

Mitsubishi Electric AC Servo System

MITSUBISHI ELECTRIC SERVO SYSTEM
MELSERVO-J5

MR-J5D-G-N1
User's Manual
(Introduction)

-MR-J5D_-_G_-_N1

SAFETY INSTRUCTIONS

Please read the instructions carefully before using the equipment.

To use the equipment correctly, do not attempt to install, operate, maintain, or inspect the equipment until you have read through this manual, installation guide, and appended documents carefully. Do not use the equipment until you have a full knowledge of the equipment, safety information and instructions.

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



WARNING

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



CAUTION


Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight injury.

Note that the CAUTION level may lead to a serious consequence depending on conditions.


Please follow the instructions of both levels because they are important to personnel safety.

Forbidden actions and required actions are indicated by the following diagrammatic symbols.



Indicates a forbidden action. For example, "No Fire" is indicated by .



Indicates a required action. For example, grounding is indicated by .

In this manual, precautions for hazards that can lead to property damage, instructions for other functions, and other information are shown separately in the "Point" area.

After reading this manual, keep it accessible to the operator.

[Transportation]



CAUTION

- To prevent injury, transport the products correctly according to their mass.
-

[Installation/wiring]



WARNING

- To prevent an electric shock, turn off the power and wait for 20 minutes or more before starting wiring and/or inspection.
 - To prevent an electric shock, ground the converter unit/drive unit.
 - To prevent an electric shock, any person who is involved in wiring should be fully competent to do the work.
 - To prevent an electric shock, mount the converter unit/drive unit before wiring.
 - To prevent an electric shock, connect the protective earth (PE) terminal of the converter unit/drive unit to the protective earth (PE) of the cabinet, then connect the grounding lead wire to the ground.
 - To prevent an electric shock, do not touch the conductive parts.
-

[Setting/adjustment]



WARNING

- To prevent an electric shock, do not operate the switches with wet hands.
-

[Operation]

WARNING

- To prevent an electric shock, do not operate the switches with wet hands.
-

[Maintenance]

WARNING

- To prevent an electric shock, any person who is involved in inspection should be fully competent to do the work.
 - To prevent an electric shock, do not operate the switches with wet hands.
-

ABOUT THE MANUAL

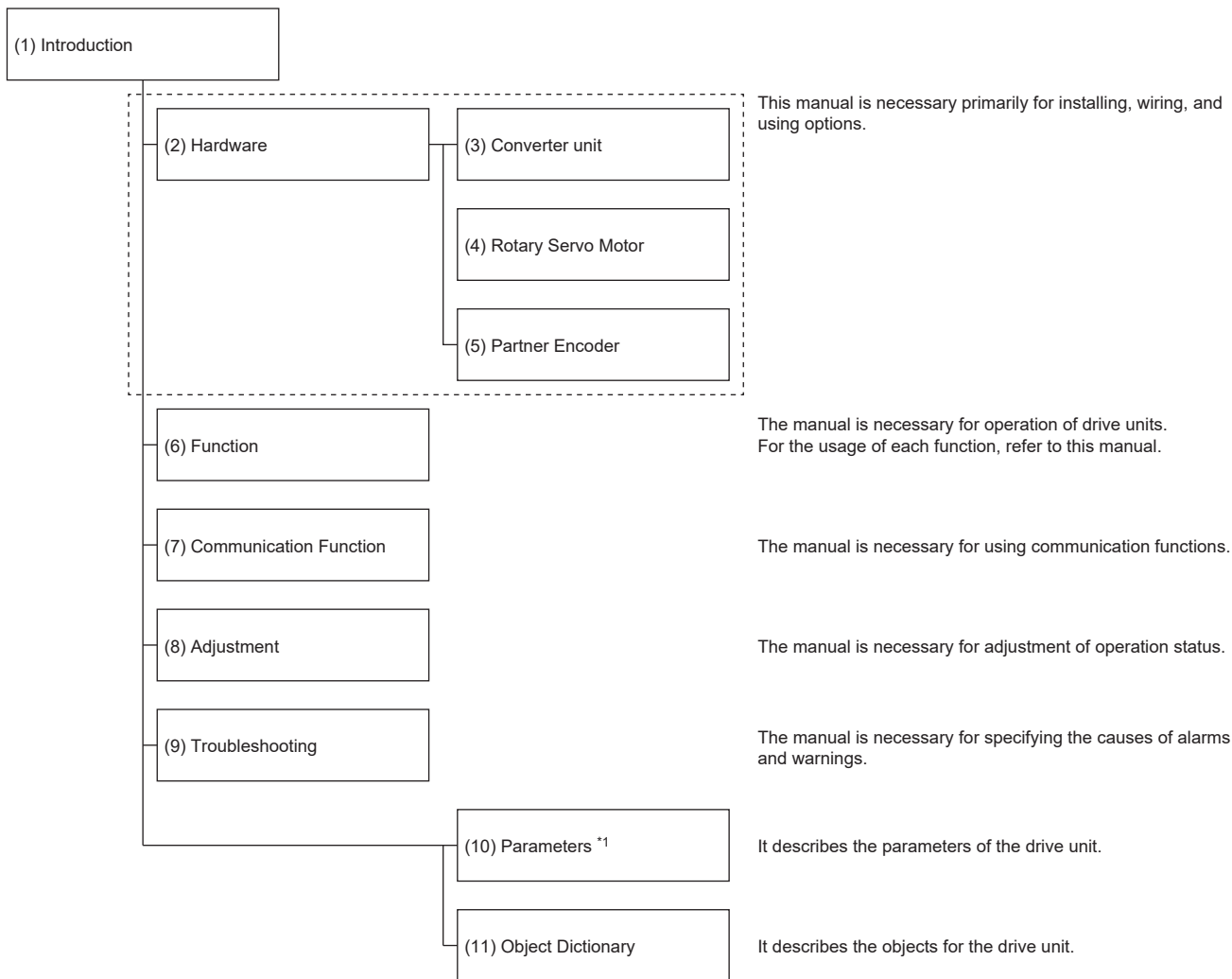
Point

e-Manuals are Mitsubishi Electric FA electronic book manuals that can be browsed with a dedicated tool.

e-Manuals enable the following:

- Searching for desired information in multiple manuals at the same time (manual cross searching)
 - Jumping from a link in a manual to another manual for reference
 - Browsing for hardware specifications by scrolling over the components shown in product illustrations
 - Bookmarking frequently referenced information
 - Copying sample programs to engineering tools
-

If using the servo for the first time, prepare and use the following related manuals to ensure that the servo is used safely.



*1 For details of parameters, read chapter 7 and chapter 8 of this manual first.

☞ Page 73 SERVO PARAMETERS

☞ Page 113 NETWORK PARAMETERS

☞ Page 116 FUNCTIONAL SAFETY PARAMETERS

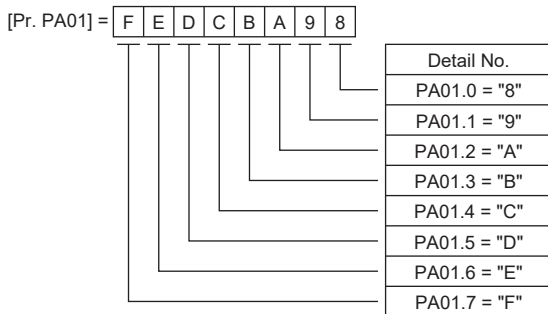
No.	Manual name	Manual No.
(1)	MR-J5D-G-N1 User's Manual (Introduction)	IB(NA)-0300543ENG
(2)	MR-J5D User's Manual (Hardware)	IB(NA)-0300548ENG
(3)	MR-CV Power Regeneration Converter Unit User's Manual	IB(NA)-0300553ENG
(4)	Rotary Servo Motor User's Manual (For MR-J5)	SH(NA)-030314ENG
(5)	MR-J5 Partner's Encoder User's Manual	SH(NA)-030320ENG
(6)	MR-J5 User's Manual (Function)	SH(NA)-030300ENG
(7)	MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Communication Function)	SH(NA)-030371ENG
(8)	MR-J5 User's Manual (Adjustment)	SH(NA)-030306ENG
(9)	MR-J5 User's Manual (Troubleshooting)	SH(NA)-030312ENG
(10)	MR-J5-G/MR-J5W-G User's Manual (Parameters)	SH(NA)-030308ENG
(11)	MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Object Dictionary)	SH(NA)-030376ENG

Interpreting servo parameter numbers

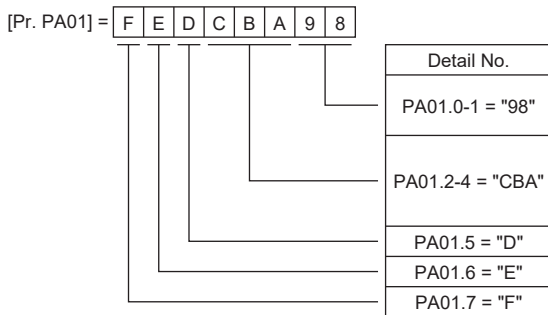
For a servo parameter which uses one particular digit to select a function, the position of its digit indicates the detail number of the servo parameter, and the value in hexadecimal which is set to the digit indicates the selected function.

For example, the detail number of the servo parameter in the last digit is expressed as [Pr. PA01.0]. In addition, a servo parameter which uses a combination of several digits to select a function, is expressed using "-" as seen in [Pr. PA01.0-1]. The following is an example of the servo parameter number PA01 with the setting values of "FEDCBA98" in hexadecimal.

- When setting a servo parameter with one particular digit



- When setting a servo parameter using a combination of several digits



For example, if the servo parameter name is "Function selection A-1", the setting digit name is "Forced stop deceleration function selection", and the setting digit is the fourth last digit in PA04, the servo parameter is expressed as shown below.

[Pr. PA04.3 Forced stop deceleration function selection]

Servo parameter	Symbol	Name	Summary
PA04.3	*AOP	Forced stop deceleration function selection	Set "Forced stop deceleration function" to enabled/disabled. Initial value: 1h (enabled)

Global standards and regulations

Compliance with the indicated global standards and regulations is current as of the release date of this manual. Some standards and regulations may have been modified or withdrawn.

U.S. CUSTOMARY UNITS

U.S. customary units are not shown in this manual. Convert the values if necessary according to the following table.

Quantity	SI (metric) unit	U.S. customary unit
Mass	1 [kg]	2.2046 [lb]
Length	1 [mm]	0.03937 [inch]
Torque	1 [N•m]	141.6 [oz•inch]
Moment of inertia	1 [(× 10 ⁻⁴ kg•m ²)]	5.4675 [oz•inch ²]
Load (thrust load/axial load)	1 [N]	0.2248 [lbf]
Temperature	N [°C] × 9/5 + 32	N [°F]

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1 SPECIFICATIONS

1.1 Outline

MR-J5D-_G_-N1 are EtherCAT drive units. EtherCAT is an abbreviation of Ethernet for Control Automation Technology. It is open network communication between a master station and slave stations via real-time Ethernet developed by Beckhoff Automation GmbH.

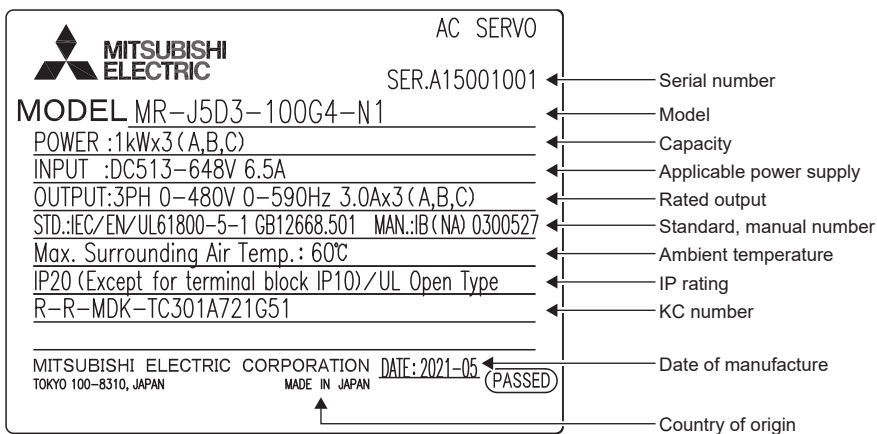
MR-J5D2-_G_-N1 and MR-J5D3-_G_-N1 drive units can drive two or three servo motors with one drive unit. The footprint of MR-J5D2-_G_-N1 and MR-J5D3-_G_-N1 drive units is considerably smaller than that of two or three MR-J5D1-_G_-N1 drive units.



1.2 Model designation

Rating plate

The following shows an example of the rating plate for explanation of each item.

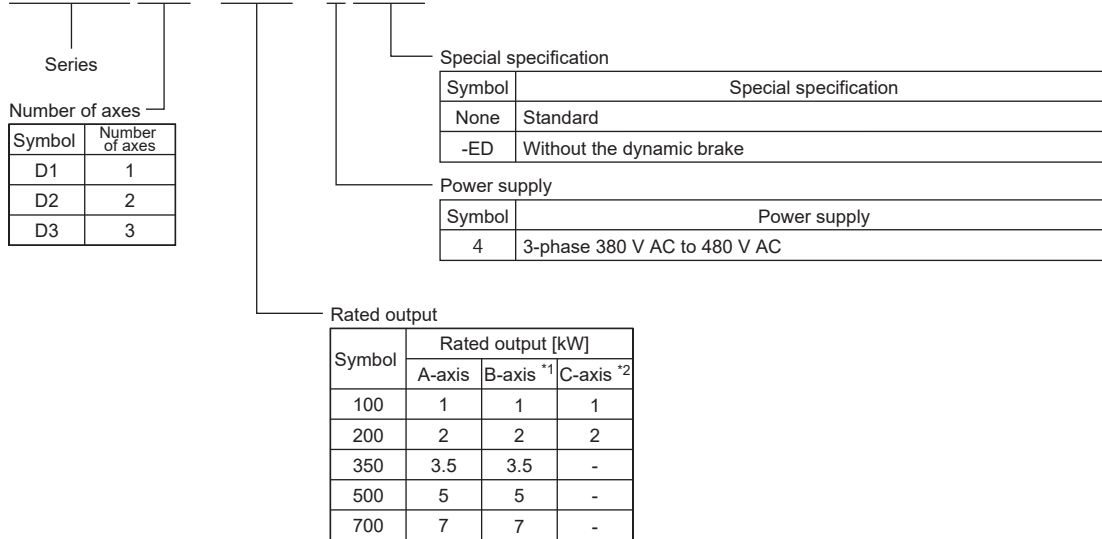


Model

The following describes what each block of a model name indicates. Not all combinations of the symbols are available.

■ MR-J5D_-G_-N1

MR - J 5 D 1 - 1 0 0 G 4 - E D N 1



*1 For the 2-axis drive unit and 3-axis drive unit.

*2 For the 3-axis drive unit.

Item	Special specifications ^{*1}						Detailed explanation
	Not attached (standard model)			-ED			
	MR-J5D1	MR-J5D2	MR-J5D3	MR-J5D1	MR-J5D2	MR-J5D3	
CN2AL connector	○	×	×	○	×	×	☞ Page 35 External encoder connector
Fully closed loop system	○	○	×	○	○	×	
Scale measurement function	○	×	×	○	×	×	
Built-in dynamic brake	○	○	○	×	×	×	☞ Page 21 Special specifications

*1 ○: The corresponding item is included or supported.

×: The corresponding item is not included or not supported.

1.3 Drive unit/motor combinations

Refer to "Drive unit/motor combinations" in the following manual.

☞ MR-J5D User's Manual (Hardware)

1.4 Drive unit standard specifications

MR-J5D1-_G_-N1

400 V class


Model: MR-J5D1-_N1		100G4	200G4	350G4	500G4	700G4
Output	Voltage	3-phase 0 V AC to 480 V AC				
	Rated current [A]	3.0	5.5	8.6	14.0	17.0
Main circuit power supply input		The main circuit power of the drive unit is supplied by the converter unit.				
Control circuit power supply input	Voltage/Frequency	1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz				
	Rated current [A]	0.2				
	Permissible voltage fluctuation	1-phase 323 V AC to 528 V AC				
	Permissible frequency fluctuation	Within $\pm 5\%$				
	Power consumption [W]	40				
	Inrush current [A]	Refer to "Inrush currents at power-on of control circuit" in the following manual. MR-J5D User's Manual (Hardware)				
Interface power supply	Voltage	24 V DC $\pm 10\%$				
	Current capacity [A]	0.3 (including CN8 connector signals) ^{*1}				
Control method		Sine-wave PWM control, current control method				
Dynamic brake		Built-in				
EtherCAT	Communication cycle	125 μ s, 250 μ s, 500 μ s, 1 ms, 2 ms, 4 ms, 8 ms				
Communication function	USB	Connection to a personal computer or other devices (MR Configurator2-compatible)				
Encoder output pulses		Compatible (A/B/Z-phase pulse)				
Analog monitor		Two channels				
Fully closed loop control		Supported				
Scale measurement function		Supported				
Load-side encoder interface		Mitsubishi Electric high-speed serial communication/A/B/Z-phase differential input signal				
Protective functions		Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, excessive error protection, magnetic pole detection protection, and linear servo control error protection				
Satisfied standards	CE marking	LVD: EN 61800-5-1, EMC: EN 61800-3, MD: EN ISO 13849-1:2015, EN 61800-5-2, EN 62061				
	UKCA marking	LVD: BS EN 61800-5-1, EMC: BS EN IEC 61800-3, MD: BS EN ISO 13849-1:2015, BS EN 61800-5-2, BS EN 62061				
	UL standard	UL 61800-5-1				
Structure (IP rating)		Natural cooling, open (IP20) ^{*2}			Force cooling, open (IP20) ^{*2}	
Mass [kg]		5.5			4.6	

*1 This value is applicable when all I/O signals are used. Reducing the number of I/O points decreases the current capacity.

*2 IP20 requires a side protection cover (an option).

MR-J5D2-_G_-N1

400 V class

Model: MR-J5D2-_N1		100G4	200G4	350G4	500G4	700G4
Output	Voltage	3-phase 0 V AC to 480 V AC				
	Rated current (each axis) [A]	3.0	5.5	8.6	14.0	17.0
Main circuit power supply input		The main circuit power of the drive unit is supplied by the converter unit.				
Control circuit power supply input	Voltage/Frequency	1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz				
	Rated current [A]	0.2				
	Permissible voltage fluctuation	1-phase 323 V AC to 528 V AC				
	Permissible frequency fluctuation	Within ± 5 %				
	Power consumption [W]	40				
	Inrush current [A]	Refer to "Inrush currents at power-on of control circuit" in the following manual.  MR-J5D User's Manual (Hardware)				
Interface power supply	Voltage	24 V DC ± 10 %				
	Current capacity [A]	0.35 (including CN8 connector signals) *1				
Control method		Sine-wave PWM control, current control method				
Dynamic brake		Built-in				
EtherCAT	Communication cycle	250 μ s, 250 μ s, 500 μ s, 1 ms, 2 ms, 4 ms, 8 ms				
Communication function	USB	Connection to a personal computer or other devices (MR Configurator2-compatible)				
Encoder output pulses		Compatible (A/B-phase pulse)				
Analog monitor		Two channels				
Fully closed loop control		Supported				
Scale measurement function		Supported				
Load-side encoder interface		Mitsubishi Electric high-speed serial communication				
Protective functions		Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, excessive error protection, magnetic pole detection protection, and linear servo control error protection				
Satisfied standards	CE marking	LVD: EN 61800-5-1, EMC: EN 61800-3, MD: EN ISO 13849-1:2015, EN 61800-5-2, EN 62061				
	UKCA marking	LVD: BS EN 61800-5-1, EMC: BS EN IEC 61800-3, MD: BS EN ISO 13849-1:2015, BS EN 61800-5-2, BS EN 62061				
	UL standard	UL 61800-5-1				
Structure (IP rating)		Natural cooling, open (IP20) *2	Force cooling, open (IP20) *2			
Mass [kg]		5.7	5.6	6.2		

*1 This value is applicable when all I/O signals are used. Reducing the number of I/O points decreases the current capacity.

*2 IP20 requires a side protection cover (an option).

MR-J5D3-_G_-N1

400 V class


Model: MR-J5D3-_N1		100G4	200G4
Output	Voltage	3-phase 0 V AC to 480 V AC	
	Rated current (each axis) [A]	3.0	5.5
Main circuit power supply input		The main circuit power of the drive unit is supplied by the converter unit.	
Control circuit power supply input	Voltage/Frequency	1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz	
	Rated current [A]	0.2	
	Permissible voltage fluctuation	1-phase 323 V AC to 528 V AC	
	Permissible frequency fluctuation	Within ± 5 %	
	Power consumption [W]	40	
	Inrush current [A]	Refer to "Inrush currents at power-on of control circuit" in the following manual. IB0300548ENG	
Interface power supply	Voltage	24 V DC ± 10 %	
	Current capacity [A]	0.45 (including CN8 connector signals) *1	
Control method		Sine-wave PWM control, current control method	
Dynamic brake		Built-in	
EtherCAT	Communication cycle	250 μ s, 250 μ s, 500 μ s, 1 ms, 2 ms, 4 ms, 8 ms	
Communication function	USB	Connection to a personal computer or other devices (MR Configurator2-compatible)	
Encoder output pulses		Not supported	
Analog monitor		Two channels	
Fully closed loop control		Not supported	
Scale measurement function		Not supported	
Protective functions		Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, excessive error protection, magnetic pole detection protection, and linear servo control error protection	
Satisfied standards	CE marking	LVD: EN 61800-5-1, EMC: EN 61800-3, MD: EN ISO 13849-1:2015, EN 61800-5-2, EN 62061	
	UKCA marking	LVD: BS EN 61800-5-1, EMC: BS EN IEC 61800-3, MD: BS EN ISO 13849-1:2015, BS EN 61800-5-2, BS EN 62061	
	UL standard	UL 61800-5-1	
Structure (IP rating)		Natural cooling, open (IP20) *2	Force cooling, open (IP20) *2
Mass [kg]		5.9	5.8

*1 This value is applicable when all I/O signals are used. Reducing the number of I/O points decreases the current capacity.

*2 IP20 requires a side protection cover (an option).

Positioning mode

Point table method (CP)

Item		Description
Command interface		Object dictionary
Operation specifications		Positioning by specifying the point table number (255 points)
System		Signed absolute value command method
Position command input	Absolute value command method	Setting in the point table Setting range of feed length for one point: -2147483648 to 2147483647 [μm], -214748.3648 to 214748.3647 [inch], -2147483648 to 2147483647 [pulse], -360.000 to 360.000 [degree]
Speed command input		Set the servo motor speed in the point table. Set the acceleration/deceleration time constants and acceleration/deceleration in the point table. Set the S-pattern acceleration/deceleration time constant in [Pr. PT51]. The speed unit can be selected ([r/min], command unit/s) The acceleration/deceleration unit can be selected ([ms], command unit/s ²)
Torque limit		Setting by the servo parameter or object dictionary
Point table mode (pt)	One positioning operation	Point table number input method Perform one positioning operation based on the position command and speed command.
	Continuous positioning operation	Speed change operation (2nd gear to 255th gear)/ Continuous positioning operation (2 points to 255 points)/ Continuous operation to the point table selected at startup/ Continuous operation to the point table No. 1
JOG operation mode (jg)	JOG operation	Perform inching operation in the network communication function based on the speed command.
Homing mode (hm)		For information on the homing method, refer to "Homing mode (hm)" in the following manual.  MR-J5 User's Manual (Function)
Function on positioning operation		Absolute position detection/external limit switch/software position limit/positioning function to the home position, etc.

Functional safety

Drive unit specifications

Item	Specifications	
Safety performance	Satisfied standards ^{*1}	EN ISO 13849-1:2015 Category 4 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (750a)
	Diagnostic coverage (DC)	DC = Medium, 96.5 [%]
	Probability of dangerous Failure per Hour (PFH)	PFH = 3×10^{-9} [1/h]
	Mission time (T _M) ^{*2}	T _M = 20 [year]

*1 When DI/O connection (CN8) is used, diagnosis by test pulses is required in order to satisfy Category 4 PL e, SIL 3.

*2 Although the special proof tests within the mission time of the safety sub-function is not needed to be performed, the suggested diagnostic test interval in IEC 61800-5-2: 2016 is at least one test per three months for Category 3 PL e, SIL 3.

Function specifications

Item	Specifications		
Safety sub-function ^{*1*2}	STO	Shut-off response time (STO input off → energy shut off)	8 ms or less (when an input device is used) 60 ms or less (when a network is used) ^{*5*6*7}
	SS1	Deceleration delay time	0 ms to 60000 ms (set by functional safety parameters)
	SS2	Deceleration delay time	0 ms to 60000 ms (set by functional safety parameters)
	SOS	Observation position	0 rev to 1000 rev (set by functional safety parameters)
	SBC	Shut-off response time	8 ms or less (when an input device is used) 60 ms or less (when a network is used) ^{*5*6*7}
	SLS1/2/3/4	Observation speed	0 r/min (mm/s) to 10000 r/min (mm/s) (set by functional safety parameters) ^{*4}
	SSM	Observation speed	0 r/min (mm/s) to 10000 r/min (mm/s) (set by functional safety parameters)
	SDI	Direction monitor delay time	0 ms to 60000 ms (set by functional safety parameters)
	SLI	Observation position	0 rev to 1000 rev (set by functional safety parameters)
	SLT	Observation torque	-1000.0% to 1000.0% (set by functional safety parameters)
I/O function	Input device	Number of inputs	1 point × 2 systems
		Permissible time for mismatched double inputs	0 ms to 60000 ms (set by functional safety parameters)
		Noise elimination filter	1.000 ms to 32.000 ms (set by functional safety parameters)
		Test pulse off time ^{*3}	1 ms or less
		Test pulse interval ^{*3}	1 Hz to 25 Hz
	Output device	Number of outputs	1 point × 2 systems
		Test pulse off time ^{*3}	0.500 ms to 2.000 ms (set by functional safety parameters)
Safety communication function	Response time	250 ms ^{*8}	
	FSoE Watchdog Time	16.0 ms to 65534.0 ms (set by objects) (when a network is used) ^{*7}	
	Safety communication delay time	60 ms or less (when a network is used) ^{*5*7}	

*1 Available functions and safety levels differ depending on the combination of the drive units, the servo motors and firmware version of the drive units.

☞ Page 17 List of safety sub-function compatible units

*2 When DI/O connection (CN8) is used, diagnosis by test pulses is required in order to satisfy Category 4 PL e, SIL 3.

*3 A test pulse is a signal which instantaneously turns off a signal to the drive unit at a constant period for external circuits to perform self-diagnosis.

*4 Safety sub-function speed can be set individually.

*5 It applies when FSoE Watchdog Time is 30.0 ms or less.

*6 For MR-J5D1- G_-N1, connect to a network with a communication cycle of 250 μs or longer. For MR-J5D2- G_-N1 or MR-J5D3- G_-N1, connect to a network with a communication cycle of 500 μs or longer.

*7 This specification applies when the safety sub-functions by a network connection is used.

*8 It applies when FSoE Watchdog Time is 60.0 ms or less.

List of safety sub-function compatible units

Drive unit	Function achieving method (wiring destination)	Servo motor type	Safety sub-function (IEC/EN 61800-5-2)											
			STO	SS1		SS2 ^{*4}	SOS ^{*4}	SBC	SLS ^{*4}	SSM ^{*4}	SDI ^{*4}	SLI ^{*4}	SLT	
				SS1-t	SS1-r ^{*4}	SS2-t, SS2-r								
MR-J5D1-_G_-N1 ^{*6} MR-J5D2-_G_-N1 ^{*2*6} MR-J5D3-_G_-N1 ^{*2*6}	DI/O connection ^{*1*3} (CN8)	Servo motor with functional safety	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 3PL d, SIL 2	
		Rotary servo motor	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 3PL d, SIL 2	—	—	Cat. 4PL e, SIL 3	Cat. 3PL d, SIL 2	Cat. 3PL d, SIL 2	Cat. 3PL d, SIL 2	—	Cat. 3PL d, SIL 2	
		Linear servo motor Direct drive motor	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 3PL d, SIL 2	—	—	Cat. 4PL e, SIL 3	Cat. 3PL d, SIL 2	Cat. 3PL d, SIL 2	Cat. 3PL d, SIL 2	—	Cat. 3PL d, SIL 2	
	Network connection ^{*5*7} (CN1A/CN1B)	Servo motor with functional safety	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 3PL d, SIL 2
		Rotary servo motor	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 3PL d, SIL 2	—	—	Cat. 4PL e, SIL 3	Cat. 3PL d, SIL 2	Cat. 3PL d, SIL 2	Cat. 3PL d, SIL 2	—	Cat. 3PL d, SIL 2	
		Linear servo motor Direct drive motor	Cat. 4PL e, SIL 3	Cat. 4PL e, SIL 3	Cat. 3PL d, SIL 2	—	—	Cat. 4PL e, SIL 3	Cat. 3PL d, SIL 2	Cat. 3PL d, SIL 2	Cat. 3PL d, SIL 2	—	Cat. 3PL d, SIL 2	

*1 The safety levels in the table apply if the safety sub-function control is performed by a safety CPU or a safety controller that complies with Category 4 PL e, SIL 3. If the drive units are directly connected with emergency stop switches, safety switches, enabling switches, or other similar devices, the safety level Category 3 PL d, SIL 2 applies.

*2 STO can be set separately for each axis.

*3 When DI/O connection (CN8) is used, diagnosis by test pulses is required in order to satisfy Category 4 PL e, SIL 3.

*4 Fully closed loop control systems do not support SS1-r, SS2, SOS, SLS, SSM, SDI, and SLI.

*5 For MR-J5D1-_G_-N1, connect to a network with a communication cycle of 250 μs or longer. For MR-J5D2-_G_-N1 or MR-J5D3-_G_-N1, connect to a network with a communication cycle of 500 μs or longer.

*6 SS1-r, SS2, SOS, SLS, SSM, SDI and SLI can be used on drive units with the firmware version D8 or later.

*7 The safety sub-function by a network connection is available on drive units with firmware version D8 or later.

Environment

Item	Operation	Transportation	Storage
Ambient temperature	0 °C to 60 °C (non-freezing) Class 3K3 (IEC 60721-3-3)	-25 °C to 70 °C (non-freezing) Class 2K12 (IEC 60721-3-2)	-25 °C to 70 °C (non-freezing) Class 1K4 (IEC 60721-3-1)
Ambient humidity	5 %RH to 95 %RH (non-condensing)	5 %RH to 95 %RH (non-condensing)	5 %RH to 95 %RH (non-condensing)
Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust		
Altitude/atmospheric pressure	Altitude: 2000 m or less ^{*1}	Transportation conditions: Must be transported by ground/sea, or air at an atmospheric pressure of 700 hPa or more.	Atmospheric pressure: 700 hPa to 1060 hPa (equivalent to the altitude of -400 m to 3000 m.)
Vibration resistance	Under intermittent vibration: 10 Hz to 57 Hz, displacement amplitude 0.075 mm 57 Hz to 150 Hz, acceleration amplitude 9.8 m/s ² Class 3M1 (IEC 60721-3-3) Under continuous vibration (X, Y, Z axes): 10 Hz to 55 Hz, acceleration amplitude 5.9 m/s ²	2 Hz to 9 Hz, displacement amplitude (half amplitude) 7.5 mm 9 Hz to 200 Hz, acceleration amplitude 20 m/s ² Class 2M3 (IEC 60721-3-2)	2 Hz to 9 Hz, displacement amplitude (half amplitude) 1.5 mm 9 Hz to 200 Hz, acceleration amplitude 5 m/s ² Class 1M2 (IEC 60721-3-1)
Dielectric strength	400 V class	Between main circuit (power supply/power terminal) and PE: 2000 V AC, 1 minute, 50 Hz/60 Hz	
Insulation resistance	Between main circuit (power supply/power terminal) and PE: 0.5 MΩ or more (with a 500 V DC megger)		

*1 Refer to "Restrictions when using this product at altitude exceeding 1000 m and up to 2000 m" in the following manual for using the product at altitude exceeding 1000 m.

