MITSUBISHI ELECTRIC

Mitsubishi Electric AC Servo System

MITSUBISHI ELECTRIC SERVO SYSTEM
MELSERVO-JET

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

-MR-JET-_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.

[Installation/wiring]

⚠WARNING

- To prevent an electric shock, turn off the power and wait for 15 minutes or more before starting wiring and/or inspection.
- To prevent an electric shock, ground the servo amplifier.
- 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 servo amplifier before wiring.
- To prevent an electric shock, connect the protective earth (PE) terminal of the servo amplifier 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.

DISPOSAL OF WASTE

Please dispose of this product, battery (primary battery), and other options according to your local laws and regulations.
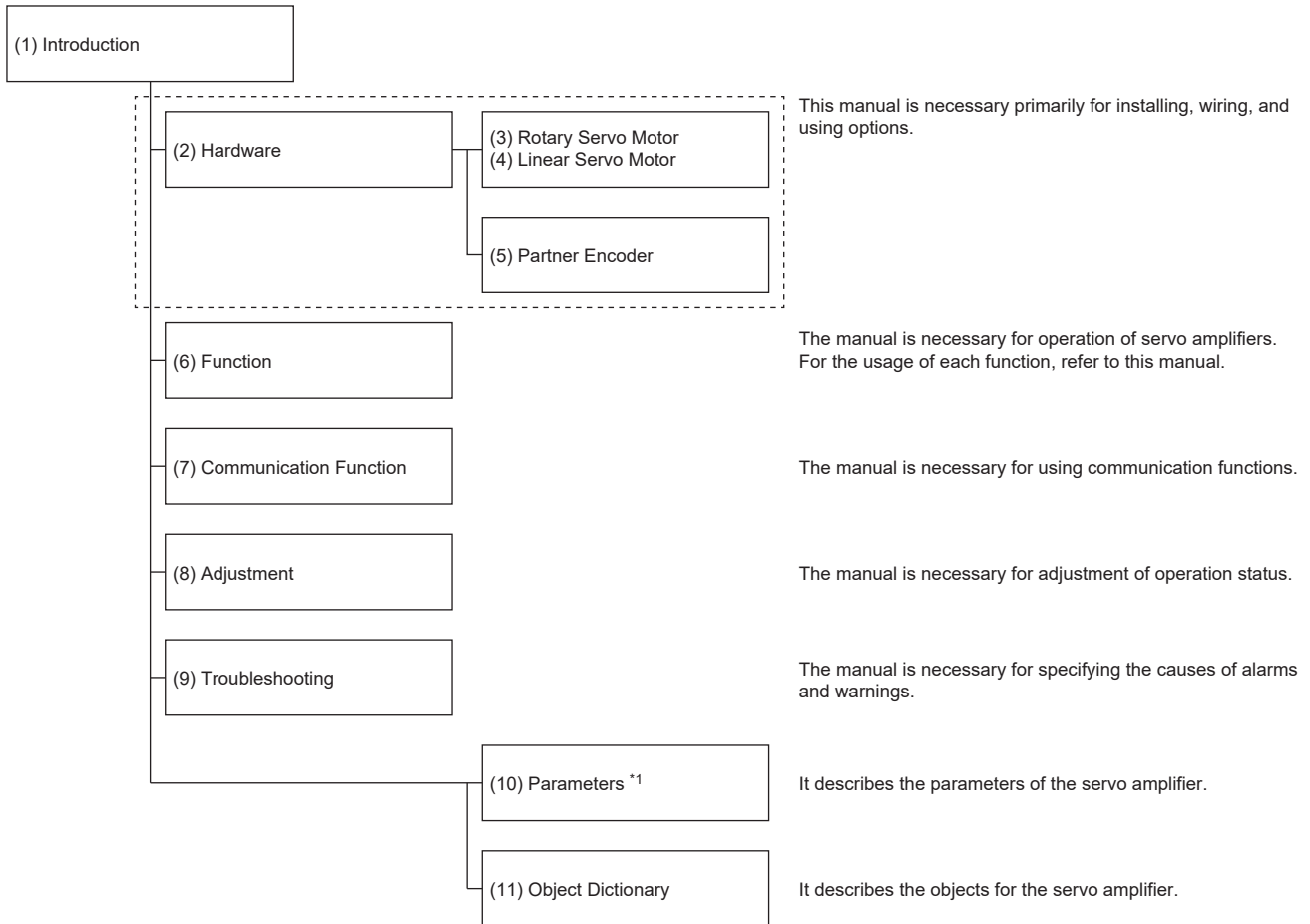
ABOUT THE MANUAL

