MITSUBISHI General-Purpose AC Servo MITSUBISHI SERVO AMPLIFIERS & MOTORS

MR-J4 Sen MR-J4-10_ to M MR-J4-60_4 to MR-J4-10_1 to MR-J4W2-22B t MR-J4W3-222B MR-J4-03A6, M	IR-J4-22K MR-J4-22K_4	
	e of AC Servos	Q
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MR-J4 servo amplifiers can be used with the MR-D30 functional safety unit, MR-J3-D05 safety logic unit, or safety PLCs. (except for MR-J4-03A6 and MR-J4W2-0303B6) 2.3 Correct use Always use the MR-J4 servo amplifiers within specifications (voltage, temperature, etc. Refer to each instruction manual for details). Mitsubish IEctric Co. accepts no claims for liability if the equipment is used in any other way or if modifications are made to the device, even in the context of mounting and installation.

WARNING •It takes 15 minutes maximum for capacitor discharging. Do not touch the unit and terminals immediately after power off.

2.3.1 Peripheral device and power wiring The followings are selected based on IEC/EN 61800-5-1, UL 508C, and CSA C22.2 No.14. (1) Power Wiring (local wiring and crimping tool) Use only copper wires or copper bus bars for wiring. The following table shows the stranded wire sizes [AWG] and the crimp terminal symbols rated at 75 °C/60 °C. Table 2 De

Tabi	le 1. Recor	nmended wi	res		I able	e 2. Recomm	ended crimp te	rminais		
0 55 41 4 70	75 °C	C/60 °C strande	d wire [AWG]	(Note 2)		Servo ampl terr	Manu-			
Servo amplifier (Note 7)	L1/L2/L3	L11/L21	L11/L21 P+/C		Symbol	Crimp terminal (Note 2)	Applicable tool	facturer		
MR-J4-03A6/	19/-	/	/	19/-	а	FVD5.5-4	YNT-1210S			
MR-J4W2-0303B6	(Note 5)			(Note 6)	b (Note 1)	8-4NS	YHT-8S			
MR-J4-10_(1)/MR-J4-20_(1)/ MR-J4-40_(1)/MR-J4-60_(4)/ MR-J4-70_/MR-J4-100_(4)/ MR-J4-200_(4)(T)/ MR-J4-350_4					С	FVD2-4	YNT-1614			
MR-J4-40_(1)/MR-J4-60_(4)/	14/14			14/14	d	FVD14-6	YF-1			
MR-14-200 (4) (T)	14/14	14/14	14/14 14/14		e	FVD5.5-6	YNT-1210S			
MR-J4-350_4		14/14	14/14		f	FVD22-6	YF-1	IST		
MR-J4-200_(S)	12/12				g	FVD38-6	YF-1	JST (J.S.T		
MR-J4-350_	12/12			12/12	h	R60-8	YF-1	Mfg. Cr Ltd.)		
MR-J4-500_ (Note 1)	10: a/10: a		14: c/14: c	10: b/10: b	1	FVD5.5-8	YNT-1210S	LIU.)		
MR-J4-700_ (Note 1)	8: b/8: b		12: a/12: a	8: b/8: b	j	CB70-S8	YF-1			
MR-J4-11K_ (Note 1)	6: d/4: f		12: e/12: e	4: f/4: f	k	FVD2-6	YNT-1614			
MR-J4-15K_ (Note 1)	4: f/3: f		10: e/10: e	3: g/2: g		FVD8-6	YF-1			
MR-J4-22K_ (Note 1)	1: h/-: -	14 [.] c/14 [.] c	10: i/10: i	1: j/-: -	m	FVD14-8	YF-1			
MR-J4-500_4 (Note 1)	14: c/14: c	14: C/14: C	14 [.] c/14 [.] c	12: a/10: a	n	FVD22-8	YF-1			
MR-J4-700_4 (Note 1)	12: a/12: a		14. 0/14. 0	10: a/10: a	Note 1.	Coat the crimpin	ig part with an insu	lation tube		
MR-J4-11K_4 (Note 1)	10: e/10: e		14: k/14: k	8: 1/8: 1		Some crimp terr	ninals may not be i	nounted		
MR-J4-15K 4 (Note 1)	8: 1/8: 1		12: e/12: e	6: d/4: d	-	Some crimp terminals may not be mounted depending on the size. Make sure to use the				
MR-J4-22K_4 (Note 1)	6: m/4: m		12: i/12: i	6: n/4: n	1	recommended of	nes or equivalent of	ones.		
MR-J4WB	14/14 (Note 4)	14/14	14/14	14/14	1					