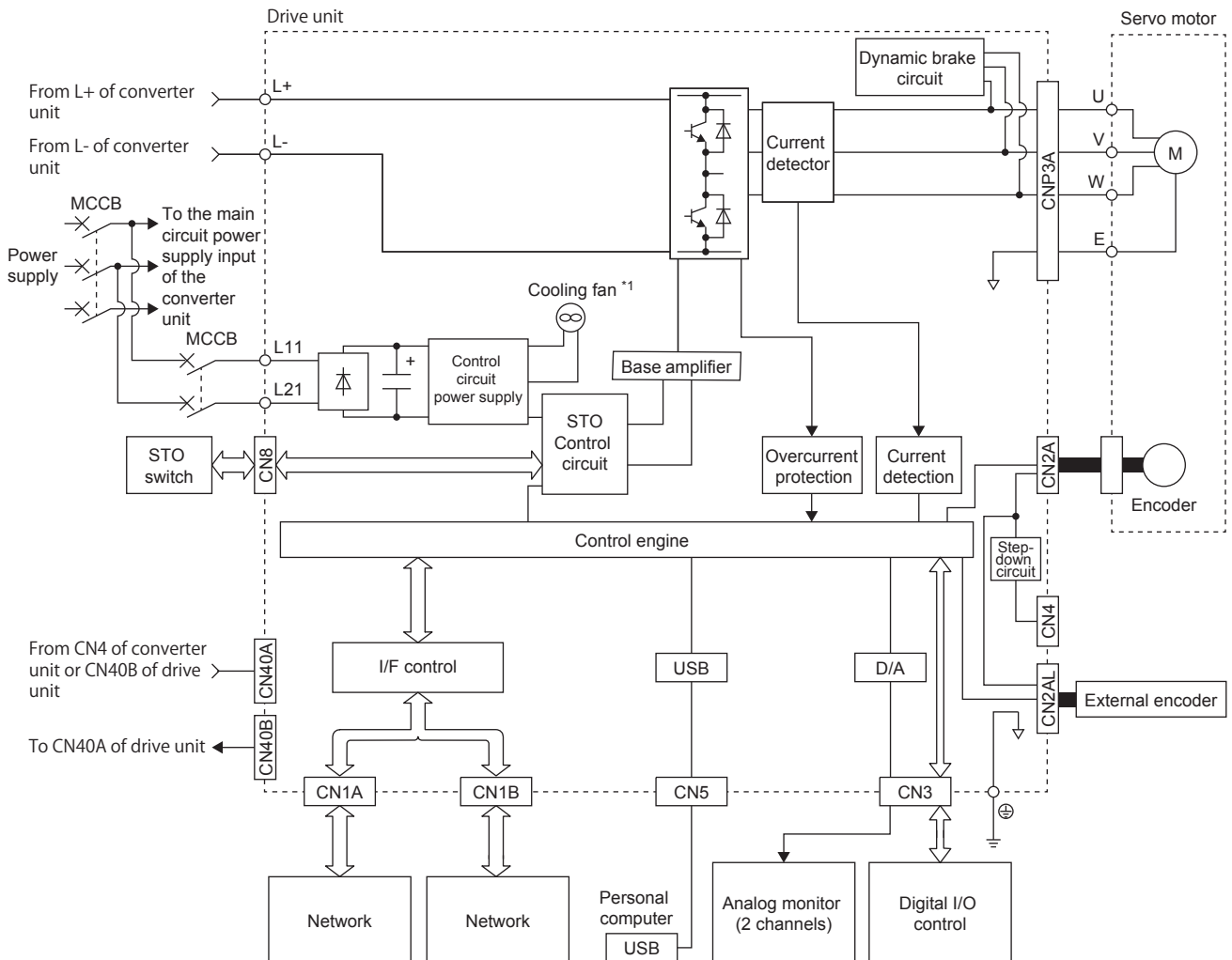
MR-J5D User's Manual (Hardware)

1.5 Function block diagram

The following shows the function block diagram of this drive unit.

MR-J5D1-_G_-N1

400 V class

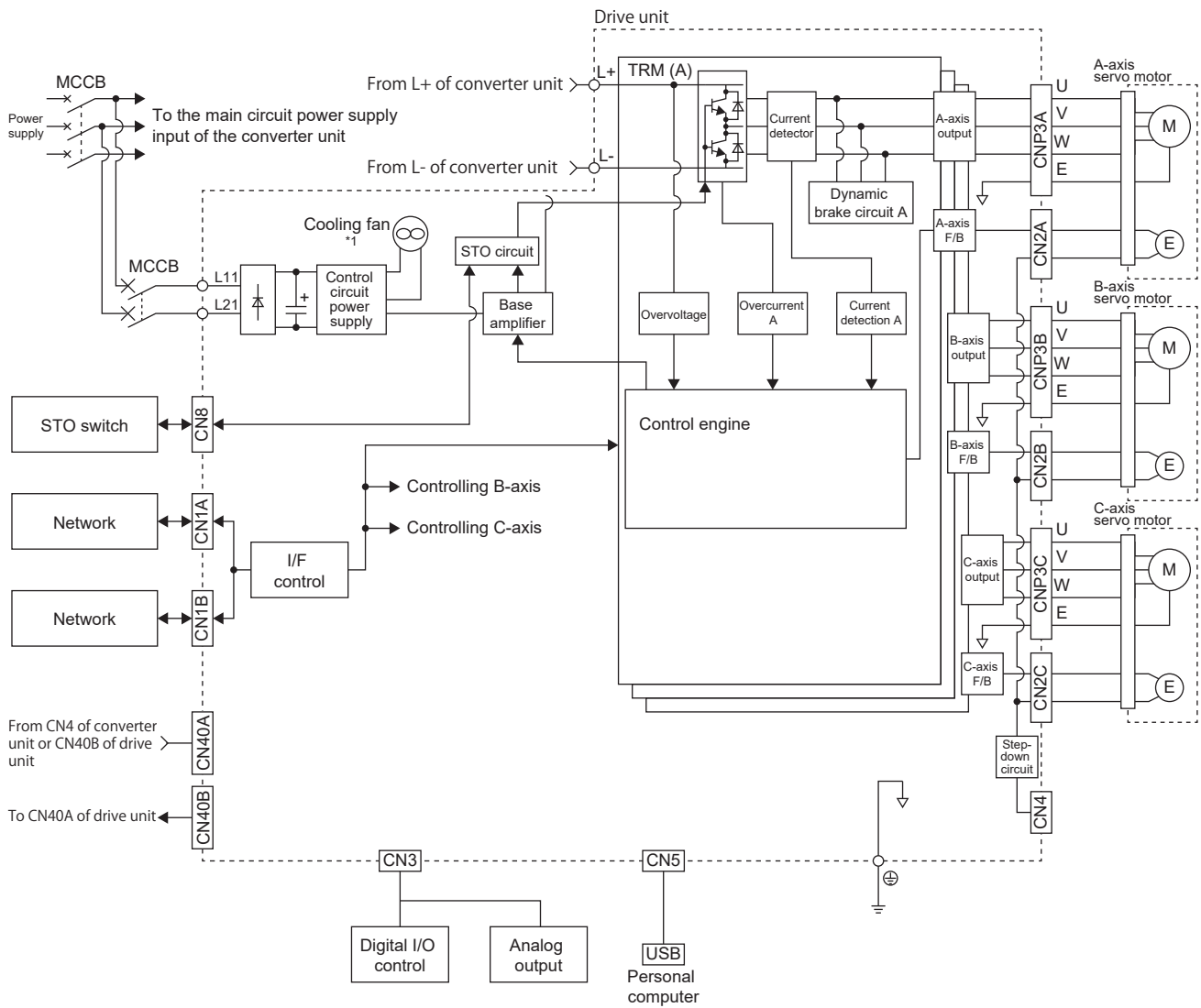


*1 Drive units with the rated output symbol of 500 (MR-J5D1-500G4-N1) or greater have a cooling fan.

MR-J5D2-_G_-N1/MR-J5D3-_G_-N1

400 V class

The following is an example using MR-J5D3-_G_-N1.



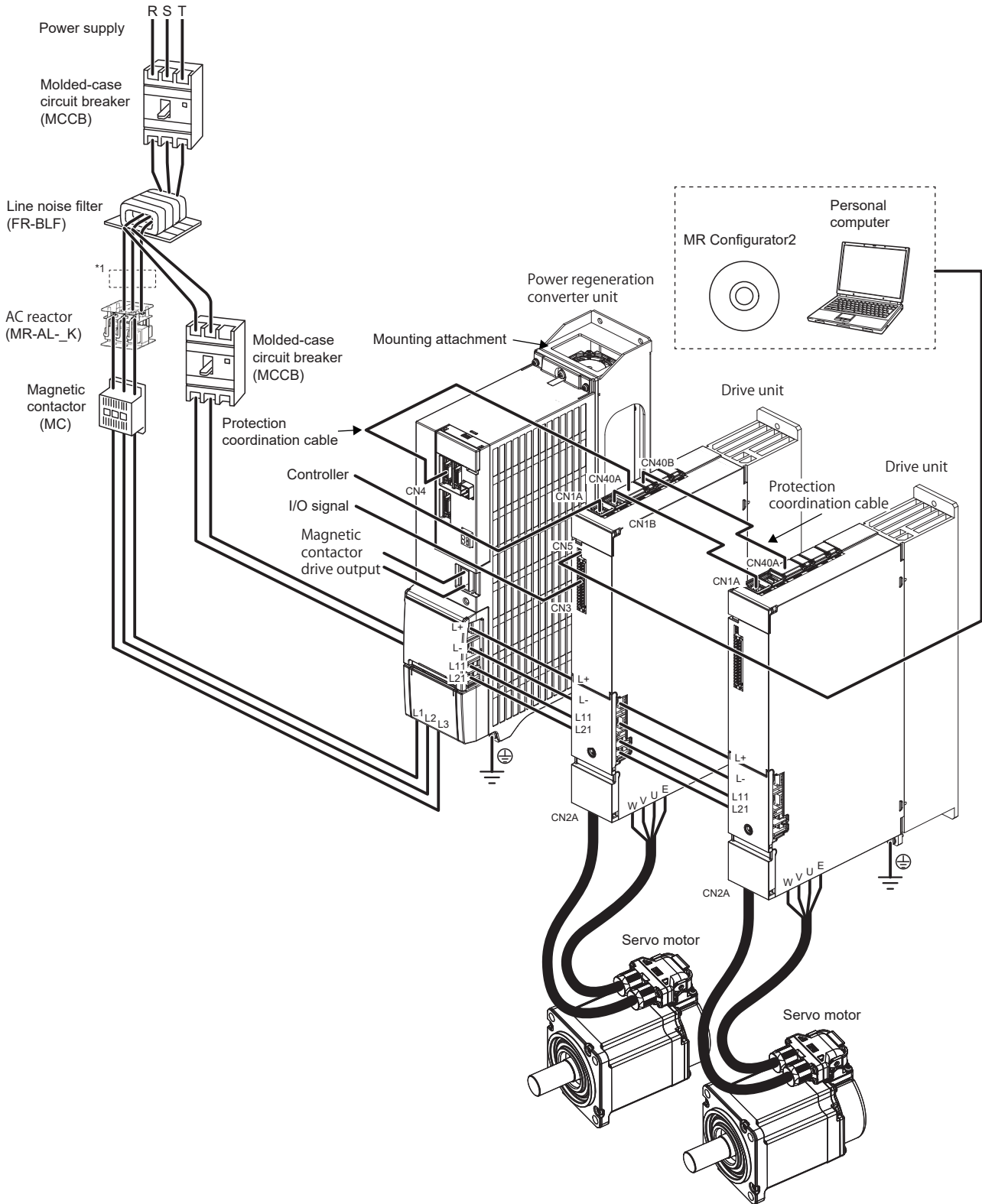
*1 Drive units other than the MR-J5D2-100G4-N1 and MR-J5D3-100G4-N1 have a cooling fan.

1.6 Configuration including peripheral equipment

- To prevent a malfunction, do not connect these connectors to any network other than the specified network.
- Equipment other than the converter unit, drive unit and servo motor is optional or a recommended product.

The following is an example using MR-J5D1-100G4-N1 and MR-CV11K4.

In the actual connection, the power regeneration converter unit is closely mounted to the drive unit.



*1 When using the same power supply for the main circuit and cooling fan for MR-CV_, do not supply power between the MR-CV_ and AC reactor or to the inductive load from the secondary side of the magnetic contactor. Connect them closer to the power supply side than the broken line area.

1.7 Special specifications

Drive units without the dynamic brake (-ED)

Summary

This section describes the drive units without the dynamic brake. Items not described in this section are the same as the MR-J5D_-_G_-N1.

Specifications

The built-in dynamic brakes of the drive units are removed.

Take safety measures such as providing an extra circuit in case of an emergency stop, alarm, and servo motor stop at power supply shut-off.

When specific servo motors are being used, the electronic dynamic brake may be activated at an alarm occurrence.

For the specific servo motors, refer to "Precautions relating to the dynamic brake characteristics" in the following manual.

 MR-J5D User's Manual (Hardware)

Setting the following servo parameter disables the electronic dynamic brake.

Drive unit	Servo parameter	Setting value
MR-J5D_-_G_-EDN1	[Pr. PF06.0]	2

When [Pr. PA04.3] is set to "2" (initial value), the forced stop deceleration function may be executed at an alarm occurrence.

Setting [Pr. PA04.3] to "0" disables the forced stop deceleration function.

2 FUNCTION

2.1 Restrictions on the MR-J5_-_G_

Category	Detailed functions	Network communication cycle restrictions (minimum)		
		MR-J5D1-_G_-N1	MR-J5D2-_G_-N1	MR-J5D3-_G_-N1
Control mode	Profile position mode (pp)	250 μs	500 μs	500 μs
	Profile velocity mode (pv)	250 μs	Not used	Not used
	Profile torque mode (tq)	250 μs	Not used	Not used
	Point table method ([Pr. PA01.0 Control mode selection] = "6")	250 μs	500 μs	500 μs
Functional safety	Safety sub-function control by network ([Pr. PSA01.1 Input mode selection] = "1")	250 μs	500 μs	500 μs
	Monitor the position/speed using a servo motor with functional safety. ([Pr. PSA02.1 Position/Speed monitor setting] = "1")	250 μs	500 μs	500 μs
—	Command unit selection function (When [Pr. PT01.2 Unit for position data] is set to "2" (degree))	250 μs	500 μs	500 μs

2.2 Function list

The function list of this drive unit is shown in the following table. For details of the functions, refer to each section indicated in the detailed explanation field.


Control mode

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
CiA 402 control mode	Cyclic synchronous position mode (csp)	This function operates the servo motor in the cyclic synchronous position mode.	C0	Refer to "CONTROL MODE" in the following manual. MR-J5 User's Manual (Function)
	Cyclic synchronous velocity mode (csv)	This function operates the servo motor in the cyclic synchronous velocity mode.	C0	
	Cyclic synchronous torque mode (cst)	This function operates the servo motor in the cyclic synchronous torque mode.	C0	
	Profile position mode (pp)	This function operates the servo motor in the profile position mode.	C0	
	Profile velocity mode (pv) *2	This function operates the servo motor in the profile velocity mode.	C0	
	Profile torque mode (tq) *2	This function operates the servo motor in the profile torque mode.	C0	
	Homing mode (hm)	This function either operates the servo motor in the homing mode or performs homing.	C0	
Point table method	Point table mode (pt)	This function operates the servo motor according to the setting values by selecting the point table with preset 255 points.	C0	
	JOG operation mode (jg)	This control mode enables desired positioning for machine adjustment and home positioning.	C0	
Test operation	Test operation mode	This function requires MR Configurator2 for JOG operation, positioning operation, motorless operation, DO forced output, and program operation.	C0	Page 55 Test operation

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.


*2 This control mode is not available for multi-axis drive units.

Drive motor

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Servo motor	Linear servo motor	Using the linear servo motor and linear encoder enables the linear servo system to be configured.	C0	—
	Direct drive motor	Using this function enables the direct drive servo system to be configured to drive the direct drive motor.	C0	—
Encoder	High-resolution encoder	A 67108864 pulses/rev high-resolution encoder is used for the encoder of the rotary servo motor.	C0	—
	Batteryless absolute position encoder	The rotation position of the servo motor can be backed up without the battery. Using the servo motor with this encoder enables an absolute value detection system to be configured without battery.	C0	Refer to "ABSOLUTE POSITION DETECTION SYSTEM" in the following manual.  MR-J5D User's Manual (Hardware)




*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Network

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Open network	EtherCAT communication	This function connects the drive unit to equipment such as a controller through EtherCAT communication.	C0	 MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Communication Function)

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Position detection

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Control method	Semi closed loop system	This function uses the servo motor encoder to configure semi closed loop systems.	C0	—
	Fully closed loop system	This function uses the load-side encoder to configure fully closed loop systems.	C0	Refer to "USING A FULLY CLOSED LOOP SYSTEM" in the following manual.  MR-J5D User's Manual (Hardware)
	Scale measurement function	This function connects the scale measurement encoder in the state of the semi closed loop control to transmit the position information of the scale measurement encoder to the controller.	C0	Refer to "Scale measurement function" in the following manual.  MR-J5 User's Manual (Function)
Absolute position	Absolute position detection system	This function performs homing once, and thereafter does not require homing at every power-on.	C0	Refer to "ABSOLUTE POSITION DETECTION SYSTEM" in the following manual.  MR-J5D User's Manual (Hardware)

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Operation function

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Stop function	Quick Stop	This function stops the servo motor with a specified method and switches to the servo-off status.	C0	Refer to "Quick stop" in the following manual. MR-J5 User's Manual (Function)
	Halt	This function stops the servo motor while the servo-on status is maintained.	C0	Refer to "Halt" in the following manual. MR-J5 User's Manual (Function)
	Stroke limit function	This function uses LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end) to limit the travel interval of the servo motor.	C0	Refer to "Stroke limit function" in the following manual. MR-J5 User's Manual (Function)
	Software position limit	This function uses servo parameters to limit the travel intervals by address. A function equivalent to the stroke limit function can be set with the servo parameter.	C0	Refer to "Software position limit" in the following manual. MR-J5 User's Manual (Function)
Command generation	Rotation/travel direction selection	This function sets the rotation direction of the servo motor without changing the command polarity.	C0	Refer to "Rotation/travel direction selection" in the following manual. MR-J5 User's Manual (Function)
	Electronic gear	This function performs positioning control with the value obtained by multiplying the position command from the upper controller by a set electronic gear ratio.	C0	Refer to "Electronic gear function" in the following manual. MR-J5 User's Manual (Function)
	Acceleration/deceleration function	This function enables smooth acceleration/deceleration.	C0	Refer to "Acceleration/deceleration function" in the following manual. MR-J5 User's Manual (Function)
	S-pattern acceleration/deceleration time constant	This function performs smooth acceleration and deceleration.	C0	Refer to "S-pattern acceleration/deceleration time constant" in the following manual. MR-J5 User's Manual (Function)
	Torque limit	This function limits the servo motor torque.	C0	Refer to "Torque limit" in the following manual. MR-J5 User's Manual (Function)
	Speed limit	This function limits the servo motor speed in the torque control mode.	C0	Refer to "Speed limit" in the following manual. MR-J5 User's Manual (Function)
	Command offset	This function compensates the position/speed/torque commands by adding a desired amount of offset to the commands.	C0	Refer to "Command offset" in the following manual. MR-J5 User's Manual (Function)

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Positioning function

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Override function	Override function	This function can change the servo motor speed via communication. The value can be changed to 0% to 360% of the set speed.	D4	Refer to "Override function" in the following manual. MR-J5 User's Manual (Function)
Absolute position	Infinite feed function	In an absolute position detection system, even if the servo motor rotates 32768 rev or more in the same direction, [AL. 0E3.1 Multi-revolution counter travel distance exceeded warning] will not occur and the home position will not be erased. Therefore, the current position will be restored after the power is cycled. When this function is not used, if the servo motor rotates 32768 rev or more in the same direction, [AL. 0E3.1] will occur and the home position will be erased.	D0	Refer to "Infinite feed function" in the following manual. MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Communication Function)

*1 "Ver." indicates the supported firmware version of the servo amplifier. The functions are available on servo amplifiers with the indicated firmware version or later.

Control function

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Vibration suppression	Advanced vibration suppression control II	This function suppresses vibration and residual vibration at an arm end.	C0	Refer to "Advanced vibration suppression control II" in the following manual. MR-J5 User's Manual (Adjustment)
	Machine resonance suppression filter	This function decreases the gain of the specific frequency to suppress the resonance of the mechanical system.	C0	Refer to "Machine resonance suppression filter" in the following manual. MR-J5 User's Manual (Adjustment)
	Shaft resonance suppression filter	When driving the servo motor with a load mounted to the servo motor shaft, resonance due to shaft torsion may generate high frequency mechanical vibration. The shaft resonance suppression filter suppresses this vibration.	C0	Refer to "Shaft resonance suppression filter" in the following manual. MR-J5 User's Manual (Adjustment)
	Robust filter	This function improves a disturbance response when a response performance cannot be increased because of a large load to motor inertia ratio, such as a roll feed axis.	C0	Refer to "Robust filter" in the following manual. MR-J5 User's Manual (Adjustment)
	Slight vibration suppression control	This function suppresses vibration of ± 1 pulse generated at each servo motor stop.	C0	Refer to "SLIGHT VIBRATION SUPPRESSION CONTROL" in the following manual. MR-J5 User's Manual (Adjustment)
Tracking control	Lost motion compensation function	This function reduces the response delay generated when the machine moving direction is reversed.	C0	Refer to "Lost motion compensation function" in the following manual. MR-J5 User's Manual (Adjustment)
	Super trace control	This function reduces the droop pulses at the rated speed and at the uniform acceleration/ deceleration to almost zero.	C0	Refer to "Super trace control" in the following manual. MR-J5 User's Manual (Adjustment)
	Path tracking model adaptive control	This function reduces tracking errors in reciprocation.	C0	Refer to "Path tracking model adaptive control" in the following manual. MR-J5 User's Manual (Adjustment)

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Adjustment function

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Automatic adjustment	Quick tuning	This function automatically adjusts the gain at servo-on in a short time without acceleration/ deceleration operation of the servo motor. Response without overshoot is possible, saving gain adjustment time.	C0	Refer to "Quick tuning" in the following manual. MR-J5 User's Manual (Adjustment)
	Auto tuning	This function automatically adjusts the gain to an optimum value even if the load applied to the servo motor shaft varies.	C0	Refer to "ADJUSTMENT FUNCTION TYPES" in the following manual. MR-J5 User's Manual (Adjustment)
	One-touch tuning	Gain adjustment is performed with this function just by pressing buttons on the drive unit or by clicking a button once on MR Configurator2. One-touch tuning can also be performed via a network.	C0	Refer to "One-touch tuning" in the following manual. MR-J5 User's Manual (Adjustment)
Custom adjustment	Model adaptive control	This function enables control according to the ideal model that is both stable and highly responsive. This is a two-degrees-of-freedom model and can adjust responses to the command and to the disturbance separately. This function can also be disabled.	C0	Refer to "MODEL ADAPTIVE CONTROL" in the following manual. MR-J5 User's Manual (Adjustment)
	Gain switching function	This function switches gains during rotation and during stop, and uses an input device to switch gains during operation. It supports the gain switching by rotation direction and the 3-step gain switching. Therefore, more detailed gain switching is available.	C0	Refer to "GAIN SWITCHING FUNCTION" in the following manual. MR-J5 User's Manual (Adjustment)
Adjustment support	Machine analyzer	This function analyzes the frequency characteristic of the mechanical system by simply connecting the drive unit with an MR Configurator2 installed personal computer.	C0	Refer to "Adjustment functions available in combination with MR Configurator2" in the following manual. MR-J5 User's Manual (Adjustment)

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

I/O, monitor

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
DI/DO	Input signal selection (device selection)	This function assigns input devices such as LSP (Forward rotation stroke end) to certain pins of the connector.	C0	Refer to "Assigning I/O devices" in the following manual. MR-J5 User's Manual (Function)
	Output signal selection (device setting)	This function assigns output devices such as MBR (Electromagnetic brake interlock) to certain pins of the connector.	C0	
	Output signal (DO) forced output	This function forcibly switches the output signals on and off regardless of the servo status. Use this function for purposes such as checking output signal wiring.	C0	Page 62 Output signal (DO) forced output
	A/B/Z-phase output	This function outputs the positions of the encoder and linear encoder in the A/B/Z-phase signal.	C0	Refer to "A/B/Z-phase pulse output function" in the following manual. MR-J5 User's Manual (Function)
LED	Status display	This function shows the servo status on the 7-segment LED display.	C0	Page 36 Switch setting and display of the drive unit
Analog input/output	Analog monitor	This function outputs the servo status in voltage in real time.	C0	Refer to "MONITORING" in the following manual. MR-J5 User's Manual (Function)
Monitor	Power monitoring function	This function calculates the running power and the regenerative power from the data in the drive unit such as speed and current. The power consumption and other values are displayed on MR Configurator2.	C0	MR-J5 User's Manual (Function)
Touch probe	Current position latch function	This function latches the current position when TPR1 (Touch probe 1), TPR2 (Touch probe 2), or TPR3 (Touch probe 3) is turned on.	C0	Refer to "Touch probe" in the following manual. MR-J5 User's Manual (Function)


*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Option

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Regenerative capacity enhancement	Simple converter	This function enables servo amplifiers to be used in a common DC bus connection. Utilizing the regenerative power contributes to energy-conservation. In addition, it decreases the number of molded case circuit breakers and magnetic contactors.	—	For the MR-J5D_-_G_ drive unit, this function cannot be used.
	Regenerative option	Use this function if the built-in regenerative resistor of the servo amplifier does not have sufficient regenerative capacity for the generated regenerative power.	—	For the MR-J5D_-_G_ drive unit, this function cannot be used.
	Multifunction regeneration converter	This function returns the regenerative energy generated at servo motor deceleration to the power supply. The bus voltage can be standardized among multiple servo amplifiers.	—	For the MR-J5D_-_G_ drive unit, this function cannot be used.







*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Engineering tool

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Setup software	MR Configurator2	This function performs settings (such as servo parameter settings), test operation, and monitoring with a personal computer.	C0	 Page 42 STARTUP

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Protective functions

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Alarm	Alarm function	This function displays an alarm or warning when an error occurs during operation. When an alarm occurs, ALM (Malfunction) turns off and stops the servo motor. When a warning occurs, WNG (Warning) will turn on. The servo motor may stop or continue operation depending on the warning.	C0	Refer to "Alarm function" in the following manual.  MR-J5 User's Manual (Function)
Power error detection	Disconnection detection function	This function detects a disconnection in the main circuit power supply input and the servo motor power supply output.	C0	For the MR-J5D-_G_ drive unit, the input open-phase detection function and servo motor incorrect wiring detection function cannot be used. Refer to "Disconnection/incorrect wiring detection function" in the following manual.  MR-J5 User's Manual (Function)
Coasting distance reduction	Forced stop deceleration function	This function decelerates the servo motor to a stop at EM2 (Forced stop 2) off or when there is an alarm.	C0	Refer to "Forced stop deceleration function" in the following manual.  MR-J5 User's Manual (Function)
Drop protection	Electromagnetic brake interlock function	This function operates the electromagnetic brake at servo off and error occurrence, and prevents the vertical axis from dropping.	C0	Refer to "Electromagnetic brake interlock function" in the following manual.  MR-J5 User's Manual (Function)
	Vertical axis freefall prevention function	This function moves the axis up by the mechanical backlash amount of the electromagnetic brake to prevent damage to machines.	C0	Refer to "Vertical axis freefall prevention function" in the following manual.  MR-J5 User's Manual (Function)
Braking protection	Dynamic brake	During the power shut-off and alarm occurrence, this function shorts between U, V, and W phases and operates the dynamic brake.	C0	Refer to "Dynamic brake characteristics" in the following manual.  MR-J5D User's Manual (Hardware)


*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Functional safety

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Safety sub-function	STO (Safe torque off) (When functional safety parameters are not used)	This drive unit supports the STO function for functional safety as per IEC/EN 61800-5-2. This allows a safety system to be easily configured for the equipment.	C0	Refer to "USING STO FUNCTION" in the following manual. MR-J5D User's Manual (Hardware)
	STO (Safe torque off) (When functional safety parameters are used)	This function electrically shuts off the servo motor driving energy with input signals from external devices (shut-off by the secondary-side output). This is equivalent to the stop category 0 of IEC/EN 60204-1.	C0	Refer to "FUNCTIONAL SAFETY" in the following manual. MR-J5 User's Manual (Function)
	SS1 (Safe stop 1)	This function starts deceleration with input signals from external devices. After the specified time to confirm the motor stop, the STO function is executed (SS1). This is equivalent to the stop category 1 of IEC/EN 60204-1.	C0	
	SS2 (Safe stop 2)	This function starts deceleration with input signals from external devices. After the specified time to confirm the motor stop, the SOS function is executed (SS2). This is equivalent to the stop category 2 of IEC/EN 60204-1.	D8	
	SOS (Safe operating stop)	This function monitors whether the servo motor stops within the prescribed range. Energy is supplied to the servo motor.	D8	
	SLS (Safely-limited speed)	This function monitors whether the speed is within the prescribed speed limit. If the speed exceeds the specified speed limit, the STO will shut off energy.	D8	
	SSM (Safe speed monitor)	This function outputs signals when the servo motor speed is below the prescribed speed.	D8	
	SBC (Safe brake control)	This function outputs signals for controlling the external brake.	C0	
	SDI (Safe direction)	This function monitors whether the servo motor travels in the specified direction. If the servo motor travels in a direction different from the specified direction, the STO will shut off energy.	D8	
	SLI (Safely-limited increment)	This function monitors whether the travel distance of the servo motor is within the specified range. If the travel distance of the servo motor exceeds the specified range, the STO will shut off energy.	D8	
	SLT (Safely-limited torque)	This function monitors whether the torque is below the specified torque. If the torque exceeds the specified torque, the STO will shut off energy.	D8	

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Instantaneous power failure measures

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Tough drive	SEMI-F47 function	This function uses the electrical energy charged in the capacitor to avoid triggering [AL. 010 Undervoltage] in case that an instantaneous power failure occurs during operation. Use a 3-phase power supply for the input power supply of the servo amplifier. Using a 1-phase 200 V AC for the input power supply will not comply with SEMI-F47 standard.	—	For the MR-J5D_-_G_ drive unit, this function cannot be used.
	Tough drive function	This function makes the equipment continue operating even under conditions where an alarm would normally occur. There are two types of tough drive function: the vibration tough drive and the instantaneous power failure tough drive.	C0	For the MR-J5D_-_G_ drive unit, instantaneous power failure tough drive cannot be used. Refer to "Tough drive function" in the following manual.  MR-J5 User's Manual (Function)

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

Diagnostics

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
Drive data diagnosis	Drive recorder	This function continuously monitors the servo status and records the state transition before and after an alarm for a fixed period of time. The recorded data can be checked by the Waveform-Display button on the drive recorder window of MR Configurator2 being clicked.	C0	Refer to "Drive recorder" in the following manual. MR-J5 User's Manual (Function)
	Graph function	This function obtains the servo status in the graph.	C0	Refer to "Graph function" in the following manual. MR-J5 User's Manual (Function)
Failure diagnosis	Encoder communication diagnosis function	This function diagnoses with MR Configurator2 whether the encoder communication error is caused by the circuit malfunction of the drive unit or by the malfunction of the cables/encoder.	C0	Refer to "Encoder communication diagnosis function" in the following manual. MR-J5 User's Manual (Function)
Service life diagnosis	Servo amplifier life diagnosis function	This function enables checking of the cumulative energization time and the number of inrush relay on/off times. It gives an indication of the replacement time for parts on the drive unit with a service life (such as the capacitor and the relay) before they malfunction. MR Configurator2 is required for this function.	C0	Refer to "Servo amplifier life diagnosis function" in the following manual. MR-J5 User's Manual (Function)
	Motor life diagnosis function	This function predicts failures of the equipment and the servo motor based on the machine total travel distance. It gives an indication of the replacement time for the servo motor.	C0	Refer to "Machine diagnosis" in the following manual. MR-J5 User's Manual (Function)
	Machine diagnosis function	This function uses the data in the drive unit to estimate the friction and vibrational component of the drive system in the equipment and to recognize an error in machine parts such as ball screws and bearings.	C0	
		This function automatically sets the threshold used for detecting the error of machine parts such as ball screws and bearings. It outputs the warning when the friction, vibrational component, and total revolution of the servo motor are out of the set threshold. The error in the machine parts such as ball screws and bearings can be detected automatically.	C0	
		This function estimates the friction of gears and loosening of belts (decrease in the belt tension), and detects errors in the gears and belts.	C0	
System diagnosis	System configuration information	This function uses MR Configurator2 to monitor the drive unit model, connected servo motor, encoder, and other information.	C0	Refer to "System configuration display" in the following manual. MR-J5 User's Manual (Function)

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

History

Functions	Detailed functions	Description	Ver. *1	Detailed explanation
—	Alarm history	This function saves information of the alarm that occurred in the drive unit. The information is saved in chronological order and used for occasions such as analyzing the cause of the alarm.	C0	Refer to "Alarm history" in the following manual. MR-J5 User's Manual (Function)

*1 "Ver." indicates the supported firmware version of the drive unit. The functions are available on drive units with the indicated firmware version or later.

2.3 Security

To completely prevent unauthorized access to the system from external devices, the user also must take safety measures. Mitsubishi Electric Corporation cannot be held responsible for any problems caused by unauthorized access.

