20000 (200J)	20000 (200J)	20000 (200J)	20000 (1000J)

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

Peripheral Equipment (standard interface)

Connections with peripheral equipment (Note 1)

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



Notes: 1. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for the actual connections.
2. When using a power supply, 1-phase 230VAC, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3.

Amplifier Specifications

MR-E-A-QW003

Servo amplifier model MR-E-□-QW003		10A	20A	40A	70A	100A	200A
Power supply	Voltage/frequency (Note 1)	3-phase 200 to 230VAC 50/60Hz or 1-phase 230VAC 50/60Hz				3-phase 200 to 230VAC 50/60Hz	
	Permissible voltage fluctuation	For 3-phase 200 to 230VAC: 3-phase170 to 253VAC For 1-phase 230VAC: 1-phase 207 to 253VAC				3-phase 170 to 253VAC	
	Permissible frequency fluctuation	±5% maximum					
Control system		Sine-wave PWM control/current control system					
Dynamic brake		Built-in					
Built-in regenerative resistor		None		Installed			
Safety features		Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection					
Position control mode	Maximum input pulse frequency	1Mpps (when using differential receiver), 200 kpps (when using open collector)					
	Positioning feedback pulse	Resolution per encoder/servo motor rotation: 131072 p/rev					
	Command pulse multiple	Electronic gear A/B multiple, A: 1 to 65535, B: 1 to 65535, 1/50 < A/B < 50					
	Positioning complete width setting	0 to ±10000 pulses (command pulse unit)					
	Excess error	±2.5 rotations					
	Torque limit	Set by parameters					
Speed control mode	Speed control range	Internal speed command 1:5000					
	Speed fluctuation rate	±0.01% maximum (load fluctuation 0 to 100%) 0% (power fluctuation ±10%)					
	Torque limit	Set by parameters					
Structure		Self-cooling open (IP00)					Fan cooling open (IP00)
Environment	Ambient temperature	0 to 55°C (32 to 131°F) (non freezing), storage: –20 to 65°C (–4 to 149°F) (non freezing)					
	Ambient humidity	90% RH maximum (non condensing), storage: 90% RH maximum (non condensing)					
	Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust					
	Elevation	1000m or less above sea level					
	Vibration	5.9m/s^2 maximum					
Mass (kg [lb])		0.7 (1.5)	0.7 (1.5)	1.1 (2.4)	1.7 (3.7)	1.7 (3.7)	2.0 (4.4)

MR-E-AG-QW003

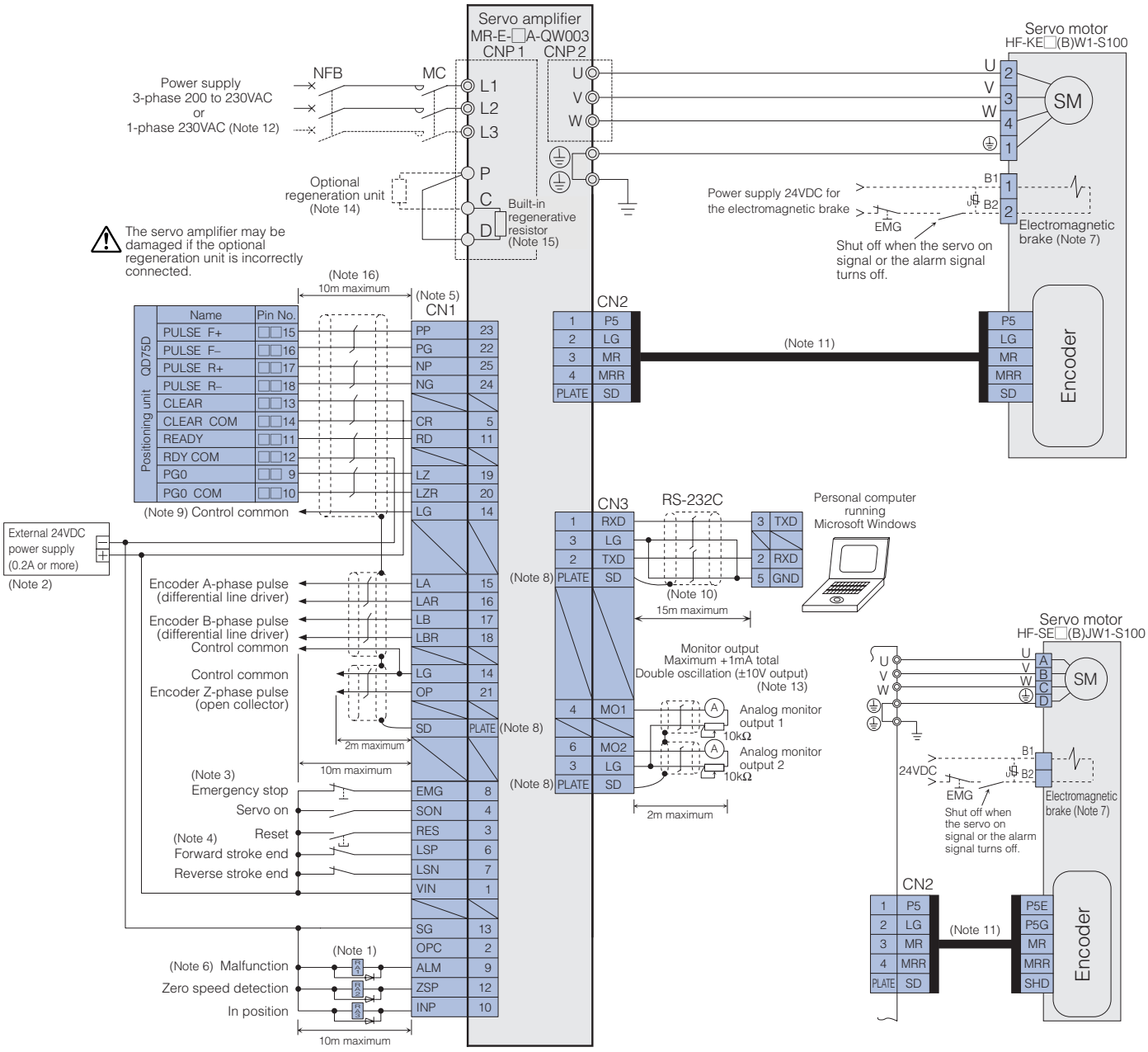
Servo amplifier model MR-E-□-QW003		10AG	20AG	40AG	70AG	100AG	200AG
Power supply	Voltage/frequency (Note 1)	3-phase 200 to 230VAC 50/60Hz or 1-phase 230VAC 50/60Hz				3-phase 200 to 230VAC 50/60Hz	
	Permissible voltage fluctuation	For 3-phase 200 to 230VAC: 3-phase 170 to 253VAC For 1-phase 230VAC: 1-phase 207 to 253VAC				3-phase 170 to 253VAC	
	Permissible frequency fluctuation	±5% maximum					
Control system		Sine-wave PWM control/current control system					
Dynamic brake		Built-in					
Built-in regenerative resistor		None		Installed			
Safety features		Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection					
Speed control mode	Speed control range	Analog speed command 1:2000, internal speed command 1:5000					
	Analog speed command input	0 to ±10VDC/rated speed					
	Speed fluctuation rate	±0.01% maximum (load fluctuation 0 to 100%) 0% (power fluctuation ±10%) ±0.2% maximum (ambient temperature 25°C±10°C [59°F to 95°F]), when using analog speed command					
	Torque limit	Set by parameters or external analog input (0 to +10VDC/maximum torque)					
Torque control mode	Analog torque command input	0 to ±8VDC/maximum torque (input impedance 10 to 12kΩ)					
	Speed limit	Set by parameters or external analog input (0 to ±10VDC/rated speed)					
Structure		Self-cooling open (IP00)					Fan cooling open (IP00)
Environment	Ambient temperature	0 to 55°C (32 to 131°F) (non freezing), storage: –20 to 65°C (–4 to 149°F) (non freezing)					
	Ambient humidity	90% RH maximum (non condensing), storage: 90% RH maximum (non condensing)					
	Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust					
	Elevation	1000m or less above sea level					
	Vibration	5.9m/s^2 maximum					
Mass (kg [lb])		0.7 (1.5)	0.7 (1.5)	1.1 (2.4)	1.7 (3.7)	1.7 (3.7)	2.0 (4.4)

Notes: 1. Rated output and rated speed of a servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency. The torque drops when the power supply voltage is less than specified.

Standard Wiring Diagram

MR-E-A-QW003: Position control operation

●Connection example to QD75D (position servo, incremental)



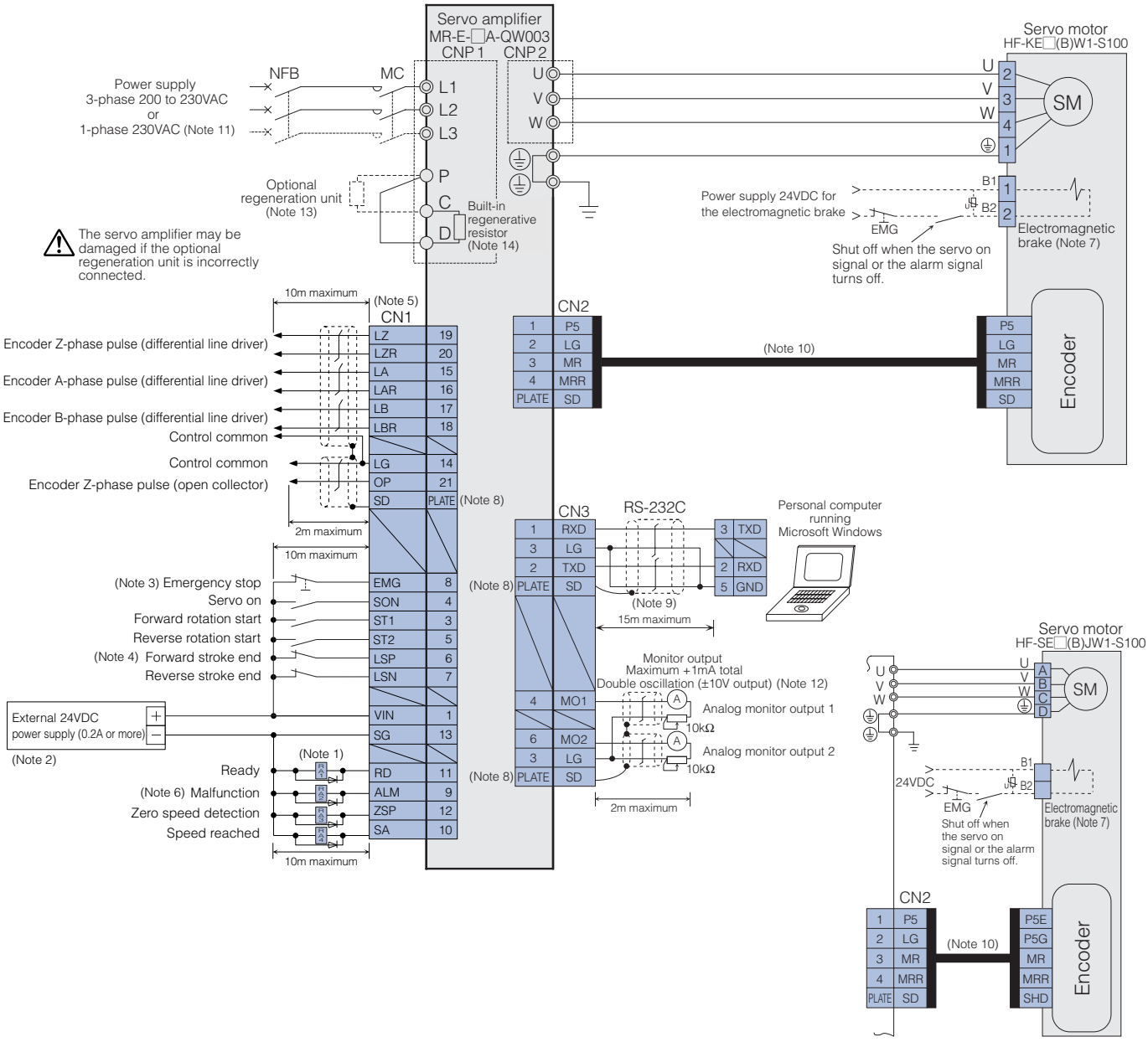
Notes:

1. Do not reverse the diode's direction. Connecting it backwards could cause the servo amplifier to malfunction such that signals are not output, and emergency stop and other safety circuits are inoperable.
2. Provide a 24VDC ±10% 200mA power supply from an external source for the interface. 200mA is the value when all input/output signals are used. Note that the current capacity can be stepped down according to the number of input/output points in use. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for details.
3. Always turn on the emergency stop (EMG) signal (normally closed contact) before starting the operation. If not, the operation will not start.
4. Always turn on the forward/reverse stroke end (LSP/LSN) signals (normally closed contact) before starting the operation. If not, the commands will not be accepted.
5. Signals with the same name are connected internally.
6. The malfunction (ALM) signal (normally closed contact) is conducted to VIN in normal alarm-free condition.
7. This is for the motor with an electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
8. Connect the shield wire securely to the plate inside the connector (ground plate).
9. This connection is not necessary for QD75D of the positioning unit. Note that the connection between LG and the control common terminal is recommended to increase noise resistance depending on the positioning unit being used.
10. A shielded multicore cable must be used. The cable length up to 15m is possible in a low noise environment. However, if the RS-232C communication is set up with a baud rate of more than 38400bps, keep the cable length within 3m.
11. The signals shown apply when using a two-wire type encoder cable. Encoder cable 30m or longer is four-wire type. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for details.
12. When using a power supply, 1-phase 230VAC, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC power supply is available only for the MR-E-70A-QW003 or smaller servo amplifier.
13. Use the analog monitor/RS-232C branch cable (MR-E3CBL15-P) when connecting the analog monitor output 1 (MO1), analog monitor output 2 (MO2) and a personal computer at the same time.
14. Connect P and D when using the built-in regenerative resistor.
15. Disconnect P and D when connecting the optional regeneration unit externally.
16. This length applies to the command pulse train input in the differential line driver system. For the open collector system, the length should be 2m or shorter.

Standard Wiring Diagram

MR-E-A-QW003: Internal speed control operation

●Connection example

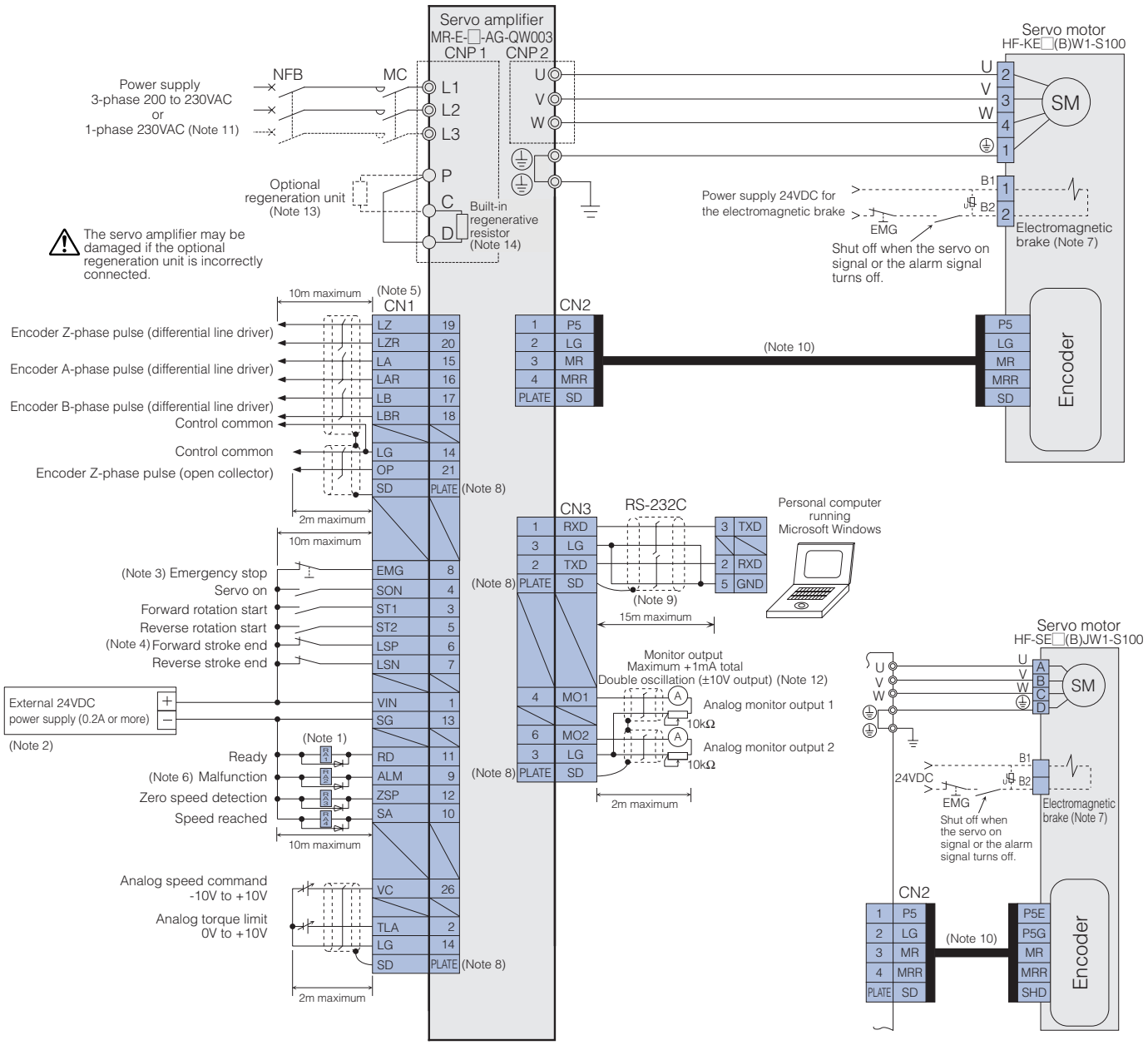


Notes:

1. Do not reverse the diode's direction. Connecting it backwards could cause the servo amplifier to malfunction such that signals are not output, and emergency stop and other safety circuits are inoperable.
2. Provide a 24VDC±10% 200mA power supply from an external source for the interface. 200mA is the value when all input/output signals are used. Note that the current capacity can be stepped down according to the number of input/output points in use. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for details.
3. Always turn on the emergency stop (EMG) signal (normally closed contact) before starting the operation. If not, the operation will not start.
4. Always turn on the forward/reverse stroke end (LSP/LSN) signals (normally closed contact) before starting the operation. If not, the commands will not be accepted.
5. Signals with the same name are connected internally.
6. The malfunction (ALM) signal (normally closed contact) is conducted to VIN in normal alarm-free condition.
7. This is for the motor with an electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
8. Connect the shield wire securely to the plate inside the connector (ground plate).
9. A shielded multicore cable must be used. The cable length up to 15m is possible in a low noise environment. However, if the RS-232C communication is set up with a baud rate of more than 38400bps, keep the cable length within 3m.
10. The signals shown apply when using a two-wire type encoder cable. Encoder cable 30m or longer is four-wire type. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for details.
11. When using a power supply, 1-phase 230VAC, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC power supply is available only for the MR-E-70A-QW003 or smaller servo amplifier.
12. Use the analog monitor/RS-232C branch cable (MR-E3CBL15-P) when connecting the analog monitor output 1 (MO1), analog monitor output 2 (MO2) and a personal computer.
13. Disconnect P and D when connecting the optional regeneration unit externally.
14. Connect P and D when using the built-in regenerative resistor.

MR-E-AG-QW003: Speed control operation

●Connection example



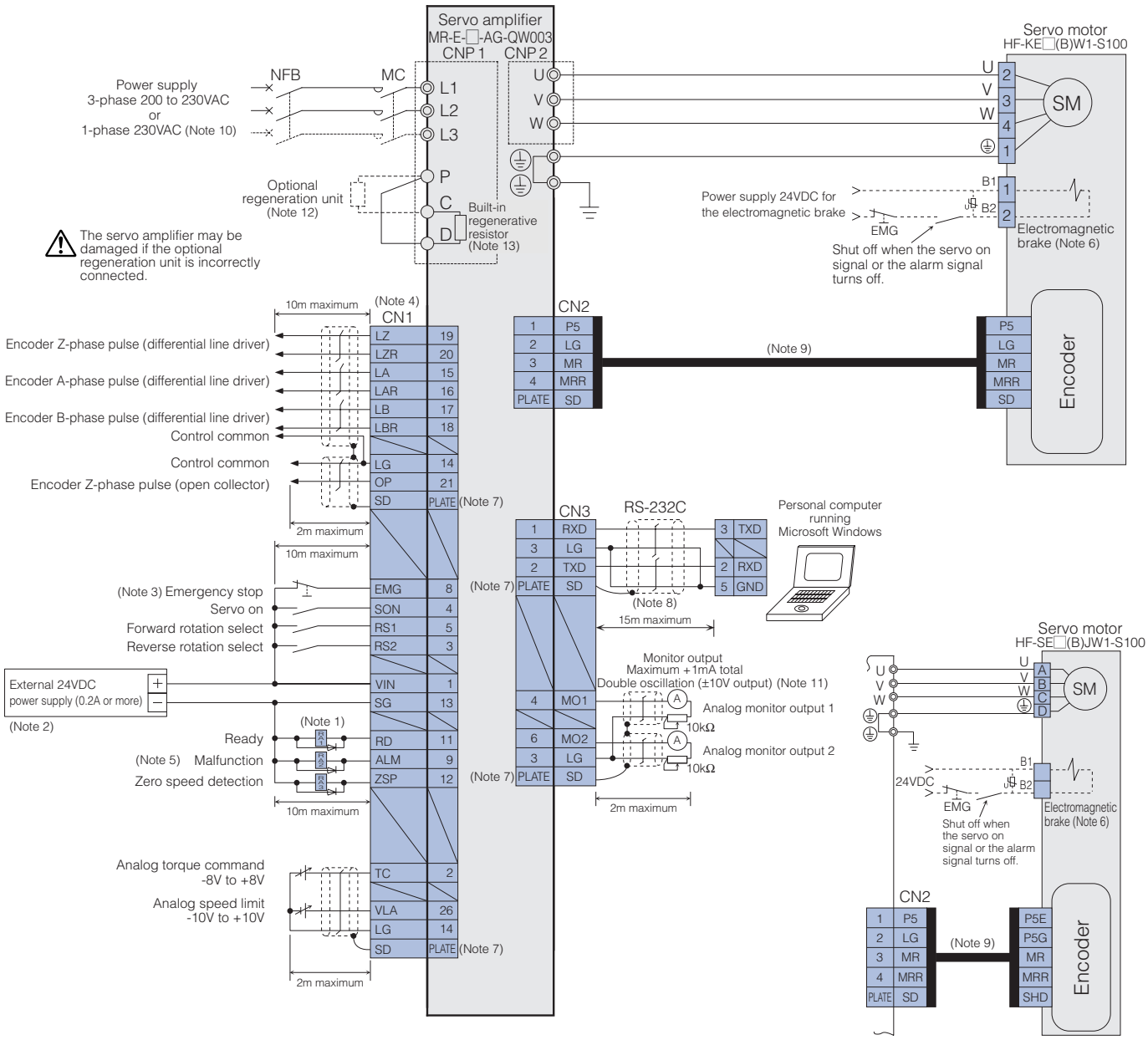
Notes:

1. Do not reverse the diode's direction. Connecting it backwards could cause the servo amplifier to malfunction such that signals are not output, and emergency stop and other safety circuits are inoperable.
2. Provide a 24VDC±10% 200mA power supply from an external source for the interface. 200mA is the value when all input/output signals are used. Note that the current capacity can be stepped down according to the number of input/output points in use. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for details.
3. Always turn on the emergency stop (EMG) signal (normally closed contact) before starting the operation. If not, the operation will not start.
4. Always turn on the forward/reverse stroke end (LSP/LSN) signals (normally closed contact) before starting the operation. If not, the commands will not be accepted.
5. Signals with the same name are connected internally.
6. The malfunction (ALM) signal (normally closed contact) is conducted to VIN in normal alarm-free condition.
7. This is for the motor with an electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
8. Connect the shield wire securely to the plate inside the connector (ground plate).
9. A shielded multicore cable must be used. The cable length up to 15m is possible in a low noise environment. However, if the RS-232C communication is set up with a baud rate of more than 38400bps, keep the cable length within 3m.
10. The signals shown apply when using a two-wire type encoder cable. Encoder cable 30m or longer is four-wire type. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for details.
11. When using a power supply, 1-phase 230VAC, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC power supply is available only for the MR-E-70AG-QW003 or smaller servo amplifier.
12. Use the analog monitor/RS-232C branch cable (MR-E3CBL15-P) when connecting the analog monitor output 1 (MO1), analog monitor output 2 (MO2) and a personal computer.
13. Disconnect P and D when connecting the optional regeneration unit externally.
14. Connect P and D when using the built-in regenerative resistor.

Standard Wiring Diagram

MR-E-AG-QW003: Torque control operation

●Connection example



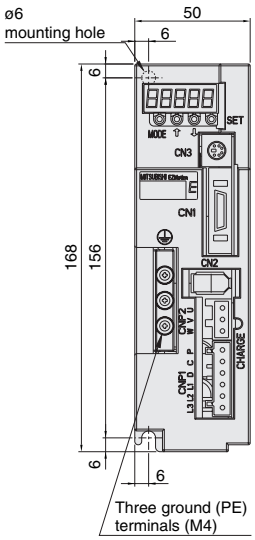
Notes:

1. Do not reverse the diode's direction. Connecting it backwards could cause the servo amplifier to malfunction such that signals are not output, and emergency stop and other safety circuits are inoperable.
2. Provide a 24VDC±10% 200mA power supply from an external source for the interface. 200mA is the value when all input/output signals are used. Note that the current capacity can be stepped down according to the number of input/output points in use. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for details.
3. Always turn on the emergency stop (EMG) signal (normally closed contact) before starting the operation. If not, the operation will not start.
4. Signals with the same name are connected internally.
5. The malfunction (ALM) signal (normally closed contact) is conducted to VIN in normal alarm-free condition.
6. This is for the motor with an electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
7. Connect the shield wire securely to the plate inside the connector (ground plate).
8. A shielded multicore cable must be used. The cable length up to 15m is possible in a low noise environment. However, if the RS-232C communication is set up with a baud rate of more than 38400bps, keep the cable length within 3m.
9. The signals shown apply when using a two-wire type encoder cable. Encoder cable 30m or longer is four-wire type. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for details.
10. When using a power supply, 1-phase 230VAC, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC power supply is available only for the MR-E-70AG-QW003 or smaller servo amplifier.
11. Use the analog monitor/RS-232C branch cable (MR-E3CBL15-P) when connecting the analog monitor output 1 (MO1), analog monitor output 2 (MO2) and a personal computer.
12. Disconnect P and D when connecting the optional regeneration unit externally.
13. Connect P and D when using the built-in regenerative resistor.

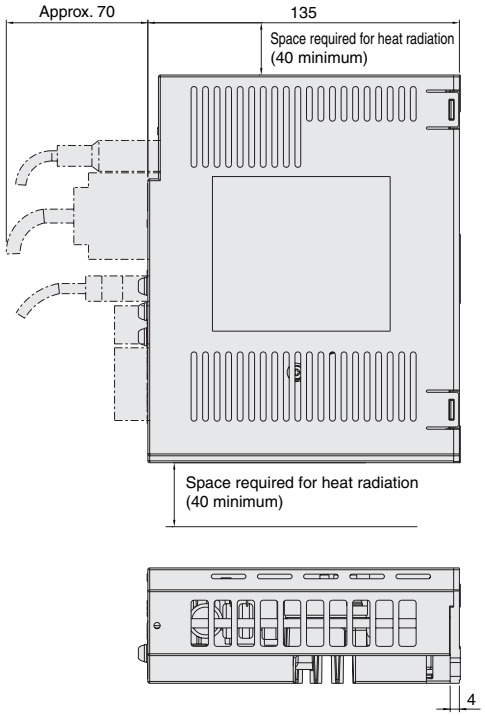
Amplifier Dimensions

●MR-E-10A/AG-QW003, 20A/AG-QW003

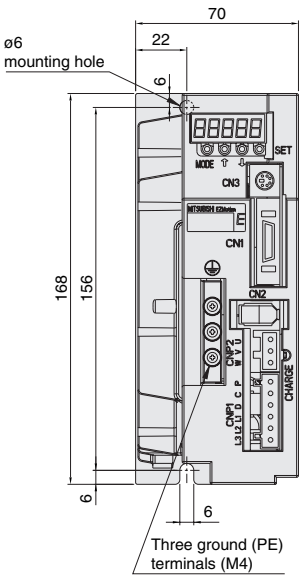
(Unit: mm)