Select wire sizes depending on the rated output of the serve motors. The values in the table are sizes based on rated output of the serve amplifiers. Use the orms terminal c for the FE terminal of the serve amplifiers. The value is of UVIVIE for the NR-0448 and NR-04420 and

AC power input in the table. (2) Selection example of MCCB and fuse Use T class fuses or molded-case circuit breaker (UL 489 Listed MCCB) as the following table. The T class fuses and molded-case circuit breakers in the table are selected examples based on rated I/O of the servo amplifiers. When you select a smaller capacity servo motor to connect it to the servo amplifier you can also use smaller capacity T class fuses or molded-case circuit breaker than ones in the table. For selecting ones other than Class T fuses and molded-case circuit breakers below, refer to each servo amplifier instruction manual.

Servo amplifier (100 V class)	Molded-case circuit breaker (120 V AC)	Fuse (300 V)
MR-J4-10_1/MR-J4-20_1/MR-J4-40_1	NV50-SVFU-15A (50 A frame 15 A)	20 A
Servo amplifier (200 V class) (Note)	Molded-case circuit breaker (240 V AC)	Fuse (300 V)
MR-J4-10_/MR-J4-20_/MR-J4-40_/MR-J4-60_ (T)/MR-J4-70_ (T)/MR-J4W2-22B (T	NF50-SVFU-5A (50 A frame 5 A)	10 A
MR-J4-60_(S)/MR-J4-70_(S)/MR-J4-100_(T)/MR-J4W2-22B (S)/ MR-J4W2-44B (T)/MR-J4W2-77B (T)/MR-J4W3-222B/MR-J4W3-444B (T)	NF50-SVFU-10A (50 A frame 10 A)	15 A
MR-J4-100_(S)/MR-J4-200_(T)/MR-J4W2-44B (S)/MR-J4W2-1010B	NF50-SVFU-15A (50 A frame 15 A)	30 A
MR-J4-200_(S)/MR-J4-350_/MR-J4W2-77B (S)/MR-J4W3-444B (S)	NF50-SVFU-20A (50 A frame 20 A)	40 A
MR-J4-500_	NF50-SVFU-30A (50 A frame 30 A)	60 A
MR-J4-700_	NF50-SVFU-40A (50 A frame 40 A)	80 A
MR-J4-11K	NF100-CVFU-60A (100 A frame 60 A)	125 A
MR-J4-15K	NF100-CVFU-80A (100 A frame 80 A)	150 A
MR-J4-22K	NF225-CWU-125A (225 A frame 125 A)	300 A
lote. "(S)" means 1-phase 200 V AC power input and "(T)" means 3-phase 200 V AC	C power input in the table.	
Servo amplifier (400 V class)	Molded-case circuit breaker (480 V AC)	Fuse (600 V)
MR-J4-60 4/MR-J4-100 4	NF100-HRU-5A (100 A frame 5 A)	10 A
MR-J4-200 4	NF100-HRU-10A (100 A frame 10 A)	15 A
MR-J4-350 4	NF100-HRU-10A (100 A frame 10 A)	20 A
MR-J4-500_4	NF100-HRU-15A (100 A frame 15 A)	30 A
MR-J4-700_4	NF100-HRU-20A (100 A frame 20 A)	40 A
MR-J4-11K_4	NF100-HRU-30A (100 A frame 30 A)	60 A
MR-J4-15K_4	NF100-HRU-40A (100 A frame 40 A)	80 A
MR-14-22K 4	NE100-HRU-60A (100 A frame 60 A)	125 A

(3) Power supply (3) Power supply This servo amplifier can be supplied from star-connected supply with grounded neutral point of overvoltage category III (overvoltage category II for 1-phase servo amplifiers, MR-J4-03A6, and MR-J4W2-0303B6) set forth in IEC/EN 60664-1. For the interface power supply, use an external 24 V DC power supply with reinforced insulation on I/O terminals. In case of MR-J4-03A6 and MR-J4W2-0303B6, use DC power supplies of reinforced insulation type to main circuit, control circuit, and UL listed (recognized) 48 V DC/24 V DC power supplies which can generate more than 1.2 A/2.4 A per axis.