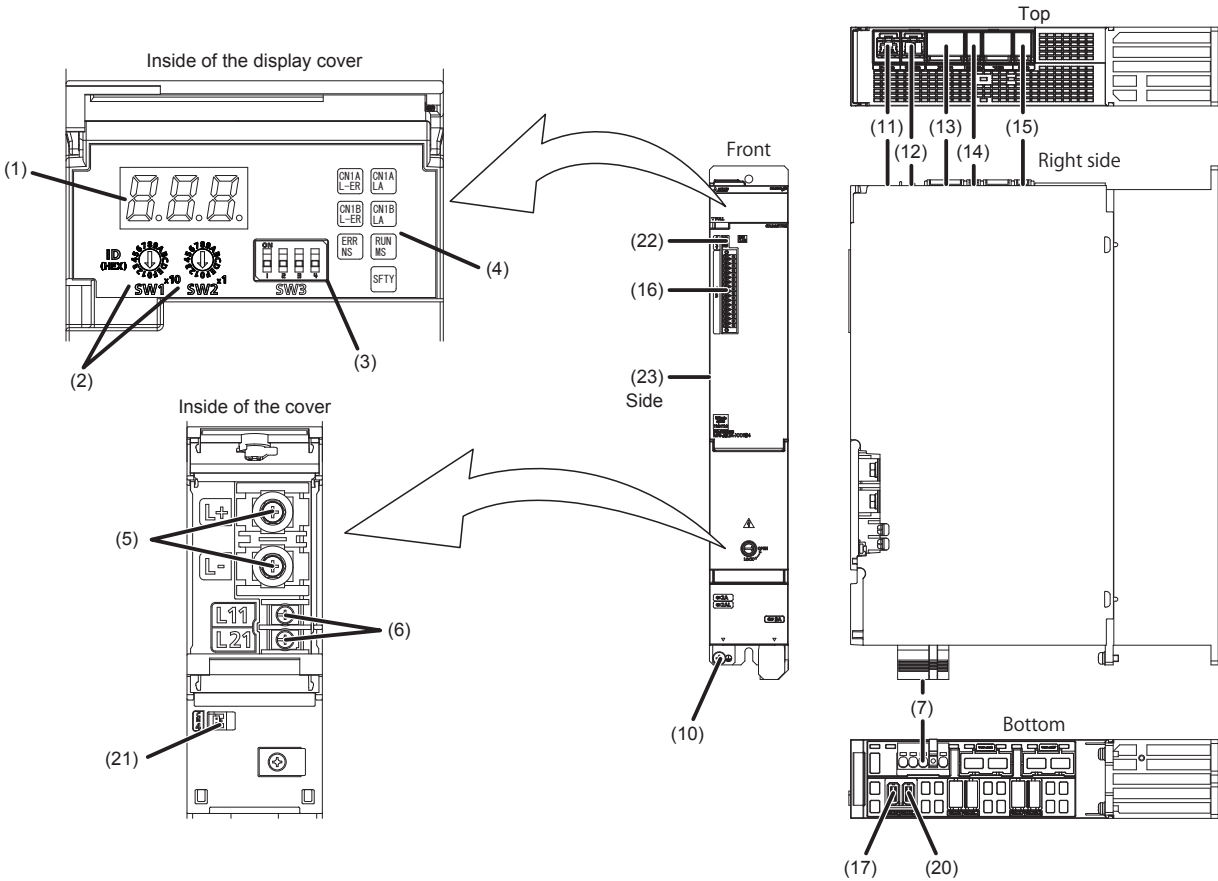
3 STRUCTURE

3.1 Parts identification

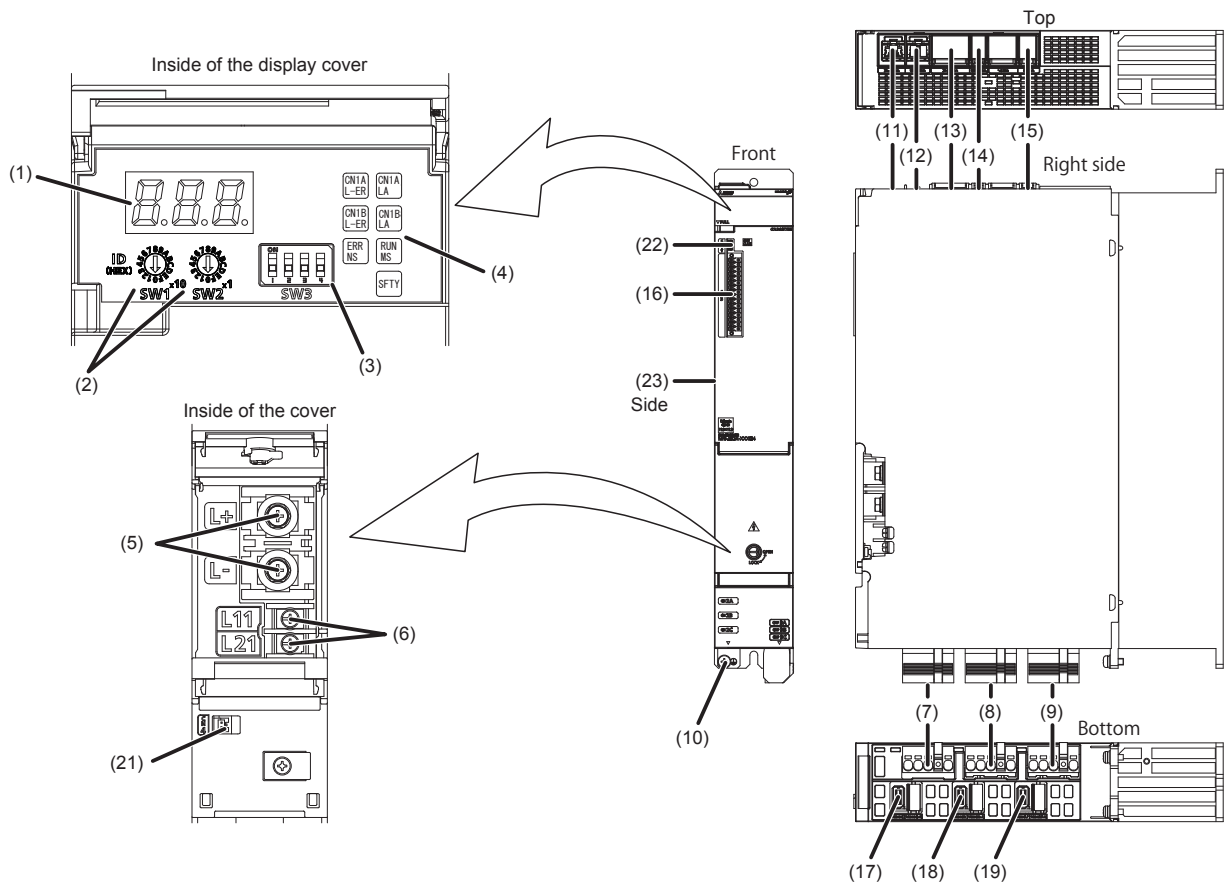
MR-J5D_-_G_-N1

- MR-J5D1-_G_-N1

The diagram shows MR-J5D1-100G4-N1.



• MR-J5D2-_G_-N1/MR-J5D3-_G_-N1
 The diagram shows MR-J5D3-100G4-N1.



No.	Name	Application	Detailed explanation
(1)	Display section	The 3-digit, 7-segment LED display shows the servo status and alarm number.	Page 36 Switch setting and display of the drive unit
(2)	ID setting switches (SW1/SW2)	Set the node address of the drive unit.	
(3)	DIP switch (SW3)	Consists of the test operation switch and control axis deactivation switch.	
(4)	Network status LEDs	Displays each network status.	
(5)	L+/L- terminal (TE2)	Connect with the L+ and L- terminals of the converter unit or another drive unit by bus bars. (DC input)	Refer to "Explanation of power supply system" in the following manual. MR-J5D User's Manual (Hardware)
(6)	Control circuit terminal (TE3)	Connect the control circuit power supply.	
(7)	A-axis servo motor power connector (CNP3A)	Connect the A-axis servo motor.	
(8) *1	B-axis servo motor power connector (CNP3B)	Connect the B-axis servo motor.	
(9) *2	C-axis servo motor power connector (CNP3C)	Connect the C-axis servo motor.	
(10)	Protective earth (PE) terminal	Connect this terminal to the protective earth (PE) of the cabinet.	
(11)	Ethernet cable connector (CN1A) (IN port)	Connect the controller, drive unit, servo amplifier or each network connected device.	—
(12)	Ethernet cable connector (CN1B) (OUT port)	Connect the drive unit, servo amplifier or each network connected device.	
(13)	Protection coordination connector (CN40A)	Connect it with a nearby converter unit or drive unit.	Refer to "Example power circuit connections" in the following manual. MR-J5D User's Manual (Hardware)
(14)	Protection coordination connector (CN40B)	Connect it with a nearby drive unit.	

No.	Name	Application	Detailed explanation
(15)	Functional safety I/O signal connector (CN8)	Connect an external safety relay to use the STO function. When using other safety-sub functions, refer to "FUNCTIONAL SAFETY" in the following manual. IMR-J5 User's Manual (Function)	Refer to "USING STO FUNCTION" and "USING FUNCTIONAL SAFETY" in the following manual. IMR-J5D User's Manual (Hardware)
(16)	I/O signal connector (CN3)	Connect the digital I/O signals. The analog monitor is output from this connector.	Refer to "Connectors and pin assignments" in the following manual. IMR-J5D User's Manual (Hardware)
(17)	A-axis encoder connector (CN2A)	Connect the A-axis servo motor encoder or external encoder.	Page 35 External encoder connector
(18) *1	B-axis encoder connector (CN2B)	Connect the B-axis servo motor encoder or external encoder.	
(19) *2	C-axis encoder connector (CN2C)	Connect the C-axis servo motor encoder or external encoder.	
(20) *3	External encoder connector (CN2AL)	Connect the external encoder.	
(21)	Battery connector (CN4)	This is a connector to connect the battery for absolute position data backup. When the servo motor with a batteryless absolute position encoder is being used, it does not need to be connected to the battery for absolute position data backup.	—
(22)	USB communication connector (CN5)	Connect with a personal computer.	—
(23)	Rating plate	Indicates model, capacity, and other information.	Page 10 Rating plate

*1 For the 2-axis drive unit and 3-axis drive unit.

*2 For the 3-axis drive unit.

*3 For the 1-axis drive unit.

External encoder connector

The following table shows the communication method of the external encoder compatible with the drive units.

Operation mode	External encoder communication method	Connector		
		MR-J5D1-_G_-N1	MR-J5D2-_G_-N1	MR-J5D3-_G_-N1
Fully closed loop system	Two-wire type	CN2AL	CN2A *1 *2 CN2B *1 *2	—
	Four-wire type		—	
	A/B/Z-phase differential input		—	
Scale measurement function	Two-wire type	CN2AL	CN2A *1 *2 CN2B *1 *2	—
	Four-wire type		—	
	A/B/Z-phase differential input		—	

*1 The MR-J4FCCBL03M branch cable is required.

*2 If the external encoder communication method is the four-wire type, the MR-J5D2-_G_ cannot be used. Use MR-J5D1-_G_.

3.2 Switch setting and display of the drive unit

Switching to the test operation mode and configuring network setting can be done with switches on the drive unit. The network communication status and alarm status can also be checked on the display (3-digit, 7-segment LED) of the drive unit.

Switches

If a metal screw driver contacts with the conductive areas, the switches may malfunction. Therefore, use an insulated screw driver instead of the metal screw driver to operate ID setting switches (SW1/SW2) and DIP switches (SW3).

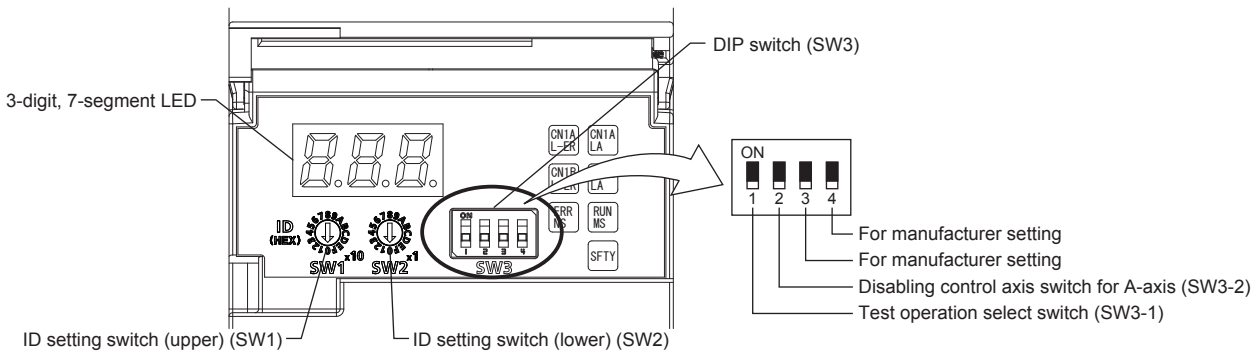
If all the DIP switches (SW3) are turned "ON (up)", the drive unit is switched to the operation mode for manufacturer setting and "off" will be displayed. The drive unit cannot be used in this mode. Thus, set the DIP switches (SW3) correctly according to this section.

To apply the settings of all switches, cycle the control circuit power supply or reset the software.

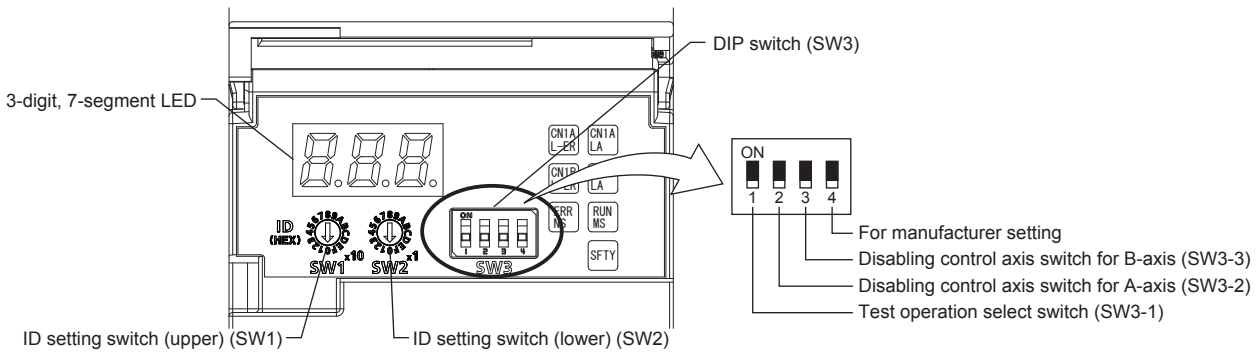
The following explains the ID setting switches (SW1/SW2) and DIP switches (SW3).

Switch identification

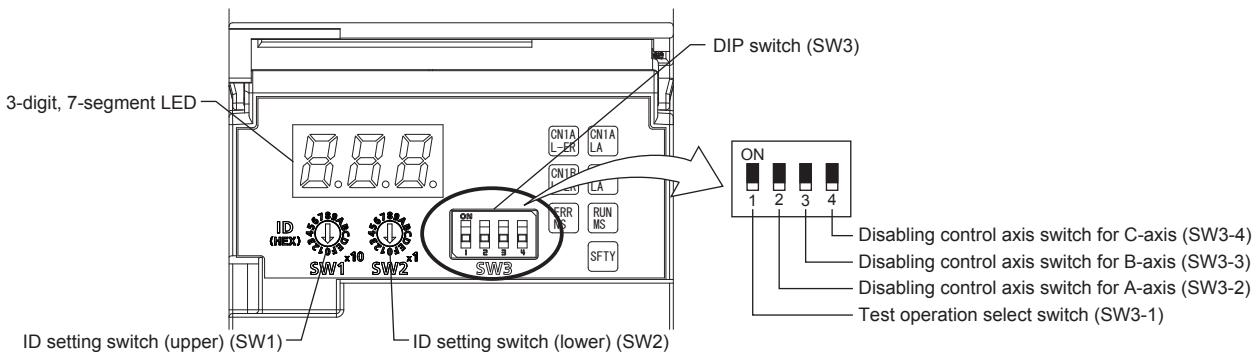
1-axis drive unit



2-axis drive unit



3-axis drive unit



Test operation select switch (SW3-1)

Turning "ON (up)" the test operation select switch enables the test operation mode. In the test operation mode, functions such as JOG operation, positioning operation, and machine analyzer are available using MR Configurator2.

☞ Page 55 Test operation

Disabling control axis switches (SW3-2, SW3-3, and SW3-4)

Turning "ON (up)" the disabling control axis switch disables the corresponding servo motor. The servo motor will become in the disabled-axis state and will not be recognized by the controller.

ID setting switches (SW1/SW2)

The node address can be set with the ID setting switches (SW1/SW2) of the drive unit. SW1 indicates an upper digit and SW2 indicates a lower digit of a hexadecimal. The ID setting switches are set to 01h when shipped from the factory.

For how to set node addresses, refer to "Node address setting" in the following manual.

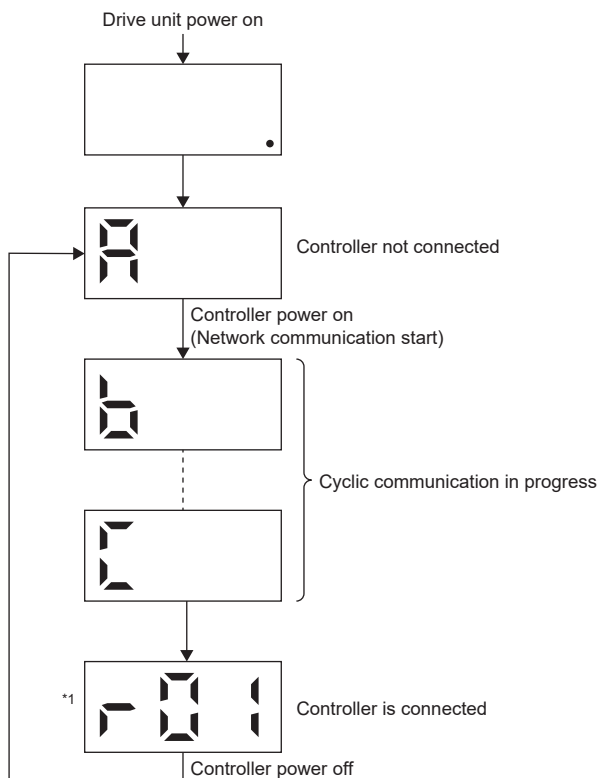
📖 MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Communication Function)

7-segment LED

The network connection status, servo status, and alarm/warning occurrence statuses can be checked on the 7 segment LED display.

Display sequence

The following shows the display sequence of the 7-segment LED display after power-on. Once a system check is complete and the drive unit is started, the network connection status will be displayed.



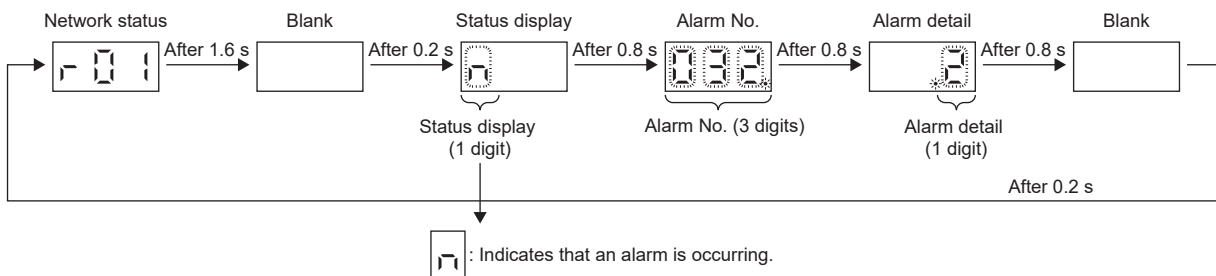
*1 The segment of the last 2 digits shows the node address.

☞ Page 38 When the network is connected

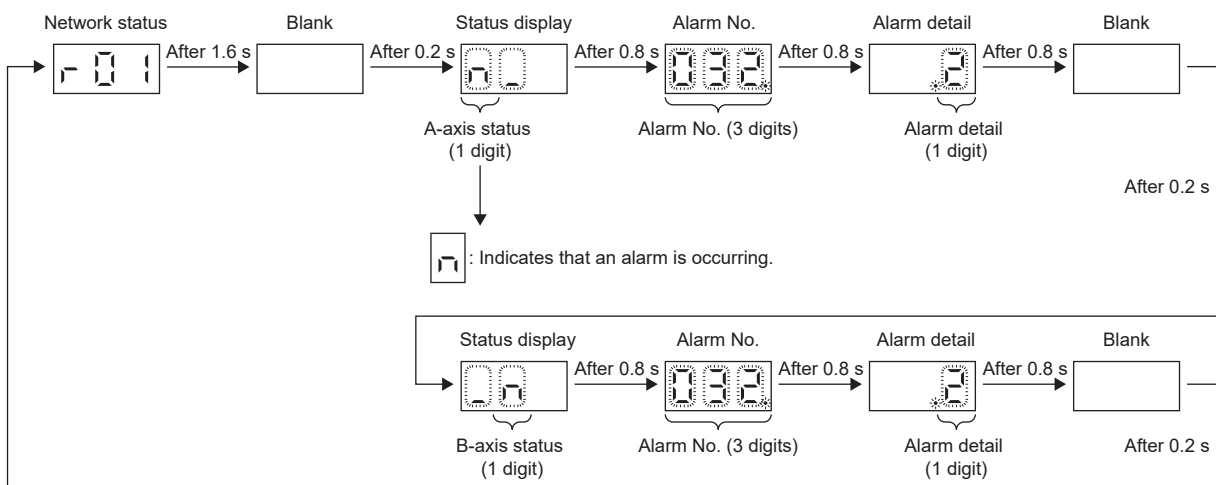
Alarm display

When an alarm/warning occurs, the alarm status is displayed after the network connection status. This is an example of the alarm display for when [AL. 032.2 Overcurrent] is occurring.

1-axis drive unit



For multi-axis drive units



When a 3-axis drive unit is used, the alarm occurrence status in the B-axis is indicated before the alarm occurrence in the C-axis.

When the network is connected

The network connection status is displayed as follows. The servo status is expressed in decimal points.

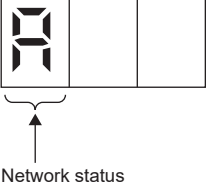
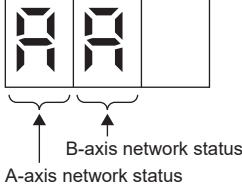
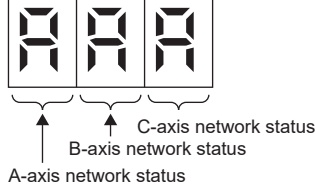
1-axis drive unit	2-axis drive unit	3-axis drive unit
<p>Servo status</p> <p>Off: Indicates ready-off and servo-off status. Blinking: Indicates ready-on and servo-off status. On: Indicates ready-on and servo-on status.</p>	<p>A-axis servo status</p> <p>B-axis servo status</p> <p>Off: Indicates ready-off and servo-off status. Blinking: Indicates ready-on and servo-off status. On: Indicates ready-on and servo-on status.</p>	<p>A-axis servo status</p> <p>B-axis servo status</p> <p>C-axis servo status</p> <p>Off: Indicates ready-off and servo-off status. Blinking: Indicates ready-on and servo-off status. On: Indicates ready-on and servo-on status.</p>

The last 2 digits indicate a network address corresponding to each network.





Network	Address
EtherCAT	A node address is displayed in hexadecimal.

When the network is not connected





The network connection status is displayed for each axis.

1-axis drive unit	2-axis drive unit	3-axis drive unit
		

The 7-segment LED display during cyclic communication is as follows.

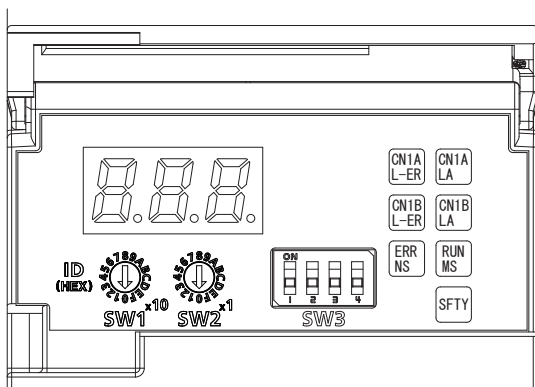
Display	Description
	Indicates that the drive unit is not connected to the controller.
	Indicates the Pre-Operational state shown in the state transition diagram of the ESM state machine.
	Indicates the Safe-Operational state shown in the state transition diagram of the ESM state machine.
	Indicates the BootStrap state shown in the state transition diagram of the ESM state machine.

Other status displays

Display	Status	Description
	Test operation mode	Indicates that the test operation mode is set.
	CPU error	Indicates that a CPU watchdog error has occurred.
	—	This is for manufacturer setting.
	Initialization in progress	Indicates that initialization of settings such as parameters is in progress.

Status LEDs

The LED states (RUN MS/ERR NS) indicate the network status of the drive unit.



LED	Description
CN1AL-ER/CN1BL-ER (red)	Name: Line error status On: Indicates that erroneous data is being received.
CN1ALA/CN1BLA (green)	Name: Link/Activity ☞ Page 41 LED display
RUNMS (green)	☞ Page 41 LED display
ERRNS (red)	
SFTY (green)	Off: Indicates that the functional safety cannot be activated. On: Indicates that the functional safety can be activated.

LED display

RUN MS (RUN LED), ERR NS (ERROR LED), and Link/Activity operate in compliance with the EtherCAT standard (ETG.1300 EtherCAT Indicator and Labeling Specification).

LED status definitions

The following shows LED status definitions.

LED status	Definition
On	The LED is lit steady.
Off	The LED is unlit.
Flickering	The LED turns on and off repeatedly in a 10 Hz cycle (every 50 ms).
Blinking	The LED turns on and off repeatedly in a 2.5 Hz cycle (every 200 ms).
Single flash	The LED turns on for 200 ms and off for 1000 ms repeatedly.
Double flash	The LED repeats the cycle of turning on for 200 ms -> off for 200 ms -> on for 200 ms -> off for 1000 ms.

Explanations of LED statuses

■ RUN MS (RUN LED)

The RUN LED indicates the EtherCAT communication status (ESM status).

LED		Description
Status	Color	
Off	—	Indicates the power supply being shut off or the Init state.
Blinking	Green	Indicates the Pre-Operational state.
Single flash		Indicates the Safe-Operational state.
On		Indicates the Operational state.

■ ERR NS (ERROR LED)

The ERROR LED indicates an error occurrence in EtherCAT communication.

LED		Description
Status	Color	
Off	—	No errors
Blinking	Red	Indicates that the EtherCAT state cannot be changed as instructed from the master station.
Single flash		Indicates that the EtherCAT state has been changed autonomously because of an internal error.
Double flash		Indicates a watchdog error in the Sync manager.
On		Indicates critical errors such as a watchdog timeout.

■ Link/Activity LED (OUT port/IN port)

The Link/Activity LEDs indicate the link status of each EtherCAT communication port.

LED		Description
Status	Color	
Off	—	Indicates that the power supply being shut off or the link-unestablished state.
On	Green	Indicates that the link is established but no traffic.
Flickering		Indicates that the link is established with traffic.

4 STARTUP

Point

- MR-J5D_-_G_-N1 drive units can only be set with MR Configurator2 version 1.125F or later.
- Before starting operation, check each servo parameter. Depending on the machine, an unexpected operation may occur.

When using a linear servo motor, the terms below have the following meanings.

- Load to motor inertia ratio → Load to motor mass ratio
- Torque → Thrust

Servo parameter setting method

Point

- Servo parameters may be changed by the controller via a network. In this case, take measures such as not turning on the controller or not connecting the network cable to the controller, so that the servo parameter setting does not change.

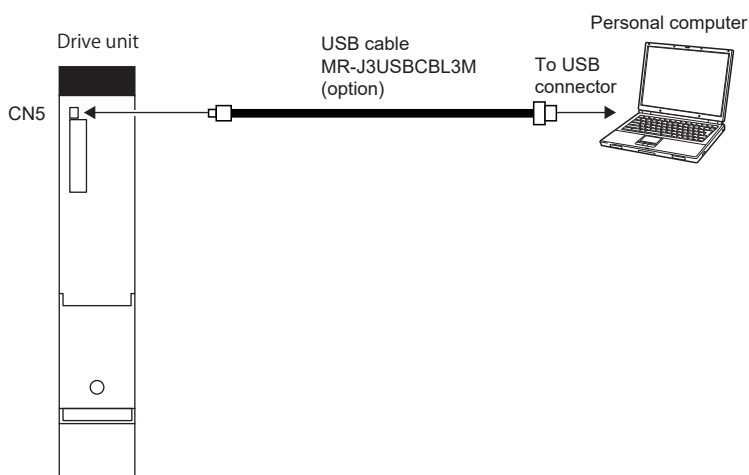
MR Configurator2 is the software used for purposes such as servo parameter settings, graph measurement/display, and test operation. This chapter describes the startup procedure of the drive unit when the drive unit is connected to a personal computer which has MR Configurator2 installed. To learn more about using MR Configurator2, refer to Help in MR Configurator2.

■ For USB communication

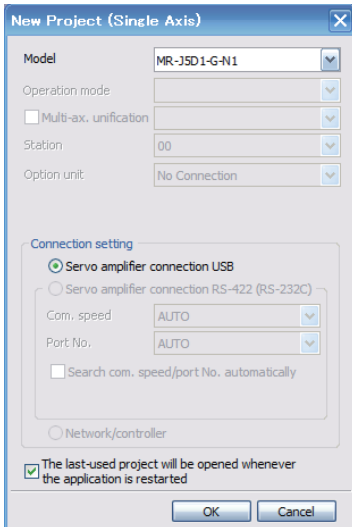
Point

- The USB communication may be disconnected by operations such as servo parameter settings and drive recorder readout, depending on the load on the drive unit. If this is the case, remove the USB cable, then connect it again.

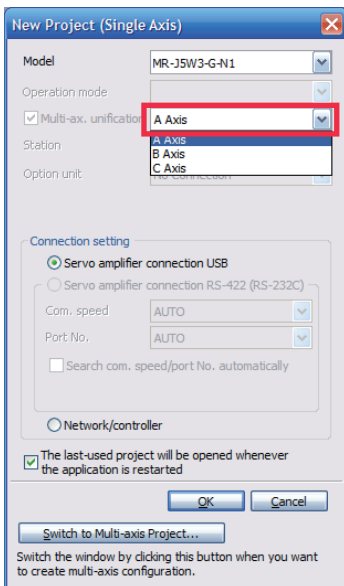
1. Connect the drive unit and the personal computer with a USB cable. Turn on the drive unit control circuit power supply.



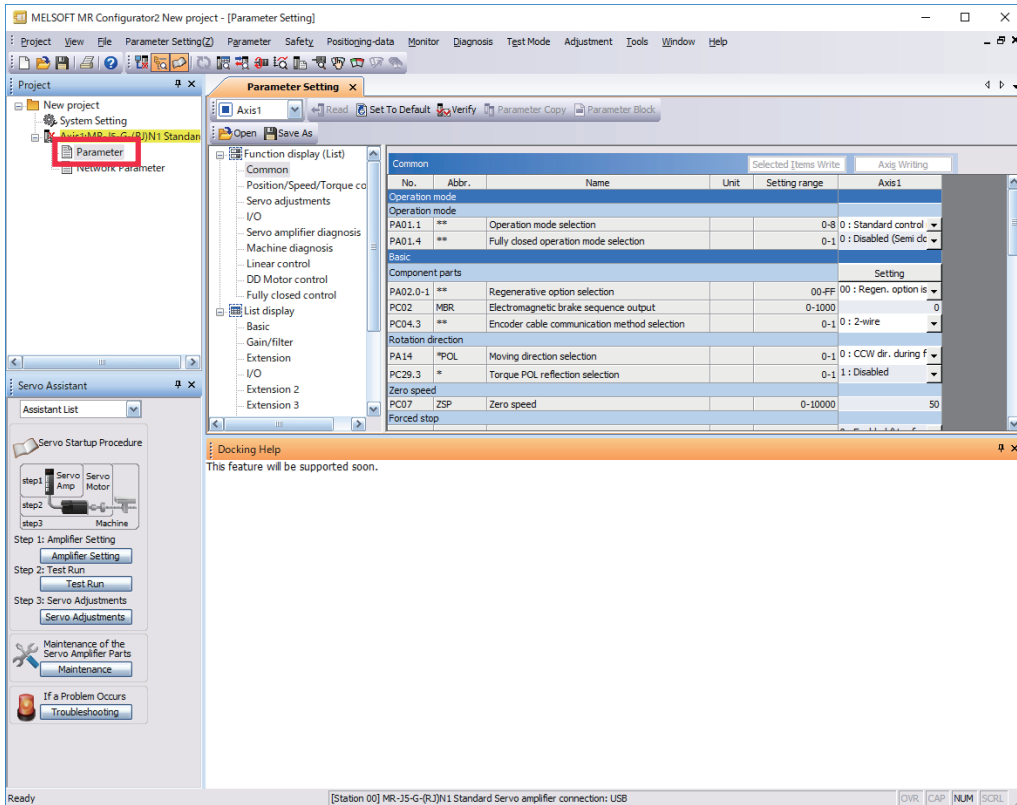
2. Start MR Configurator2 and create a new project. For the connection setting, select USB. Select the drive unit model.



