Changes for the Better



MR-E Super

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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 management systems)









MELSOFT

Reducing workload with high performance and Enhancing the system cost

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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

3.Global Standard Products

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



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DDD

MR-E-20A-00003

Extensive Applications

Processing machines or machine tools



- 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

Enhancing machine performance

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.



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

		Rated speed		With	Global s	tandards			
	Motor series	(maximum speed) (r/min)	Rated output (kW)	electro- magnetic brake (B)	EN	UL cUL	Protection level	Feature	Application examples
Small capacity series	●HF-KEW1-S100	3000 (4500)	4 types 0.1, 0.2, 0.4, 0.75	\checkmark	\checkmark	\checkmark	IP55 Excluding the shaft- through portion and connector	Stable control from low to high speeds allows	 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	\checkmark	\checkmark	\checkmark	IP65 Excluding the shaft- through portion	compliance with a variety of applications.	 Material handling systems Robots X-Y tables

Global Standar

High Performance

■For servo amplifier



For servo motor



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Motor Specifications and Characteristics

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

		<u> </u>								
	Se	ervo m	otor series		HF-KE (B)W1-S100 (Lo	w inertia, small capacity)				
Se	rvo motor mo	odel		HF-KE13(B)W1-S100	HF-KE23(B)W1-S100	HF-KE43(B)W1-S100	HF-KE73(B)W1-S100			
Se	rvo amplifier	model		MR-E-10A/AG-QW003	MR-E-20A/AG-QW003	MR-E-40A/AG-QW003	MR-E-70A/AG-QW003			
	Power facil	lity cap	pacity (Note 1) (kVA)	0.3	0.5	0.9	1.3			
	Continuous	Rate	d output (W)	100	200	400	750			
	duty	Rate	d torque (N·m [oz·in])	0.32 (45.3)	0.64 (90.6)	1.3 (184)	2.4 (340)			
	Maximum t	torque	(N·m [oz·in])	0.95 (135)	1.9 (269)	3.8 (538)	7.2 (1020)			
	Rated spee	ed (r/m	iin)		30	00				
atas	Maximum s	speed	(r/min)		45	00				
	Permissible	e instai	ntaneous speed (r/min)		51	75				
	Power rate	at conti	nuous rated torque (kW/s)	11.5	16.9	38.6	39.9			
	Rated curr	ent (A)		0.8	1.4	2.7	5.2			
	Maximum	current	: (A)	2.4	4.2	8.1	15.6			
	Regenerative		With no options	(Note 4)	(Note 4)	249	140			
tor	braking freq		MR-RB032 (30W)	(Note 4)	(Note 4)	747	210			
motor	(times/min) (Note 2, 3)		MR-RB12 (100W)	_	(Note 4)	2490	700			
Servo			MR-RB32 (300W)	—	—	—	2100			
Se	Moment of ir J (×10-4kg·m		Standard	0.088 (0.481)	0.24 (1.31)	0.42 (2.30)	1.43 (7.82)			
	[J (oz·in ²)]	.)	With electromagnetic brake	0.090 (0.492)	0.31 (1.69)	0.50 (2.73)	1.63 (8.91)			
	Recommend	ded load	d/motor inertia moment ratio	Ma	ximum of 15 times the servo	motor's inertia moment (Note	5)			
	Speed/pos	sition d	etector	Increm	ental encoder (resolution per	servo motor rotation: 131072	2 p/rev)			
	Attachmen	its		_						
	Structure			То	tally enclosed non ventilated	(protection level: IP55) (Note	6)			
			Ambient temperature	0 to 40°C (32 t	o 104°F) (non freezing), stora	ge: -15 to 70°C (5 to 158°F)	(non freezing)			
	Environme	nt	Ambient humidity	80% RH max	imum (non condensing), stora	age: 90% RH maximum (non	condensing)			
	LINIOIIIIe	111	Atmosphere	Indoors (no	o direct sunlight); no corrosiv	e gas, inflammable gas, oil m	ist or dust			
			Elevation/vibration (Note 7)		1000m or less above sea le	evel; X: 49m/s ² Y: 49m/s ²				
	Mass		Standard	0.56 (1.3)	0.94 (2.1)	1.5 (3.3)	2.9 (6.4)			
	(kg [lb])		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.