Grounding be task. To prevent an electric shock, always connect the protective earth (PE) of the cabinet. Do not connect two grounding cables to the same protective earth (PE) terminal. Always connect cables to the terminals one-to-one. This product can cause a DC current in the protective earthing conductor. To protect direct/indirect contact using an earth-leadage current breaker (RCD), only an RCD of type B can be used for the power supply side of the

another. The MR.44-700 4 is high protective earthing conductor current equipment, the minimum size of the protective earthing conductor must comply with the local safety regulations.

earthing conductor must comply with the local safety regulations. 2.3.2 EU compliance The MR-J4 servo amplifiers are designed to comply with the following directions to meet requirements for mounting, using, and periodic technical inspections: Machinery directive (2006/42/EC), EMC directive (2004/108/EC), and Low-voltage directive (2006/95/EC). (1) EMC requirement MR-J4 servo amplifiers comply with category C3 in accordance with EN 61800-3. As for I/O wires (max. length 10 m. Howver; 3 m for STO cable for CN8), and encoder cables (max. length 50 m), use shielded wires and ground the shields. Install an EMC filter and surge protector on the primary side for input and output of 200 V class and for output of 400 V class servo amplifiers. In addition, use a line noise filter for output of 210 V class; and 15 kW of 400 V class servo amplifiers. The following schows recommended products. EMC filter: Soshin Electric H7:00A-UN series (200 V class), TF3000C-TX series (400 V class) Surge protector: Okaya Electric Industries RSPD-250-U4 series Line noise filter for ubitshi Electric FR-MB, Lergies are not intended to be used on a low-workprag hubits further surgitor surger protector: Okaya Electric remainses:

Build protector. Oracle and control industries RSPD-20-04 series are industries recurst in the recent of the recen

(2)

.3.3 USA/Canada compliance his servo amplifier is designed in compliance with UL 508C and CSA C22.2 No.14.

- This serve ampliter is designed in compliance with UL 508C and CSA C22.2 No.14.
 Installation
 The minimum cabinet size is 150% of each MR-J4 serve amplifier's volume. Also, design the cabinet so that the ambient temperature in the cabinet is 55 °C or less. The serve amplifier will be installed in the metal cabinet. Additionally, mount the serve amplifier on a cabinet that the protective earth based on the standard of IEC/EN 60204-1 is correctly connected. For environment, the units should be used in open type (UL 50) and overvoltage category shown in table in section 8.1. The serve amplifier needs to be installed at or below of pollution degree 2. For connection, use copper wires.
 Short-circuit current rating (SCCR) Suitable for Use On A Circuit Capable Of Delivering Not More Than 100 kA rms Symmetrical Amperes, 500 Volts Maximum (for MR-J4-03A6 and MR-J4W2-03386).

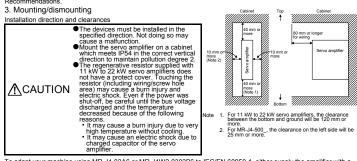
- 030386).
 3 Overload protection characteristics
 The MR-J4 servo amplifiers have solid-state servo motor overload protection. (It is set on the basis (full load
 current) of 120% rated current of the servo amplifier.)
 (4) Over-temperature protection for motor
 Motor Over temperature sensing is not provided by the drive.
 Integral thermal protection(s) is necessary for motor and refer to chapter 4 for the proper connection.
 (5) Branch circuit protection(s)
- (5) B
- Tranch circuit protection (5) of metabolic for interface to chapter 4 of the proper contraction. Franch circuit protection franch circuit protection Electrical Code and any applicable local codes. For installation in Canada, branch circuit protection must be provided, in accordance with the Canada Electrical Code and any applicable provincial codes.