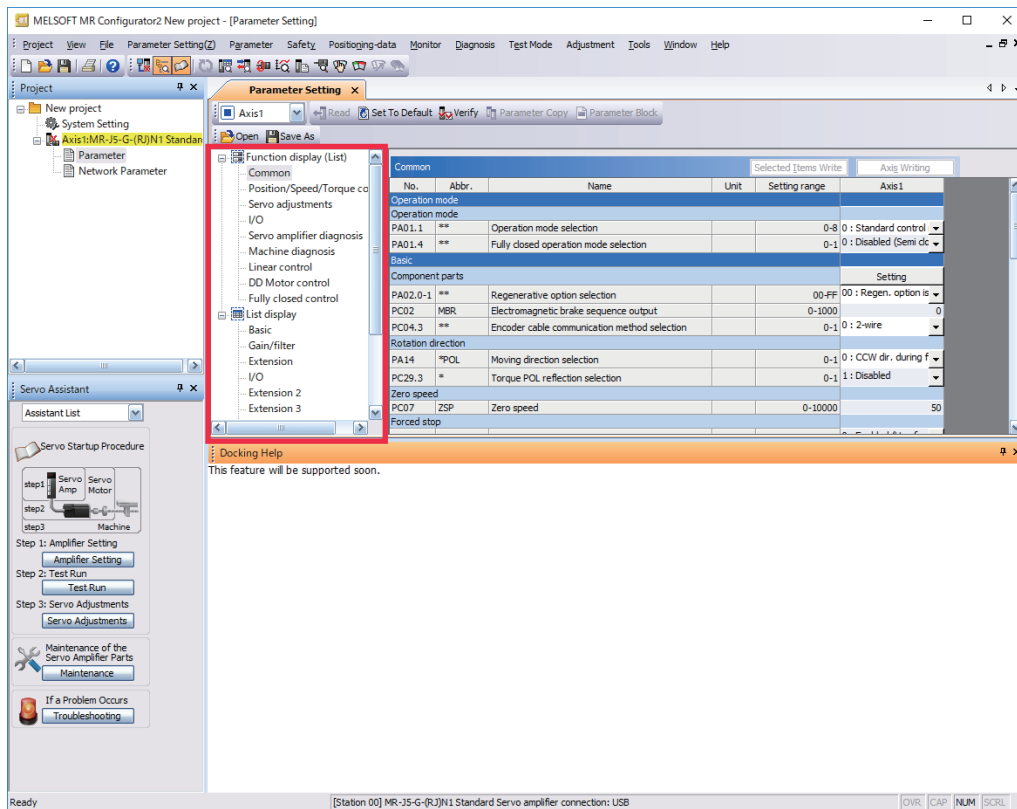
For a multi-axis drive unit, select an axis to be connected.



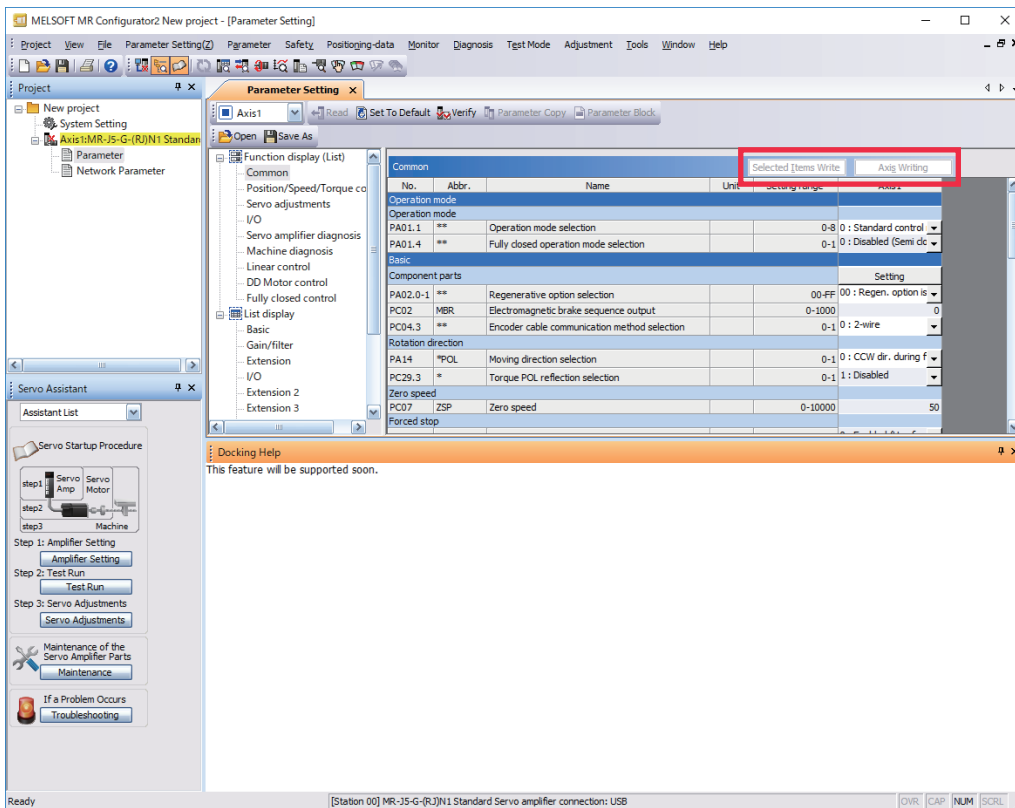
3. Selecting "Parameter" from the project tree opens the "Parameter Setting" screen.



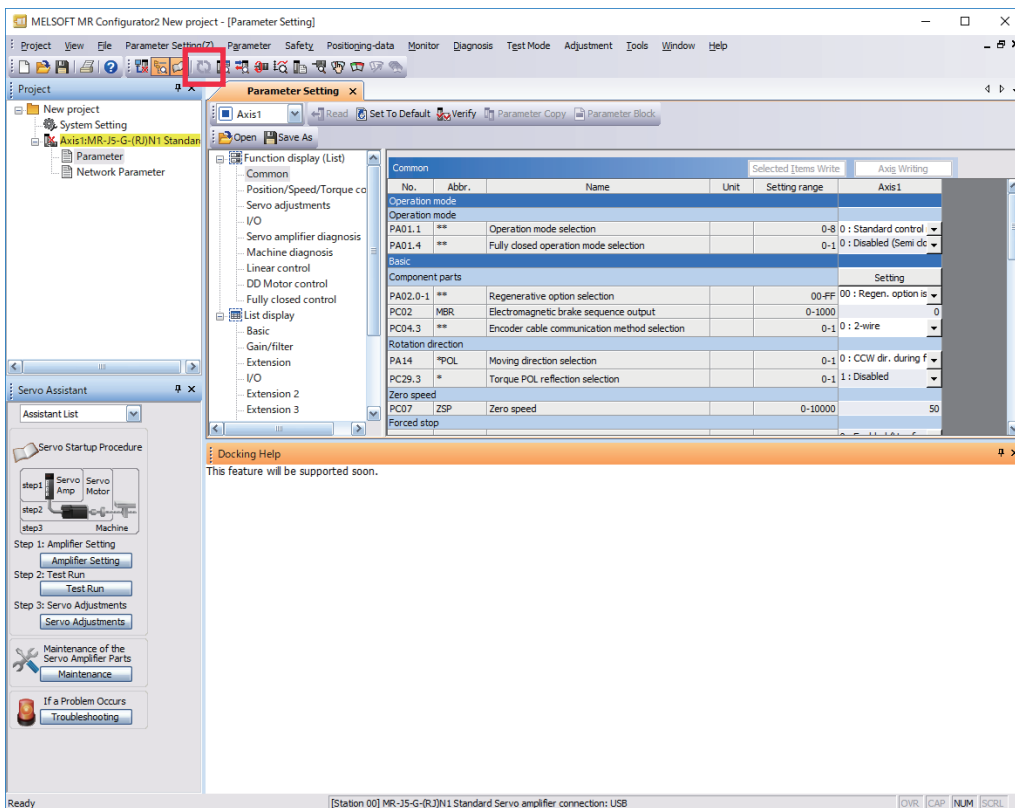
4. Select a group of servo parameters in the selection tree of the "Parameter Setting" window to display and configure the settings.



5. After changing the servo parameter, click "Selected Items Write" or "Axis Writing".



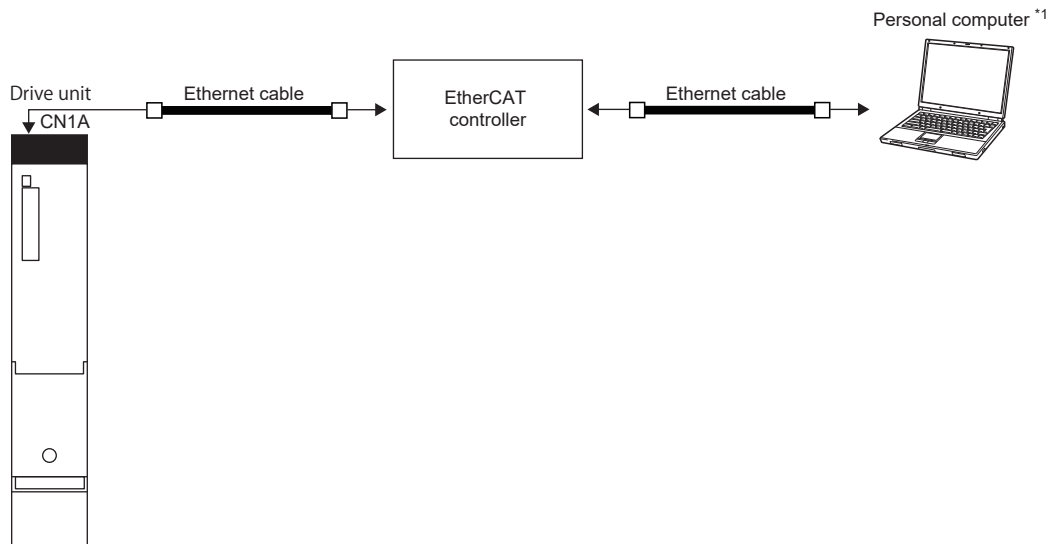
6. Abbreviated servo parameters prefixed with * and servo parameters marked with ** are enabled after the power is cycled or a software reset is performed. Click "Software Reset" in MR Configurator2 to perform the software reset.



■ For EoE communication

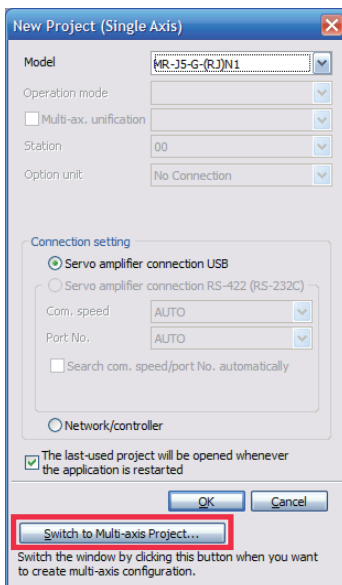
Connection via a controller is available on drive units with firmware version C4 or later being used with MR Configurator2 with software version 1.130L or later.

1. Connect the drive unit with the EtherCAT controller and the EtherCAT controller with the personal computer using an Ethernet cable between each equipment. Turn on the drive unit control circuit power supply. Establish the EoE communication between the EtherCAT controller and drive unit according to the manual of the EtherCAT controller to be used.

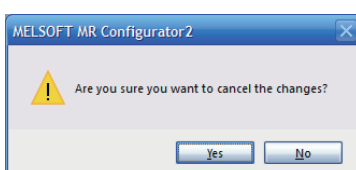


*1 When using a personal computer as the EtherCAT controller, connect the drive unit and the personal computer with an Ethernet cable.

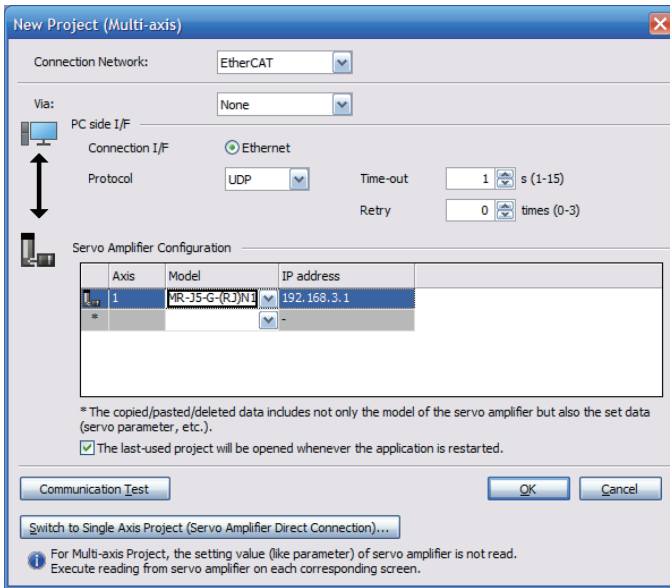
2. Start MR Configurator2 and create a new project. Select the drive unit model. Click the "Switch to Multi-axis Project" button.



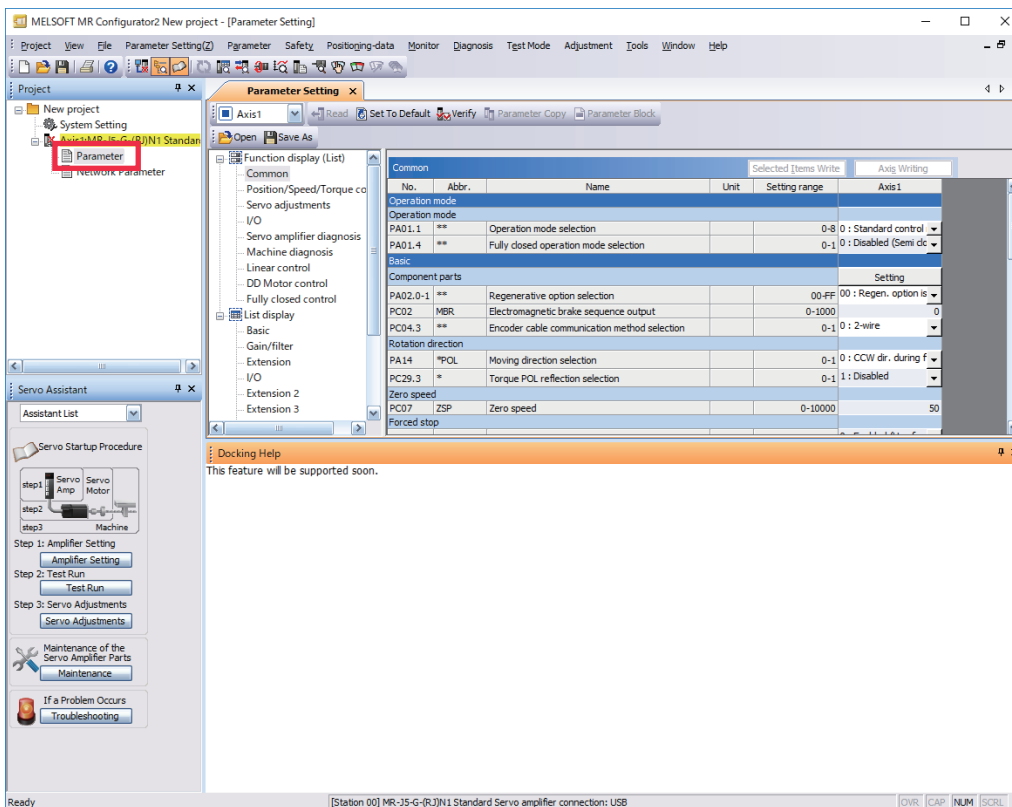
3. When the message "Are you sure you want to cancel the changes?" appears, click the "Yes" button.



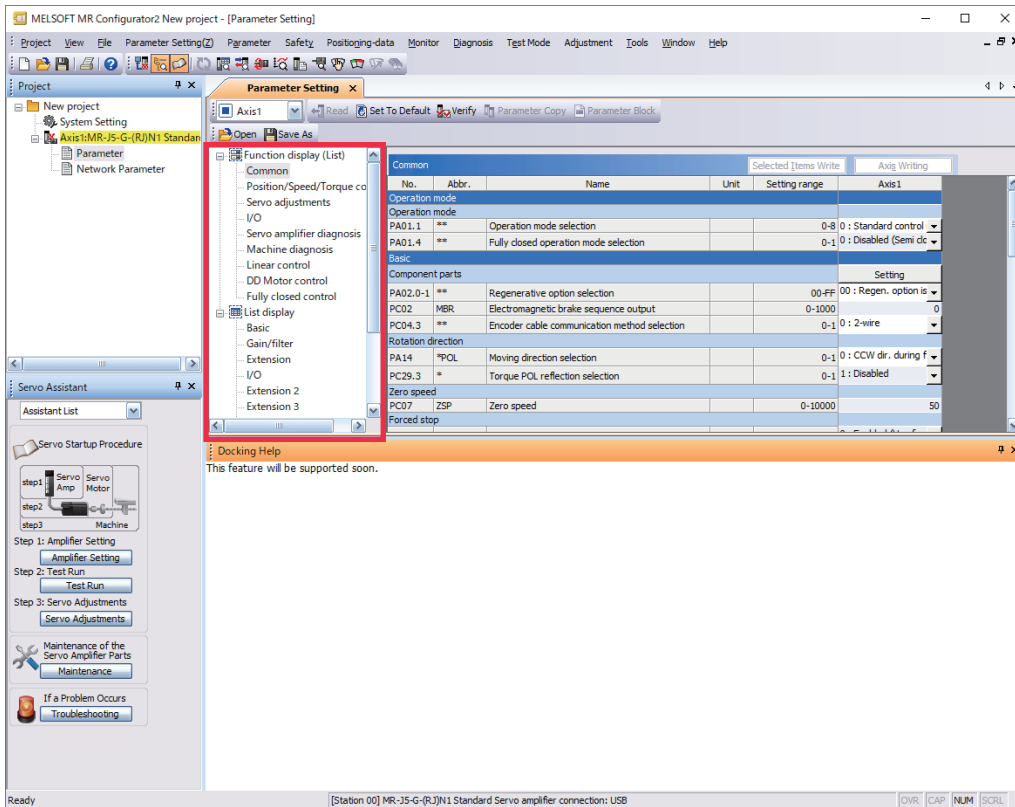
- Select "EtherCAT" for the connection network. Only "UDP" can be selected for the protocol. Set the time-out and retry as required. Set the drive unit and its IP address for the servo amplifier configuration. The axis number can be set as desired.



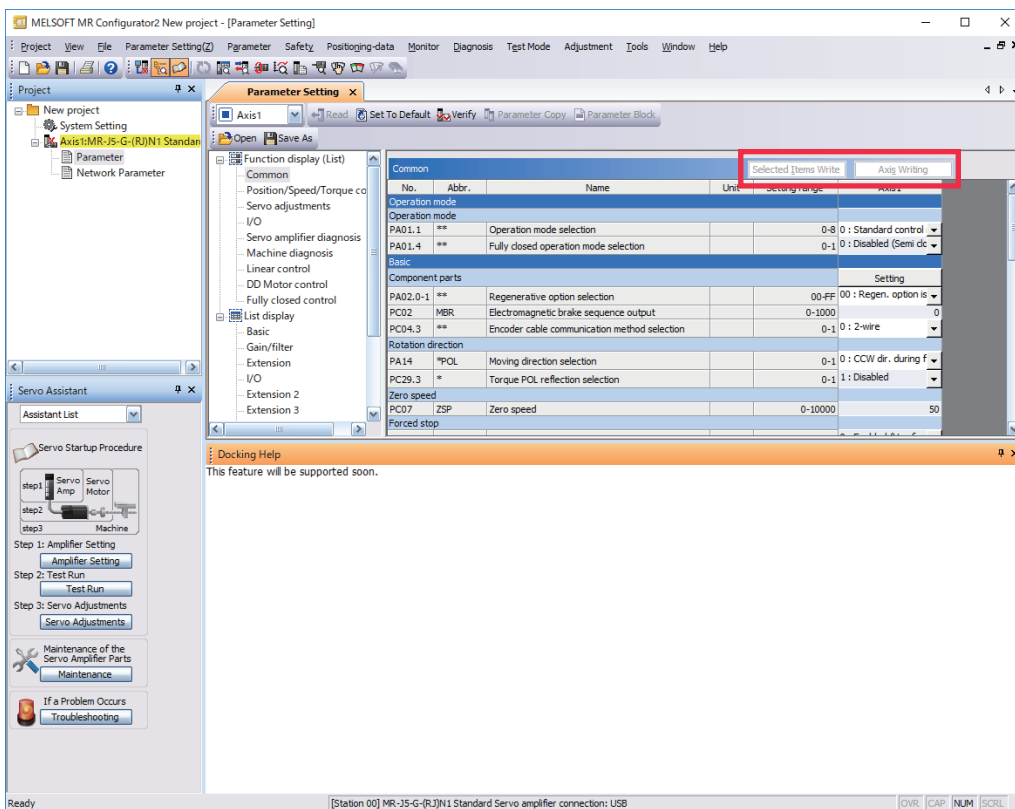
- Selecting "Parameter" from the project tree opens the "Parameter Setting" screen.



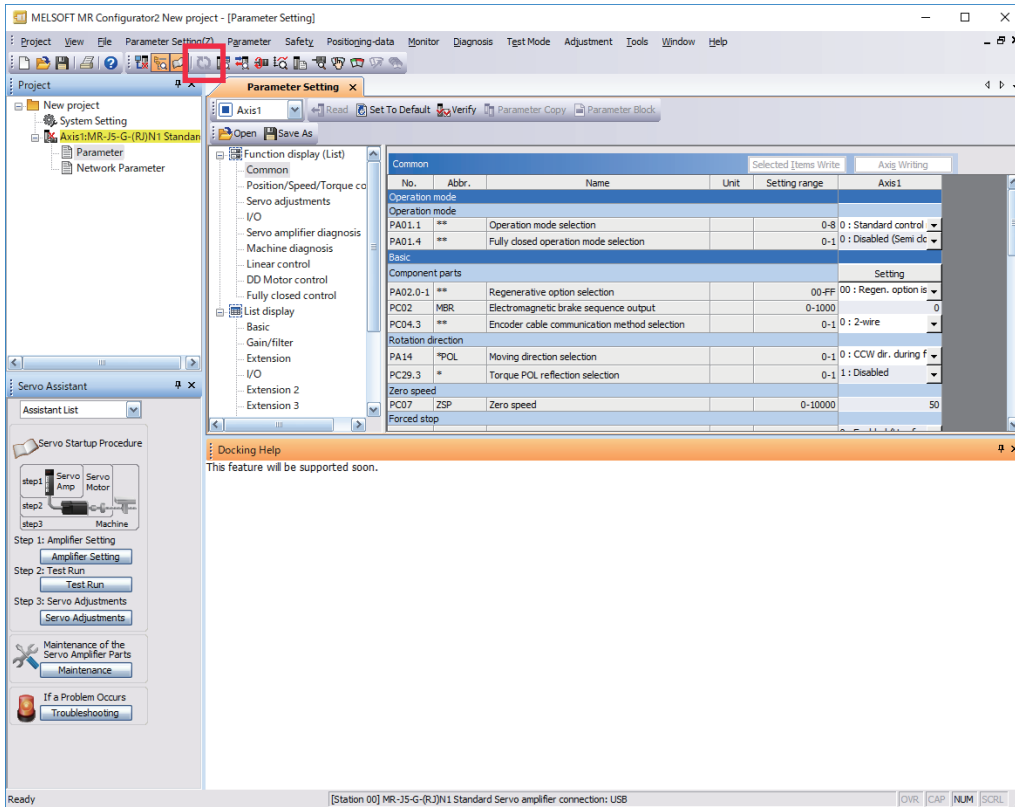
- Select a group of servo parameters in the selection tree of the "Parameter Setting" window to display and configure the settings.



- After changing the servo parameter, click "Selected Items Write" or "Axis Writing".



8. Abbreviated servo parameters prefixed with * and servo parameters marked with ** are enabled after the power is cycled or a software reset is performed. Click "Software Reset" in MR Configurator2 to perform the software reset.



4.1 Turning on drive unit for the first time

Point

- For the controller settings, refer to the relevant controller manual.
- For the gain adjustment, refer to the following manual.

📖 MR-J5 User's Manual (Adjustment)

When turning on the drive unit for the first time, follow the steps below.

Procedure	Description	Reference
1. Installation and wiring	Install and wire the converter unit, drive unit and servo motor.	📖 MR-J5D User's Manual (Hardware)
2. Test operation of the servo motor alone in test operation mode	With the servo motor disconnected from the machine, operate the servo motor at the lowest speed possible, and check whether the servo motor operates correctly.	📖 Page 51 Test operation of the servo motor alone in test operation mode
3. Equipment configuration setting	Set each servo parameter according to the equipment configuration.	📖 Page 52 Equipment configuration setting
4. Controller-related setting	Perform necessary settings according to commands from the controller.	📖 Page 52 Controller-related setting
5. Operation by controller command	Operate the servo motor at the lowest speed possible by giving commands to the drive unit from the controller, and check whether the servo motor operates correctly.	📖 Page 53 Operation by controller command
6. Actual operation	—	—

Test operation of the servo motor alone in test operation mode

Point

- If the servo motor operates in an unintended manner, stop the servo motor with EM2 (Forced stop 2).

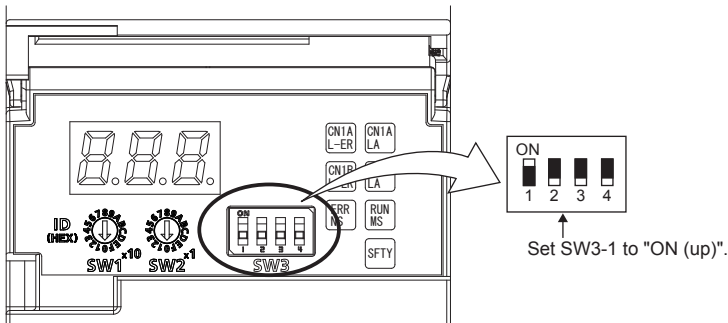
Check that the drive unit and servo motor operate normally. With the servo motor disconnected from the machine, use the test operation mode and check whether the servo motor operates correctly. This section describes how to check the servo motor operation in the JOG operation. The test operation also includes the positioning operation and program operation.

☞ Page 55 Test operation

In the linear servo motor control mode, the JOG operation cannot be performed. Check the linear servo motor operation status by using the positioning operation or by other means.

☞ Page 57 Motor driving by test operation

1. Turn off the power.
2. Turn "ON (up)" the test operation select switch (SW3-1). When performing test operation with multiple MR-J5D_-_G_ connected to one power regeneration converter unit, turn "ON (up)" the test operation select switch (SW3-1) of all the MR-J5D_-_G_ connected to the power regeneration converter unit.



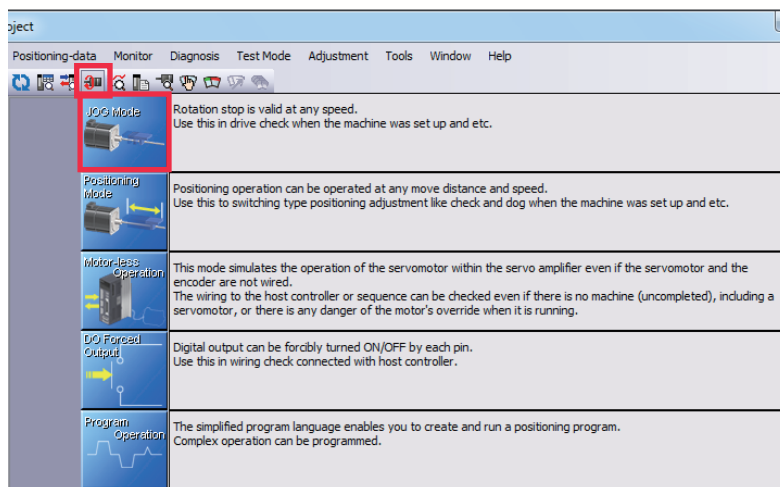
3. Turn on the power supply of the converter unit and drive unit. Once initialization is complete, the display will change as follows.

Test operation status display

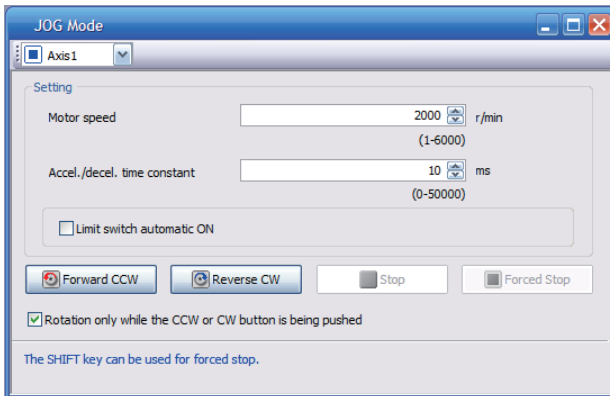


The display of a 1-axis drive unit is shown as an example.

4. Open the "JOG Mode" screen of MR Configurator2.



- To operate the servo motor, input the motor speed and acceleration/deceleration time constants, then click "Forward CCW" or "Reverse CW". The servo motor operates only while the button is being clicked. Give a low speed command at first and check the operation status.



- After the test operation is complete, turn off the power and "OFF (down)" the test operation select switch (SW3-1).

Equipment configuration setting

Set the servo parameters for each function according to the equipment configuration. For details, refer to the following manual.

📖 MR-J5 User's Manual (Function)

Item	Description
Rotation/travel direction selection	To change the rotation/travel direction (POL), change the servo parameter.
Stroke limit function	Limit switches can be used to limit travel intervals of the servo motor. Configure the settings according to the connection method of the limit switch.
In-position setting	Positioning completion status can be checked with in-position. Set this as necessary.
Forced stop deceleration function	Stops the servo motor at EM2 (Forced stop 2) off. Perform settings such as the deceleration time constant.
Vertical axis freefall prevention function	For vertical axes, this function pulls up the shaft slightly. When using a servo motor with an electromagnetic brake for a vertical axis, perform settings as required.

Controller-related setting

Refer to the applicable network instruction manual for the network connection setting.

Network	Reference
EtherCAT	Refer to "Startup" in the following manual. 📖 MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Communication Function)

Set the servo parameter using the controller according to the control mode to be used.

Item	Description	Reference
Network standard mode	Operates in the modes such as csp/csv/cst specified in CiA 402.	Refer to "CONTROL MODE" in the following manual. 📖 MR-J5 User's Manual (Function)
Positioning mode (point table method)	This function operates the servo motor according to the setting values by selecting the point table with preset 255 points.	Refer to "POSITIONING MODE (POINT TABLE METHOD) (CP)" in the following manual. 📖 MR-J5 User's Manual (Function)

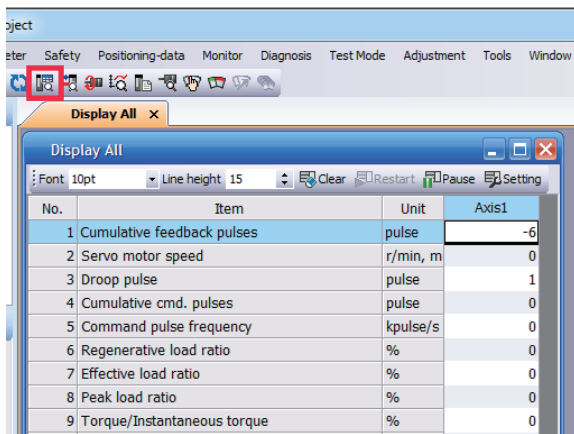
Set each servo parameter that is necessary for the operation using controller commands.