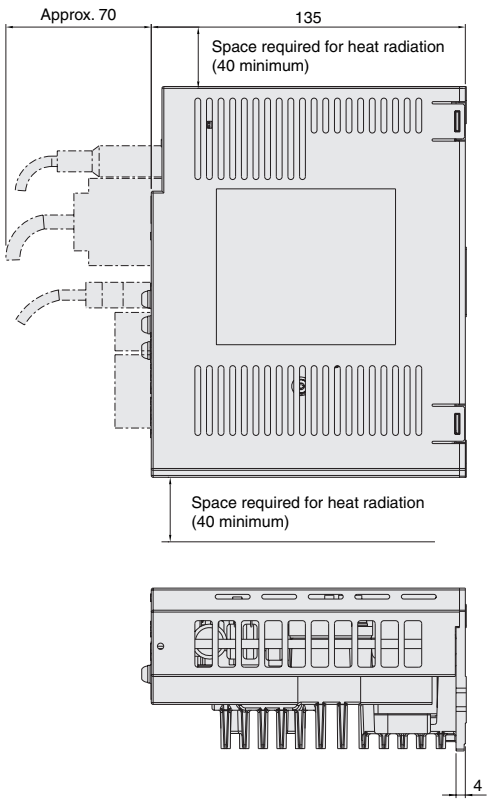
Mounting screw size: M5



●MR-E-40A/AG-QW003



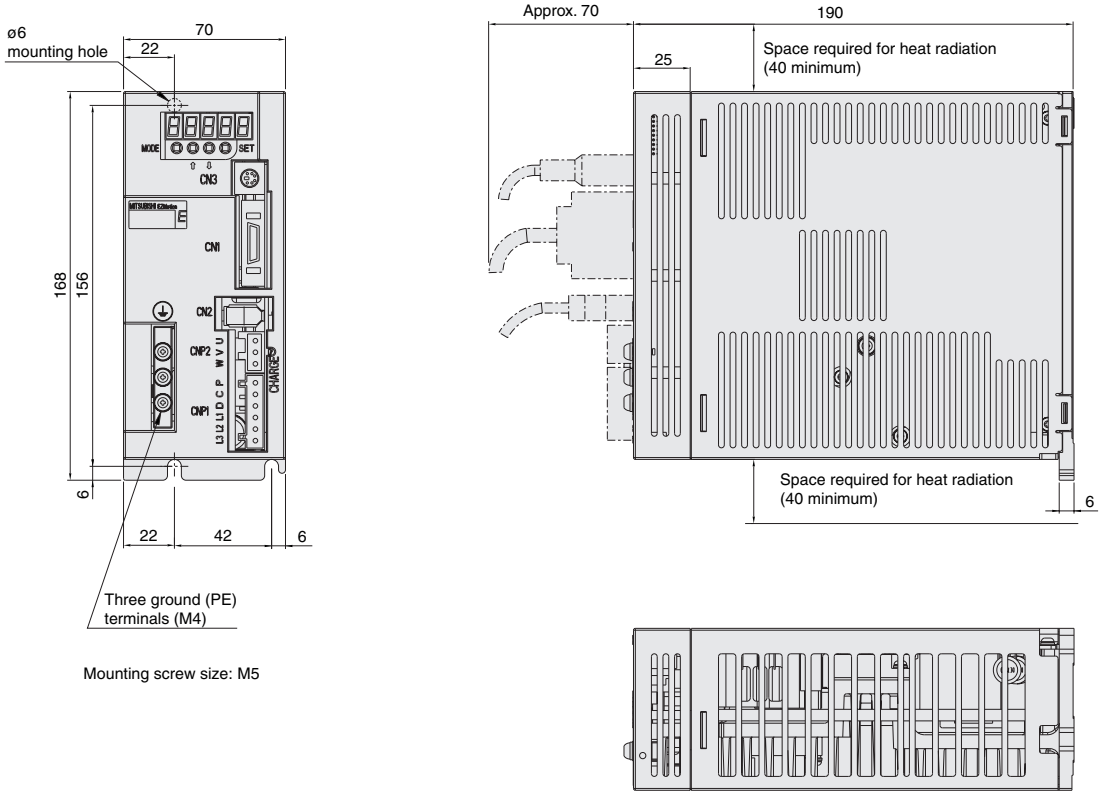
Mounting screw size: M5



Amplifier Dimensions

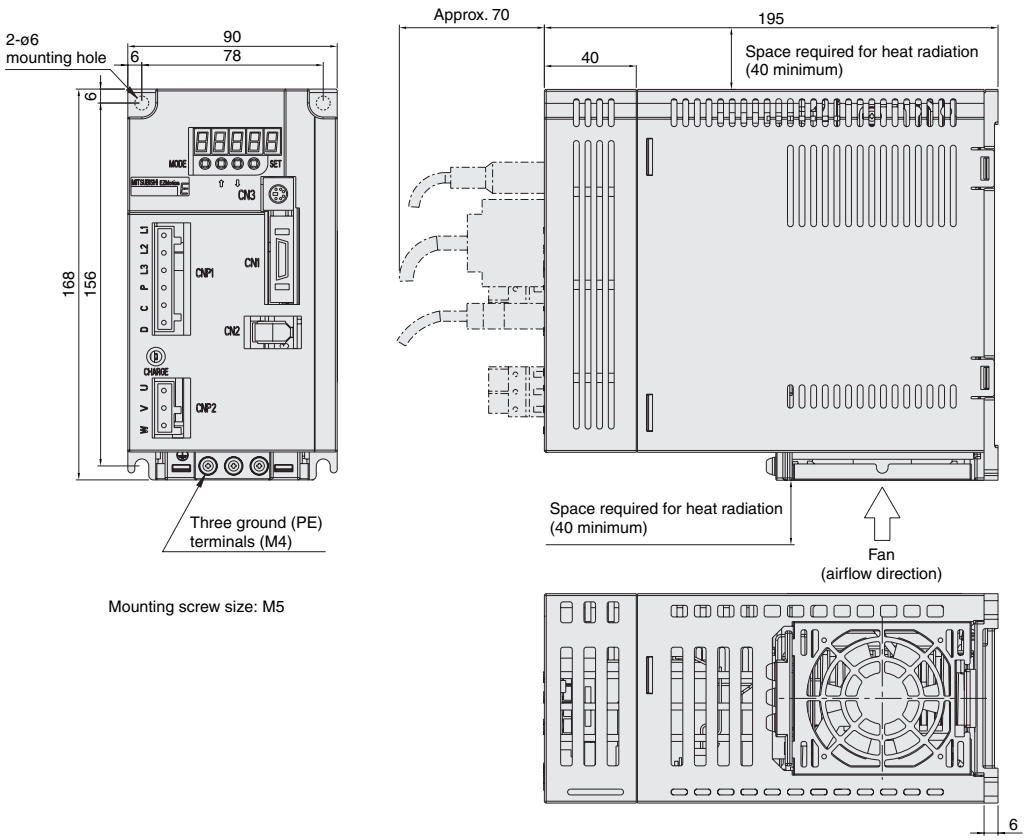
●MR-E-70A/AG-QW003, 100A/AG-QW003

(Unit: mm)



Mounting screw size: M5

●MR-E-200A/AG-QW003



Mounting screw size: M5

Options

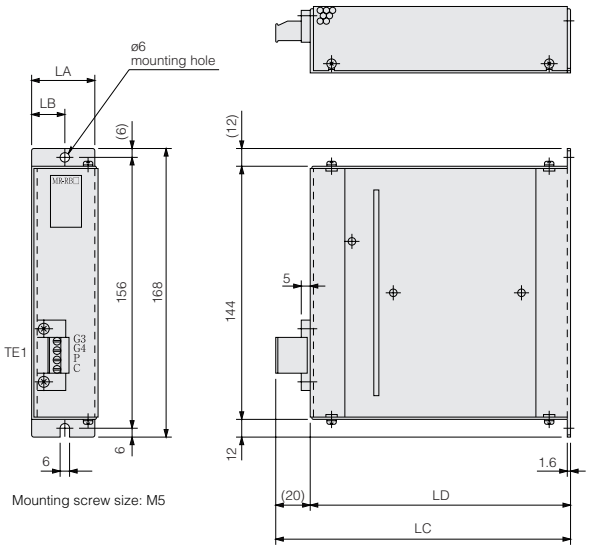
● Optional regeneration unit (Note 1)

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

Servo amplifier model	Built-in regenerative resistor/tolerable regenerative power (W)	Optional regeneration unit/tolerable regenerative power (W)				
		MR-RB032 [40Ω]	**MR-RB12 [40Ω]**	**MR-RB30 [13Ω]**	**MR-RB32 [40Ω]**	**MR-RB50 [13Ω]** (Note 2)
MR-E-10A/AG-QW003	—	30	—	—	—	—
MR-E-20A/AG-QW003	—	30	100	—	—	—
MR-E-40A/AG-QW003	10	30	100	—	—	—
MR-E-70A/AG-QW003	20	30	100	—	300	—
MR-E-100A/AG-QW003	20	30	100	—	300	—
MR-E-200A/AG-QW003	100	—	—	300	—	500

Notes: 1. Connect the optional regeneration unit referring to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL".
2. Be sure to install a cooling fan. The cooling fan must be prepared by user.

● MR-RB032, MR-RB12



Mounting screw size: M5

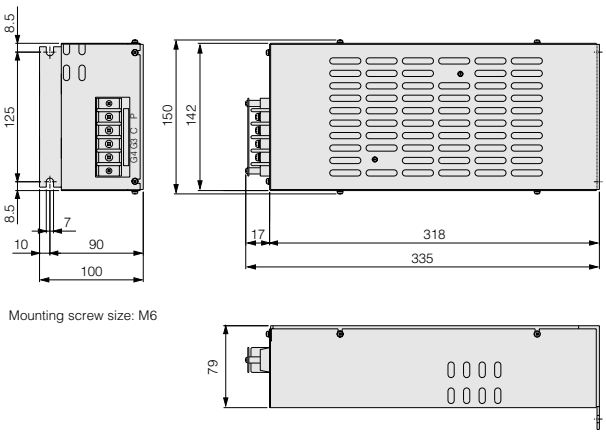
Model	Variable dimensions				Mass kg (lb)
	LA	LB	LC	LD	
MR-RB032	30	15	119	99	0.5 (1.1)
MR-RB12	40	15	169	149	1.1 (2.4)

<Terminal arrangement>

TE1
G3
G4
P
C

Terminal screw size: M3

● MR-RB30, MR-RB32



Mounting screw size: M6

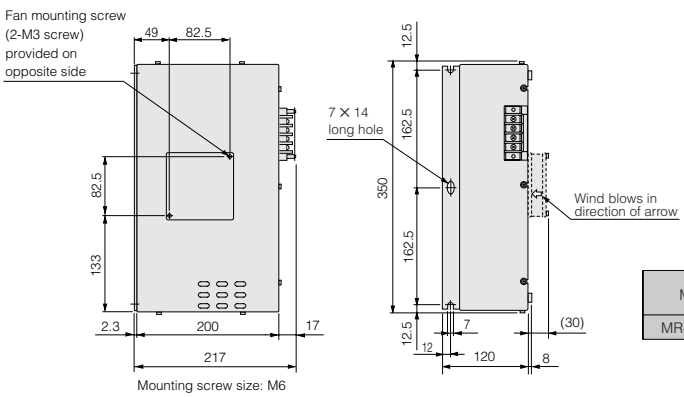
<Terminal arrangement>

P
C
G3
G4

Terminal screw size: M4

Model	Mass kg (lb)
MR-RB30	2.9 (6.4)
MR-RB32	

● MR-RB50 (Note 1)



Mounting screw size: M6

Model	Mass kg (lb)
MR-RB50	5.6 (12)

<Terminal arrangement>

P
C
G3
G4

Terminal screw size: M4

Notes: 1. When using MR-RB50, cool the unit forcibly with a fan (92x92mm, minimum air flow: 1.0m^3/min). The cooling fan must be prepared by user.

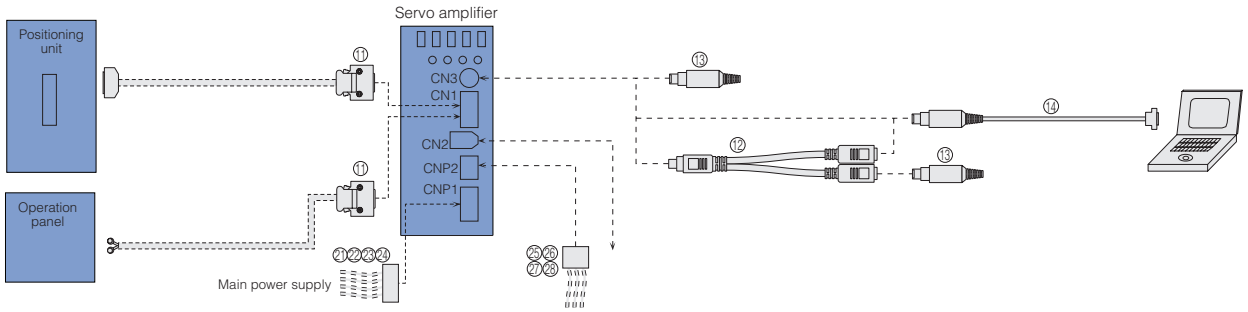
(Unit: mm)

✻ Cautions when connecting the optional regeneration unit.