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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 "Optional © 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

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



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

	Se	rvo motor series		HF-SE (B)JW1-S100 (Medi	um inertia, medium capacity)					
Se	rvo motor mo	del	HF-SE52(B)JW1-S100	HF-SE102(B)JW1-S100	HF-SE152(B)JW1-S100	HF-SE202(B)JW1-S100				
Se	rvo amplifier	model	MR-E-70A/AG-QW003	MR-E-100A/AG-QW003	MR-E-200A/	AG-QW003				
	Power facili	ty capacity (Note 1) (kVA)	1.0	1.7	2.5	3.5				
	Continuous running	Rated output (kW)	0.5	1.0	1.5	2.0				
	duty	Rated torque (N·m [oz·in])	2.39 (338)	4.77 (675)	7.16 (1010)	9.55 (1350)				
	Maximum to	orque (N·m [oz·in])	7.16 (1010)	14.3 (2020)	21.5 (3040)	28.6 (4050)				
	Rated speed (r/min)		2000							
e 40	Maximum s	peed (r/min)		30	00					
	Permissible	instantaneous speed (r/min)		. 34	50					
	Power rate a	t continuous rated torque (kW/s)	9.34	19.2	28.8	23.8				
	Rated curre	ent (A)	2.9	5.3	8.0	10				
	Maximum c	urrent (A)	8.7	15.9	24	30				
		With no options	120	62	152	71				
	Regenerativ		180	93		—				
	braking frequency (times/min) (Note 2, 3)	uency MR-RB12 (100W)	600	310		—				
to		MR-RB30 (300W)		_	456	213				
Servo motor	(11010 2, 0)	MR-RB32 (300W)	1800	930		—				
NO N		MR-RB50 (500W)	_	_	760	355				
Se	Moment of ine	ertia Standard	6.1 (33.4)	11.9 (65.1)	17.8 (97.3)	38.3 (209)				
	J (×10 ⁻⁴ kg·m ² [J (oz·in ²)]	With electromagnetic brake	8.3 (45.4)	14.0 (76.5)	20.0 (109)	47.9 (262)				
	Recommende	ed load/motor inertia moment ratio	Maximum of 15 times the servo motor's inertia moment (Note 4)							
	Speed/posi	tion detector	Inc	Incremental encoder (resolution per servo motor: 131072 p/rev)						
	Attachment	s		Oil	seal					
	Structure		Totally enclosed non ventilated (protection level: IP65) (Note 5)							
		Ambient temperature	0 to 40°C (32 t	to 104°F) (non freezing), store	age: -15 to 70°C (5 to 158°F)	(non freezing)				
		Ambient humidity	80% RH max	imum (non condensing), stor	age: 90% RH maximum (non	condensing)				
	Environmer	Atmosphere	Indoors (n	o direct sunlight); no corrosiv	e gas, inflammable gas, oil m	ist or dust				
		Elevation		1000m or less a	above sea level					
		Vibration (Note 6)		X : 24.5m/s ² Y : 24.5m/s ²		X : 24.5m/s² Y : 49m/s²				
	Mass	Standard	4.8 (11)	6.5 (15)	8.3 (19)	12 (27)				
	(kg [lb])	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.

 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 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 bracking 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.

Contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table.
 The shaft-through portion is excluded.

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



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Motor Dimensions

•HF-KE13(B)W1-S100



●HF-KE23(B)W1-S100, HF-KE43(B)W1-S100



●HF-KE73(B)W1-S100





Brake connector pin assignment (Note 3)							
Pin No.	Signal name						
1	B1						
2	B2						

(Unit: mm)

Signal name

Earth

U

w

B1

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)

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Model	Variable dimensions				
Widdei	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.

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Motor Special Specifications

Special shaft end specifications

Motors with the following specifications are available.