- perform. 2) When monthing, installing, and using the MR-J4 servo amplifier, always observe standards and directives applicable in the country. (3) The item about noises of the test notices in the manuals should be observed.
- Residual risk
- Resucutar IBA Be sure that all safety related switches, relays, sensors, etc., meet the required safety standards. Perform all risk assessments and safety level certification to the machine or the system as a whole. If the upper and lower power module in the servo amplifier are shorted and damaged simultaneously, the servo motor may make a half revolution at a maximum.

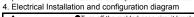
(4) Only qualified personnel are authorized to install, start-up, repair or service the machines in which these components are installed. Only trained engineers should install and operate the equipment. (ISO 13849-1 Table F.1 No.5)
 (5) Separate the wiring for safety observation function from other signal wirings. (ISO 13849-1 Table F.1 No.1)

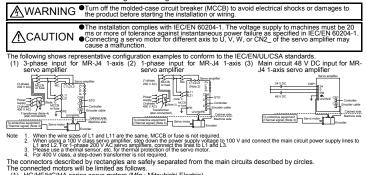
- (c) Separate the winning for safety observation function from other signal wirings. (ISO 13849-1 Tab.
 (6) Protect the cables with appropriate ways (routing them in a cabinet, using a cable guard, etc.).
 (7) Keep the required clearance/creepage distance depending on voltage you use.
 2.6 Disposal

2.6 Disposal Disposal of unusable or irreparable devices should always occur in accordance with the applicable country-specific waste disposal regulations. (Example: European Waste 16 02 14) 2.7 Lithium battery transportation To transport lithium batteries, take actions to comply with the instructions and regulations such as the United Nations (UN), the International Civil Aviation Organization (ICAO), and the International Maritime Organization (IMO). The batteries (IMR-BATGV1SET, MR-BATGV1SETA, MR-BATGV1, and MR-BATGV1BJ) are assembled batteries from two batteries (Ithium metal battery CR17335A) which are not subject to the dangerous goods (Class 9) of the UN ommendations.



To adapt your machine using MR-J4-03A6 or MR-J4W2-0303B6 to IEC/EN 60950-1, either supply the amplifier with a power supply complying with the requirement of 2.5 stated in IEC/EN 60950-1 (Limited Power Source), or cover the amplifier and motors connected to the outputs with a fire enclosure.





HG/HF/HC/HC/HA series servo motors (Mfg.: Mitsubishi Electric)
 Using a servo motor complied with IEC 60034-1 and Mitsubishi Electric encoder (OBA, OSA)

5. Signals

STO I/O signal connector CN8

5.2 I/O device Input device

5.1 Signal 5.2 I/O devic The following shows MR-J4-10B signals as a typical seample. For other servo amplifiers, refer to each servo amplifier instruction manual.

2 DI1 4 MO 6 LA 8 LZ 10 DICC

	C	13			EM2	Forced stop 2	CN:
	1	1	11)	STOCOM	Common terminal for input signals STO1/STO2	
	LG	12	LG		S101	STO1 state input	CN8
1	3	DI2	13		STO2	STO2 state input	
_	росом	14	MBR			Output device	
1	5	MO2	15		Symbol	Device	Conne
	DICOM	16 LAR	ALM 17		TOFCOM	Common terminal for monitor output signal in STO state	
-		18			TOFB1	Monitor output signal in STO1 state	CN8
,	LB	LZR	LBR		TOFB2	Monitor output signal in STO2 state	
	9 INP	20	19 DI3			Power supply	
DM		EM2		J	Symbol	Device	Conne
_		-	-	·	DICOM	Digital I/F power supply input	
-					DOCOM	Digital I/F common	CN3
					SD	Shield	1

4

3. Maintenance and service WARNING To avoid an electric shock, only qualified personnel should attempt inspections. For repair and parts replacement, contact your local sales office.