Item	Description	Reference
Command unit selection function	This function enables the unit of speed command to be selected. The initial setting for the unit of speed command is pulses/s.	Refer to "Command unit selection function" in the following manual. MR-J5 User's Manual (Function)
Electronic gear setting	Perform the settings related to the controller command unit and amplifier command unit.	Refer to "Electronic gear function" in the following manual. MR-J5 User's Manual (Function)
Homing	To perform homing with the function of the amplifier without using the homing function of the controller, perform the necessary settings.	Refer to "CONTROL MODE" in the following manual. MR-J5 User's Manual (Function)

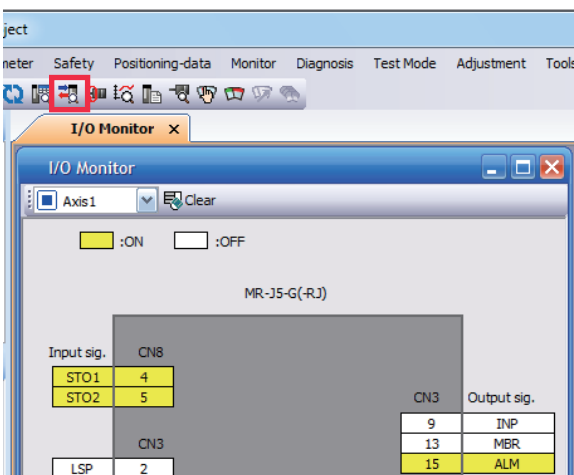
Operation by controller command

Confirm that the servo motor operates correctly under the commands from the controller. Give a low speed command at first to check the servo motor operations such as the rotation direction. If the servo motor does not operate in the intended direction, check the input signal.

1. Display the Display All window in MR Configurator2. Confirm that there is no error in the items such as servo motor speed and load ratio.



2. Display the I/O Monitor window. Confirm that there is no error in the I/O signal.



4.2 Instructions on startup

Instructions for power-on

- When the absolute position detection system is used in a rotary servo motor, [AL. 025 Absolute position erased] occurs the first time that the power is turned on and the servo motor cannot be changed to servo-on status. Shut off the power once, then cycle the power to deactivate the alarm.
- If the power is turned on while the servo motor is being rotated by an external force, an alarm may occur. Make sure that the servo motor is not operating before turning on the power. In addition, refer to the manual for the servo motor or encoder being used.

Stop

If any of the following situations occur, the drive unit suspends and stops the operation of the servo motor. If the servo motor is operated by the network command, the servo motor may be stopped by the controller command.

Operation/command	Stopping condition
Alarm occurrence	The servo motor decelerates to a stop. There are also alarms that activate and stop the dynamic brake. For details of alarms, refer to the following manual. MR-J5 User's Manual (Troubleshooting)
EM2 (Forced stop 2) off	The servo motor decelerates to a stop. [AL. 0E6 Servo forced stop warning] occurs. In the torque mode, EM2 functions the same as EM1.
STO (STO1 and STO2) off	The base circuit is shut off and the dynamic brake operates to stop the servo motor.
Limit switch off	If LSP (Forward rotation stroke end), LSN (Reverse rotation stroke end), FLS (Upper stroke limit), or RLS (Lower stroke limit) is turned off, the servo motor will stop slowly and become in the servo-lock state. Operation in the opposite direction is possible.

Instructions for network disconnection

To turn off the system power and disconnect the drive unit from the network, specific procedures may be required. For details, refer to "Disconnecting the communication" in the following manual.

[MR-J5-G-N1/MR-J5W-G-N1 User's Manual \(Communication Function\)](#)

4.3 Troubleshooting at startup

Investigation by using MR Configurator2.

The reason that the servo motor does not rotate can be investigated via MR Configurator2.

The cause that the servo motor fails to rotate is acquired from the drive unit of the target axis, and displayed on "No Motor Rotation".


The window will remain blank when no cause exists. "- - -" is displayed when off-line or the cause cannot be acquired.

4.4 Duplicate setting

Drive unit parameters for which setting has been completed can be copied to another drive unit. Use this function when replacing the drive unit of equipment with another drive unit during operation, and when starting up multiple devices with the same configuration.

Restrictions

■ The following data is not duplicated. Set them as required after the duplication.

Item	Description
Homing	The information of the home position is not duplicated. Execute homing again.
Machine service life diagnosis	Machine service life diagnosis information may not be duplicated. Refer to "Machine diagnosis" in the following manual, and perform required settings.  MR-J5 User's Manual (Function)

■ The following data is not duplicated.

- Alarm history data
- Drive recorder data

Duplication using MR Configurator2

1. The data set in MR Configurator2 can be saved as a project.
2. To copy the project to a different drive unit, open the project and then connect the drive unit and a personal computer via a USB cable. Turn on the drive unit control circuit power supply.
3. Write the required data in MR Configurator2. After the writing is completed, cycle the power or reset the software as necessary.

4.5 Test operation

Using the test operation function enables the machine operation to be checked before the actual operation. With a personal computer and MR Configurator2, operations such as the JOG operation, positioning operation, output signal forced output, and program operation can be performed.

Precautions

- The test operation mode is designed for checking servo operation. This mode is not for checking machine operation. Do not use this mode with the machine. Use this mode only with the servo motor.

Execution method

Test operation mode is enabled by MR Configurator2. To set to the normal operation mode again after executing the test operation mode, cycle the power or reset the software.

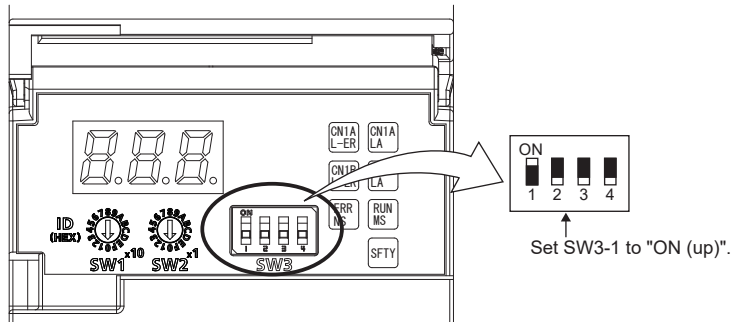
- Perform the test operation after the forced stop has been released. For details of the forced stop, refer to "Forced stop deceleration function" in the following manual.

 MR-J5 User's Manual (Function)

Test operation mode

Setting the drive unit to the test operation mode enables the test operation while the personal computer and drive unit are connected via a USB cable.

1. Turn off the power.
2. Turn "ON (up)" the test operation select switch (SW3-1). When performing test operation with multiple MR-J5D_-_G_ connected to one power regeneration converter unit, turn "ON (up)" the test operation select switch (SW3-1) of all the MR-J5D_-_G_ connected to the power regeneration converter unit.



3. Turn on the power supply of the converter unit and drive unit. Once initialization is complete, the display will change as follows.

Test operation status display



4. Use MR Configurator2 to perform the test operation.

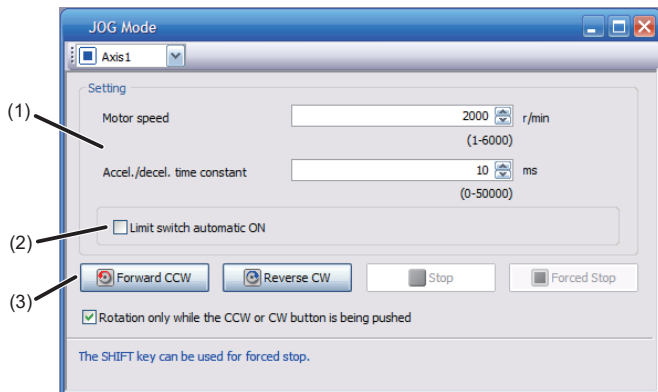
☞ Page 57 Motor driving by test operation

5. After the test operation is complete, turn off the power and "OFF (down)" the test operation select switch (SW3-1).

Motor driving by test operation

JOG operation

The JOG operation can be performed when there is no command from the controller. The motor can be operated at the specified speed. Operate the motor using the JOG Mode screen of MR Configurator2.



■ Motor operation setting (1)

Set the motor speed and acceleration/deceleration time constants for JOG operation. When changing the speed to the permissible speed, set the speed in [Pr. PA28.4 Speed range limit selection].

■ Limit switch automatic ON (2)

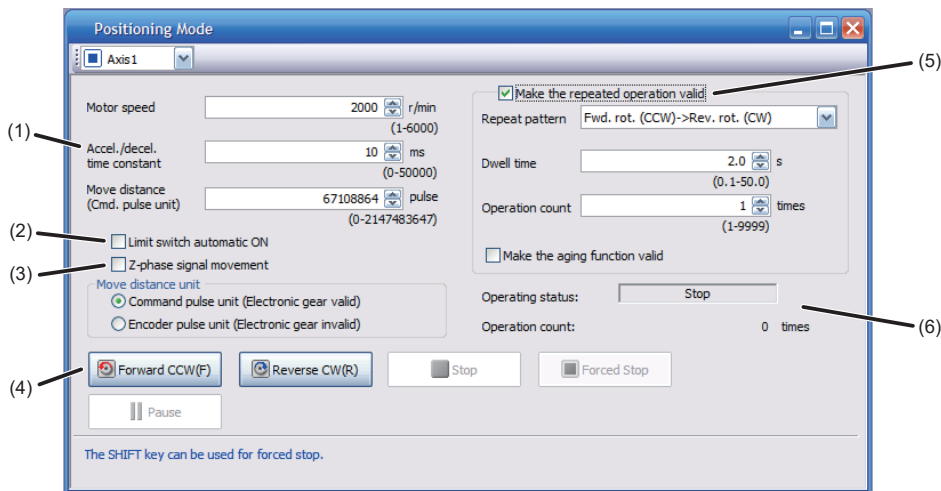
JOG operation can be performed when the limit switch is not connected. Be sure to avoid causing a collision while performing the operation.

■ Operation (3)

The servo motor can be started (CCW/CW), paused, stopped, or forcibly stopped. Clicking "Start" starts the operation. When "Rotation only while the CCW or CW button is being pushed" is selected, clicking "Forward CCW" or "Reverse CW" will perform operation until "Stop" or "Forced Stop" is clicked.

Positioning operation

Positioning operation can be performed without the controller. Operate the motor using the Positioning Mode screen of MR Configurator2.



■ Motor operation setting (1)

Set the motor speed, acceleration/deceleration time constants, and travel distance in the positioning operation mode. When changing the speed to the permissible speed, set the speed in [Pr. PA28.4 Speed range limit selection].

■ Limit switch (2)

Select "Limit switch automatic ON" to perform the positioning operation when the limit switch is not connected. Be sure to avoid causing a collision while performing the operation.

■ Move until Z-phase signal (3)

When "Z-phase signal movement" is selected, the servo motor moves until the first Z-phase signal after positioning operation.

■ Operation (4)

The servo motor can be started (CCW/CW), paused, stopped, or forcibly stopped. Clicking "Operation Start" starts the operation in the specified operation condition.

■ Repeat operation (5)

Selecting "Make the repeated operation valid" enables the repeat operation. Selecting "Make the aging function valid" enables the continuous operation until clicking "Stop" or "Forced Stop". Set the repeat pattern, the dwell time, and the number of operations.

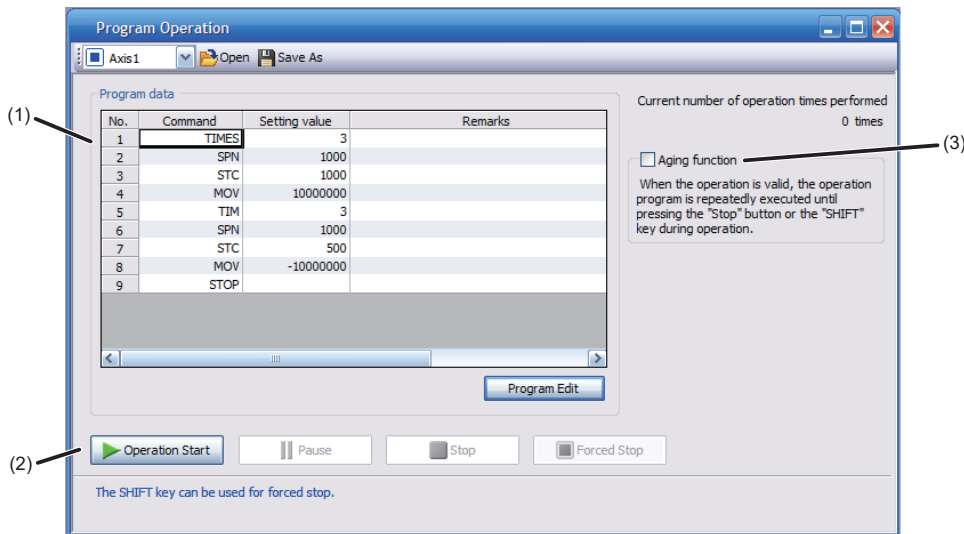
■ Operation status (6)

The operation status during the repeat operation and the number of operations are displayed.

Program operation

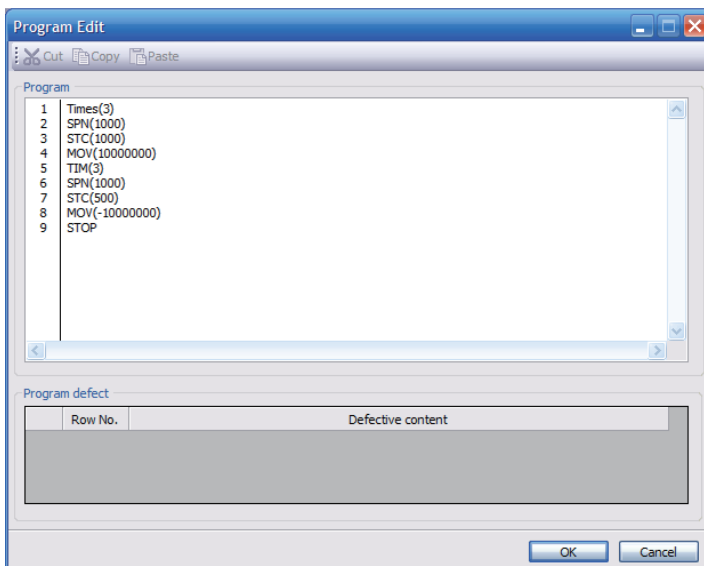
Positioning operation using multiple operation patterns can be performed without a controller. Operate the motor using the Program Operation screen of MR Configurator2. For details, refer to Help of MR Configurator2.

1. Open the Program Operation screen of MR Configurator2.



No.	Item	Screen operation
(1)	Program display	Displays the program. To edit the display item, click "Program Edit".
(2)	Operation	The servo motor can be started (CCW/CW), paused, stopped, or forcibly stopped. Clicking "Operation Start" starts the operation.
(3)	Repeat execution	Displays the number of execution times. Selecting "Aging function" enables the repeated operation of the operation program.

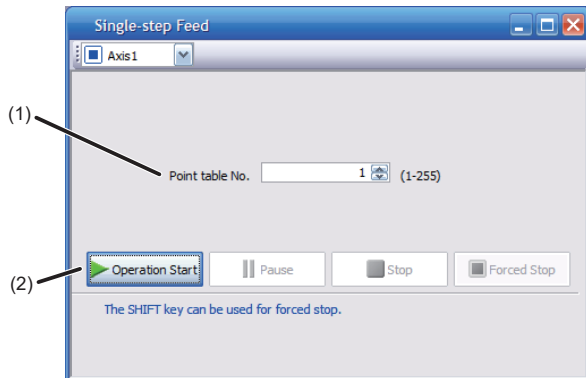
2. Clicking "Program Edit" in the program operation screen opens the Program Edit screen. Input the program and click "OK". For program commands, refer to Help of MR Configurator2.



Single-step Feed

This function enables test operation in accordance with the point table. Configure the settings of the point table operation in advance. For the point table operation, refer to "POSITIONING MODE (POINT TABLE METHOD) (CP)" in the following manual.

📖MR-J5 User's Manual (Function)



No.	Item	Screen operation
(1)	Point table No.	Specify the point table number to be operated.
(2)	Operation	The servo motor can be started (CCW/CW), paused, stopped, or forcibly stopped. Clicking "Operation Start" starts the operation in accordance with the point table.

Motor-less operation

Point

- The motor-less operation cannot be used in the fully closed loop control mode, linear servo motor control mode or direct drive motor control mode.

Without connecting a servo motor to the drive unit, output signals or status displays can be provided in response to the controller commands as if the servo motor is actually running. This operation can be used to check the sequence of a controller. Use this operation after the forced stop has been released. Use this operation with the drive unit connected to the controller.

To perform the motor-less operation, set [Pr. PC05.0 Motor-less operation selection] to "1" (enabled). To terminate the motor-less operation, set [Pr. PC05.0] to "0" (disabled).

To apply the motor-less operation settings, cycle the power or reset the software.

Load conditions

The operation is performed in the following conditions. Note that the conditions may differ from those of actual machines.

Load item	Condition
Load torque	0
Load to motor inertia ratio	[Pr. PB06 Load to motor inertia ratio/load to motor mass ratio]

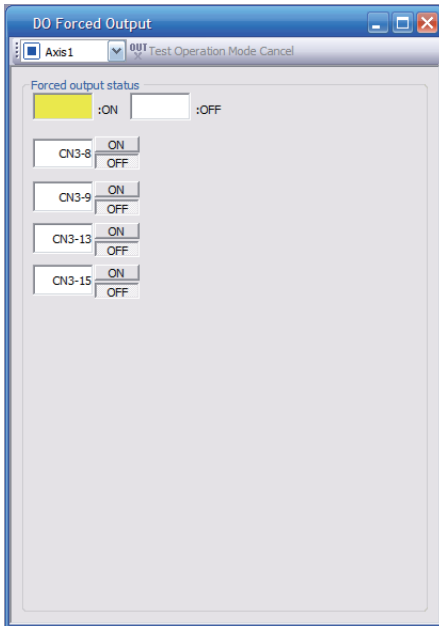
Alarm

In the motor-less operation, some alarms and warnings are not generated. The following are examples of alarms which do not occur.

- [AL. 016 Encoder initial communication error 1]
- [AL. 01E Encoder initial communication error 2]
- [AL. 01F Encoder initial communication error 3]
- [AL. 020 Encoder normal communication error 1]
- [AL. 021 Encoder normal communication error 2]
- [AL. 025 Absolute position erased]
- [AL. 092 Battery cable disconnection warning]
- [AL. 09F Battery warning]

Output signal (DO) forced output

This function forcibly switches the output signals on and off regardless of the servo status. Use this function for purposes such as checking output signal wiring. Operate this function on the DO Forced Output screen of MR Configurator2.



Each output signal can be turned on/off by clicking the ON/OFF button next to its name. After checking, click "Test Operation Mode Cancel" and terminate the output signal (DO) forced output.

4.6 Drive unit setting initialization

Drive unit settings can be initialized by using the engineering tool (MR Mode Change packed with MR Configurator2). However, information related to the drive unit, including power-on cumulative time and the number of relays on/off, is not initialized.

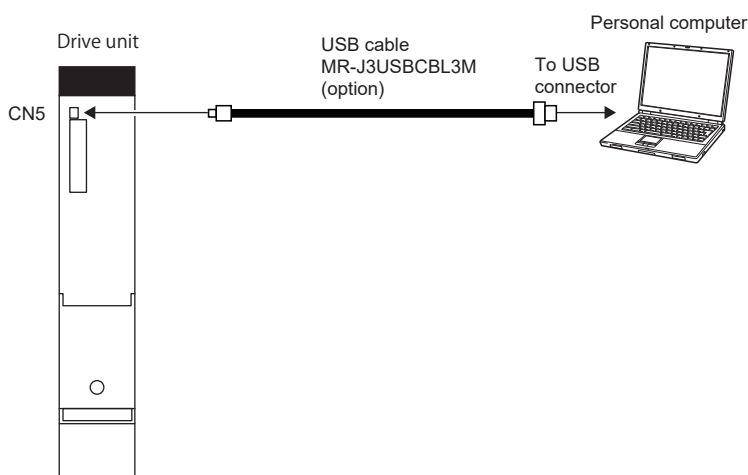
Point

- The storage area of the drive unit has a limit for the number of writings. Do not use this function frequently.
- Execute the initialization with the drive unit disconnected from the network and directly connected to MR Mode Change via a USB cable.

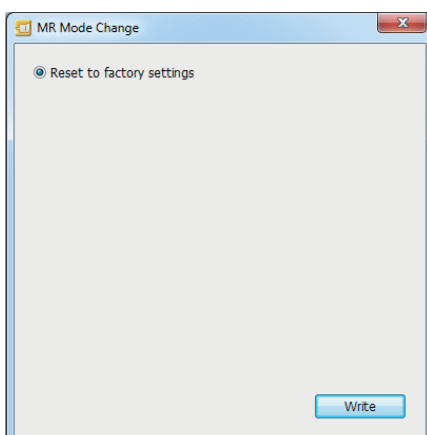
Initialization procedure by MR Mode Change

Open MR Mode Change and use a USB cable to connect the drive unit that will be initialized with a personal computer. Turn on the drive unit control circuit power supply.

4



Confirm that "Reset to factory settings" is selected, then click "Write". After the writing is completed, cycle the power or reset the software.



Cycling the power or resetting the software initializes the setting of the drive unit at startup. Confirm that the initialization has completed by reading the settings from the drive unit.

5 MAINTENANCE, INSPECTION AND PARTS REPLACEMENT

5.1 Inspection items

Precautions

- Do not disassemble, repair, or modify the product.
- For repair and parts replacement, contact your local sales office.
- To prevent a malfunction, do not perform an insulation resistance test (megger test) on the drive unit.

Periodic inspection

Perform the following inspections.

- Check for loose terminal block screws. Retighten any loose screws.
- Check the cables and the like for scratches or cracks. Inspect them periodically according to operating conditions especially when the servo motor is movable.
- Check that the connector is securely connected to the drive unit.
- Check that the wires are not coming out from the connector.
- Check for dust accumulation on the drive unit.
- Check for unusual noise generated from the drive unit.
- Make sure that the emergency stop circuit operates properly such that an operation can be stopped immediately and a power is shut off by the emergency stop switch.

5.2 Parts with a service life

The service life of the following parts is listed below. In addition, the service life varies depending on the operating methods and environment. If any fault is found in a part, it is necessary to replace it immediately regardless of its service life. For parts replacement, please contact your local sales office.

Part name	Recommended service life
Relay	Total number of power-on, operation of dynamic brake, and forced stops: 100,000 times
Cooling fan	50,000 hours to 70,000 hours (7 to 8 years)

Relays

Contact faults occur due to contact wear arisen from switching currents. A relay will reach the end of its service life if the following actions are performed a total of 100,000 times: powering on the servo amplifier, inputting the dynamic brake operation, and inputting the forced stop. In addition, the service life of a relay may vary depending on the power supply capacity.

Drive unit cooling fan

The cooling fan bearings will reach the end of their service life in 50,000 hours to 70,000 hours. Therefore, the cooling fan must be replaced after seven to eight years of continuous operation as a guideline. If unusual noise or vibration is found during inspection, the cooling fan must also be replaced. The service life has been calculated in an environment which contains no corrosive gas, flammable gas, oil mist, or dust. The average annual ambient temperature was 40 °C.

5.3 Replacing fan unit

The internal circuits of the drive unit may be damaged by static electricity. Take the following precautions.

- Ensure that the work bench and your body are grounded.
- Do not directly touch conductive areas such as the connector pins and electrical parts.

The fan unit is composed of a cooling fan and its cover.


List of applicable fan units

Drive unit	Fan units
MR-J5D1-500G4-N1 MR-J5D1-700G4-N1 MR-J5D2-200G4-N1 MR-J5D2-350G4-N1 MR-J5D3-200G4-N1	MR-J5D-FAN1
MR-J5D2-500G4-N1 MR-J5D2-700G4-N1	MR-J5D-FAN2

5

Replacement procedure

For the replacement procedure of fan units, refer to "Fan unit replacement procedure" in the following manual.

 MR-J5D User's Manual (Hardware)

6 COMPLIANCE WITH GLOBAL STANDARDS

Converter units and drive units refer to servo amplifiers in this chapter.

This chapter provides information common among AC servo amplifiers. Information that is not applicable to MR-J5 servo amplifier/other equipment combinations is also included.

6.1 Compliance with global standards

For compliance with the standards of Europe/UK, United States/Canada, and South Korea, refer to the following manual. Safety Instructions and Precautions for MR-J5D AC Servos (IB(NA)-0300527)

6.2 Handling of AC servo amplifier batteries for the United Nations Recommendations on the Transport of Dangerous Goods

To reflect the United Nations Recommendations on the Transport of Dangerous Goods (hereinafter Recommendations of the United Nations), we have modified the description on the package for AC servo amplifier batteries since January 2009. The description complies with transport regulations for lithium metal batteries in the Technical Instruction (ICAO-TI) by the International Civil Aviation Organization (ICAO) and the International Maritime Dangerous Goods Code (IMDG Code) by the International Maritime Organization (IMO).

The above change will not affect the function or performance of the product.

This section describes the handling of lithium metal batteries in air transportation that has been changed in response to the IATA (International Air Transport Association) Dangerous Goods Regulations 63rd Edition issued on January 1, 2022, and the handling of lithium metal batteries in maritime transportation that has also been changed.

Target model

Battery (cell)

Model	Option model	Type	Lithium content	Mass of battery	Remark
ER6	MR-J3BAT	Cell	0.65 g	16 g	Each battery (cell) contains more than 0.3 grams of lithium content and must be handled as dangerous goods (Class 9) for certain packaging requirements.
	MR-J3W03BATSET	Cell	0.65 g	16 g	
ER17330	MR-BAT	Cell	0.48 g	13 g	
	A6BAT	Cell	0.48 g	13 g	

Battery unit (assembled)

Model	Option model	Type	Lithium content	Mass of battery	Remark
ER6	MR-J2M-BT_	Assembled battery (Seven cells)	4.55 g	112 g	The assembled battery contains more than two grams of lithium content and must be handled as dangerous goods (Class 9) regardless of packaging requirements.
CR17335A	MR-BAT6V1	Assembled battery (Two cells)	1.20 g	34 g	Each battery (cell) contains more than 0.3 grams of lithium content and must be handled as dangerous goods (Class 9) for certain packaging requirements.
	MR-BAT6V1SET_	Assembled battery (Two cells)	1.20 g	34 g	
	MR-BAT6V1BJ	Assembled battery (Two cells)	1.20 g	34 g	

Purpose

To enable safer transportation of lithium metal batteries.

Handling during transportation

This section describes how to handle lithium metal batteries in transportation. The batteries alone transported by air are classified as UN3090, and the batteries packed with or contained in equipment transported by air are classified as UN3091. Lithium metal batteries are classified as SP188 when transported by sea as non-dangerous goods.

Air transportation of lithium metal batteries alone

Packaging requirements	Classification	Main requirements
Lithium content per cell ≤ 1 g Number of cells per package ≤ 8	UN3090 PI968 Section II Transitioned to Section IB on or after April 1, 2022	The package must pass a 1.2 m drop test, and a lithium battery mark (size: 100 × 100 mm) must be attached on the package. Refer to the requirements of Section IB on or after April 1, 2022.
Lithium content per battery ≤ 2 g Number of batteries per package ≤ 2		
Lithium content per cell ≤ 1 g Number of cells per package > 8	UN3090 PI968 Section IB	The total battery weight per package must be 10 kg or less. The package must pass a 1.2 m drop test, and a lithium battery mark (size: 100 × 100 mm) must be attached on the package. The batteries must be handled conforming to Class 9 Dangerous Goods Regulations (e.g.: displaying the lithium battery hazard label).
Lithium content per battery ≤ 2 g Number of batteries per package > 2		
Lithium content per cell > 1 g	UN3090 PI968 Section IA	The total battery weight per package must be 35 kg or less. The package must comply with UN specification packing requirements and be handled complying with Class 9 Dangerous Goods Regulations (e.g.: displaying the lithium battery hazard label).
Lithium content per battery > 2 g		

Transportation of lithium metal batteries alone classified as UN3090 PI968 Section II must comply with Section IB.

Transportation of lithium metal batteries alone as cargo on passenger aircraft has been prohibited since January 1, 2015.

Lithium metal batteries can be transported by sea or cargo aircraft.

Air transportation of lithium metal batteries packed with or contained in equipment

Lithium metal batteries packed with or contained in equipment can be transported as cargo on passenger aircraft.

■ For batteries packed with equipment, follow the requirements of UN3091 PI969.

Batteries are classified into either Section II or Section I depending on the lithium content/packaging requirements.

■ For batteries contained in equipment, follow the requirements of UN3091 PI970.

Batteries are classified into either Section II or Section I depending on the lithium content/packaging requirements. The special handling may be unnecessary depending on the number of batteries and gross mass per package.

Maritime transportation of lithium metal batteries

Packaging requirements	Classification	Main requirements
Lithium content per cell ≤ 1 g	SP188	For transportation of batteries alone, the total weight of the package must be 30 kg or less. The package must pass a 1.2 m drop test, and the lithium battery mark (size: 100 × 100 mm) must be attached on the package. For transportation of batteries packed with or contained in equipment, the special handling may be unnecessary depending on the number of batteries per package.
Lithium content per battery ≤ 2 g		
Lithium content per cell > 1 g	—	The package must comply with UN specification packaging requirements and be handled complying with Class 9 Dangerous Goods Regulations (e.g.: displaying the lithium battery hazard label).
Lithium content per battery > 2 g		

Package at our shipment

When the packages containing the target batteries are shipped overseas directly from us, the lithium battery mark (Figure 1) is displayed on the packages.

If the packages are shipped domestically, the mark (Figure 1) is not displayed.

Thus, when customers transport the domestic-bound packages overseas, the lithium battery mark (Figure 1) must be displayed on the packages by customers. The responsibility for the cargo lies with the customers. Please contact a transportation company for details on the lithium battery mark (Figure 1).

For both domestic and overseas shipments, the target battery units which must be handled as Class 9 Dangerous Goods are packaged according to UN specification packaging requirements, and the packages bear the lithium battery hazard label (Figure 2).

Figure 1: Lithium battery mark example



* UN number(s)

** Telephone number for additional information

Figure 2: Lithium battery hazard label example



Transportation precaution for customers

For maritime or air transportation, the lithium battery mark (Figure 1) is required also for the outer package containing several packages of Mitsubishi Electric cells or batteries. When the content of a package must be handled as dangerous goods (Class 9), the package must comply with UN specification packaging requirements. Please issue Shipper's Declaration for Dangerous Goods and an Air Waybill (AWB) and attach the lithium battery hazard label (Figure 2) to the packages for transportation.

This section outlines the IATA Dangerous Goods Regulations 63rd Edition and the conditions of SP188 for non-dangerous goods transported by sea. The IATA Dangerous Goods Regulations are revised, and the requirements are changed annually. When customers transport lithium batteries by themselves, the responsibility for the cargo lies with the customers. Thus, be sure to check the latest version of the IATA Dangerous Goods Regulations and International Maritime Dangerous Goods Code (IMDG Code).

6.3 Symbol for EU

The contents of each directive described in this section apply to the UK as similar rules.

EU Battery Directive

The symbol for the new EU Battery Directive (2006/66/EC) that is plastered to the AC servo battery is explained here.



Point

- This symbol is valid only in EU.

This symbol is in accordance with directive 2006/66/EC Article 20 "Information for end-users" and Annex II. MITSUBISHI ELECTRIC products are designed and manufactured with high quality materials and components which can be recycled and/or reused.

This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from household waste.

If a chemical symbol is shown beneath the above symbol, a heavy metal of the corresponding chemical symbol is contained in the battery or the accumulator with the following standard concentration or more.

This will be indicated as follows.

Hg: mercury (0.0005 %), Cd: cadmium (0.002 %), Pb: lead (0.004 %)

In the European Union, there are separate collection systems for used batteries and accumulators. Batteries and accumulators must be disposed of properly.

Help us to conserve the environment we live in.

6.4 Compliance with China Compulsory Certification (CCC)

Introduction

Some products are required to comply with China Compulsory Certification (hereinafter referred to as CCC) if exported, distributed, or sold to China. An outline of CCC is explained in this section. Mitsubishi Electric servo products are not subject to CCC.



Outline of CCC

CCC is a system for product certification that has been in effect in China since August 2003, the purpose of which is to protect consumers and ensure safety domestically in China. The certification system currently has five types of certification: safety, electromagnetic compatibility (EMC), safety + EMC, fire-fighting equipment, and wireless LAN. Products subject to the certification are allowed to be exported, distributed, or sold to China only if they are certified by this system.

Products that have received certification proving compliance with the relevant technical standards (or products declared by the manufacturer as being compliant) must carry the specified mark (CCC mark). Many of the technical standards to be applied are GB standards (Chinese national standards), which comply with global standards such as those set forth by the IEC (International Electrotechnical Commission) and CISPR (International Special Committee on Radio Interference).

As part of the State Administration for Market Supervision and Administration Announcement No. 18 of 2020 ("Announcement on the Catalogue of Compulsory Product Certification" (April 21, 2020)), a revised list of products subject to CCC certification (2020 version) has been published. Simultaneously, CCC Product Certification List No. 45 of 2014 (CNCA Notice No. 45 of 2014) was repealed.

Judgment

17 product groups divided into 103 categories are specified as the subject products (announcement No. 18 of 2020). The following table shows the judgment rendered regarding the CCC compliance requirement for servo products.