HF-KE (B)W1-S100



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)

			HF-KE	W1-S100		HF-SE_JW1-S100				
Motor model		13B	23B	43B	73B	52B	102B	152B	202B	
Туре		Spring-action safety brake					Spring-action safety brake			
Rated voltage			24VD	C-10%			24VD	C-10%		
Brake static	(N·m)	0.32	1.3	1.3	2.4	8.5	8.5	8.5	44	
friction torque	(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	(J)/time	5.6	22	22	64	400	400	400	4500	
braking work	(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.

(Unit: mm)

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.

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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 a	mplifier model MR-EQW003	10A	20A	40A	70A	100A	200A			
	Voltage/frequency (Note 1)			, 30VAC 50/60Hz or VAC 50/60Hz		3-phase 200 to	230VAC 50/60Hz			
Power supply	Permissible voltage fluctuation			C: 3-phase170 to 2 1-phase 207 to 253V		3-phase 17	70 to 253VAC			
	Permissible frequency fluctuation ±5% maximum									
Control s	system		Sin	e-wave PWM contro	l/current control sys	tem				
Dynamic	brake			Bui	lt-in					
a Built-in re	egenerative resistor		None Installed							
Safety features Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic the encoder fault protection, regeneration fault protection, undervoltage/sudden power outage pro overspeed protection, excess error protection					ic thermal), e protection,					
	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								
Position control	Command pulse multiple	Electronic gear A/B multiple, A: 1 to 65535, B: 1 to 65535, 1/50 < A/B < 50								
mode	Positioning complete width setting	0 to ±10000 pulses (command pulse unit)								
	Excess error	±2.5 rotations								
	Torque limit	Set by parameters								
	Speed control range	Internal speed command 1:5000								
Speed control mode	Speed fluctuation rate		±0.	01% maximum (load 0% (power fluc		0%)				
	Torque limit	Set by parameters								
Structure	;		Se	If-cooling open (IP0	0)		Fan cooling open (IP00)			
	Ambient temperature	0 to	55°C (32 to 131°F)	(non freezing), stora	ge: –20 to 65°C (–4	to 149°F) (non free	ezing)			
	Ambient humidity	90	% RH maximum (nc	on condensing), stor	age: 90% RH maxin	num (non condens	ing)			
Environ- ment	Atmosphere		Indoors (no direct s	unlight); no corrosiv	e gas, inflammable	gas, oil mist or due	st			
mont	Elevation			1000m or less a	above sea level					
	Vibration		5.9m/s² 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 a	amplifier model MR-EQW003	10AG	20AG	40AG	70AG	100AG	200AG		
_	Voltage/frequency (Note 1)			30VAC 50/60Hz or VAC 50/60Hz		3-phase 200 to 2	230VAC 50/60Hz		
Power supply	Permissible voltage fluctuation	For 3-phase 200 to 230VAC: 3-phase 170 to 253VAC3-phase 170 to 253VACFor 1-phase 230VAC: 1-phase 207 to 253VAC3-phase 170 to 253VAC							
	Permissible frequency fluctuation	±5% maximum							
Control s	system		Sin	e-wave PWM contro	l/current control sys	tem			
Dynamic	brake			Bui	lt-in				
Built-in re	egenerative resistor	No	one		Insta	alled			
Safety fe	eatures	Overcurrer encoder fau	ult protection, regene	eration overvoltage s eration fault protection erspeed protection,	on, undervoltage/su	idden power outage	c thermal), protection,		
	Speed control range		Analog speed	d command 1:2000,	internal speed com	nmand 1:5000			
	Analog speed command input	/rated speed							
Speed control mode	Speed fluctuation rate	±0.2% maxir		0%) n using analog speed command					
	Torque limit		Set by parameter	rs or external analog	input (0 to +10VDC	C/maximum torque)			
Torque	Analog torque command input		0 to ±8VD	C/maximum torque	(input impedance 1	0 to 12kΩ)			
control mode	Speed limit		Set by paramet	ers or external analo	og input (0 to ±10VE	C/rated speed)			
Structure	Э		Se	elf-cooling open (IPO	0)		Fan cooling open (IP00)		
	Ambient temperature	0 to	55°C (32 to 131°F)	(non freezing), stora	ge: –20 to 65°C (–4	to 149°F) (non free	zing)		
	Ambient humidity	90% RH maximum (non condensing), storage: 90% RH maximum (non condensing)							
Environ- ment	Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
mont	Elevation			1000m or less a	above sea level				
	Vibration			5.9m/s ² r	naximum				
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.