Inspection items s recommended that the following points periodically be checked. ¹ Check for loose terminal block screws. Retighten any loose screws. (Except for MR-J4-03A6 and MR-J4W2-

Servo amplifier	Tightening L1 L2 L3 N- P3 P4 P+	torque [l	N•m] L11 L21	UVWPE
MR-J4-10_(1)/MR-J4-20_(1)/MR-J4-40_(1)/ MR-J4-60_(4)/ MR-J4-70_/ MR-J4-100_(4)/MR-J4-200_(4)/MR-J4-350_(4)				1.2
MR-J4-500_	1.2		0.8	1.2
MR-J4-700_(4)/MR-J4-500_4	1.2	Ϊ	0.8	1.2
MR-J4-11K_(4)/MR-J4-15K_(4)	3.0	Ϊ	1.2	3.0
MR-J4-22K_(4)	6.0	Ϊ	1.2	6.0
MR-J4WB			_	1.2
(2) Servo motor bearings, brake section, etc. for unusual noi	se			

Servo motor bearings, brake section, etc. for unusual noise. Check the cables and the like for scratches or cracks. Perform periodic inspection according to operating conditions. Check that the connectors are securely connected to the servo motor. Check that the wires are not coming out from the connector. Check for dust accumulation on the servo amplifier. Check the servo motor shaft and coupling for connection.

- 6.2 Parts ha service lives

Parts having service news vice lives of the following parts are listed below. However, the service lives vary depending on operation and ronment. If any fault is found in the parts, they must be replaced immediately regardless of their service lives. For s replacement, please contact your local sales office.

Part name	Life guideline
Smoothing capacitor	(Note 3) 10 years
Relay	Number of power-on, forced stop and controller forced stop times: 100 000 times Number of on and off for STO: 1,000,000 times
Cooling fan	10,000 hours to 30,000 hours (2 years to 3 years)
(Note 1) Battery backup time	Approximately 20,000 hours (equipment power supply: off, ambient temperature: 20 °C)
(Note 2) Battery life	5 years from date of manufacture
 The time is for using MR-J4 1-axis servo ampli BAT6V1BJ. For details and other battery back Quality of the batteries degrades by the storag status 	ifier with an rotary servo motor using MR-BAT6V1SET, MR-BAT6V1SET-A, or MR- up time, refer to each instruction manual e condition. The battery life is 5 years from the production date regardless of the connection

status. 3. The characteristic of smoothing capacitor is deteriorated due to ripple currents, etc. The life of the capacitor greatly depends on ambient temperature and operating conditions. The capacitor will be the end of its life in 10 years of continuous operation in normal air conditioned environment (40 °C surrounding air temperature or less for use at the maximum 1000 m above sea level, 30 °C or less for over 1000 m to 2000 m). 7. Transportation and storage

Transport the products correctly according to their mass. Stacking in excess of the limited number of product packages is not allowed. Do not hold the front cover to transport the servo amplifier. Otherwise, it may drop. Install the product in a load-bearing place of servo amplifier and servo motor in account with the instruction manual. **ACAUTION** Install the product in a load-beam prace or serve imprimer and serve motion in accordant with the instruction manual.
 Do not get on or put heavy load on the equipment.
 For detailed information on transportation and handling of the battery, refer to the serve

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When you k	eep or use it, please ful	fill the following environment.
	Item	Environment
Amelainet		
temperature	Transportation (Note) [°C]	-20 to 65 Class 2K4 (IEC/EN 60721-3-2)
Ambient temperature Storn Ambient Ope humidity Stor Vibration resistance Pollution degree IP rating Altitude Tran	Storage (Note) [°C]	-20 to 65 Class 1K4 (IEC/EN 60721-3-1)
Ambient temperature Operation (*C) 0 to 55 Class 3K3 (EC/EN 80721-3-3) Ambient temperature Transportation (Note) (*C) -20 to 56 Class 2K4 (IEC/EN 60721-3-2) Ambient humidity Storage (Note) (*C) -20 to 56 Class 1K4 (IEC/EN 60721-3-2) Ambient humidity Operation, transportation, transportation 5 % RH to 90 % RH Vibration resistance 57 Hz to 150 Hz with constant acceleration of 9.8 m/s' to IEC/EN 6100-5-1 (Test Fc of IEC Depration 5 m/s' to IEC/EN 60721-3-2) Pollution degree Class 2M3 (IEC/EN 60721-3-2) Storage Class 1M3 (IEC/EN 60721-3-2) Pollution degree IP20 (IEC/EN 60721-3-2) Class 1M4 (IEC/EN 60721-3-2) IP rating Operation storage Operation (Note) Class 1M3 (IEC/EN 60721-3-2) IP rating IP20 (IEC/EN 60721-3-2) Class 1M3 (IEC/EN 60721-3-2) Depration storage IP rating Operation storage IP20 (IEC/EN 60721-3-2) Depration storage		
humidity s Vibration resistance	Test condition	10 Hz to 57 Hz with constant amplitude of 0.075 mm 57 Hz to 150 Hz with constant acceleration of 9.8 m/s ² to IEC/EN 61800-5-1 (Test Fc of IEC 60068-2-6)
	Operation	5.9 m/s ²
realaterice	Transportation (Note)	Class 2M3 (IEC/EN 60721-3-2)
Vibration resistance		Class 1M2 (IEC/EN 60721-3-2)
Pollution degree	ee	2
ID rating		
ii iauily		
Altitude	Operation, storage	
Alutude	Transportation	Max. 10000 m above sea level
Note. In regula	ir transport packaging	