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

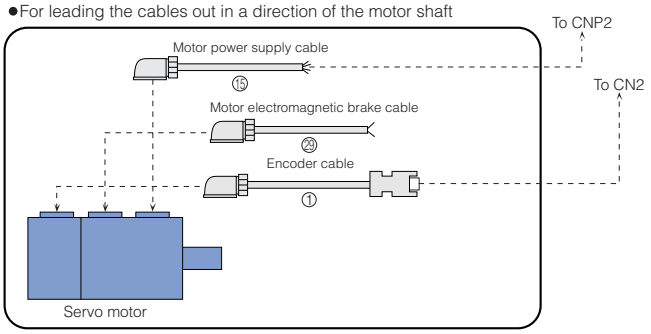
Options

● Cables and connectors for MR-E-□A/AG-QW003

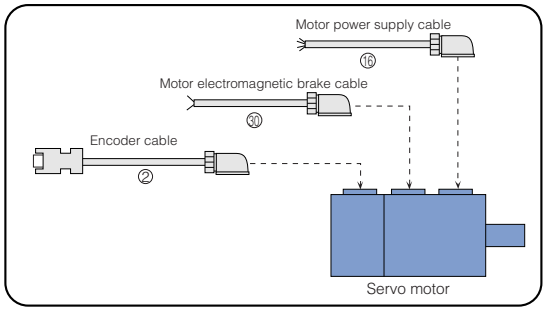


< For HF-KE□(B)W1-S100 servo motor: encoder cable length 10m or shorter >

●For leading the cables out in a direction of the motor shaft

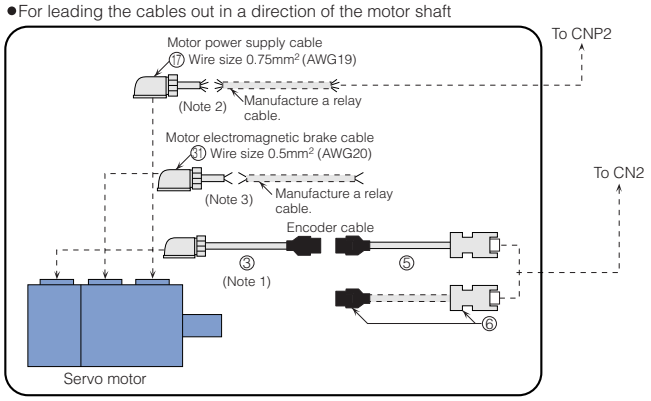


●For leading the cables out in an opposite direction of the motor shaft

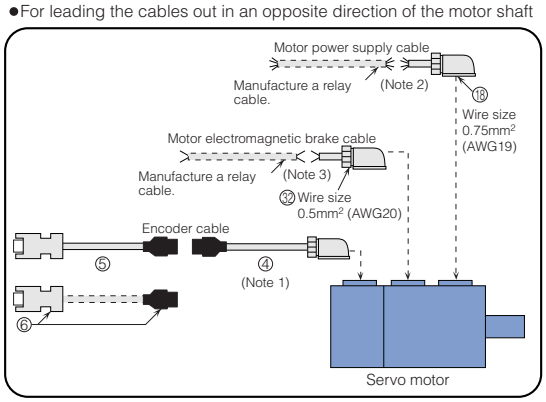


< For HF-KE□(B)W1-S100 servo motor: encoder cable length over 10m >

●For leading the cables out in a direction of the motor shaft

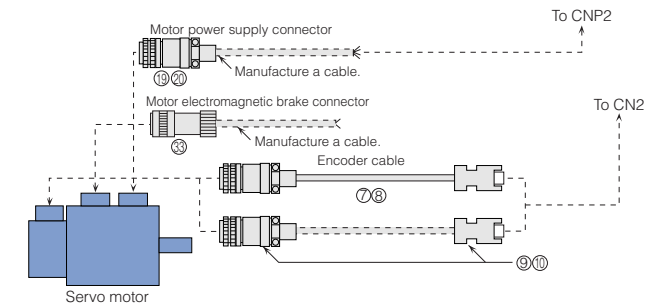


●For leading the cables out in an opposite direction of the motor shaft



Notes:1. This cable does not have a long bending life, so always fix the cable before using.
2. If the length exceeds 10m, relay a cable using the cable MR-PWS2CBL03M-A1-L/-A2-L. This cable does not have a long bending life, so always fix the cable before using. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for details on manufacturing the relay cable.
3. If the length exceeds 10m, relay a cable using the cable MR-BKS2CBL03M-A1-L/-A2-L. This cable does not have a long bending life, so always fix the cable before using. Refer to "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" for details on manufacturing the relay cable.

< For HF-SE□(B)JW1-S100 servo motor >



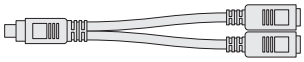
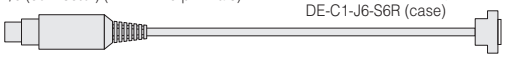
● Cables and connectors (for MR-E-□A/AG-QW003)

Item				Model	Protection level	Description
Encoder cables and connector sets for CN2	①	10m or shorter (Direct connection type)	Encoder cable for HF-KE□(B)W1-S100 Lead out in direction of motor shaft	MR-J3ENCBL□M-A1-H □=cable length: 2, 5, 10m (Note 1)	IP65	Encoder connector (Tyco Electronics AMP) 1674320-1  Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M), or 54599-1019 (connector set, Molex)
				MR-J3ENCBL□M-A1-L □=cable length: 2, 5, 10m (Note 1)	IP65	
	②		Encoder cable for HF-KE□(B)W1-S100 Lead out in opposite direction of motor shaft	MR-J3ENCBL□M-A2-H □=cable length: 2, 5, 10m (Note 1)	IP65	
				MR-J3ENCBL□M-A2-L □=cable length: 2, 5, 10m (Note 1)	IP65	
	③	Exceeding 10m (Relay type)	Motor-side encoder cable for HF-KE□(B)W1-S100 Lead out in direction of motor shaft	MR-J3JCBL03M-A1-L Cable length: 0.3m (Note 1)	IP20	Encoder connector (Tyco Electronics AMP) 1674320-1  Use this in combination of ⑤ or ⑥. Junction connector (Tyco Electronics AMP) 1473226-1 (with ring) (contact) 1-172169-9 (housing) 316454-1 (cable clamp)
	④		Motor-side encoder cable for HF-KE□(B)W1-S100 Lead out in opposite direction of motor shaft	MR-J3JCBL03M-A2-L Cable length: 0.3m (Note 1)	IP20	
	⑤		Amplifier-side encoder cable for HF-KE□(B)W1-S100	MR-EKCBL□M-H □=cable length: 20, 30, 40, 50m (Note 1)	IP20	Junction connector (Tyco Electronics AMP) 1-172161-9 (housing) 170359-1 (connector pin) MTI-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL)  Use this in combination of ③ or ④. Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M), or 54599-1019 (connector set, Molex)
				MR-EKCBL□M-L □=cable length: 20, 30m (Note 1)	IP20	
	⑥	Exceeding 10m (Relay type)	Encoder connector set for HF-KE□(B)W1-S100	MR-ECNM	IP20	Junction connector (Tyco Electronics AMP) 1-172161-9 (housing) 170359-1 (connector pin) MTI-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL)  <Applicable cable example> Wire size: 0.3mm² (AWG22) Completed cable outer diameter: ϕ8.2mm Crimping tool (91529-1) is required. Amplifier connector 54599-1019 (connector set, Molex), or 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M)  Use these in combination of ③ or ④.
	⑦	Encoder cable for HF-SE□(B)JW1-S100		MR-ESCBL□M-H □=cable length 2, 5, 10, 20, 30, 40, 50m (Note 1)	IP20	Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M), or 54599-1019 (connector set, Molex) Encoder connector (DDK) D/MS3057-12A (cable clamp) D/MS3106B20-29S (straight plug) 
				MR-ESCBL□M-L □=cable length 2, 5, 10, 20, 30m (Note 1)	IP20	
	⑧			MR-ENECBL□M-H □=cable length 2, 5, 10, 20, 30, 40, 50m (Note 1)	IP65 IP67	Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M), or 54599-1019 (connector set, Molex) Encoder connector (DDK) D/MS3106A-29S (D190) (plug) CE02-20BS-S-D (backshell, straight) CE3057-12A-3-D (cable clamp) 
	⑨	Encoder connector set for HF-SE□(B)JW1-S100		MR-ECNS	IP20	Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M), or 54599-1019 (connector set, Molex)  Encoder connector (DDK) D/MS3057-12A (cable clamp) D/MS3106B20-29S (straight plug) 
	⑩			MR-ENECNS	IP65 IP67	Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M), or 54599-1019 (connector set, Molex)  Encoder connector (DDK) D/MS3106A-29S (D190) (plug) CE02-20BS-S-D (backshell, straight) CE3057-12A-3-D (cable clamp) 
For CN1	⑪	CN1 connector		MR-ECN1 (Unit: 20 pcs/box)	—	 Amplifier-side connector (3M or an equivalent product) 10126-3000PE (connector) 10326-52F0-008 (shell kit)

Notes: 1. -H and -L indicate bending life. -H indicates a long bending life, and -L indicates a standard bending life.

Options

● Cables and connectors (for MR-E-□A/AG-QW003)

		Item		Model	Protection level	Description
For CN3	⑫	Analog monitor/ RS-232C branch cable		MR-E3CBL15-P	—	RS-232C option connector (Marushin electric mfg. or an equivalent product) MP371/6 (connector) (mini-DIN 6-pin male)  Analog monitor connector (Marushin electric mfg. or an equivalent product) MJ372/6 (connector) (mini-DIN 6-pin female)
	⑬	Analog monitor RS-232C connector		MR-ECN3 (Unit: 20 pcs/box)	—	 Analog monitor, RS-232C option connector (Marushin electric mfg. or an equivalent product) MP371/6 (connector) (mini-DIN 6-pin male)
	⑭	Personal computer communication cable		QC30R2 Cable length: 3m	—	RS-232C option connector (Marushin electric mfg. or an equivalent product) MP371/6 (connector) (mini-DIN 6-pin male) DOS/V personal computer connector (Japan Aviation Electronics Industry) DE-9SF-N (connector) DE-C1-J6-S6R (case) 
Motor power supply connectors (motor side)	⑮	10m or shorter (Direct connection type)	Motor power supply cable for HF-KE□(B)W1-S100 Lead out in direction of motor shaft	MR-PWS1CBL□M-A1-H □=cable length: 2, 5, 10m (Note 1)	IP65	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04SJ1-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)  Lead-out
				MR-PWS1CBL□M-A1-L □=cable length: 2, 5, 10m (Note 1)	IP65	
	⑯		Motor power supply cable for HF-KE□(B)W1-S100 Lead out in opposite direction of motor shaft	MR-PWS1CBL□M-A2-H □=cable length: 2, 5, 10m (Note 1)	IP65	
				MR-PWS1CBL□M-A2-L □=cable length: 2, 5, 10m (Note 1)	IP65	
	⑰	Exceeding 10m (Relay type)	Motor power supply cable for HF-KE□(B)W1-S100 Lead out in direction of motor shaft	MR-PWS2CBL03M-A1-L Cable length: 0.3m (Note 1)	IP55	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04SJ2-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)  Lead-out
	⑱		Motor power supply cable for HF-KE□(B)W1-S100 Lead out in opposite direction of motor shaft	MR-PWS2CBL03M-A2-L Cable length: 0.3m (Note 1)	IP55	
	⑲	Motor power supply connector set (motor side) for HF-SE52(B)JW1-S100 HF-SE102(B)JW1-S100 HF-SE152(B)JW1-S100		MR-PWCNS4 (Straight type)	IP65 IP67	 Motor power supply connector (DDK) CE05-6A18-10SD-D-BSS (plug) (straight) CE3057-10A-1-D (cable clamp) <Applicable cable example> Wire size: 2mm² (AWG14) to 3.5mm² (AWG12) Completed cable outer diameter: ϕ10.5 to 14.1mm
	⑳	Motor power supply connector set (motor side) for HF-SE202(B)JW1-S100		MR-PWCNS5 (Straight type)	IP65 IP67	 Motor power supply connector (DDK) CE05-6A22-22SD-D-BSS (plug) (straight) CE3057-12A-1-D (cable clamp) <Applicable cable example> Wire size: 5.5mm² (AWG10) to 8mm² (AWG8) Completed cable outer diameter: ϕ12.5 to 16mm
Amplifier power supply connectors (for CNP1)	㉑	Amplifier power supply connector set (press bonding type) for MR-E-10A/AG to 100A/AG-QW003		MR-ECNP1-A (Unit: 20 pcs/box)	—	Connector 51240-0600 (Molex or an equivalent product)  Terminal 56125-0128 (Molex or an equivalent product) 
	㉒	Amplifier power supply connector (insertion type) for MR-E-10A/AG to 100A/AG-QW003		MR-ECNP1-B (Unit: 20 pcs/box)	—	Connector 54927-0610 (Molex or an equivalent product) 
	㉓	Amplifier power supply connector set (press bonding type) for MR-E-200A/AG-QW003		MR-ECNP1-A1 (Unit: 20 pcs/box)	—	Connector 54241-0600 (Molex or an equivalent product)  Terminal 56125-0128 (Molex or an equivalent product) 
	㉔	Amplifier power supply connector (insertion type) for MR-E-200A/AG-QW003		MR-ECNP1-B1 (Unit: 20 pcs/box)	—	Connector 54928-0610 (Molex or an equivalent product) 

Notes: 1. -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.