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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

- 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.
 Always turn on the emergency stop (EMG) signal (normally closed contact) before starting the operation. If not, the operation will not start.
 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.

- Signals with the same name are connected internally.
 The malfunction (ALM) signal (normally closed contact) is conducted to VIN in normal alarm-free condition
- This is for the motor with an electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity. Connect the shield wire securely to the plate inside the connector (ground plate).
- 9. This connection is not arecessary 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.

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. 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 12. When using a power 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.

Always turn on the emergency stop (EMG) signal (normally closed contact) before starting the operation. If not, the operation will not start.
 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.

- Signals with the same name are connected internally.
 The malfunction (ALM) signal (normally closed contact) is conducted to VIN in normal alarm-free condition.
- This is for the motor with an electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
 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.

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.
 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.
 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.

Disconnect P and D when connecting the optional regeneration unit externally
 Connect P and D when using the built-in regenerative resistor.

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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

- 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.
 Always turn on the emergency stop (EMG) signal (normally closed contact) before starting the operation. If not, the operation will not start.
 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 MRF-E-70AG-QW003 or smaller service 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.
- Disconcert P and D when concerting the optional regeneration unit externally
 Connect P and D when concerting the optional 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

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.

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

Amplifier Dimensions

•MR-E-10A/AG-QW003, 20A/AG-QW003

(Unit: mm)

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•MR-E-40A/AG-QW003



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Amplifier Dimensions

•MR-E-70A/AG-QW003, 100A/AG-QW003

(Unit: mm)







•MR-E-200A/AG-QW003



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Optional regeneration unit (Note 1)

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

		Built-in regenerative		Optional regeneration unit/tolerable regenerative power (W)							
	Servo amplifier model	resistor/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	—	—	—				
Ī	MR-E-70A/AG-QW003	20	30	100	—	300	_				
	MR-E-100A/AG-QW003	20	30	100	—	300	_				
ee	MR-E-200A/AG-QW003	100	_	_	300	—	500				

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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



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





- Notes: 1. This cable does not have a long bending life, so always fix the cable before using. 2. If the length exceeds 10m, relay a cable using 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 >



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• Cables and connectors (for MR-E-__A/AG-QW003)

		Ite	em	Model	Protection level	Description
	(1)		Encoder cable for HF-KE_(B)W1-S100	MR-J3ENCBL M-A1-H =cable length: 2, 5, 10m (Note 1)	IP65	
		10m or shorter (Direct	Lead out in direction of motor shaft	MR-J3ENCBL M-A1-L =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),
	2	connection type)	Encoder cable for HF-KE (B)W1-S100	MR-J3ENCBL M-A2-H =cable length: 2, 5, 10m (Note 1)	IP65	(
4U.			Lead out in opposite direction of motor shaft	MR-J3ENCBL M-A2-L =cable length: 2, 5, 10m (Note 1)	IP65	
	3		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 Junction connector (Tyco Electronics AMP)
	4	Exceeding	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	Use this in combination of (§) or (§). 1473226-1 (with ring) (contact) 1-172169-9 (housing) 316454-1 (cable clamp)
	(5)	(Relay type)	type) 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) MT-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL) 36210-0100PL (receptacle, 3M)
	9			MR-EKCBL M-L =cable length: 20, 30m (Note 1)	IP20	Use this in combination of ③ or ④.
Encoder cables and connector sets for CN2	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) CApplicable cable example> Wire size: 0.3mm² (AWG22) Completed cable outer diameter: \$8.2mm Crimping tool (91529-1) is required. Amplifier connector 54599-1019 (connector set, Molex 0 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M)
der cables	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)
Enco				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, straigh 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) 54599-1019 (connector set, Molex)
	10			MR-ENECNS	IP65 IP67	Amplifier connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M), or 54599-1019 (connector set, Molex)
For CN1	1	CN1 conne	ector	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.