(2) Persons who have read and raminiarized nimserinterseri with this installation guide and operating manuals for the protective devices (e.g., light curtain) connected to the safety control system.
2.2 Applications of the devices
MR-14 serve amplifiers comply with the following standards.
IEC/EN 61800-5-1, IEC/EN 61800-3, IEC/EN 60204-1
ISO/EN ISO 13849-1 Category 3 PL e, IEC/EN 62061 SIL CL 3, IEC/EN 61800-5-2 (STO) (Except for MR-J4-03A6 and MR-J4W2-030386, Refer to section 8.1 for compatible models.)

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Contents of the package

Unpack the product and check the rating plate to see if the servo motor is as you ordered.	
Contents	C
Servo amplifier	
MELSERVO-J4 Series Instructions and Cautions for Safe Use of AC Servos (This guide)	

Rating plate The following shows an example.	ample of rating plate for explanation
Construction C	Serial number Model Capacity Rated output current Rated output current Ambient temperature Frang KC certification number KC certification number

Warning plate Model The following shows an example of warning plate. The following describes what each block of a model name indicates

ee	Not all combinations of the symbols are available.	
して WARNING 警告	MR-J-4W2-22B- Series Number of avers	
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About the manuals

1.1 MELSERVO J4 relevant manuals This installation guide explains how to mount MR-J4 servo amplifiers. You can also check it with our website for free. http://www.misubshielectic.com/fa/ if you have any questions about the operation or programming of the equipment described in this guide, contact your local sales office.

In addition, when you mount a protective device, specific technical skills which are not detailed in the guide will be

In addition, when you mount a protective device, specific technical skills which are not detailed in the guide will be required. 1.2 Purpose of this guide This installation guide explains the safe operation of MR-J4 servo amplifiers for engineers of machinery manufacturers and machine operators. This installation guide does not explain how to operate machines in which safe servo system is, or will be integrated. For detailed information of the products, refer to each servo amplifier instruction manual. 1.3 Terms related to safety 1.3 Terms related to safety 1.3 TIEC 61800-5-25 top function STO function (Refer to IEC 61800-5-2:2007 4.2.2.2 STO.) The MR-J4 servo amplifiers have the STO function. The STO function shuts down energy to servo motors, thus removing torque. This function electronically cuts off power supply in the servo amplifier. In addition, MR-J4-03A6 and MR-J4W2-0303B6 don't support this function. 2. About safety

This chapter explains safety of users and machine operators. Please read the chapter carefully before mounting the equipment. In this installation guide, the specific warnings and cautions levels are classified as follows.

WARNING Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

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

Professional engineer
 Only professional engineers should mount MR-J4 servo amplifiers.
 Here, professional engineers should meet the all conditions below.
 Persons who took a proper training of related work of electrical equipment or persons who can avoid risk based on operation of the province of t

- past experience.(2) Persons who have read and familiarized himself/herself with this installation guide and operating manuals for the

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of each item.

I WIR-J4 Selvo a	MR-	J4-10_/MR-J4-20_/							MR	-J4-6	0 4/	1		
Item		MR-J4-200 / MR-J4W2- MR-J4W2-22B/ MR-J4-1 MR-J4W2-44B/ MR-J4-1 MR-J4W3-222B/ MR-J4-2 MR-J4W3-222B/ MR-J4-2							MR- MR- MR- MR-	MR-J4-11K_4/ MR-J4-11K_4/ MR-J4-22K_4				A6/ 303B6
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