● Cables and connectors (for MR-E-□A/AG-QW003)

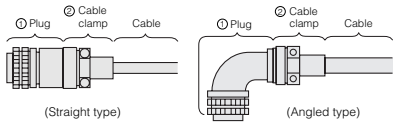
Item				Model	Protection level	Description
Motor power supply connectors (for CNP2)	㉕	Motor power supply connector set (amplifier side) for MR-E-10A/AG to 100A/AG-QW003 (press bonding type)		MR-ECNP2-A (Unit: 20 pcs/box)	—	Connector 51240-0300 (Molex or an equivalent product)  Terminal 56125-0128 (Molex or an equivalent product) 
	㉖	Motor power supply connector (amplifier side) for MR-E-10A/AG to 100A/AG-QW003 (insertion type)		MR-ECNP2-B (Unit: 20 pcs/box)	—	Connector 54927-0310 (Molex or an equivalent product) 
	㉗	Motor power supply connector set (amplifier side) for MR-E-200A/AG-QW003 (press bonding type)		MR-ECNP2-A1 (Unit: 20 pcs/box)	—	Connector 54241-0300 (Molex or an equivalent product)  Terminal 56125-0128 (Molex or an equivalent product) 
	㉘	Motor power supply connector (amplifier side) for MR-E-200A/AG-QW003 (insertion type)		MR-ECNP2-B1 (Unit: 20 pcs/box)	—	Connector 54928-0310 (Molex or an equivalent product) 
Motor electromagnetic brake connectors	㉙	10m or shorter (Direct connection type)	Brake cable for HF-KE□BW1-S100 Lead out in direction of motor shaft	MR-BKS1CBL□M-A1-H □=cable length: 2, 5, 10m (Note 1)	IP65	Motor brake connector (Japan Aviation Electronics Industry) JN4FT02SJ1-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)  Lead-out
				MR-BKS1CBL□M-A1-L □=cable length: 2, 5, 10m (Note 1)	IP65	
	㉚		Brake cable for HF-KE□BW1-S100 Lead out in opposite direction of motor shaft	MR-BKS1CBL□M-A2-H □=cable length: 2, 5, 10m (Note 1)	IP65	
				MR-BKS1CBL□M-A2-L □=cable length: 2, 5, 10m (Note 1)	IP65	
	㉛	Exceeding 10m (Relay type)	Brake cable for HF-KE□BW1-S100 Lead out in direction of motor shaft	MR-BKS2CBL03M-A1-L Cable length: 0.3m (Note 1)	IP55	Motor brake connector (Japan Aviation Electronics Industry) JN4FT02SJ2-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)  Lead-out
	㉜		Brake cable for HF-KE□BW1-S100 Lead out in opposite direction of motor shaft	MR-BKS2CBL03M-A2-L Cable length: 0.3m (Note 1)	IP55	
	㉝	Brake connector for HF-SE□BJW1-S100		MR-BKCNS1 (Straight type)	IP65 IP67	 Motor brake connector (DDK) (soldered type) CM10-SP2S-L(straight plug), CM10-#22SC(S2)-100(socket contact) <Applicable cable example> Wire size: 1.25mm² (AWG16) or smaller Completed cable outer diameter: ϕ9.0 to 11.6mm

Notes: 1. -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.

Ordering Information for Customers

● Servo motor power supply connectors

Power supply connectors are not included with the motors. Order from the previous pages, or choose from the following recommended products. To order the following recommended products, contact the relevant manufacturers directly.



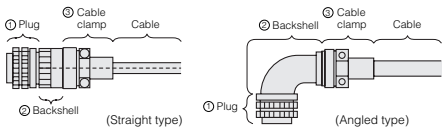
Motor model	Protection level	① Plug (manufactured by DDK Ltd.)		② Cable clamp (manufactured by DDK Ltd.)	
		Type	Model	Cable outer diameter (mm)	Model
HF-SE52(B)JW1-S100 HF-SE102(B)JW1-S100 HF-SE152(B)JW1-S100	IP65 IP67 EN standards	Straight	CE05-6A18-10SD-D-BSS	ϕ8.5 to 11	CE3057-10A-2-D
				ϕ10.5 to 14.1	CE3057-10A-1-D
		Angled	CE05-8A18-10SD-D-BAS	ϕ8.5 to 11	CE3057-10A-2-D
				ϕ10.5 to 14.1	CE3057-10A-1-D
	General environment (Note 1)	Straight	D/MS3106B18-10S	ϕ14.3 (Inner diameter of bushing)	D/MS3057-10A
		Angled	D/MS3108B18-10S		D/MS3057-10A
HF-SE202(B)JW1-S100	IP65 IP67 EN standards	Straight	CE05-6A22-22SD-D-BSS	ϕ9.5 to 13	CE3057-12A-2-D
				ϕ12.5 to 16	CE3057-12A-1-D
		Angled	CE05-8A22-22SD-D-BAS	ϕ9.5 to 13	CE3057-12A-2-D
				ϕ12.5 to 16	CE3057-12A-1-D
	General environment (Note 1)	Straight	D/MS3106B22-22S	ϕ15.9 (Inner diameter of bushing)	D/MS3057-12A
		Angled	D/MS3108B22-22S		D/MS3057-12A

Notes: 1. Not compliant with EN standards.

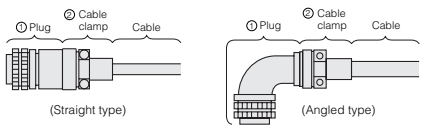
Motor model	Protection level	Model	Description	Applicable cable example
HF-KE□(B)W1-S100	IP65	JN4FT04SJ1-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)	 Manufacturer: Japan Aviation Electronics Industry, Ltd.	Wire size: 0.75mm² (AWG19) Completed cable outer diameter: ϕ6.2 ± 0.3mm Fluoric resin wire (Vinyl jacket cable FV4C <UL Style 2103> (SP3866W-X), KURABE INDUSTRIAL CO.,LTD. or an equivalent product) Crimping tool (CT160-3-TMH5B) is required.

● Encoder connectors

Encoder connectors are not included with the motors. Order from the previous pages, or choose from the following recommended products. To order the following recommended products, contact the relevant manufacturer directly.



Motor model	Protection level	① Plug (manufactured by DDK Ltd.)	② Backshell (manufactured by DDK Ltd.)		③ Cable clamp (manufactured by DDK Ltd.)	
			Type	Model	Cable outer diameter (mm)	Model
HF-SE□(B)JW1-S100	IP65, IP67 EN standards	D/MS3106A20-29S (D190)	Straight	CE02-20BS-S-D	ϕ6.8 to 10	CE3057-12A-3-D
			Angled	CE-20BA-S-D		



Motor model	Protection level	① Plug (manufactured by DDK Ltd.)		② Cable clamp (manufactured by DDK Ltd.)	
		Type	Model	Cable outer diameter (mm)	Model
HF-SE□(B)JW1-S100	General environment (Note 1)	Straight	D/MS3106B20-29S	ϕ15.9 (Inner diameter of bushing)	D/MS3057-12A
		Angled	D/MS3108B20-29S		

Notes: 1. Not compliant with EN standards.

● Brake connectors

Brake connectors are not included with the motors. Order from the previous pages, or choose from the following recommended products. To order the following recommended products, contact the relevant manufacturer directly.

Motor model	Protection level	Connector			Contact	Cable outer diameter (mm)	Description
		Type	Straight plug	Socket contact			
HF-SE□BJW1-S100	IP65 IP67	Straight	CM10-SP2S-S	CM10-#22SC (S2)-100	Soldered type	ϕ4 to 6	 Manufacturer: DDK Ltd.
			CM10-SP2S-M			ϕ6 to 9	
			CM10-SP2S-L			ϕ9 to 11.6	
			CM10-SP2S-S	CM10-#22SC (C3)-100	Press bonding type	ϕ4 to 6	
			CM10-SP2S-M			ϕ6 to 9	
			CM10-SP2S-L			ϕ9 to 11.6	

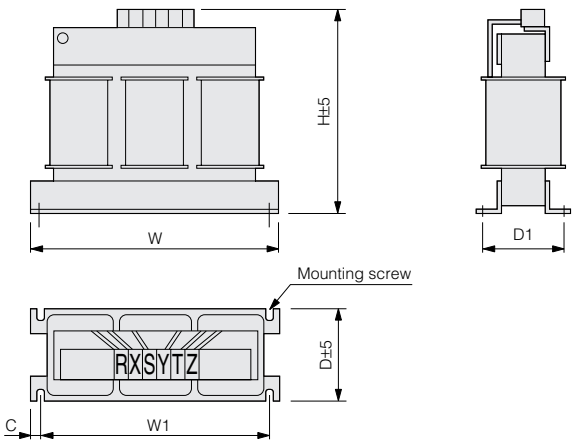
Motor model	Protection level	Model	Description	Applicable cable example
HF-KE□BW1-S100	IP65	JN4FT02SJ1-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)	 Manufacturer: Japan Aviation Electronics Industry, Ltd.	Wire size: 0.5mm^2 (AWG20) Completed cable outer diameter: ϕ4.5 ± 0.3mm Fluoric resin wire (Vinyl jacket cable FV2C <UL Style 2103> (SP3866U-X), KURABE INDUSTRIAL CO.,LTD. or an equivalent product) Crimping tool (CT160-3-TMH5B) is required.