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Options

• Cables and connectors (for MR-E-___A/AG-QW003)

			Ite	m	Model	Protection level	Description
		12	Analog mol RS-232C b	nitor/ ranch 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)
Dar	For CN3	(13) heeti	Analog mor RS-232C co		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 cc communica		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-01-J6-S6R (case)
		(Motor power supply cable for	MR-PWS1CBL M-A1-H	IP65	Motor power supply connector (Japan Aviation Electronics Industry)
		(15)	10m or shorter	HF-KE (B)W1-S100 Lead out in direction of motor shaft	MR-PWS1CBL M-A1-L =cable length: 2, 5, 10m (Note 1)	IP65	JNAFTORSJ1-R (blug) ST-TMH-S-C1B-100-(A534G) (socket contact)
			(Direct connection type)	Motor power supply cable for	MR-PWS1CBL_M-A2-H =cable length: 2, 5, 10m (Note 1)	IP65	
	side)	16		HF-KE (B)W1-S100 Lead out in opposite direction of motor shaft	MR-PWS1CBL M-A2-L =cable length: 2, 5, 10m (Note 1)	IP65	Lead-out
	rs (motor si	17	Exceeding	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)
	y connectors (motor	18	10m (Relay type)	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	Lead-out
	Motor power supply	(19	Motor power supply connector set (motor side) for		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: \phi10.5 to 14.1mm</applicable>
		8	Motor powe (motor side) HF-SE202(E		MR-PWCNS5 (Straight type)	IP65 IP67	Motor power supply connector (DDK) (E05-6A22-22SD-D-BSS (plug) (straight) (E3057-12A-1-D (cable clamp) <applicable cable="" example=""> Wire size: 5.5mm² (AWG10) to 8mm² (AWG8) Completed cable outer diameter: §12.5 to 16mm</applicable>
	-CNP1)	21)	(press bond	wer supply connector set ting type) for 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)
	supply connectors (for	2	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)
	Amplifier power supply	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)
	Amplifi	24	(insertion ty	ower supply connector /pe) for /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)

		lte	em	Model	Protection level	Description
CNP2)	25	(amplifier si	AG to 100A/AG-QW003	MR-ECNP2-A (Unit: 20 pcs/box)	_	Connector 51240-0300 Terminal 56125-0128 (Molex or an equivalent product) (Molex or an equivalent product)
connectors (for	26	(amplifier si	AG to 100A/AG-QW003	MR-ECNP2-B (Unit: 20 pcs/box)	_	Connector 54927-0310 (Molex or an equivalent product)
Motor power supply connectors (for CNP2)	Ø	(amplifier si	VAG-QW003	MR-ECNP2-A1 (Unit: 20 pcs/box)	_	Connector 54241-0300 (Molex or an equivalent product) Terminal 56125-0128 (Molex or an equivalent product)
Moto	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)
	29	10m or shorter (Direct connection type)		MR-BKS1CBL_M-A1-H =cable length: 2, 5, 10m (Note 1)	IP65	
				MR-BKS1CBL M-A1-L =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)
lectors	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	Lead-out
c brake conr				MR-BKS1CBL M-A2-L =cable length: 2, 5, 10m (Note 1)	IP65	
Motor electromagnetic brake connectors	31	Exceeding	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)
Motor	32	(Relay type)	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	Lead-out
	33	3 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: \overline{9.0} to 11.6mm</applicable>

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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.