Product	Judgment
AC servo amplifier	Not subject
AC servo motor *1	Not subject
Options **2	Not subject

*1 AC servo motors are included in the list of low-power motors (small motors 750 W or less) in the list of products subject to compulsory certification, but are not subject to certification requirements for the following reason.

Explosion proof motors and controlled motors (servo motors, stepping motors, etc.) are excluded from the subject small capacity motors.

*2 Mitsubishi Electric option cables use the wires that is not classified into the cable category in the catalog.

6.5 Compliance with the China RoHS directive





Outline

The China RoHS directive: 电子信息产品污染控制管理办法 (Management Methods for Controlling Pollution by Electronic Information Products) came into effect on March 1, 2007. The China RoHS directive was replaced by the following China RoHS directive: 电器电子产品有害物质限制使用管理办法 (Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products). The succeeding China RoHS directive has been in effect since July 1, 2016.

The China RoHS directive restricts the following hazardous substances: six hazardous substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE)) which are also restricted by EU RoHS 2 (directive 2011/65/EU), and other hazardous substances specified by the State (currently no applicable substances).

Status of our products for compliance with the China RoHS directive

The following table shows the logo types for the environmental protection use period, and whether the six hazardous substances are contained in our products or not. This table was created based on the standard SJ/T11364.

Part name		Hazardous substance (substance/threshold/standard) *1						Logo for environmental protection use period *2	Remark
		Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr(VI))	PBB	PBDE		
		Threshold: cadmium: 0.01 wt% (100 ppm), other than cadmium: 0.1 wt% (1000 ppm)							
Servo amplifier	Mounting board	×	○	○	○	○	○		—
	Heat sink	×	○	○	○	○	○		
	Resin cabinet	○	○	○	○	○	○		
	Plate and screw	○	○	○	○	○	○		
Servo motor	Bracket	×	○	○	○	○	○		—
	Mounting board	×	○	○	○	○	○		
	Resin cabinet	○	○	○	○	○	○		
	Core and cable	○	○	○	○	○	○		
Cable product	Wire	○	○	○	○	○	○		Including connector set
	Connector	○	○	○	○	○	○		
Optional unit	Mounting board	×	○	○	○	○	○		—
	Resin cabinet	○	○	○	○	○	○		
	Plate and screw	○	○	○	○	○	○		

*1 ○: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T26572.

×: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T26572.

*2 Indications based on "Marking for the restriction of the use of hazardous substances in electrical and electronic products" [SJ/T11364-2014]



Indicates that a certain hazardous substance is contained in the product manufactured or sold in China.

Follow safety and usage precautions for the product, and use the product within a limited number of years from the production date. Doing so prevents any hazardous substances in the product from causing environmental pollution or seriously affecting human health or property.



Indicates that no certain hazardous substance is contained in the product.

Difference between the China RoHS directive and the EU RoHS directive

The China RoHS directive allows no restriction exemption unlike the EU RoHS directive. Although a product complies with the EU RoHS directive, a hazardous substance in the product may be considered to be above the limit requirement (marked "×") in the China RoHS directive.





The following shows some restriction exemptions and their examples according to the EU RoHS directive.

- Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0.35 % lead by weight, lead as an alloying element in aluminum containing up to 0.4 % lead by weight, and copper alloy containing up to 4 % lead by weight, e.g. brass-made insert nuts
- Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead)
- Electrical and electronic components (such as piezoelectric sensors) containing lead in glass or ceramic materials, but not including the dielectric ceramics used in capacitors
- Electrical and electronic components containing lead in a glass or ceramic matrix compound, e.g. chip resistors

Status of our products for compliance with the China RoHS directive (Chinese)

The following table is given in Chinese according with a request by "Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products".

☞ Page 71 Status of our products for compliance with the China RoHS directive

部件名称		有害物质 (物质名称/阈值/基准)*1						环境保护使用期限标识*2	备注
		铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	PBB	PBDE		
		阈值: 镉: 0.01wt% (100ppm)、镉以外: 0.1wt% (1000ppm)							
伺服放大器 伺服系统控制 器 转换器模块 驱动模块	电路板组件	×	○	○	○	○	○		—
	散热片	×	○	○	○	○	○		
	树脂壳体	○	○	○	○	○	○		
	金属板、螺丝	○	○	○	○	○	○		
伺服电机	托架	×	○	○	○	○	○		—
	电路板组件	×	○	○	○	○	○		
	树脂壳体	○	○	○	○	○	○		
	铁心、电线	○	○	○	○	○	○		
电缆加工品	电线	○	○	○	○	○	○		包括连接器 组件
	连接器	○	○	○	○	○	○		
选件模块	电路板组件	×	○	○	○	○	○		—
	树脂壳体	○	○	○	○	○	○		
	金属板、螺丝	○	○	○	○	○	○		


*1 ○: 表示该有害物质在该部件所有均质材料中的含量均在GB/T26572规定的限量要求以下。

×: 表示该有害物质在该部件的至少一种均质材料中的含量超出GB/T26572规定的限量要求。

*2 根据“电子电气产品有害物质限制使用标识要求”、[SJ/T11364-2014] 的表示

 该标志表示在中国制造/销售的产品中含有特定有害物质。

只要遵守本产品的安全及使用方面的注意事项, 从生产日算起的环保使用期限内不会造成环境污染或对人体、财产产生深刻的影响。

 该标志表示制造的产品中不含有特定有害物质。

7 SERVO PARAMETERS

Point

Refer to the following manual for the parameters not described in this chapter.

MR-J5-G/MR-J5W-G User's Manual (Parameters)

7.1 Basic setting servo parameters group ([Pr. PA__])

[Pr. PA01_ Operation mode (**STY)]

Initial value	Setting range	Setting method	Ver.
00003000h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

[Pr. PA01.0_ Control mode selection]

Initial value	Setting range	Ver.
0h	Refer to the text	B8

Select a control mode.

0: Network standard mode

6: Positioning mode (point table method)

Supported control mode	
[Pr. PA01.0] = "0"	[Pr. PA01.0] = "6"
csp/csv/cst/pp/pv/tq/hm	pt/jg/hm

Setting a value other than "0" and "6" triggers [AL. 037 Parameter error].

[Pr. PA01.1_ Operation mode selection]

Initial value	Setting range	Ver.
0h	Refer to the text	A0

0: Standard control mode

4: Linear servo motor control mode

6: Direct drive motor control mode

[Pr. PA01.4_ Fully closed loop operation mode selection]

Initial value	Setting range	Ver.
0h	Refer to the text	A5

Select whether to enable or disable the fully closed loop control mode.

The external encoder communication method of four-wire type cannot be used in the fully closed loop control mode on the MR-J5D2-_G_-N1. In that case, use the MR-J5D1-_G_-N1.

When this servo parameter is set to "1" in the linear servo motor control mode, [AL. 037 Parameter error] occurs.

Setting "1" on the MR-J5D3-_G_-N1 triggers [AL. 037].

0: Disabled (semi closed loop control mode)

1: Enabled (fully closed loop control mode)

[Pr. PA01.7_ For manufacturer setting]

This servo parameter is for manufacturer setting.

7.2 Gain/filter setting servo parameters group ([Pr. PB_ _])

[Pr. PB03_ For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PB82_ Position command smoothing filtering time constant (PFT)]

Initial value	Setting range	Setting method	Ver.
0.0 [ms]	0.0 to 100.0	Each axis	A5

Set the position command smoothing filtering time constant.

This servo parameter can be used when [Pr. PB81.4 Position command smoothing filter] is set to "1" (enabled).

7.3 Extension setting servo parameters group ([Pr. PC__])

[Pr. PC42_Function selection C-10 (COP10)]

Initial value	Setting range	Setting method	Ver.
00000000h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

[Pr. PC42.0_Forward/Reverse rotation torque limit 2 selection]

Initial value	Setting range	Ver.
0h	Refer to the text	A5

Enable or disable the torque limit value switching which is performed by CPTL (bit 11 of [Controlword (Obj. 6040h)]) and by CNTL (bit 12 of [Controlword]).

0: Disabled

1: Enabled

For the combinations of servo parameters and objects that are switched by CPTL/CNTL, refer to the following table.

[Pr. PC42.0]/ [Positive/Negative torque limit 2 select (Obj. 2D6Dh: 01h)]	Forward rotation torque limit value		Reverse rotation torque limit value	
	CPTL: 0	CPTL: 1	CNTL: 0	CNTL: 1
0h/ 0000h	[Pr. PA11]/ [Positive torque limit value (Obj. 60E0h)]	[Pr. PA11]/ [Positive torque limit value (Obj. 60E0h)]	[Pr. PA12]/ [Negative torque limit value (Obj. 60E1h)]	[Pr. PA12]/ [Negative torque limit value (Obj. 60E1h)]
1h/ 0001h	[Pr. PA11]/ [Positive torque limit value (Obj. 60E0h)]	[Pr. PC43]/ [Positive torque limit value2 (Obj. 2D6Dh: 02h)]	[Pr. PA12]/ [Negative torque limit value (Obj. 60E1h)]	[Pr. PC44]/ [Negative torque limit value2 (Obj. 2D6Dh: 03h)]

This servo parameter corresponds to [Positive/Negative torque limit 2 select (Obj. 2D6Dh: 01h)].

[Pr. PC43_Forward rotation torque limit 2 (TLP2)]

Initial value	Setting range	Setting method	Ver.
1000.0 [%]	0.0 to 1000.0	Each axis	A5

The torque or thrust generated by the servo motor can be limited.

Set this servo parameter in relation to the rated torque or continuous thrust (= 100.0 %). Set the servo parameter when limiting the torque of the servo motor for CCW power running or CW regeneration, or when limiting the thrust of the linear servo motor for positive direction power running or negative direction regeneration. If this servo parameter is set to "0.0", the servo motor does not generate torque or thrust.

The polarity of the torque limit can be changed with the setting values of [Pr. PA14 Travel direction selection] and [Pr. PC29.3 Torque POL reflection selection].

This servo parameter corresponds to [Positive torque limit value 2 (Obj. 2D6Dh: 02h)].

Depending on the settings in [Pr. PC29] and [Pr. PA14], the corresponding object changes to [Negative torque limit value 2 (Obj. 2D6Dh: 03h)].

If a value larger than the maximum torque or maximum thrust of the servo motor is set, the value will be limited to the maximum torque or maximum thrust of the servo motor.

[Pr. PC44_Reverse rotation torque limit 2 (TLN2)]

Initial value	Setting range	Setting method	Ver.
1000.0 [%]	0.0 to 1000.0	Each axis	A5

The torque or thrust generated by the servo motor can be limited.

Set this servo parameter in relation to the rated torque or continuous thrust (= 100.0 %). Set the servo parameter to limit the torque of the servo motor for CW power running or CCW regeneration, or to limit the thrust of the linear servo motor for positive direction power running or negative direction regeneration. If this servo parameter is set to "0.0", the servo motor does not generate torque or thrust.

The polarity of the torque limit can be changed with the setting values of [Pr. PA14 Travel direction selection] and [Pr. PC29.3 Torque POL reflection selection]. This servo parameter corresponds to [Negative torque limit value 2 (Obj. 2D6Dh: 03h)]. Depending on the settings in [Pr. PC29] and [Pr. PA14], the corresponding object changes to [Positive torque limit value 2 (Obj. 2D6Dh: 02h)].

If a value larger than the maximum torque or maximum thrust of the servo motor is set, the value will be limited to the maximum torque or maximum thrust of the servo motor.

[Pr. PC69_Following error output filtering time (FEWF)]

Initial value	Setting range	Setting method	Ver.
0 [ms]	0 to 65535	Each axis	A5

Set the time until the following error output turns on.

When the state in which droop pulses \geq [Pr. PC67 Following error output level] continues for the time set in the servo parameter setting value, bit 13 (Following error) of [Statusword (Obj. 6041h)] turns on.

This function is enabled in the cyclic synchronous position mode, profile position mode, point table mode, and JOG operation mode.

This servo parameter corresponds to [Following error time out (Obj. 6066h)]. When the object is mapped to the cyclic communication, do not write values with engineering tools because the controller overwrites the servo parameter values written with engineering tools.

When the setting value of [Pr. PC67] is "FFFFFFFFh", the following error output is disabled.

[Pr. PC71_In-position 2 - Output filtering time (INP2F)]

Initial value	Setting range	Setting method	Ver.
0 [ms]	0 to 65535	Each axis	A5

This servo parameter sets the time until the in-position 2 output turns on.

If the state where the error between the command position and the actual position is within [Pr. PC70 In-position 2 - Output range] continues for the setting value of this servo parameter or longer, bit 10 (Target reached) of [Statusword (Obj. 6041h)] turns on. When [Pr. PC70] is set to "4294967295", bit 10 (Target reached) of [Statusword (Obj. 6041h)] is always turned on.

This function is enabled in the profile position mode, point table mode, and JOG operation mode.

This servo parameter corresponds to [Position window time (Obj. 6068h)]. When the object is mapped to the cyclic communication, do not write values with engineering tools because the controller overwrites the servo parameter values written with engineering tools.

[Pr. PC73_Speed reached 2 - Output filtering time (SA2F)]

Initial value	Setting range	Setting method	Ver.
0 [ms]	0 to 65535	Each axis	A5

This servo parameter sets the time until the speed reached 2 output turns on.

If the state where the error between the speed command and the servo motor speed is within [Pr. PC72 Speed reached 2 - Output range] continues for the setting value of this servo parameter or longer, bit 10 (Target velocity reached) of [Statusword (Obj. 6041h)] turns on.

This function is enabled in the profile velocity mode.

This servo parameter corresponds to [Velocity window time (Obj. 606Eh)]. When the object is mapped to the cyclic communication, do not write values with engineering tools because the controller overwrites the servo parameter values written with engineering tools.

[Pr. PC78_Function selection C-F (*COPF)]

Initial value	Setting range	Setting method	Ver.
00000010h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

[Pr. PC78.1_Maximum torque limit 1 selection]

Initial value	Setting range	Ver.
1h	Refer to the text	A5

Select whether to enable or disable the maximum torque limit 1.

0: Disabled

1: Enabled

[Pr. PC81_For manufacturer setting]

This servo parameter is for manufacturer setting.

7.4 I/O setting servo parameters group ([Pr. PD_ _])

[Pr. PD15_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PD22_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PD23_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PD26_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PD30_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PD31_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PD32_For manufacturer setting]

This servo parameter is for manufacturer setting.

7.5 Extension setting 2 servo parameters group ([Pr. PE_ _])

[Pr. PE53_Maximum torque limit 1 (TLMX1)]

Initial value	Setting range	Setting method	Ver.
1000.0 [%]	0.0 to 1000.0	Each axis	A5

The torque or thrust generated by the servo motor can be limited.

When [Pr. PC78.1 Maximum torque limit 1 selection] is set to "0" (the maximum torque limit 1 is disabled)

The torque limit function using this servo parameter or [Max torque (Obj. 6072h)] is disabled.

The setting value of this servo parameter does not match the setting value of [Max torque (Obj. 6072h)].

[Max torque (Obj. 6072h)] returns the maximum torque of the servo motor.

When [Pr. PC78.1] is set to "1" (the maximum torque limit 1 is enabled)

The torque limit function using this servo parameter or [Max torque (Obj. 6072h)] is enabled.

Set this servo parameter in relation to the rated torque or continuous thrust (= 100.0 %).

If this servo parameter is set to "0.0", the servo motor does not generate torque or thrust.

This servo parameter corresponds to [Max torque (Obj. 6072h)].

When the object is mapped to the cyclic communication, do not write values with engineering tools because the controller overwrites the servo parameter values written with engineering tools.

7.6 Positioning control setting servo parameters group ([Pr. PT_ _])

[Pr. PT01_Command mode selection (**CTY)]

Initial value	Setting range	Setting method	Ver.
00000300h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

[Pr. PT01.1_Speed/acceleration/deceleration unit selection]

Initial value	Setting range	Ver.
1h	Refer to the text	A5

Select the unit of speed and the unit of acceleration/deceleration.

This function is enabled in the cyclic synchronous mode, profile mode, and positioning mode (point table method).

Setting value	Speed	Acceleration/deceleration
0	r/min, mm/s *1	ms
1	Command unit/s *2	Command unit/s ² *2

*1 In the linear servo motor control mode, the unit is mm/s.

*2 The command unit can be changed to 0.001 mm, 0.0001 inch, 0.001 degree, or pulses with [Pr. PT01.2 Unit for position data]. The actual servo motor speed (encoder pulse unit) is calculated by multiplying the set speed data by the electronic gear ratio.

The speed of point table and the unit of acceleration/deceleration are changed depending on the setting value of this servo parameter. When the unit is changed, review and reset the point table setting value.

Servo parameters to be enabled by this servo parameter vary depending on whether the setting value of this servo parameter is "0" or "1". Refer to the following table.

Setting value		Object interlocked with servo parameter
0	1	
[Pr. PT65 Profile speed command]	[Pr. PV01 Profile speed command extension setting]	[Profile velocity (Obj. 6081h)]
[Pr. PT66 Maximum profile speed]	[Pr. PV03 Maximum profile speed extension setting]	[Max profile velocity (Obj. 607Fh)]
[Pr. PT49 Speed acceleration time constant]	[Pr. PV05 Profile acceleration]	[Profile acceleration (Obj. 6083h)]
[Pr. PT50 Speed deceleration time constant]	[Pr. PV07 Profile deceleration]	[Profile deceleration (Obj. 6084h)]
[Pr. PC24 Deceleration time constant at forced stop]	[Pr. PV09 Deceleration at forced stop]	[Quick stop deceleration (Obj. 6085h)]
[Pr. PT05 Homing speed]	[Pr. PV11 Homing speed extension setting]	[Speed during search for zero (Obj. 6099h: 2h)]
[Pr. PT06 Creep speed]	[Pr. PV13 Creep speed extension setting]	[Speed during search for switch (Obj. 6099h: 1h)]
[Pr. PT56 Homing acceleration time constant]	[Pr. PV15 Homing acceleration]	[Homing acceleration (Obj. 609Ah)]
[Pr. PT57 Homing deceleration time constant]	[Pr. PV17 Homing deceleration]	—
[Pr. PC72 Speed reached 2 - Output range]	[Pr. PV19 Speed reached 2 - Output range - Extension setting]	[Velocity window (Obj. 606Dh)]
[Pr. PC65 Zero speed 2 level]	[Pr. PV20 Zero speed 2 level extension setting]	[Velocity threshold (Obj. 606Fh)]
[Pr. PT67 Speed limit]	[Pr. PV21 Speed limit extension setting]	[Velocity limit value (Obj. 2D20h)]

[Pr. PT01.2_Unit for position data]

Initial value	Setting range	Ver.
3h	Refer to the text	B6

0: mm

1: inch

2: degree

3: pulse

If this servo parameter is changed, perform homing.

The compatible control modes and firmware versions are as follows.

Control mode	Setting value			
	0 (mm) ^{*4}	1 (inch) ^{*4}	2 (degree) ^{*1*2}	3 (pulse)
Cyclic synchronous mode	—	—	— ^{*3}	A0
Profile mode	—	—	B6	A5
Positioning mode (point table method)	B8	B8	B8	B8

*1 If [Pr. PA01.4 Fully closed loop operation mode selection] is set to "1" (enabled), use a rotary encoder as the load-side encoder. Connecting a linear encoder will trigger [AL. 037 Parameter error].

*2 If [Pr. PA01.1 Operation mode selection] is set to "4" (linear servo motor control mode), [AL. 037] will occur.

*3 If this parameter is set to "2", the control mode cannot be switched to the cyclic synchronous mode.

*4 Setting this value in a control mode other than the positioning mode (point table method) will cause [AL. 037].

[Pr. PT53_Torque slope (TQS)]

Initial value	Setting range	Setting method	Ver.
100.0 [%/s]	0.0 to 1000000.0	Each axis	A5

Set the rate of change in the torque command per second.

When "0.0" is set, the torque slope is disabled.

This function is enabled in the profile torque mode.

This function corresponds to [Torque slope (Obj. 6087h)].

When the object is mapped to the cyclic communication, do not write values with engineering tools because the controller overwrites the servo parameter values written with engineering tools.

[Pr. PT85_Function selection T-14 (*TOP14)]

Initial value	Setting range	Setting method	Ver.
0000000h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

[Pr. PT85.0_Infinite feed function selection]

Initial value	Setting range	Ver.
0h	Refer to the text	D0

Select whether to enable or disable the infinite feed function.

0: Disabled

1: Enabled

When [Pr. PT85.0] is changed while the absolute position detection system is enabled, perform homing again. If homing is not performed, [AL. 090.5 Homing incomplete warning] occurs at the start of an operation.

7.7 Network setting servo parameters group ([Pr. PN_ _])

[Pr. PN02_ For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PN03_ Communication mode setting (**NWMD)]

Initial value	Setting range	Setting method	Ver.
00000000h	Refer to the relevant detail No.	Common	Refer to the relevant detail No.

[Pr. PN03.3_ Object attribute selection]

Initial value	Setting range	Ver.
0h	Refer to the text	D4

Select the attribute of an object.

0: Object attribute selection 1

1: Object attribute selection 2

For drive units with firmware version D4 or later, the PDO Mapping attribute of the following objects has been changed. To use the PDO Mapping attribute before the change, set "1" in this servo parameter.

Index	Sub Index	Object name	Setting value	
			0 (Object attribute selection 1) (after the change)	1 (Object attribute selection 2) (before the change)
6072h	00h	Max Torque	RxPDO	TxPDO/RxPDO
607Ch	00h	Home Offset	RxPDO	TxPDO
6080h	00h	Max motor speed	RxPDO	TxPDO
608Fh	01h	Encoder increments	RxPDO	TxPDO
608Fh	02h	Motor revolutions	RxPDO	TxPDO

When an ESI file is required to use the setting of "1" (Object attribute selection 2), contact the sales representative.

[Pr. PN05_ For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PN07_Communication cycle initial setting (**CCS)]

Initial value	Setting range	Setting method	Ver.
00000000h	Refer to the text	Common	B6

The initial value of the communication cycle in the PDO communication can be set.

Use this servo parameter when [Cycle Time (Obj. 1C32h: 02h)] and [Cycle Time (Obj. 1C33h: 02h)] are not to be set with the master controller (asynchronous mode). This servo parameter setting is not required for master controllers that can change the communication cycle with the objects in the asynchronous mode.

The setting value of this servo parameter will be set in [Cycle Time (Obj. 1C32h: 02h)] and [Cycle Time (Obj. 1C33h: 02h)] as the initial value. Once this servo parameter is set to "0", the objects will be set to "250000 ns (250 μs)". Setting an unsupported communication cycle triggers [AL. 037 Parameter error].

Setting value	Communication cycle
00	Automatic (250 μs)
04	125 μs
05	250 μs
06	500 μs
07	1 ms
08	2 ms
09	4 ms
0A	8 ms

[Pr. PN13_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PN18_Counter level for communication error detection (CERN)]

Initial value	Setting range	Setting method	Ver.
9	0 to 32767	Common	A5

Set the threshold until [AL. 086.1 Network receive data error (Network communication error 1)] is detected.

When "0" is set, this parameter is disabled.

If the PDO data is not updated with Sync0, the internal error counter will be added by 3 at a time.

When the PDO data is updated properly, the internal error counter is subtracted by 1.

Refer to the following for the example of the counter.

Receive (SM2) Event	1	0	1	0	1	0	1	0	1	0	1
Internal Error Counter (Setting value = 9)	0	3	2	5	4	7	6	9 (error)	9	9	9

This servo parameter corresponds to [Sync Error Counter Limit (Obj. 10F1h: 02h)].

If detection of [AL. 086.1] is disabled, the servo motor cannot be stopped at occurrence of a communication error. In addition, if the setting value is increased, it takes longer for the servo motor to stop at occurrence of a communication error. Be careful when changing the set value as there is a danger of collision.

[Pr. PN20_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PN22_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PN33_Device Warning Mask (DWM)]

Initial value	Setting range	Setting method	Ver.
FFFFFFFFh	00000000h to FFFFFFFFh	Each axis	D4

Set the mask values in [Active Device Warning Details (Obj. F381h)] and [Latched Device Warning Details (Obj. F391h)].

This servo parameter corresponds to [Device Warning Mask (Obj. F3A1h)].

For details of the mask values, refer to "[Device Warning Mask (Obj. F3A1h)]" in the following manual.

 MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Object Dictionary)

[Pr. PN34_Device Error Mask (DEM)]

Initial value	Setting range	Setting method	Ver.
FFFFFFFFh	00000000h to FFFFFFFFh	Each axis	D4

Set the mask values in [Active Device Error Details (Obj. F383h)] and [Latched Device Error Details (Obj. F393h)].

This servo parameter corresponds to [Device Error Mask (Obj. F3A3h)].

For details of the mask values, refer to "[Device Error Mask (Obj. F3A3h)]" in the following manual.

 MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Object Dictionary)

7.8 Positioning extension setting servo parameters group ([Pr. PV_ _])

[Pr. PV23_Speed unit conversion - Electronic gear - Numerator (*VCMX)]

Initial value	Setting range	Setting method	Ver.
1	1 to 1024	Each axis	A5

Set the electric gear numerator for converting the speed (command unit/s) into a value in speed units.
This function is enabled when [Pr. PT01.1 Speed/acceleration/deceleration unit selection] is set to "1".

[Pr. PV24_Speed unit conversion - Electronic gear - Denominator (*VCDV)]

Initial value	Setting range	Setting method	Ver.
1	1 to 256	Each axis	A5

Set the electric gear denominator for converting the speed command (command unit/s) into a value in speed units.
This function is enabled when [Pr. PT01.1 Speed/acceleration/deceleration unit selection] is set to "1".

[Pr. PV25_Acceleration unit conversion - Electronic gear - Numerator (*ACMX)]

Initial value	Setting range	Setting method	Ver.
1	1 to 1024	Each axis	A5

Set the electric gear numerator for converting the acceleration (command unit/s²) into a value in acceleration/deceleration units.

This function is enabled when [Pr. PT01.1 Speed/acceleration/deceleration unit selection] is set to "1".

[Pr. PV26_Acceleration unit conversion - Electronic gear - Denominator (*ACDV)]

Initial value	Setting range	Setting method	Ver.
1	1 to 256	Each axis	A5

Set the electric gear denominator for converting the acceleration (command unit/s²) into a value in acceleration/deceleration units.

This function is enabled when [Pr. PT01.1 Speed/acceleration/deceleration unit selection] is set to "1".

[Pr. PV33_For manufacturer setting]

This servo parameter is for manufacturer setting.

7.9 Lists of supported control modes

The following shows the meaning of each abbreviation used in the lists. "○" indicates the modes that can be used, and "—" indicates the modes that cannot be used or modes that are not used even if set.

Mode	List abbreviation	Meaning
Operation mode	Standard	Standard control mode
	Linear	Linear servo motor control mode
	DD	Direct drive motor control mode
	Semi closed	Semi closed loop control mode
	Fully closed	Fully closed loop control mode
Control mode	csp	Cyclic synchronous position mode
	csv	Cyclic synchronous velocity mode
	cst	Cyclic synchronous torque mode
	pp	Profile position mode
	pv	Profile velocity mode
	tq	Profile torque mode
	hm	Homing mode
	pt	Point table mode
	jg	JOG operation mode

Basic setting servo parameters group ([Pr. PA_ _])

No.	Detail No.	Operation mode					Control mode								
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg
		Standard	Linear	DD	Standard	DD									
PA01	PA01.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PA01.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PA01.4	○	—	○	○	○	○	○	○	○	○	○	○	○	○
PA03	PA03.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PA03.1	○	—	—	○	—	○	○	○	○	○	○	○	○	○
	PA03.2	○	—	—	—	—	○	○	○	○	○	○	○	○	○
PA04	PA04.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PA04.3	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PA06	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA07	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA08	PA08.0	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PA08.4	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PA08.5	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PA08.6	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PA09	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PA10	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PA11	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA12	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA14	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA15	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA16	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA17	—	—	○	○	—	○	○	○	○	○	○	○	○	○	○
PA18	PA18.0-3	—	○	○	—	○	○	○	○	○	○	○	○	○	○
PA19	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA20	PA20.1	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PA21	PA21.0	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PA22	PA22.1	○	○	○	○	○	○	—	—	○	—	—	○	○	○
	PA22.3	○	○	○	—	—	○	○	○	○	○	○	○	○	○
PA23	PA23.0-1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PA23.2-4	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA24	PA24.0	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PA24.5	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PA25	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PA26	PA26.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA28	PA28.4	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PA34	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Gain/filter setting servo parameters group ([Pr. PB_ _])

No.	Detail No.	Operation mode					Control mode								
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg
		Standard	Linear	DD	Standard	DD									
PB01	PB01.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PB01.3	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB02	PB02.0	○	○	○	○	○	○	—	—	○	—	—	○	○	○
	PB02.1	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB04	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB06	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB07	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB08	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB09	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB10	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB11	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB12	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB13	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PB14	PB14.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PB14.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PB15	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PB16	PB16.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PB16.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PB16.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PB17	PB17.0-1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PB17.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PB18	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB19	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB20	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB21	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB22	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB23	PB23.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PB23.1	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PB23.3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PB24	PB24.0	○	○	○	○	○	○	—	—	○	—	—	○	○	○
	PB24.1	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB25	PB25.0	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB26	PB26.0	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PB26.1	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PB26.2	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PB26.4	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PB26.5	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB27	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB28	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB29	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB30	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB31	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB32	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PB33	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB34	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB35	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PB36	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○

No.	Detail No.	Operation mode					Control mode									
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg	
		Standard	Linear	DD	Standard	DD										
PB45	PB45.0-1	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
	PB45.2	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB46	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PB47	PB47.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PB47.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PB47.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PB48	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PB49	PB49.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PB49.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PB49.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PB50	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PB51	PB51.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PB51.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PB51.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PB52	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB53	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB54	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB55	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB56	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB57	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB58	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB59	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB60	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○	
PB65	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○	
PB66	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○	
PB67	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○	
PB68	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB69	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○	
PB70	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○	
PB71	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB72	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB73	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB74	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB75	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB76	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB77	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB78	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB79	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○	
PB81	PB81.4	○	○	○	○	○	○	—	—	○	—	—	○	○	○	
PB82	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○	

Extension setting servo parameters group ([Pr. PC_ _])

No.	Detail No.	Operation mode					Control mode								
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg
		Standard	Linear	DD	Standard	DD									
PC01	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PC02	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC03	PC03.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PC03.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PC03.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC04	PC04.3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC05	PC05.0	○	—	—	—	—	○	○	○	○	○	○	○	○	○
	PC05.4	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC06	PC06.0	○	○	○	○	○	○	—	—	○	—	—	○	○	○
	PC06.3	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PC07	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC08	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC09	PC09.0-1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PC09.3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC10	PC10.0-1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PC10.3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC11	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC12	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC16	PC16.5	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC17	PC17.1	—	○	—	—	—	○	○	○	○	○	○	○	○	○
PC19	PC19.0	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PC19.4	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PC19.6	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC20	PC20.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC21	PC21.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC24	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PC26	PC26.3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC27	PC27.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PC27.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PC27.5	○	○	○	—	—	○	○	○	○	○	○	○	○	○
PC29	PC29.0	○	—	—	○	—	○	○	○	○	○	○	○	○	○
	PC29.3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PC29.5	○	—	○	○	○	○	○	○	○	○	○	○	○	○
PC31	—	○	○	○	○	○	—	—	○	—	—	○	○	○	
PC38	—	○	○	○	○	○	○	—	—	○	—	—	○	○	○
PC41	PC41.0	○	○	○	○	○	○	—	—	—	—	—	—	—	—
	PC41.3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC42	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC43	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC44	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC46	PC46.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PC46.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PC46.3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PC65	—	○	○	○	○	○	—	—	—	—	○	—	—	—	—
PC66	—	○	○	○	○	○	—	—	—	—	○	—	—	—	—
PC67	—	○	○	○	○	○	○	—	—	○	—	—	—	○	○
PC69	—	○	○	○	○	○	○	—	—	○	—	—	—	○	○
PC70	—	○	○	○	○	○	—	—	—	○	—	—	—	○	○

No.	Detail No.	Operation mode					Control mode									
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg	
		Standard	Linear	DD	Standard	DD										
PC71	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	<input type="radio"/>	—	—	—	<input type="radio"/>	<input type="radio"/>	
PC72	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	—	<input type="radio"/>	—	—	—	—	
PC73	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	—	<input type="radio"/>	—	—	—	—	
PC76	PC76.1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	PC76.2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	PC76.3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PC78	PC78.1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PC79	PC79.0-1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

I/O setting servo parameters group ([Pr. PD_ _])

No.	Detail No.	Operation mode					Control mode									
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg	
		Standard	Linear	DD	Standard	DD										
PD01	PD01.0-7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD03	PD03.0-1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD04	PD04.0-1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD05	PD05.0-1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	PD05.4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD07	PD07.0-1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD08	PD08.0-1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	PD08.2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	PD08.3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD09	PD09.0-1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	PD09.2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	PD09.3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD11	PD11.0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD12	PD12.3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD13	PD13.2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	<input type="radio"/>	—	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
PD14	PD14.1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD38	PD38.0-1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD39	PD39.0-1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD41	PD41.2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	PD41.3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD51	PD51.0-1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	PD51.4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
PD60	PD60.0-7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Extension setting 2 servo parameters group ([Pr. PE_ _])