Options

● Power factor improvement reactor (FR-BAL)

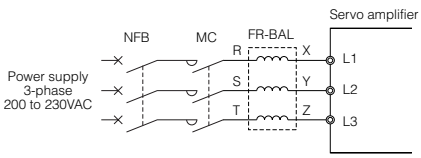
This reactor enables users to boost the servo amplifier's power factor and reduce its power supply capacity.

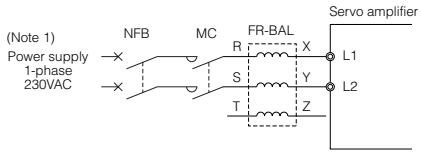
External dimensions (Unit: mm)



Servo amplifier	Model	Variable dimensions						Mounting screw size	Terminal screw size	Mass kg (lb)
		W	W1	H	D	D1	C			
MR-E-10A/AG-QW003 MR-E-20A/AG-QW003	FR-BAL-0.4K	135	120	115	59	$45^{0}_{-2.5}$	7.5	M4	M3.5	2.0 (4.4)
MR-E-40A/AG-QW003	FR-BAL-0.75K	135	120	115	69	$57^{0}_{-2.5}$	7.5	M4	M3.5	2.8 (6.2)
MR-E-70A/AG-QW003	FR-BAL-1.5K	160	145	140	71	$55^{0}_{-2.5}$	7.5	M4	M3.5	3.7 (8.2)
MR-E-100A/AG-QW003	FR-BAL-2.2K	160	145	140	91	$75^{0}_{-2.5}$	7.5	M4	M3.5	5.6 (12)
MR-E-200A/AG-QW003	FR-BAL-3.7K	220	200	192	90	$70^{0}_{-2.5}$	10	M5	M4	8.5 (19)

Connections





Notes: 1. When using a power supply, 1-phase 230VAC, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC is available only for the MR-E-70A/AG-QW003 or smaller servo amplifier.

Peripheral Equipment

● EMC filter

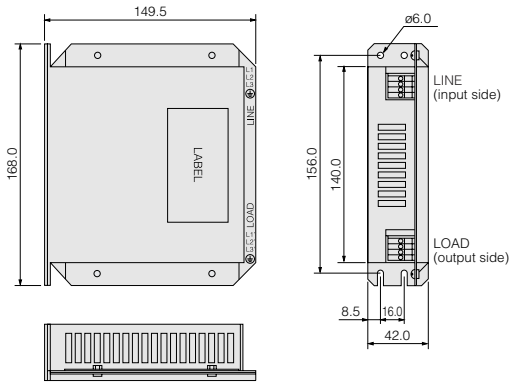
The following filters are recommended as a filter compliant with the EMC directive for the servo amplifier's power supply.

Model	Applicable servo amplifier	Fig.
SF1252	MR-E-10A/AG-QW003 to MR-E-100A/AG-QW003	A
SF1253	MR-E-200A/AG-QW003	B

External dimensions (Unit: mm)

A

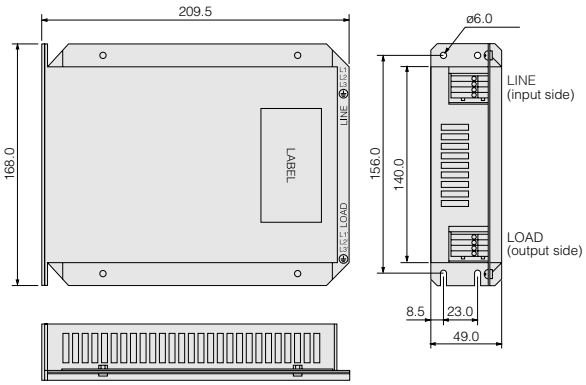
● **SF1252**



Model	Mass kg (lb)
SF1252	0.75 (1.7)

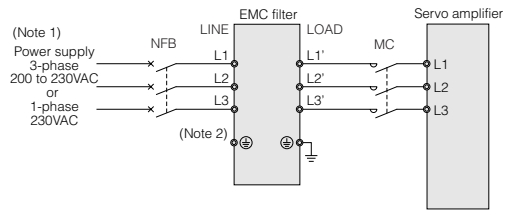
B

● **SF1253**



Model	Mass kg (lb)
SF1253	1.37 (3.0)

Connections



Notes: 1. When using a power supply, 1-phase 230VAC, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC is available only for the MR-E-70A/AG-QW003 or smaller servo amplifier.
2. Connect when the power supply has earth.

● Electrical wires, circuit breakers and magnetic contactors

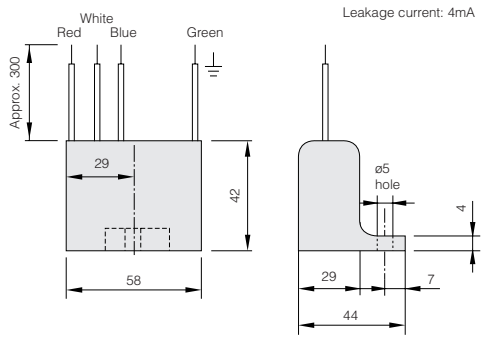
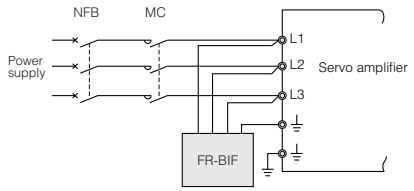
The following are examples of wire sizes when 600V polyvinyl chloride insulated wires with a length of 30m are used.

Servo amplifier	Circuit breaker	Magnetic contactor	Electrical wire size (mm²)			
			L1, L2, L3, ⏚	U, V, W, ⏚	P, C, D	B1, B2
MR-E-10A/AG-QW003	30A frame 5A	S-N10	2 (AWG14)	1.25 (AWG16)	2 (AWG14)	1.25 (AWG16)
MR-E-20A/AG-QW003	30A frame 5A					
MR-E-40A/AG-QW003	30A frame 10A					
MR-E-70A/AG-QW003	30A frame 15A					
MR-E-100A/AG-QW003	30A frame 15A			2 (AWG14)		
MR-E-200A/AG-QW003	30A frame 20A	S-N18	2.5 (AWG14) (Note 1)	2.5 (AWG14) (Note 1)		

Notes: 1. When using AWG14 at an ambient temperature of 40°C (104°F) or more, use heat-resistant PVC (rated 105°C [221°F] or more). Refer to the specifications in this catalog for the permissible ambient temperature of the servo amplifier and servo motor.

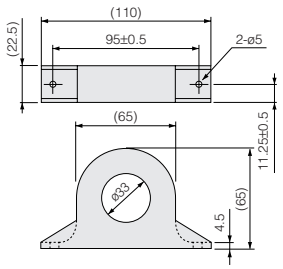
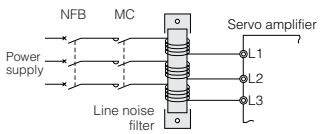
● Radio noise filter (FR-BIF)

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

External dimensions (Unit: mm)	Connections
	This filter is not connectable to output side of the servo amplifier. Wiring should be as short as possible. Grounding is always required. Be sure to insulate the unused wire when using FR-BIF with 1-phase power. 

● Line noise filter (FR-BSF01, FR-BLF)

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

External dimensions (Unit: mm)	Connections
<FR-BSF01> 	Use the line noise filter for wires of the main power supply (L1, L2, L3) of the servo amplifier, and of the motor power supply (U, V, W). Pass each of the 3-phase wires through the line noise filter equal times in a same direction. For the main power supply, the effect of the filter rises as the number of passes increases, but generally four passes would be appropriate. For the motor power supply, passes must be four times or less. Do not pass the grounding (earth) wire through the filter, or the effect of the filter will drop. Wind the wires to pass through the filter as the required number of passes as shown in the diagram below. If the wires are too thick to wind, use two or more filters to have the required number of passes. Place the line noise filters as close to the servo amplifier as possible for their best performance. 

● Surge suppressor

Attach surge suppressors to AC relays and AC valves around the servo amplifier. Attach diodes to DC relays and DC valves.

Sample configuration

Surge suppressor : 972A-2003 504 11 (rated 200VAC, manufactured by Matsuo Electric Co., Ltd.)

Diode : A diode with breakdown voltage 4 or more times greater than the relay's drive voltage, and with current capacity 2 or more times greater than the relay's drive current.

● Data line filter

Noise can be prevented by attaching a data line filter to the pulse output cable of the pulse train output controller (QD75D, etc.) or motor encoder cable.

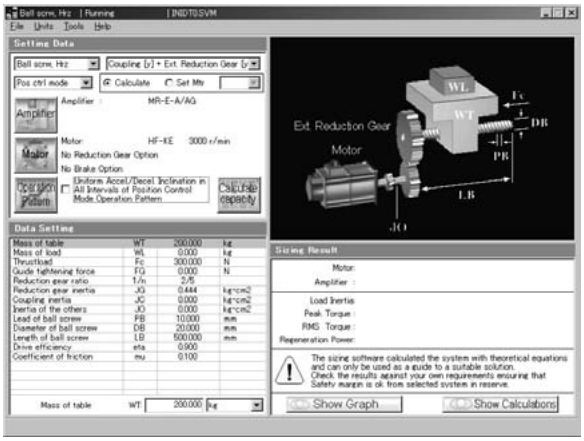
Sample configuration

Data line filter examples: ESD-SR-25 (manufactured by NEC TOKIN Corporation) or ZCAT3035-1330 (manufactured by TDK Corporation)

Servo Support Software

< Capacity selection software >

●MRZJW3-MOTSZ111E



A user-friendly design facilitates selecting the optimum servo amplifier, servo motor (including the servo motor with an electromagnetic brake) and optional regeneration unit just by entering constants and an operation pattern into machine-specific windows.

Features

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

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

☆The screen is for reference and may differ from the actual screen.

● Specifications

Item		Description
Types of machine component		Horizontal ball screws, vertical ball screws, rack and pinions, roll feeds, rotating tables, dollies, elevators, material handling systems and other (direct inertia input) devices
Output of results	Parameter	Selected servo amplifier model, selected servo motor model, selected regenerative resistor model, load inertia moment, load inertia moment ratio, peak torque, peak torque ratio, effective torque, effective torque ratio, regenerative power, regenerative power ratio
	Printing	Prints input specifications, operation pattern, calculation process, graph of selection process feedrate (or motor speed) and torque, and selection results.
	Data storage	Assigns a file name to input specifications, operation patterns and selection results, and saves them on hard disk or floppy disk, etc.
Inertia moment calculation function		Cylinder, core alignment column, variable speed, linear movement, suspension, conical, truncated cone

● Compatible personal computer

IBM PC/AT compatible model running with the following operation conditions.