© Plug © Cable clamp Cable © Cable (Angled type)

Motor model	Protection level	1) Plug (ma	anufactured by DDK Ltd.)	2 Cable clamp (man	ufactured by DDK Ltd.)
Wotor model	Protection level	Туре	Model	Cable outer diameter (mm)	Model
		Otraiakt		φ8.5 to 11	CE3057-10A-2-D
	IP65 IP67	Straight	CE05-6A18-10SD-D-BSS	φ10.5 to 14.1	CE3057-10A-1-D
HF-SE52(B)JW1-S100	EN standards	Analad		φ8.5 to 11	CE3057-10A-2-D
HF-SE102(B)JW1-S100 HF-SE152(B)JW1-S100		Angled	CE05-8A18-10SD-D-BAS	φ10.5 to 14.1	CE3057-10A-1-D
	General environment	Straight	D/MS3106B18-10S	¢14.3	D/MS3057-10A
	(Note 1)	Angled	D/MS3108B18-10S	(Inner diameter of bushing)	D/MS3057-10A
		Straight	ight CE05-6A22-22SD-D-BSS	φ9.5 to 13	CE3057-12A-2-D
	IP65 IP67			φ12.5 to 16	CE3057-12A-1-D
HF-SE202(B)JW1-S100	EN standards		CE05-8A22-22SD-D-BAS	φ9.5 to 13	CE3057-12A-2-D
		Angled		φ12.5 to 16	CE3057-12A-1-D
	General environment	Straight	D/MS3106B22-22S	¢15.9	D/MS3057-12A
	(Note 1)	Angled	D/MS3108B22-22S	(Inner diameter of bushing)	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: 0.75mm ² (AWG19) Completed cable outer diameter: ϕ 6.2 ± 0.3mm Fluoric resin wire (Vinyl jacket cable FV4C <ul 2103="" style=""> (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 ① Plug		2 Backshell (manufactured by DDK Ltd.)		③ Cable clamp (manufactured by DDK Ltd.)		
Motor model	level	(manufactured by DDK Ltd.)	Туре	Model	Cable outer diameter (mm)	Model	
	IP65, IP67	D/MS3106A20-29S (D190)	Straight	CE02-20BS-S-D	φ6.8 to 10	CE3057-12A-3-D	
HF-SE (B)JW1-S100	EN standards	D/WIS3106A20-295 (D 190)	Angled	CE-20BA-S-D	φο.οιΟΙΟ	CE3057-12A-3-D	





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

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.

	Matar madal	Protection level	el Connector Contact (Contont	Cable autor diamater (mm)	Description	
	Motor model	Protection level			Contact	Cable outer diameter (mm)		
				CM10-SP2S-S			φ4 to 6	
				CM10-SP2S-M	CM10-#22SC (S2)-100	Soldered type	φ6 to 9	
	HF-SE BJW1-S100	IP65 IP67	Straight	CM10-SP2S-L			φ9 to 11.6	
			Straight	CM10-SP2S-S	CM10-#22SC (C3)-100	100 Press bonding type	φ4 to 6	Manufacturer:
				CM10-SP2S-M			φ6 to 9	DDK Ltd.
hee	4U.com			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)	Magufagturar	Wire size: 0.5mm ² (AWG20) Completed cable outer diameter: ϕ 4.5 ± 0.3mm Fluoric resin wire (Vinyl jacket cable FV2C <ul 2103="" style=""> (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.



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	А
SF1253	MR-E-200A/AG-QW003	В



• 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.

			Electrical wire size (mm ²)				
Servo amplifier	Circuit breaker	Magnetic contactor	L1, L2, L3, 🕀	U, V, W, 🕒	P, C, D	B1, B2	
MR-E-10A/AG-QW003	30A frame 5A						
MR-E-20A/AG-QW003	30A frame 5A			1.25 (AWG16)			
MR-E-40A/AG-QW003	30A frame 10A	S-N10	2 (AWG14)	1.23 (AWG10)	2 (AWG14)	1.25 (AWG16)	
MR-E-70A/AG-QW003	30A frame 15A				2 (AWG14)	1.23 (AWG10)	
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)			

25 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.



High Performance

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.

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• 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.



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
	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
Output of results	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)			
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			
r (N) 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)			
o Tecosu Su d	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



Global Standar

High Performance

Easy Operation

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.

	Components	Description (Note 1)
9 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
uter (Note	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)
sonal computer	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)
Persol	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.



• Operation conditions

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 generalpurpose 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 guality 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

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- 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 arounding 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. www.DataSheet4U.com



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
 www.DataSheet4an.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.

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A 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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