No.	Detail No.	Operation mode					Control mode								
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg
		Standard	Linear	DD	Standard	DD									
PE01	PE01.0	—	—	—	○	○	○	○	○	—	—	—	—	—	—
	PE01.4	—	—	—	○	○	○	○	○	—	—	—	—	—	—
PE03	PE03.0	—	—	—	○	○	○	—	—	○	—	—	○	○	○
	PE03.1	—	—	—	○	○	○	—	—	○	—	—	○	○	○
	PE03.3	—	—	—	○	○	○	—	—	○	—	—	○	○	○
PE04	—	—	—	○	○	○	—	—	○	—	—	○	○	○	
PE05	—	—	—	○	○	○	—	—	○	—	—	○	○	○	
PE06	—	—	—	○	○	○	○	○	○	○	○	○	○	○	
PE07	—	—	—	○	○	○	○	○	○	○	○	○	○	○	
PE08	—	—	—	○	○	○	—	—	○	—	—	○	○	○	
PE10	PE10.1	—	—	—	○	○	○	○	○	○	○	○	○	○	
PE41	PE41.0	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PE41.6	○	○	○	○	○	○	○	○	○	○	○	○	○	
PE44	—	○	○	○	○	○	—	—	○	—	—	○	○	○	
PE45	—	○	○	○	○	○	○	—	—	○	—	—	○	○	
PE46	—	○	○	○	○	○	○	—	—	○	—	—	○	○	
PE47	—	○	○	○	○	○	○	○	○	○	○	○	○	○	
PE48	PE48.0	○	○	○	○	○	○	—	—	○	—	—	○	○	
	PE48.1	○	○	○	○	○	○	—	—	○	—	—	○	○	
PE49	—	○	○	○	○	○	○	—	—	○	—	—	○	○	
PE50	—	○	○	○	○	○	○	—	—	○	—	—	○	○	
PE51	—	○	○	○	○	○	○	○	○	○	○	○	○	○	
PE53	—	○	○	○	○	○	○	○	○	○	○	○	○	○	

Extension setting 3 servo parameters group ([Pr. PF_ _])

No.	Detail No.	Operation mode					Control mode								
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg
		Standard	Linear	DD	Standard	DD									
PF02	PF02.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF02.4	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF02.5	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF06	PF06.0	○	—	—	○	—	○	○	○	○	○	○	○	○	○
	PF06.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF12	—	○	—	—	○	—	○	○	○	○	○	○	○	○	○
PF18	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF19	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF20	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF21	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF23	—	○	○	○	○	○	○	○	○	○	○	—	○	○	○
PF24	PF24.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF25	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF29	PF29.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF31	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF32	—	○	○	○	○	○	○	○	—	○	○	—	○	○	○
PF34	PF34.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF34.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF34.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF34.5	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF34.6	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF40	PF40.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF40.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF40.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF40.4	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF40.5	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF41	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF42	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF43	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF45	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF46	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF47	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF62	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF63	PF63.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF63.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF66	PF66.0-3	○	—	○	○	○	○	○	—	○	○	—	○	○	○
	PF66.4-7	○	—	○	○	○	○	○	—	○	○	—	○	○	○
PF67	—	○	—	○	○	○	○	○	—	○	○	—	○	○	○
PF68	—	○	—	○	○	○	○	○	—	○	○	—	○	○	○
PF69	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF70	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF71	PF71.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PF71.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PF72	—	○	—	○	○	○	○	○	○	○	○	○	○	○	○
PF73	—	○	—	○	○	○	○	○	○	○	○	○	○	○	○
PF74	—	○	—	○	○	○	○	○	○	○	○	○	○	○	○
PF75	—	○	—	○	○	○	○	○	○	○	○	○	○	○	○
PF76	—	○	—	○	○	○	○	○	○	○	○	○	○	○	○

No.	Detail No.	Operation mode					Control mode									
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg	
		Standard	Linear	DD	Standard	DD										
PF80	PF80.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF80.2-3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF81	PF81.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF82	PF82.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF82.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF82.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF82.3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF83	PF83.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF84	PF84.0-1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF84.2-3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF84.4-5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF85	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF86	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF87	PF87.0-2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF87.4-6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF88	PF88.0-2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF88.4-6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF89	PF89.0-2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF89.4-6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF90	PF90.0-2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF91	PF91.0-3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF91.4-7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF92	PF92.0-3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF92.4-7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF93	PF93.0-3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF93.4-7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF94	PF94.0-3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	PF94.4-7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PF95	PF95.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

Motor extension setting servo parameters group ([Pr. PL_ _])

No.	Detail No.	Operation mode					Control mode									
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg	
		Standard	Linear	DD	Standard	DD										
PL01	PL01.0	—	○	○	—	○	○	○	○	○	○	○	○	○	○	
	PL01.2	—	○	—	—	—	—	—	—	—	—	○	—	—	—	
PL02	—	—	○	—	—	—	○	○	○	○	○	○	○	○	○	
PL03	—	—	○	—	—	—	○	○	○	○	○	○	○	○	○	
PL04	PL04.0	—	○	○	—	○	○	○	○	○	○	○	○	○	○	
	PL04.3	—	○	○	—	○	○	○	○	○	○	○	○	○	○	
PL05	—	—	○	○	—	○	○	—	—	○	—	—	○	○	○	
PL06	—	—	○	○	—	○	○	—	○	○	—	○	○	○	○	
PL07	—	—	○	○	—	○	○	○	○	○	○	○	○	○	○	
PL08	PL08.0	—	○	○	—	○	○	○	○	○	○	○	○	○	○	
	PL08.2	—	○	○	—	○	○	○	○	○	○	○	○	○	○	
PL09	—	—	○	○	—	○	○	○	○	○	○	○	○	○	○	
PL17	PL17.0	—	○	○	—	○	○	○	○	○	○	○	○	○	○	
	PL17.1	—	○	○	—	○	○	○	○	○	○	○	○	○	○	
PL18	—	—	○	○	—	○	○	○	○	○	○	○	○	○	○	

Positioning control setting servo parameters group ([Pr. PT_ _])

No.	Detail No.	Operation mode					Control mode								
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg
		Standard	Linear	DD	Standard	DD									
PT01	PT01.1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PT01.2	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PT02	PT02.7	○	○	○	○	○	—	—	—	○	—	—	○	○	○
PT03	PT03.2	○	—	○	—	—	—	—	—	○	—	—	—	○	—
PT05	—	○	○	○	○	○	—	—	—	—	—	—	○	—	—
PT06	—	○	○	○	○	○	—	—	—	—	—	—	○	—	—
PT07	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PT08	—	○	○	○	○	○	○	—	—	○	○	○	○	○	○
PT09	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PT10	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PT11	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PT12	—	○	○	○	○	○	—	—	—	○	—	—	○	○	—
PT15	—	○	○	○	○	○	○	—	—	○	—	—	—	○	○
PT17	—	○	○	○	○	○	○	—	—	○	—	—	—	○	○
PT19	—	○	○	○	○	○	○	—	—	○	—	—	—	○	○
PT21	—	○	○	○	○	○	○	—	—	○	—	—	—	○	○
PT26	PT26.4	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PT29	PT29.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PT34	PT34.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PT34.3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PT38	PT38.1	○	○	○	○	○	—	—	—	—	—	—	○	○	○
	PT38.4	○	○	○	○	○	○	○	—	—	—	—	—	—	—
PT41	PT41.0	○	○	○	○	○	—	—	—	—	—	—	○	—	—
PT45	—	○	○	○	○	○	—	—	—	—	—	—	○	—	—
PT49	—	○	○	○	○	○	—	—	—	○	○	—	—	—	○
PT50	—	○	○	○	○	○	—	—	—	○	○	—	—	—	○
PT51	—	○	○	○	○	○	—	—	—	○	○	—	—	○	○
PT53	—	○	○	○	○	○	—	—	—	—	—	○	—	—	—
PT55	PT55.0	○	○	○	○	○	—	—	—	—	—	—	○	—	—
	PT55.1	○	○	○	○	○	—	—	—	—	—	—	○	—	—
PT56	—	○	○	○	○	○	—	—	—	—	—	—	○	—	—
PT57	—	○	○	○	○	○	—	—	—	—	—	—	○	—	—
PT65	—	○	○	○	○	○	—	—	—	○	—	—	—	—	○
PT66	—	○	○	○	○	○	—	—	—	○	○	—	—	—	○
PT67	—	○	○	○	○	○	—	—	○	—	—	○	—	—	—
PT68	PT68.0	○	○	○	○	○	○	○	—	○	○	—	○	○	○
	PT68.2	○	○	○	○	○	—	—	—	○	○	○	○	○	○
PT83	PT83.2	○	○	○	○	○	—	—	—	—	—	—	—	○	—
PT85	—	○	—	—	—	—	○	—	—	—	—	—	○	—	—

Network setting servo parameters group ([Pr. PN_ _])

No.	Detail No.	Operation mode					Control mode								
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg
		Standard	Linear	DD	Standard	DD									
PN03	PN03.3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PN07	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PN18	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PN33	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PN34	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Positioning extension setting servo parameters group ([Pr. PV_ _])

No.	Detail No.	Operation mode					Control mode								
		Semi closed			Fully closed		csp	csv	cst	pp	pv	tq	hm	pt	jg
		Standard	Linear	DD	Standard	DD									
PV01	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	<input type="radio"/>	—	—	—	—	<input type="radio"/>
PV03	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	<input type="radio"/>	<input type="radio"/>	—	—	—	<input type="radio"/>
PV05	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	<input type="radio"/>	<input type="radio"/>	—	—	—	<input type="radio"/>
PV07	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	<input type="radio"/>	<input type="radio"/>	—	—	—	<input type="radio"/>
PV09	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	<input type="radio"/>	<input type="radio"/>	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PV11	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	—	—	—	<input type="radio"/>	—	—
PV13	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	—	—	—	<input type="radio"/>	—	—
PV15	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	—	—	—	<input type="radio"/>	—	—
PV17	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	—	—	—	<input type="radio"/>	—	—
PV19	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	—	<input type="radio"/>	—	—	—	—
PV20	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	—	<input type="radio"/>	—	—	—	—
PV21	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	<input type="radio"/>	—	—	<input type="radio"/>	—	—	—
PV23	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PV24	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PV25	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PV26	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PV29	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	<input type="radio"/>	<input type="radio"/>	—	<input type="radio"/>	—	<input type="radio"/>
PV31	—	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	—	—	—	<input type="radio"/>	<input type="radio"/>	—	<input type="radio"/>	—	<input type="radio"/>

7.10 Lists of servo parameter initial values

Basic setting servo parameters group ([Pr. PA_ _])

No.	Initial value
PA01	00003000h
PA02	00000000h
PA03	00000000h
PA04	00002000h
PA05	10000
PA06	1
PA07	1
PA08	00000001h
PA09	16
PA10	25600
PA11	1000.0
PA12	1000.0
PA13	00000000h
PA14	0
PA15	4000
PA16	1
PA17	00000000h
PA18	00000000h
PA19	000000ABh
PA20	00000000h
PA21	00000001h
PA22	00000000h
PA23	00000000h
PA24	00000000h
PA25	0
PA26	00000000h
PA27	00000000h
PA28	00000000h
PA29	0
PA30	0
PA31	0
PA32	00000000h
PA33	0.0
PA34	0
PA35	00000000h
PA36	00000000h
PA37	00000000h
PA38	00000000h
PA39	00000000h
PA40	00000000h
PA41	00000000h
PA42	00000000h
PA43	00000000h
PA44	00000000h

Gain/filter setting servo parameters group ([Pr. PB_ _])

No.	Initial value
PB01	00000000h
PB02	00000000h
PB03	36000
PB04	0
PB05	500
PB06	7.00
PB07	15.0
PB08	37.0
PB09	823
PB10	33.7
PB11	980
PB12	0
PB13	4500
PB14	00000000h
PB15	4500
PB16	00000000h
PB17	00000000h
PB18	3141
PB19	100.0
PB20	100.0
PB21	0.00
PB22	0.00
PB23	00001000h
PB24	00000000h
PB25	00000000h
PB26	00000000h
PB27	10
PB28	1
PB29	7.00
PB30	0.0
PB31	0
PB32	0.0
PB33	0.0
PB34	0.0
PB35	0.00
PB36	0.00
PB37	1600
PB38	0.000
PB39	0.000
PB40	0.000
PB41	00000000h
PB42	00000000h
PB43	00000000h
PB44	0.00
PB45	00000000h
PB46	4500
PB47	00000000h
PB48	4500
PB49	00000000h
PB50	4500
PB51	00000000h

No.	Initial value
PB52	100.0
PB53	100.0
PB54	0.00
PB55	0.00
PB56	0.0
PB57	0.0
PB58	0.00
PB59	0.00
PB60	0.0
PB61	0.0
PB62	00000000h
PB63	00000000h
PB64	00000000h
PB65	10
PB66	1
PB67	7.00
PB68	0.0
PB69	0
PB70	0.0
PB71	0.0
PB72	0.0
PB73	0.00
PB74	0.00
PB75	0.0
PB76	0.0
PB77	0.00
PB78	0.00
PB79	0.0
PB80	177.0
PB81	00000001h
PB82	0.0
PB83	00000000h
PB84	00000000h
PB85	00000000h
PB86	00000000h
PB87	00000000h
PB88	00000000h
PB89	00000000h
PB90	00000000h
PB91	00000000h
PB92	00000000h

Extension setting servo parameters group ([Pr. PC_ _])

No.	Initial value
PC01	0
PC02	0
PC03	00000000h
PC04	00000000h
PC05	00000000h
PC06	00000000h
PC07	50
PC08	0
PC09	00000000h
PC10	00000001h
PC11	0
PC12	0
PC13	0
PC14	0
PC15	0
PC16	00000000h
PC17	00000000h
PC18	00000000h
PC19	00000000h
PC20	00000000h
PC21	00000000h
PC22	0
PC23	00000000h
PC24	100
PC25	0
PC26	00000050h
PC27	00000000h
PC28	00000000h
PC29	00101000h
PC30	0
PC31	0
PC32	0
PC33	0
PC34	100
PC35	00000000h
PC36	00000000h
PC37	00000000h
PC38	0
PC39	0.0
PC40	0.0
PC41	00000000h
PC42	00000000h
PC43	1000.0
PC44	1000.0
PC45	00000000h
PC46	00000000h
PC47	00000000h
PC48	00000000h
PC49	00000000h
PC50	00000000h
PC51	00000000h

No.	Initial value
PC52	0000000h
PC53	0000000h
PC54	0000000h
PC55	0000000h
PC56	0000000h
PC57	0000000h
PC58	0000000h
PC59	0000000h
PC60	0000000h
PC61	0000000h
PC62	0000000h
PC63	0000000h
PC64	0000000h
PC65	50.00
PC66	10
PC67	00C0000h
PC68	0000000h
PC69	0
PC70	400
PC71	0
PC72	20.00
PC73	0
PC74	10.0
PC75	10
PC76	0000001h
PC77	1000.0
PC78	0000010h
PC79	0000000h
PC80	0000000h
PC81	0000000h
PC82	0
PC83	0000000h
PC84	0000000h
PC85	0000000h
PC86	0000000h
PC87	0000000h
PC88	0000000h
PC89	0000000h
PC90	0000000h

I/O setting servo parameters group ([Pr. PD_ _])

No.	Initial value
PD01	00000000h
PD02	00000000h
PD03	000000Ah
PD04	000000Bh
PD05	0000022h
PD06	00000000h
PD07	0000005h
PD08	0000004h
PD09	0000003h
PD10	00000000h
PD11	0000007h
PD12	0000101h
PD13	00000000h
PD14	00000000h
PD15	00000000h
PD16	00000000h
PD17	00000000h
PD18	00000000h
PD19	00000000h
PD20	0
PD21	0
PD22	0
PD23	0
PD24	00000000h
PD25	00000000h
PD26	00000000h
PD27	00000000h
PD28	00000000h
PD29	00000000h
PD30	0
PD31	0
PD32	0
PD33	00000000h
PD34	00000000h
PD35	00000000h
PD36	00000000h
PD37	00110001h
PD38	0000002Ch
PD39	0000002Dh
PD40	0
PD41	00000000h
PD42	00000000h
PD43	00000000h
PD44	00000000h
PD45	00000000h
PD46	00000000h
PD47	00000000h
PD48	00000000h
PD49	0
PD50	0
PD51	00000062h

No.	Initial value
PD52	00000000h
PD53	00000000h
PD54	00000000h
PD55	00000000h
PD56	00000000h
PD57	00000000h
PD58	00000000h
PD59	00000000h
PD60	00000000h
PD61	00000000h
PD62	00000000h
PD63	00000000h
PD64	00000000h
PD65	00000000h
PD66	00000000h
PD67	00000000h
PD68	00000000h
PD69	00000000h
PD70	00000000h
PD71	00000000h
PD72	00000000h

Extension setting 2 servo parameters group ([Pr. PE_ _])

No.	Initial value
PE01	00000000h
PE02	00000000h
PE03	00000003h
PE04	1
PE05	1
PE06	400
PE07	100
PE08	10
PE09	00000000h
PE10	00000000h
PE11	00000000h
PE12	00000000h
PE13	00000000h
PE14	00000111h
PE15	20
PE16	00000000h
PE17	00000100h
PE18	00000000h
PE19	00000000h
PE20	00000000h
PE21	00000000h
PE22	00000000h
PE23	00000000h
PE24	00000000h
PE25	00000000h
PE26	00000000h
PE27	00000000h
PE28	00000000h
PE29	00000000h
PE30	00000000h
PE31	00000000h
PE32	00000000h
PE33	00000000h
PE34	1
PE35	1
PE36	0.0
PE37	0.00
PE38	0.00
PE39	20
PE40	00000000h
PE41	00000000h
PE42	0
PE43	0.0
PE44	0
PE45	0
PE46	0
PE47	0
PE48	00000000h
PE49	0
PE50	0
PE51	00000000h

No.	Initial value
PE52	0000000h
PE53	1000.0
PE54	0000000h
PE55	0000000h
PE56	0000000h
PE57	0000000h
PE58	0000000h
PE59	0000000h
PE60	0000000h
PE61	0.000
PE62	0.000
PE63	0.000
PE64	0.000
PE65	0.0
PE66	0.0
PE67	0.0
PE68	0000000h
PE69	0000000h
PE70	0.00
PE71	0
PE72	1.0000
PE73	0000000h
PE74	0000000h
PE75	0000000h
PE76	0000000h
PE77	0000000h
PE78	0
PE79	0
PE80	0000000h
PE81	0000000h
PE82	0000000h
PE83	0000000h
PE84	0000000h
PE85	0000000h
PE86	0000000h
PE87	0000000h
PE88	0000000h

Extension setting 3 servo parameters group ([Pr. PF_ _])

No.	Initial value
PF01	00000000h
PF02	00000000h
PF03	00000000h
PF04	0
PF05	00000000h
PF06	00000013h
PF07	00000000h
PF08	00000000h
PF09	00000000h
PF10	00000000h
PF11	00000000h
PF12	2000
PF13	00000000h
PF14	10
PF15	00000000h
PF16	00000000h
PF17	00000000h
PF18	10
PF19	0
PF20	0
PF21	0
PF22	200
PF23	20
PF24	00000000h
PF25	200
PF26	0
PF27	0
PF28	0
PF29	00000000h
PF30	0
PF31	0
PF32	50
PF33	00000000h
PF34	00000000h
PF35	00000000h
PF36	00000000h
PF37	00000000h
PF38	00000000h
PF39	00000000h
PF40	00000000h
PF41	0
PF42	0
PF43	0
PF44	0
PF45	0
PF46	0
PF47	0
PF48	00000000h
PF49	100
PF50	100
PF51	00000000h

No.	Initial value
PF52	00000000h
PF53	0
PF54	0
PF55	0
PF56	0
PF57	00000000h
PF58	00000000h
PF59	00000000h
PF60	00000000h
PF61	00000000h
PF62	00000000h
PF63	00000000h
PF64	00000000h
PF65	00000000h
PF66	00000000h
PF67	0
PF68	0
PF69	0
PF70	0
PF71	00000000h
PF72	0
PF73	0
PF74	0
PF75	0
PF76	0
PF77	00000000h
PF78	00000000h
PF79	00110010h
PF80	00000000h
PF81	00000000h
PF82	00000000h
PF83	00000000h
PF84	005A8101h
PF85	0
PF86	0
PF87	00020201h
PF88	02040003h
PF89	00090205h
PF90	0000000Ch
PF91	00120000h
PF92	80058010h
PF93	8000800Ah
PF94	801D8015h
PF95	00000000h
PF96	00000000h
PF97	00000000h
PF98	00000000h
PF99	00000000h

Motor extension setting servo parameters group ([Pr. PL_ _])

No.	Initial value
PL01	00000301h
PL02	1000
PL03	1000
PL04	00000003h
PL05	0
PL06	0
PL07	100
PL08	00001010h
PL09	30
PL10	5
PL11	100
PL12	500
PL13	00000000h
PL14	00000000h
PL15	20
PL16	0
PL17	00000000h
PL18	0
PL19	0
PL20	0
PL21	0
PL22	0
PL23	00000000h
PL24	0
PL25	0
PL26	00000000h
PL27	00000000h
PL28	00000000h
PL29	00000000h
PL30	00000000h
PL31	00000000h
PL32	00000000h
PL33	00000000h
PL34	00000000h
PL35	00000000h
PL36	00000000h
PL37	00000000h
PL38	00000000h
PL39	00000000h
PL40	00000000h
PL41	00000000h
PL42	00000000h
PL43	00000000h
PL44	00000000h
PL45	00000000h
PL46	00000000h
PL47	00000000h
PL48	00000000h
PL49	00000000h
PL50	0
PL51	0

No.	Initial value
PL52	12
PL53	0
PL54	00000000h
PL55	00000000h
PL56	00000000h
PL57	00000000h
PL58	00000000h
PL59	00000000h
PL60	00000000h
PL61	00000000h
PL62	00000000h
PL63	00000000h
PL64	00000000h
PL65	00000000h
PL66	00000000h
PL67	00000000h
PL68	00000000h
PL69	00000000h
PL70	00000000h
PL71	00000000h
PL72	00000000h

Positioning control setting servo parameters group ([Pr. PT_ _])

No.	Initial value
PT01	0000310h
PT02	0000001h
PT03	0000000h
PT04	0000000h
PT05	100.00
PT06	10.00
PT07	0
PT08	0
PT09	1000
PT10	100
PT11	15.0
PT12	0
PT13	0000000h
PT14	0
PT15	0
PT16	0000000h
PT17	0
PT18	0000000h
PT19	0
PT20	0000000h
PT21	0
PT22	0000000h
PT23	0000000h
PT24	0000000h
PT25	0000000h
PT26	0000000h
PT27	0000000h
PT28	8
PT29	0000000h
PT30	0000000h
PT31	0000000h
PT32	0000100h
PT33	0000000h
PT34	0000000h
PT35	0000000h
PT36	0000000h
PT37	10
PT38	0000000h
PT39	100
PT40	0
PT41	0000010h
PT42	0000000h
PT43	0000000h
PT44	0000000h
PT45	37
PT46	0
PT47	0000000h
PT48	0000000h
PT49	0
PT50	0
PT51	0

No.	Initial value
PT52	0
PT53	100.0
PT54	0
PT55	00000000h
PT56	0
PT57	0
PT58	100.00
PT59	500.00
PT60	1000.00
PT61	200.00
PT62	00000000h
PT63	00000000h
PT64	00000000h
PT65	100.00
PT66	20000.00
PT67	3000.00
PT68	00000002h
PT69	00000000h
PT70	00000000h
PT71	00000000h
PT72	1
PT73	00000000h
PT74	1
PT75	00000000h
PT76	00000000h
PT77	00000000h
PT78	00000000h
PT79	00000000h
PT80	00000000h
PT81	0
PT82	0
PT83	00000000h
PT84	00000000h
PT85	00000000h
PT86	00000000h
PT87	00000000h
PT88	00000000h
PT89	00000000h
PT90	00000000h

Network setting servo parameters group ([Pr. PN_ _])

No.	Initial value
PN01	00000000h
PN02	0
PN03	00000000h
PN04	0
PN05	0
PN06	00000000h
PN07	00000000h
PN08	00000000h
PN09	1
PN10	0
PN11	3600
PN12	00000001h
PN13	00000100h
PN14	00000000h
PN15	00000000h
PN16	00000000h
PN17	00000000h
PN18	9
PN19	00000000h
PN20	0
PN21	00000000h
PN22	00000000h
PN23	00000000h
PN24	00000000h
PN25	00000000h
PN26	00000000h
PN27	00000000h
PN28	00000000h
PN29	00000000h
PN30	00000000h
PN31	00000000h
PN32	00000000h
PN33	FFFFFFFFh
PN34	FFFFFFFFh

Positioning extension setting servo parameters group ([Pr. PV_ _])

No.	Initial value
PV01	0
PV02	0
PV03	2147483647
PV04	0
PV05	0
PV06	0
PV07	0
PV08	0
PV09	0
PV10	0
PV11	500000
PV12	0
PV13	100000
PV14	0
PV15	0
PV16	0
PV17	0
PV18	0
PV19	20000
PV20	20
PV21	2147483647
PV22	0
PV23	1
PV24	1
PV25	1
PV26	1
PV27	1
PV28	1
PV29	0
PV30	0
PV31	0
PV32	0
PV33	0
PV34	0
PV35	00000000h
PV36	00000000h
PV37	00000000h
PV38	00000000h
PV39	00000000h
PV40	00000000h

8 NETWORK PARAMETERS

Point

Refer to the following manual for the parameters not described in this chapter.

 MR-J5-G/MR-J5W-G User's Manual (Parameters)

8.1 Network basic parameters

[Pr. NPA01_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPA02_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPA04_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPA08_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPA09_Node address setting]

Initial value	Setting range	Size	Ver.
00000000h	00000000h to 0000FFFFh	4 bytes	A5

Set the node address of the network.

When using this network parameter, set the ID setting switch to "00h".

[Pr. NPA12_For manufacturer setting]

This network parameter is for manufacturer setting.

8.2 User authentication parameters

[Pr. NPB01_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB04_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB05_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB06_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB07_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB08_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB09_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB10_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB11_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB12_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB13_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB14_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB15_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB16_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB17_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB18_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB19_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB20_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB21_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB22_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB23_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB24_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB25_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB26_For manufacturer setting]

This network parameter is for manufacturer setting.

[Pr. NPB27_For manufacturer setting]

This network parameter is for manufacturer setting.

9 FUNCTIONAL SAFETY PARAMETERS

Point

Refer to the following manual for the parameters not described in this chapter.

 MR-J5-G/MR-J5W-G User's Manual (Parameters)

9.1 Safety sub-function 1 parameters group ([Pr. PSA_ _])

[Pr. PSA01_Safety sub-function mode selection (**SOA)]

Initial value	Setting range	Setting method	Ver.
00000000h	Refer to the relevant detail No.	Common	Refer to the relevant detail No.

Set the safety sub-function.

[Pr. PSA01.0_Safety sub-function activation setting]

Initial value	Setting range	Ver.
0h	Refer to the text	B2

0: Disabled

1: Enabled

When setting this functional safety parameter to "1" (enabled), check the setting of each relevant parameter for problems.

When setting this parameter to "0" (disabled), only the STO function with the CN8 connector can be used.

[Pr. PSA01.1_Input mode selection]

Initial value	Setting range	Ver.
0h	Refer to the text	B2

0: Safety sub-function control by input device

1: Safety sub-function control by network

2: Test operation

When setting this functional safety parameter to "2" (test operation), the safety sub-function is not available.


For information regarding test operation, refer to the following.

 Page 55 Test operation

If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

The setting value "1" is available on drive units with firmware version D8 or later.

Setting "1" on a drive unit that cannot use the safety sub-function control by network triggers [AL. 537]. For availability of safety sub-function control by network, refer to the following.

 Page 17 List of safety sub-function compatible units

[Pr. PSA05_SOS permissible travel distance (**SSDP)]

Initial value	Setting range	Setting method	Ver.
3 [rev]	0 to 1000	Each axis	D8

Specify the travel distance to be permitted during stop monitoring (SOS) via the SS2/SOS function. The STO function activates if movement to a position exceeding the position set in this functional safety parameter occurs after stop monitoring starts.

The setting unit can be changed with [Pr. PSA06 SOS permissible travel distance unit selection].

[Pr. PSA06_SOS permissible travel distance unit selection (**SAOP1)]

Initial value	Setting range	Setting method	Ver.
00000000h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

Select the setting unit that will be used to set the SOS permissible travel distance in [Pr. PSA05 SOS permissible travel distance].

[Pr. PSA06.0_SOS permissible travel distance unit selection]

Initial value	Setting range	Ver.
0h	Refer to the text	D8

0: [rev]

1: [0.1 rev]

2: [0.01 rev]

[Pr. PSA07_SLS deceleration monitor time 1 (**SLSDT1)]

Initial value	Setting range	Setting method	Ver.
1000 [ms]	0 to 60000	Each axis	D8

Set the threshold for the time required for the speed monitoring to start after the SLS1 command is enabled. Specify sufficient time that allows for deceleration to the safety speed after the SLS1 command is enabled. Perform deceleration control from the controller, etc. as necessary during this delay time.

[Pr. PSA08_SLS deceleration monitor time 2 (**SLSDT2)]

Initial value	Setting range	Setting method	Ver.
1000 [ms]	0 to 60000	Each axis	D8

Set the threshold for the time required for the speed monitoring to start after the SLS2 command is enabled. Specify sufficient time that allows for deceleration to the safety speed after the SLS2 command is enabled. Perform deceleration control from the controller, etc. as necessary during this delay time.

[Pr. PSA09_SLS deceleration monitor time 3 (**SLSDT3)]

Initial value	Setting range	Setting method	Ver.
1000 [ms]	0 to 60000	Each axis	D8

Set the threshold for the time required for the speed monitoring to start after the SLS3 command is enabled. Specify sufficient time that allows for deceleration to the safety speed after the SLS3 command is enabled. Perform deceleration control from the controller, etc. as necessary during this delay time.

[Pr. PSA10_SLS deceleration monitor time 4 (**SLSDT4)]

Initial value	Setting range	Setting method	Ver.
1000 [ms]	0 to 60000	Each axis	D8

Set the threshold for the time required for the speed monitoring to start after the SLS4 command is enabled. Specify sufficient time that allows for deceleration to the safety speed after the SLS4 command is enabled. Perform deceleration control from the controller, etc. as necessary during this delay time.

[Pr. PSA11_SLS speed 1 (**SLSS1)]

Initial value	Setting range	Setting method	Ver.
50 [r/min], [mm/s]	0 to 10000	Each axis	D8

Set the threshold for the safety speed if activating the SLS function via the SLS1 command. The STO function will activate if the absolute value of the servo motor speed exceeds the value set in this parameter during speed monitoring via the SLS function.

[Pr. PSA12_SLS speed 2 (**SLSS2)]

Initial value	Setting range	Setting method	Ver.
50 [r/min], [mm/s]	0 to 10000	Each axis	D8

Set the threshold for the safety speed if activating the SLS function via the SLS2 command. The STO function will activate if the absolute value of the servo motor speed exceeds the value set in this parameter during speed monitoring via the SLS function.

[Pr. PSA13_SLS speed 3 (**SLSS3)]

Initial value	Setting range	Setting method	Ver.
50 [r/min], [mm/s]	0 to 10000	Each axis	D8

Set the threshold for the safety speed if activating the SLS function via the SLS3 command. The STO function will activate if the absolute value of the servo motor speed exceeds the value set in this parameter during speed monitoring via the SLS function.

[Pr. PSA14_SLS speed 4 (**SLSS4)]

Initial value	Setting range	Setting method	Ver.
50 [r/min], [mm/s]	0 to 10000	Each axis	D8

Set the threshold for the safety speed if activating the SLS function via the SLS4 command. The STO function will activate if the absolute value of the servo motor speed exceeds the value set in this parameter during speed monitoring via the SLS function.

[Pr. PSA17_Safety sub-function - Position detection delay time (**SOSPT)]

Initial value	Setting range	Setting method	Ver.
0 [ms]	0 to 2000	Each axis	D8

Specify the filter time of the delay filter that will judge whether the motor position has exceeded the threshold during position monitoring. The setting of this functional safety parameter delays the response time of the following types of position monitoring.