● Operation conditions

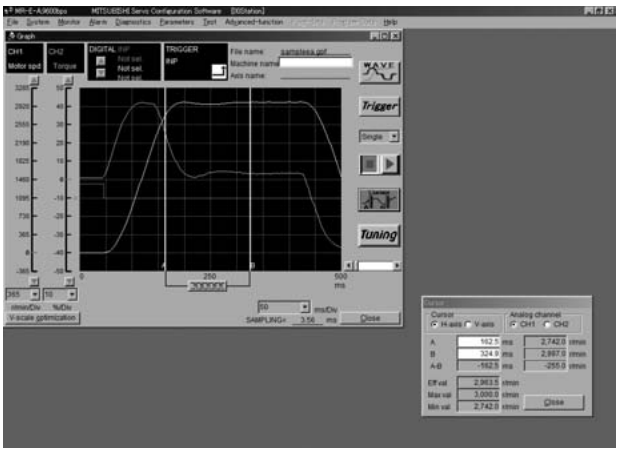
Components		Description (Note 1)
Personal computer (Note 2, 4)	OS (Note 3)	Windows® 98, Windows® Me, Windows® 2000 Professional, Windows® XP Professional, Windows® XP Home Edition, Windows Vista® Home Basic, Windows Vista® Home Premium, Windows Vista® Business, Windows Vista® Ultimate, Windows Vista® Enterprise
	Processor	Pentium®133MHz or more (Windows® 98, Windows® 2000 Professional) Pentium®150MHz or more (Windows® Me) Pentium®300MHz or more (Windows® XP Professional, Windows® XP Home Edition) 1GHz 32-bit (x86) (Windows Vista® Home Basic, Windows Vista® Home Premium, Windows Vista® Business, Windows Vista® Ultimate, Windows Vista® Enterprise)
	Memory	24MB or more (Windows® 98) 32MB or more (Windows® Me, Windows® 2000 Professional) 128MB or more (Windows® XP Professional, Windows® XP Home Edition) 512MB or more (Windows Vista® Home Basic) 1GB or more (Windows Vista® Home Premium, Windows Vista® Business, Windows Vista® Ultimate, Windows Vista® Enterprise)
	Free hard disk space	40MB or more
Browser		Internet Explorer 4.0 or above
Monitor		Resolution 800×600 or more, 16-bit high Color
Keyboard		Compatible with above personal computers.
Mouse		Compatible with above personal computers.
Printer		Compatible with above personal computers.

Notes: 1. Pentium is registered trademark of Intel Corporation. Windows and Windows Vista are registered trademarks of Microsoft Corporation in the United States and other countries.
2. This software may not run correctly, depending on a personal computer being used.
3. MRZJW3-MOTSZ111E software version C0 is compatible with Windows Vista®.
4. MRZJW3-MOTSZ111E is not compatible with 64-bit Windows® XP and 64-bit Windows Vista®.

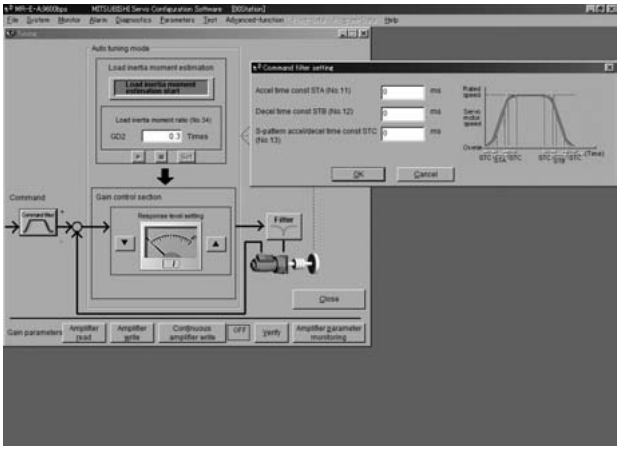
< MR Configurator (Setup software) >

● MRZJW3-SETUP154E (E:English)

This software makes it easy to perform monitor display, diagnostic, reading and writing of parameters, and test operations from the setup with a personal computer.



*The screens are for reference and may differ from the actual screens.



Features

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

● Operation conditions

Components		Description (Note 1)
Personal computer (Note 2)	OS	Windows® 95, Windows® 98, Windows® 98 Second Edition, Windows® Me, Windows NT® Workstation4.0, Windows® 2000 Professional, Windows® XP Professional and Windows® XP Home Edition
	Processor	Pentium® 133MHz or more (Windows® 95, Windows® 98, Windows® 98 Second Edition, Windows NT® Workstation4.0, Windows® 2000 Professional) Pentium® 150MHz or more (Windows® Me) Pentium® 300MHz or more (Windows® XP Professional, Windows® XP Home Edition)
	Memory	16MB or more (Windows® 95) 24MB or more (Windows® 98, Windows® 98 Second Edition) 32MB or more (Windows® Me, Windows NT® Workstation4.0, Windows® 2000 Professional) 128MB or more (Windows® XP Professional, Windows® XP Home Edition)
	Free hand disk space	60MB or more
	Communication interface	Serial port
Monitor		Resolution 800×600 or more, 16-bit high color
Keyboard		Compatible with above personal computers.
Mouse		Compatible with above personal computers. Note that serial mice are incompatible.
Printer		Compatible with above personal computers.
Communication cable		QC30R2

● Specifications

Main-menu	Functions
Monitors	Batch display, high speed monitor, graph display
Alarms	Alarm display, alarm history, display of data that generated alarm
Diagnostics	Digital I/O display, reason for rotation failure display, power ON count display, amplifier version display, motor information display, tuning data display, automatic voltage control offset display (Note 3), axis name setting
Parameters	Parameter setting, display of change list, tuning display, display of detailed information
Test operations	JOG operation, positioning operation (Note 4), motor-less operation, forced digital output, program operation using simple language (Note 4)
Advanced function	Machine analyzer, gain search (Note 4), machine simulation
File operation	Data reading, saving and printing
Others	Automatic operation, help display

Notes: 1. Pentium is registered trademark of Intel Corporation. Windows and Windows NT are registered trademarks of Microsoft Corporation in the United States and other countries.
2. This software may not run correctly, depending on the personal computer being used.
3. The automatic voltage control offset display is available only with the MR-E-AG type.
4. Positioning operation, program operation using simple language and gain search are available only with the MR-E-A type.

MELSOFT

Cautions Concerning Use

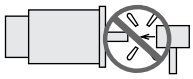
To ensure safe use

- To use the products given in this catalog properly, always read the "Installation Guide" and "MR-E-□A/AG-QW003 INSTRUCTION MANUAL" before starting to use them.
- These products have been manufactured as a general-purpose part for general industries, and have not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine, passenger movement vehicles or underwater relays, contact Mitsubishi.
- These products have been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

Cautions concerning use

Transport and installation of motor

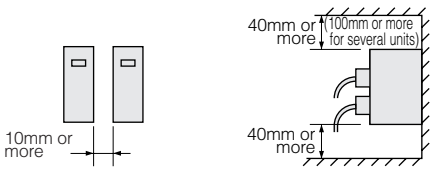
- Protect the motor or encoder from impact during handling. When installing a pulley or coupling, do not hammer on the shaft. Impact can damage the encoder. For a motor with a key, install a pulley or coupling with the screw of shaft-end. Use a pulley extractor when taking off the pulley.



- Do not apply a load exceeding the tolerable load onto the servo motor shaft. The shaft could break.

Installation

- Avoid installation in an environment in which oil mist, dust, etc. are in the air. When using in such an environment, enclose the servo amplifier in a sealed panel. Protect the motor by furnishing a cover for it or taking similar measures.
- Mount the amplifier vertically on a wall.
- When installing several amplifiers in a row in a sealed panel, leave 10mm or more open between each amplifier. When installing several units in a row, leave 100mm or more open in the upward direction, and 40mm or more in the downward direction, or install a fan to prevent heat from accumulating.
  When using one amplifier, leave 40mm or more open in the upward and downward directions.



- For a single motor, the motor can be mounted horizontally or vertically. When mounting vertically (shaft-up), take measures on the machine side to ensure that oil from the gear box does not get into the motor.
- Do not touch the servo motor during or after operation until it has had sufficient time to cool.
  The motor can be very hot, and severe burns may result from touching the motor.
- The optional regeneration unit becomes hot (the temperature rise of 100°C or more) with frequent use. Do not install within flammable objects or objects subject to thermal deformation. Take care to ensure that electrical wires do not come into contact with the unit.
- Carefully consider the cable clamping method, and make sure that bending stress and the stress of the cable's own weight are not applied on the cable connection section.
- If using in an application where the servo motor moves, select the cable bending radius according to the required bending life and wire type.
- Fix the power supply and encoder cables led out from the servo motor onto the servo motor so that they do not move. Failure to do so may result in disconnections.
  Do not modify the connector or terminals, etc., on the end of the cable.

Grounding

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

Wiring

- When a commercial power supply is applied to the amplifier's output terminals (U, V, W), the amplifier will be damaged. Before switching the power on, perform thorough wiring and sequence checks to ensure that there are no wiring errors, etc.
- When a commercial power supply is applied to the motor's input terminals (U, V, W), the motor will be damaged. Connect the motor to the amplifier's output terminals (U, V, W).
- Match the phase of the motor's input terminals (U, V, W) to the amplifier's output terminals (U, V, W) when connecting. If they are not the same, the motor control cannot be performed.
- For position or speed control mode, connect the stroke end signals (LSP, LSN) to the common terminal (VIN). If the signals are invalid, the motor will not rotate.
- Connect P and D on the power supply connector (CNP1) when using the built-in regenerative resistor.

Factory settings

- All available motor and amplifier combinations are predetermined. Confirm the models of the motor and amplifier to be used before installation.
- Select the control mode, motor series and motor capacity with the parameter No. 0.
- For MR-E-□A-QW003, position control mode is set as default. Change the setting value when using speed control mode.
- For MR-E-□AG-QW003, speed control mode is set as default. Change the setting value when using torque control mode.
- Change parameter No. 0 when using the optional regeneration unit. The optional regeneration unit is disabled as the default, so the parameter must be changed to increase the regeneration performance.

Operation

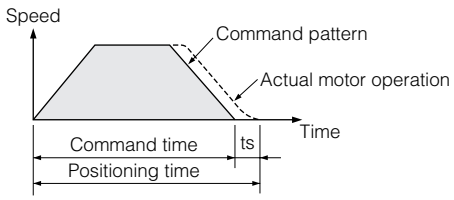
- When a magnetic contactor (MC) is installed on the amplifier's primary side, do not perform frequent starts and stops with the MC. Doing so may cause the amplifier to fail.
- Turn MC OFF if an alarm occurs.
- As for the amplifier, when trouble occurs, the amplifier's safety features will be activated, halting output, and the dynamic brake instantly stops the motor.
- When using a motor with an electromagnetic brake, do not apply the brake when the servo is on. Doing so may cause an amplifier overload or shorten brake life. Apply the brake when the servo is off.

Precautions for Choosing the Products

- Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

Cautions concerning model selection

- Select a motor with a rated torque above the continuous effective load torque.
- Design the operation pattern in the command section so that positioning can be completed, taking the stop setting time (ts) into account.



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

⚠ Safety Warning

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

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