- The time required for the STO function to start after the position feedback travel distance deviates from the permissible travel distance during stop monitoring via the SS2/SOS function

[Pr. PSA18_SSM speed (**SSMS)]

Initial value	Setting range	Setting method	Ver.
50 [r/min], [mm/s]	0 to 10000	Each axis	D8

Set the threshold for the safety speed if activating the SSM function. SSMS (SSM output) turns off when the absolute value of the servo motor speed exceeds this speed, and turns on when the absolute value of the servo motor speed falls below this speed. Note that judgment of the absolute value of the servo motor speed uses the hysteresis specified in [Pr. PSA19 SSM hysteresis width].

SSMS (SSM output) is turned off if an alarm that disables the safety sub-function occurs.

If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSA19_SSM hysteresis width (**SSMHW)]

Initial value	Setting range	Setting method	Ver.
20 [r/min], [mm/s]	0 to 10000	Each axis	D8

Set the threshold of the hysteresis width for SSM speed judgment. Ensure that the value set in this parameter is smaller than the value set in [Pr. PSA18 SSM speed].

If this parameter is set to a value larger than the value set in [Pr. PSA18], [AL. 537 Parameter setting range error (safety sub-function)] occurs.

If this functional safety parameter is set incorrectly, [AL. 537] occurs.

[Pr. PSA27_SDI positive direction monitor delay time (**SDIDTP)]

Initial value	Setting range	Setting method	Ver.
1000 [ms]	0 to 60000	Each axis	D8

Set the time required for the direction monitoring to start after the SDIP command is enabled. Specify the time that is sufficient for the travel direction of the servo motor to change to the negative direction after the SDIP command is enabled.

[Pr. PSA28_SDI negative direction monitor delay time (**SDIDTN)]

Initial value	Setting range	Setting method	Ver.
1000 [ms]	0 to 60000	Each axis	D8

Set the time required for the direction monitoring to start after the SDIN command is enabled. Specify the time that is sufficient for the travel direction of the servo motor to change to the positive direction after the SDIN command is enabled.

9.2 Safety sub-function 2 parameters group ([Pr. PSB_ _])

[Pr. PSB01_SLI permissible travel distance - Unit selection (**SLIPUS)]

Initial value	Setting range	Setting method	Ver.
00000000h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

Select the setting unit for the SLI permissible travel distance.

[Pr. PSB01.0_SLI permissible travel distance - Unit selection 1]

Initial value	Setting range	Ver.
0h	Refer to the text	D8

0: [rev]

1: [0.1 rev]

2: [0.01 rev]

[Pr. PSB02_SLI permissible travel distance - Positive direction 1 (**SLIPP1)]

Initial value	Setting range	Setting method	Ver.
3 [rev]	0 to 1000	Each axis	D8

Set the positive direction travel distance to be permitted during travel distance monitoring via the SLI function. The STO function activates if movement exceeding the travel distance set in this functional safety parameter occurs after travel distance monitoring starts.

The setting unit can be changed with [Pr. PSB01.0 SLI permissible travel distance - Unit selection 1].

[Pr. PSB06_SLI permissible travel distance - Negative direction 1 (**SLIPN1)]

Initial value	Setting range	Setting method	Ver.
3 [rev]	0 to 1000	Each axis	D8

Set the negative direction travel distance to be permitted during travel distance monitoring via the SLI function. The STO function activates if movement exceeding the travel distance set in this functional safety parameter occurs after travel distance monitoring starts.

The setting unit can be changed with [Pr. PSB01.0 SLI permissible travel distance - Unit selection 1].

[Pr. PSB10_SLT torque upper limit value 1 (**SLTP1)]

Initial value	Setting range	Setting method	Ver.
15.0 [%]	-1000.0 to 1000.0	Each axis	D8

Set the upper limit threshold for the safety torque if activating the SLT function via the SLT1 command.

The STO function will activate if the torque exceeds the threshold during torque monitoring via the SLT function.

Ensure that the value set in this parameter is larger than the value set in [Pr. PSB14 SLT torque lower limit value 1]. If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSB11_SLT torque upper limit value 2 (**SLTP2)]

Initial value	Setting range	Setting method	Ver.
15.0 [%]	-1000.0 to 1000.0	Each axis	D8

Set the upper limit threshold for the safety torque if activating the SLT function via the SLT2 command.

The STO function will activate if the torque exceeds the threshold during torque monitoring via the SLT function.

Ensure that the value set in this parameter is larger than the value set in [Pr. PSB15 SLT torque lower limit value 2]. If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSB12_SLT torque upper limit value 3 (**SLTP3)]

Initial value	Setting range	Setting method	Ver.
15.0 [%]	-1000.0 to 1000.0	Each axis	D8

Set the upper limit threshold for the safety torque if activating the SLT function via the SLT3 command.

The STO function will activate if the torque exceeds the threshold during torque monitoring via the SLT function.

Ensure that the value set in this parameter is larger than the value set in [Pr. PSB16 SLT torque lower limit value 3]. If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSB13_SLT torque upper limit value 4 (**SLTP4)]

Initial value	Setting range	Setting method	Ver.
15.0 [%]	-1000.0 to 1000.0	Each axis	D8

Set the upper limit threshold for the safety torque if activating the SLT function via the SLT4 command.

The STO function will activate if the torque exceeds the threshold during torque monitoring via the SLT function.

Ensure that the value set in this parameter is larger than the value set in [Pr. PSB17 SLT torque lower limit value 4]. If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSB14_SLT torque lower limit value 1 (**SLTN1)]

Initial value	Setting range	Setting method	Ver.
-15.0 [%]	-1000.0 to 1000.0	Each axis	D8

Set the lower limit threshold for the safety torque if activating the SLT function via the SLT1 command.

The STO function will activate if the torque falls below the threshold during torque monitoring via the SLT function.

Ensure that the value set in this parameter is smaller than the value set in [Pr. PSB10 SLT torque upper limit value 1]. If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSB15_SLT torque lower limit value 2 (**SLTN2)]

Initial value	Setting range	Setting method	Ver.
-15.0 [%]	-1000.0 to 1000.0	Each axis	D8

Set the lower limit threshold for the safety torque if activating the SLT function via the SLT2 command.

The STO function will activate if the torque falls below the threshold during torque monitoring via the SLT function.

Ensure that the value set in this parameter is smaller than the value set in [Pr. PSB11 SLT torque upper limit value 2]. If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSB16_SLT torque lower limit value 3 (**SLTN3)]

Initial value	Setting range	Setting method	Ver.
-15.0 [%]	-1000.0 to 1000.0	Each axis	D8

Set the lower limit threshold for the safety torque if activating the SLT function via the SLT3 command.

The STO function will activate if the torque falls below the threshold during torque monitoring via the SLT function.

Ensure that the value set in this parameter is smaller than the value set in [Pr. PSB12 SLT torque upper limit value 3]. If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSB17_SLT torque lower limit value 4 (**SLTN4)]

Initial value	Setting range	Setting method	Ver.
-15.0 [%]	-1000.0 to 1000.0	Each axis	D8

Set the lower limit threshold for the safety torque if activating the SLT function via the SLT4 command.

The STO function will activate if the torque falls below the threshold during torque monitoring via the SLT function.

Ensure that the value set in this parameter is smaller than the value set in [Pr. PSB13 SLT torque upper limit value 4]. If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSB18_SLT torque detection delay time (**SLTT)]

Initial value	Setting range	Setting method	Ver.
10 [ms]	0 to 2000	Each axis	D8

Specify the filter time of the delay filter that will judge whether the motor position has exceeded the threshold during torque monitoring. The setting of this functional safety parameter delays the response time of torque monitoring.

9.3 Network parameters group ([Pr. PSC_ _])

[Pr. PSC01_Transmission interval monitor time (**SNC)]

Initial value	Setting range	Setting method	Ver.
32 [ms]	16 to 1000	Common	D8

Select the transmission interval monitor time for safety communication.

Set the transmission interval monitor time so that it matches the safety communication setting of the controller.

[Pr. PSC03_Functional safety - Rotation direction selection/travel direction selection (**SNPOL)]

Initial value	Setting range	Setting method	Ver.
00000010h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

The rotation/travel direction can be changed without changing the polarity of the command from the controller.

[Pr. PSC03.0_Rotation direction selection/travel direction selection]

Initial value	Setting range	Ver.
0h	Refer to the text	D8

Set this functional safety parameter to the same value as [Pr. PA14 Travel direction selection].

Refer to the following table for setting values.

Setting value	Servo motor rotation direction/linear servo motor travel direction	
	Forward rotation pulse input	Reverse rotation pulse input
0	CCW or positive direction	CW or negative direction
1	CW or negative direction	CCW or positive direction

If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSC06_For manufacturer setting]

This functional safety parameter is for manufacturer setting.

[Pr. PSC07_FSoE Address setting (**FSADD)]

Initial value	Setting range	Setting method	Ver.
0	0 to 65535	Common	D8

Set the FSoE Slave address of the drive unit within the range of 1 to 65535.

Set the value used to identify FSoE Slave. Ensure that FSoE Slave has a unique value.

Match the value of FSoE Master with this functional safety parameter. If it is set to a non-matching value, [AL. 584 FSoE communication setting error (safety sub-function)] occurs.

When [Pr. PSA01.0 Safety sub-function activation setting] is set to "1" (Enabled) and [Pr. PSA01.1 Input mode selection] is set to "1" (Safety sub-function control by network), setting this functional safety parameter to "0" triggers [AL. 537 Parameter setting range error (Safety sub-function)].

9.4 Safety I/O device parameters group ([Pr. PSD_ _])

[Pr. PSD01_Input device automatic activation selection (**SDIA)]

Initial value	Setting range	Setting method	Ver.
00000000h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

This setting is enabled only when the input device is used. This setting allows for automatic activation of the SLS function, SLT function, and SDI function. The command set for automatic activation in this setting turns off (function enabled) at system startup, following which the relevant function will start automatically.

Speed monitoring via the SLS function is always enabled when automatically activating SLS1C to SLS4C.

If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSD01.0_SLSC function automatic activation selection]

Initial value	Setting range	Ver.
0h	Refer to the text	D8

Setting digit (BIN)	Explanation
___x	SLS1C (SLS1 command) 0:Do not perform automatic activation 1:Perform automatic activation
__x_	SLS2C (SLS2 command) 0:Do not perform automatic activation 1:Perform automatic activation
_x__	SLS3C (SLS3 command) 0:Do not perform automatic activation 1:Perform automatic activation
x___	SLS4C (SLS4 command) 0:Do not perform automatic activation 1:Perform automatic activation

[Pr. PSD01.1_SLTC function automatic activation selection]

Initial value	Setting range	Ver.
0h	Refer to the text	D8

Setting digit (BIN)	Explanation
___x	SLT1C (SLT1 command) 0:Do not perform automatic activation 1:Perform automatic activation
__x_	SLT2C (SLT2 command) 0:Do not perform automatic activation 1:Perform automatic activation
_x__	SLT3C (SLT3 command) 0:Do not perform automatic activation 1:Perform automatic activation
x___	SLT4C (SLT4 command) 0:Do not perform automatic activation 1:Perform automatic activation

[Pr. PSD01.2_SDIC function automatic activation selection]

Initial value	Setting range	Ver.
0h	Refer to the text	D8

Setting digit (BIN)	Explanation
___x	SDIPC (SDIP command) 0:Do not perform automatic activation 1:Perform automatic activation
__x_	SDINC (SDIN command) 0:Do not perform automatic activation 1:Perform automatic activation
_x__	For manufacturer setting
x___	For manufacturer setting

[Pr. PSD02_Input device selection DI1 (**SDI1)]

Initial value	Setting range	Setting method	Ver.
00000000h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

Select the device to be assigned to the input signal of the CN8-4/CN8-5 pin. Assign a device to [Pr. PSD02 Input device selection DI1] if "0" (safety sub-function control by input device) is selected in [Pr. PSA01.1 Input mode selection]. If no device is set to [Pr. PSD02], [AL. 537 Parameter setting range error (safety sub-function)] occurs.

If this functional safety parameter is set incorrectly, [AL. 537.2] occurs.

[Pr. PSD02.0-1_Safety input device selection DI1]

Initial value	Setting range	Ver.
00h	Refer to the text	B2


Select the device to be assigned to the input signal of the CN8-4/CN8-5 pin.

Refer to the following table for setting values.

Setting value	Input device
00	None
01	STOC (STO command)
02	SS1C (SS1 command)
03 *1	SS2C (SS2 command)
04 *1	SLS1C (SLS1 command)
08 *1	SDIPC (SDIP command)
09 *1	SDINC (SDIN command)
0A *1	SLT1C (SLT1 command)
0E *1	SLIC (SLI command)

*1 Available on drive units with firmware version D8 or later.

If an unavailable input device for the safety sub-function is selected, [AL. 537] occurs. For availability of each safety sub-function, refer to the following.

 Page 17 List of safety sub-function compatible units

[Pr. PSD02.3_Input axis selection DI1]

Initial value	Setting range	Ver.
0h	Refer to the text	B2

For a multi-axis drive unit, set which axis will use the input device that was assigned in [Pr. PSD02.0-1 Safety input device selection DI1].

When this functional safety parameter is set to "0h", the input device is enabled for all axes using the automatic setting. If this functional safety parameter is not "0h", refer to the following table.

Servo parameter number	Setting digit (BIN)	Setting details
PSD02.3	___x	A-axis selection 0:Disabled 1:Enabled
	__x_	B-axis selection 0:Disabled 1:Enabled
	_x__	C-axis selection 0:Disabled 1:Enabled
	x___	For manufacturer setting

When A-axis selection is enabled, the device name is ___-A. (example: "STOC-A")

When B-axis selection is enabled, the device name is ___-B. (example: "STOC-B")

When C-axis selection is enabled, the device name is ___-C. (example: "STOC-C")

When multiple axes are enabled with this functional safety parameter, the input device signal is enabled for multiple axes simultaneously.

For example, when [Pr. PSD02.3] = "5h" (A and C-axes enabled) and [Pr. PSD02.0] = "01h" (STOC) are set for the A-axis, STOC-A and STOC-C are enabled with the input signal of the DI1 pin.

In the following cases, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

- When other than "0h" is set on the MR-J5D1-_G_-N1
- When C-axis selection is enabled on the MR-J5D2-_G_-N1

[Pr. PSD08_Output device selection DO1 (**SDO1)]

Initial value	Setting range	Setting method	Ver.
00000000h	Refer to the relevant detail No.	Common	Refer to the relevant detail No.

Select the device to be assigned to the output signal of the CN8-6/CN8-7 pin.

If the functional safety parameter is set incorrectly, [AL. 537 Parameter setting range error (safety sub-function)] occurs.

[Pr. PSD08.0-1_Safety output device selection DO1]

Initial value	Setting range	Ver.
00h	Refer to the text	B2


Select the function to be assigned to the output signal of the CN8-6/CN8-7 pin.

Refer to the following table for setting values.

Setting value	Output device
00	None
01	STOS (STO output)
02	SS1S (SS1 output)
03 *1	SS2S (SS2 output)
04 *1	SLS1S (SLS1 output)
05 *1	SLS2S (SLS2 output)
06 *1	SLS3S (SLS3 output)
07 *1	SLS4S (SLS4 output)
08 *1	SSMS (SSM output)
09 *1	SOSS (SOS output)
0A	SBCS (SBC output)
0B *1	SDIPS (SDIP output)
0C *1	SDINS (SDIN output)
0D *1	SLT1S (SLT1 output)
0E *1	SLT2S (SLT2 output)
0F *1	SLT3S (SLT3 output)
10 *1	SLT4S (SLT4 output)
12 *1	SLIS (SLI output)

*1 Available on drive units with firmware version D8 or later.

If an unavailable output device for the safety sub-function is selected, [AL. 537] occurs. For availability of each safety sub-function, refer to the following.

 Page 17 List of safety sub-function compatible units

[Pr. PSD08.2_All-axis output condition selection DO1]

Initial value	Setting range	Ver.
0h	Refer to the text	B2

0: AND output

1: OR output

For AND output, the condition becomes significant (on or off) when the A, B, and C-axes all satisfy the condition.

The device name at this time is C-___. (example: "C-STOS")

For OR output, the condition becomes significant (on or off) when any of A, B, or C-axis satisfies the condition.

The device name at this time is X-___. (example: "X-STOS")

This functional safety parameter is enabled when [Pr. PSD08.3 Output axis selection] is set to "0" (all axes) while a multi-axis drive unit is used.

[Pr. PSD08.3_Output axis selection DO1]

Initial value	Setting range	Ver.
0h	Refer to the text	B2

0: All axes

1: A-axis

2: B-axis

3: C-axis

If the setting value is 1, the device name is ___-A. (example: "STOS-A")

If the setting value is 2, the device name is ___-B. (example: "STOS-B")

If the setting value is 3, the device name is ___-C. (example: "STOS-C")

9.5 Lists of functional safety parameter initial values

Refer to "LISTS OF FUNCTIONAL SAFETY PARAMETER INITIAL VALUES" in the following manual.

 MR-J5-G/MR-J5W-G User's Manual (Parameters)


10 ALARM/WARNING

10.1 Handling methods for alarms/warnings

10

Point

Refer to the following manual for the handling methods for the alarms/warnings not described in this section.

 MR-J5 User's Manual (Troubleshooting)

[AL. 09E_Network warning]

- An error exists in the network data reception.
- An error exists in the network settings.

[AL. 09E.B_PDO setting warning]

Cause	Check/action method	Model
1. The PDO setting for FSoE communication is incorrect.	Review the PDO setting for FSoE communication.	[G]

[AL. 584_FSoE communication setting error (safety sub-function)]

- There is a problem with the safety communication settings.

[AL. 584.1_FSoE Address mismatch error A (safety sub-function)]

Cause	Check/action method	Model
1. FSoE Address set in FSoE Master does not match the setting in [Pr. PSC07 FSoE Address setting].	Review the FSoE Address setting in FSoE Master or the setting in [Pr. PSC07 FSoE Address setting].	[G]

[AL. 584.2_FSoE communication parameter setting error A (safety sub-function)]

Cause	Check/action method	Model
1. The setting value of FSoE Watchdog Timer notified by FSoE Master is not supported.	Review the setting value of FSoE Watchdog Timer set in FSoE Master.	[G]

[AL. 584.3_FSoE communication parameter length error A (safety sub-function)]

Cause	Check/action method	Model
1. The parameter length notified by FSoE Master is incorrect.	Review the project setting in FSoE Master.	[G]

[AL. 584.4_FSoE SRA parameter setting error A (safety sub-function)]

Cause	Check/action method	Model
1. The SRA parameter notified by FSoE Master is incorrect.	Review the project setting in FSoE Master. If the SRA parameter is set, do not set it because it is not supported.	[G]

[AL. 584.5_FSoE SRA parameter length error A (safety sub-function)]

Cause	Check/action method	Model
1. The SRA parameter length notified by FSoE Master is incorrect.	Review the project setting in FSoE Master. If the SRA parameter is set, do not set it because it is not supported.	[G]

[AL. 584.9_FSoE Address mismatch error B (safety sub-function)]

☞ Page 130 [AL. 584.1_FSoE Address mismatch error A (safety sub-function)]

[AL. 584.A_FSoE communication parameter setting error B (safety sub-function)]

☞ Page 130 [AL. 584.2_FSoE communication parameter setting error A (safety sub-function)]

[AL. 584.B_FSoE communication parameter length error B (safety sub-function)]

☞ Page 130 [AL. 584.3_FSoE communication parameter length error A (safety sub-function)]

[AL. 584.C_FSoE SRA parameter setting error B (safety sub-function)]

☞ Page 130 [AL. 584.4_FSoE SRA parameter setting error A (safety sub-function)]

[AL. 584.D_FSoE SRA parameter length error B (safety sub-function)]

☞ Page 130 [AL. 584.5_FSoE SRA parameter length error A (safety sub-function)]

[AL. 585_FSoE communication error 1 (safety sub-function)]

- There is a problem with data reception in the safety communication. (During initial communication)

[AL. 585.1_FSoE communication error 1 - Receive data error (Unexpected command) A (safety sub-function)]

Cause	Check/action method	Model
1. The safety communication settings of FSoE Master are incorrect.	Review the safety communication settings. Refer to "Safety sub-function control by network" in the following manual. □MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Communication Function)	[G]
2. There is a problem with FSoE Master.	Check if an alarm has occurred in FSoE Master. If an alarm has occurred, take actions in accordance with the troubleshooting of FSoE Master.	
3. A network cable is disconnected.	Check if the network cable is connected correctly. Turn off the control circuit power supply of the drive unit, then connect the network cable correctly.	
4. The wiring of the network cable was incorrect.	Check if the connection of the network cable is correct.	
5. A network cable has been disconnected.	Check for disconnection in the network cable.	
6. Devices on the network (including repeaters such as hubs) are turned off.	Check that the devices on the network are turned on.	
7. The network was disconnected by an incorrect procedure.	Check if the network was disconnected by a correct procedure for each type of network. Refer to "Disconnecting the communication" in the User's Manual (Communication Function).	
8. Data transmission from the controller was interrupted for a certain time.	Check if data transmission from the controller has not been interrupted. If the data transmission has been interrupted, review the controller communication setting.	
9. The settings of the controller were incorrect.	Check the controller settings.	
10. There is a problem with the surrounding environment.	Check the noise, ambient temperature, and other conditions, and implement appropriate countermeasures for the cause. If there is noise, take countermeasures to reduce the noise. Refer to "Noise reduction techniques" in the following manual. □MR-J5D User's Manual (Hardware)	
11. The drive unit has malfunctioned.	Replace the drive unit.	
12. The controller has malfunctioned.	Replace the controller.	
13. Devices on the network (including repeaters such as hubs) have malfunctioned.	Replace the devices on the network.	

[AL. 585.2_FSoE communication error 1 - Receive data error (Unknown command) A (safety sub-function)]

☞ Page 131 [AL. 585.1_FSoE communication error 1 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 585.3_FSoE communication error 1 - Receive data error (Invalid connection ID) A (safety sub-function)]

☞ Page 131 [AL. 585.1_FSoE communication error 1 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 585.4_FSoE communication error 1 - Receive data error (CRC error) A (safety sub-function)]

☞ Page 131 [AL. 585.1_FSoE communication error 1 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 585.9_FSoE communication error 1 - Receive data error (Unexpected command) B (safety sub-function)]

☞ Page 131 [AL. 585.1_FSoE communication error 1 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 585.A_FSoE communication error 1 - Receive data error (Unknown command) B (safety sub-function)]

☞ Page 131 [AL. 585.1_FSoE communication error 1 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 585.B_FSoE communication error 1 - Receive data error (Invalid connection ID) B (safety sub-function)]

☞ Page 131 [AL. 585.1_FSoE communication error 1 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 585.C_FSoE communication error 1 - Receive data error (CRC error) B (safety sub-function)]

☞ Page 131 [AL. 585.1_FSoE communication error 1 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 586_FSoE communication error 2 (safety sub-function)]

- There is a problem with data reception in the safety communication. (During runtime communication)

[AL. 586.1_FSoE communication error 2 - Receive data error (Unexpected command) A (safety sub-function)]

Cause	Check/action method	Model
1. The safety communication settings of FSoE Master are incorrect.	Review the safety communication settings. Refer to "Safety sub-function control by network" in the following manual. □□MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Communication Function)	[G]
2. There is a problem with FSoE Master.	Check if an alarm has occurred in FSoE Master. If an alarm has occurred, take actions in accordance with the troubleshooting of FSoE Master.	
3. A network cable is disconnected.	Check if the network cable is connected correctly. Turn off the control circuit power supply of the drive unit, then connect the network cable correctly.	
4. The wiring of the network cable was incorrect.	Check if the connection of the network cable is correct.	
5. A network cable has been disconnected.	Check for disconnection in the network cable.	
6. Devices on the network (including repeaters such as hubs) are turned off.	Check that the devices on the network are turned on.	
7. The network was disconnected by an incorrect procedure.	Check if the network was disconnected by a correct procedure for each type of network. Refer to "Disconnecting the communication" in the User's Manual (Communication Function).	
8. Data transmission from the controller was interrupted for a certain time.	Check if data transmission from the controller has not been interrupted. If the data transmission has been interrupted, review the controller communication setting.	
9. The settings of the controller were incorrect.	Check the controller settings.	
10. There is a problem with the surrounding environment.	Check the noise, ambient temperature, and other conditions, and implement appropriate countermeasures for the cause. If there is noise, take countermeasures to reduce the noise. Refer to "Noise reduction techniques" in the following manual. □□MR-J5D User's Manual (Hardware)	
11. The drive unit has malfunctioned.	Replace the drive unit.	
12. The controller has malfunctioned.	Replace the controller.	
13. Devices on the network (including repeaters such as hubs) have malfunctioned.	Replace the devices on the network.	

[AL. 586.2_FSoE communication error 2 - Receive data error (Unknown command) A (safety sub-function)]

☞ Page 133 [AL. 586.1_FSoE communication error 2 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 586.3_FSoE communication error 2 - Receive data error (Invalid connection ID) A (safety sub-function)]

☞ Page 133 [AL. 586.1_FSoE communication error 2 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 586.4_FSoE communication error 2 - Receive data error (CRC error) A (safety sub-function)]

☞ Page 133 [AL. 586.1_FSoE communication error 2 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 586.5_FSoE communication error 2 - Receive time-out error A (safety sub-function)]

Cause	Check/action method	Model
1. The update time of the safety communication has exceeded the time set in FSoE Watchdog Time.	Review the setting value of FSoE Watchdog Time set in FSoE Master. Review the communication cycle setting.	[G]

[AL. 586.9_FSoE communication error 2 - Receive data error (Unexpected command) B (safety sub-function)]

☞ Page 133 [AL. 586.1_FSoE communication error 2 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 586.A_FSoE communication error 2 - Receive data error (Unknown command) B (safety sub-function)]

☞ Page 133 [AL. 586.1_FSoE communication error 2 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 586.B_FSoE communication error 2 - Receive data error (Invalid connection ID) B (safety sub-function)]

☞ Page 133 [AL. 586.1_FSoE communication error 2 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 586.C_FSoE communication error 2 - Receive data error (CRC error) B (safety sub-function)]

☞ Page 133 [AL. 586.1_FSoE communication error 2 - Receive data error (Unexpected command) A (safety sub-function)]

[AL. 586.D_FSoE communication error 2 - Receive time-out error B (safety sub-function)]

☞ Page 134 [AL. 586.5_FSoE communication error 2 - Receive time-out error A (safety sub-function)]

[AL. 587_FSoE communication error 3 (safety sub-function)]

- There is a problem with the safety communication.

[AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

Cause	Check/action method	Model
1. The safety communication settings of FSoE Master are incorrect.	Review the safety communication settings. Refer to "Safety sub-function control by network" in the following manual. □□MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Communication Function)	[G]
2. There is a problem with FSoE Master.	Check if an alarm has occurred in FSoE Master. If an alarm has occurred, take actions in accordance with the troubleshooting of FSoE Master.	
3. A network cable is disconnected.	Check if the network cable is connected correctly. Turn off the control circuit power supply of the drive unit, then connect the network cable correctly.	
4. The wiring of the network cable was incorrect.	Check if the connection of the network cable is correct.	
5. A network cable has been disconnected.	Check for disconnection in the network cable.	
6. Devices on the network (including repeaters such as hubs) are turned off.	Check that the devices on the network are turned on.	
7. The network was disconnected by an incorrect procedure.	Check if the network was disconnected by a correct procedure for each type of network. Refer to "Disconnecting the communication" in the User's Manual (Communication Function).	
8. Data transmission from the controller was interrupted for a certain time.	Check if data transmission from the controller has not been interrupted. If the data transmission has been interrupted, review the controller communication setting.	
9. The settings of the controller were incorrect.	Check the controller settings.	
10. There is a problem with the surrounding environment.	Check the noise, ambient temperature, and other conditions, and implement appropriate countermeasures for the cause. If there is noise, take countermeasures to reduce the noise. Refer to "Noise reduction techniques" in the following manual. □□MR-J5D User's Manual (Hardware)	
11. The drive unit has malfunctioned.	Replace the drive unit.	
12. The controller has malfunctioned.	Replace the controller.	
13. Devices on the network (including repeaters such as hubs) have malfunctioned.	Replace the devices on the network.	

[AL. 587.2_FSoE communication error 3 - Safety communication error 2A (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.3_FSoE communication error 3 - Safety communication error 3A (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.4_FSoE communication error 3 - Safety communication error 4A (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.5_FSoE communication error 3 - Safety communication error 5A (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.6_FSoE communication error 3 - Safety communication error 6A (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.7_FSoE communication error 3 - Safety communication error 7A (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.9_FSoE communication error 3 - Safety communication error 1B (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.A_FSoE communication error 3 - Safety communication error 2B (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.B_FSoE communication error 3 - Safety communication error 3B (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.C_FSoE communication error 3 - Safety communication error 4B (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.D_FSoE communication error 3 - Safety communication error 5B (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 587.E_FSoE communication error 3 - Safety communication error 6B (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]



[AL. 587.F_FSoE communication error 3 - Safety communication error 7B (safety sub-function)]

☞ Page 135 [AL. 587.1_FSoE communication error 3 - Safety communication error 1A (safety sub-function)]

[AL. 5E2_Safety communication warning (safety sub-function)]


- There is a problem with the safety communication.

[AL. 5E2.2_FSoE communication no connection warning A (safety sub-function)]

Cause	Check/action method	Model
1. Connection with the controller has not been established.	 Page 138 The display shows "A" (unconnected to the controller)	[G]
2. The safety communication settings are incorrect.	Review the safety communication settings. Refer to "Safety sub-function control by network" in the following manual.  MR-J5-G-N1/MR-J5W-G-N1 User's Manual (Communication Function)	

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[AL. 5E2.A_FSoE communication no connection warning B (safety sub-function)]

 Page 137 [AL. 5E2.2_FSoE communication no connection warning A (safety sub-function)]

10.2 Trouble which does not trigger an alarm/warning

Point

Refer to the following manual for the possible causes of the troubles which will not trigger an alarm or warning not described in this section.

 MR-J5 User's Manual (Troubleshooting)

The display shows "A" (unconnected to the controller)

1-axis drive unit: "A _ _"

2-axis drive unit: "AA _"

3-axis drive unit: "AAA"

Possible cause	Check/action method	Model
1. The power supply of the controller has been turned off.	Switch on the power of the controller.	[G]
2. The power supply of the device between the controller and drive unit has been turned off.	Turn on the power of the device between the controller and drive unit.	
3. The amplifier-less operation function of the controller is enabled.	Cancel the amplifier-less operation function of the controller.	
4. A network cable was disconnected.	Replace the Ethernet cable. Check if the connector (CN1A/CN1B) is disconnected.	
5. An incompatible controller is connected. Or, the network settings of the controller and the network settings of the drive units do not match.	Connect with a compatible controller. Check that the controller and drive units use the same network type.	
6. The settings of the rotary switch are incorrect.	Check if there is another drive unit assigned to the same axis No. Check if the settings of the controller and drive units are correct.	
7. The communication cycle does not match.	Refer to the controller instruction manual and check the communication cycle.	
	Check the communication error detection time of the drive unit.	
8. For a multi-axis drive unit, the axis has been disabled.	Turn off the disabling control axis switch.	

REVISIONS

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

Revision date	*Manual number	Description
June 2021	IB(NA)-0300543ENG-A	First edition
July 2022	IB(NA)-0300543ENG-B	■Added/edited: Section 1.7, Chapter 4, Chapter 6, Section 6.1, Section 6.2, Section 6.4, Section 7.4, Section 7.6, Section 7.7, Section 7.8, Section 7.9, Section 7.10
January 2023	IB(NA)-0300543ENG-C	■The following function is added: Override function ■EU WEEE Directive is added. ■Added/edited: Section 2.2, Section 3.1, Section 3.2, Section 4.1, Section 4.5, Section 5.2, Section 6.3, Section 7.7, Section 7.9, Section 7.10
July 2023	IB(NA)-0300543ENG-D	■The following function is added: FSOE, SS2, SOS, SLS, SSM, SDI, SLI ■Added/edited: Section 1.4, Section 2.1, Section 2.2, Section 6.3, Section 9.1, Section 9.2, Section 9.3, Section 9.4, Chapter 10

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WARRANTY

Warranty

1. Warranty period and coverage

We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit are repaired or replaced.

[Term]

For terms of warranty, please contact your original place of purchase.

[Limitations]

- (1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule.
It can also be carried out by us or our service company upon your request and the actual cost will be charged. However, it will not be charged if we are responsible for the cause of the failure.
- (2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.
- (3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
 1. a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
 2. a failure caused by any alteration, etc. to the Product made on your side without our approval
 3. a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
 4. a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
 5. any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
 6. a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
 7. a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
 8. any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

- (1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.
- (2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA center for details.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

- (1) Damages caused by any cause found not to be the responsibility of Mitsubishi.
- (2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
- (3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
- (4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

- (1) For the use of our AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in AC Servo, and a backup or fail-safe function should operate on an external system to AC Servo when any failure or malfunction occurs.
- (2) Our AC Servo is designed and manufactured as a general purpose product for use at general industries.
Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.
In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.
We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.
- (3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

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