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.

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┌─────────────────────┐
│ (1) Introduction    │
└─────────────────────┘
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(2) Hardware / (3) Rotary Servo Motor / (4) Linear Servo Motor / (5) Partner Encoder	This manual is necessary primarily for installing, wiring, and using options.
(6) Function	The manual is necessary for operation of servo amplifiers. For the usage of each function, refer to this manual.
(7) Communication Function	The manual is necessary for using communication functions.
(8) Adjustment	The manual is necessary for adjustment of operation status.
(9) Troubleshooting	The manual is necessary for specifying the causes of alarms and warnings.
(10) Parameters [*1]	It describes the parameters of the servo amplifier.
(11) Object Dictionary	It describes the objects for the servo amplifier.

*1 For details on the parameters, read chapter 7 and chapter 8 first.
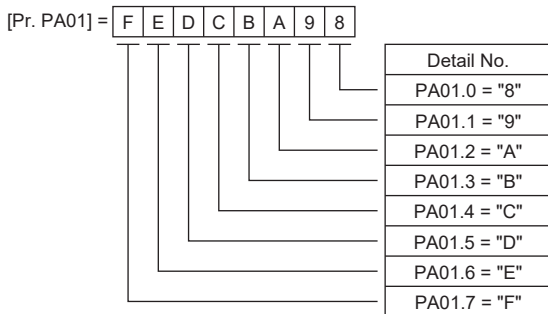
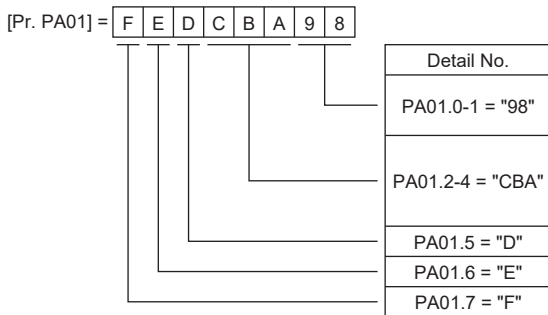| No.	Manual name	Manual No.
(1)	MR-JET-G-N1 User's Manual (Introduction)	IB(NA)-0300495ENG
(2)	MR-JET User's Manual (Hardware)	IB(NA)-0300453ENG
(3)	Rotary Servo Motor User's Manual (HG-KNS/HG-SNS)	IB(NA)-0300488ENG
(4)	Linear Servo Motor User's Manual (LM-H3/LM-U2/LM-F/LM-K2 series)	SH(NA)-030316ENG
	Linear Servo Motor User's Manual (LM-AJ series)	IB(NA)-0300518ENG
(5)	MR-JET Partner's Encoder User's Manual	IB(NA)-0300523ENG
(6)	MR-JET User's Manual (Function)	IB(NA)-0300458ENG
(7)	MR-JET-G-N1 User's Manual (Communication Function)	IB(NA)-0300500ENG
(8)	MR-JET User's Manual (Adjustment)	IB(NA)-0300473ENG
(9)	MR-JET User's Manual (Troubleshooting)	IB(NA)-0300483ENG
(10)	MR-JET-G User's Manual (Parameters)	IB(NA)-0300478ENG
(11)	MR-JET-G-N1 User's Manual (Object Dictionary)	IB(NA)-0300505ENG

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

[Pr. PA01] = F E D C B A 9 8

Detail No.
PA01.0 = "8"
PA01.1 = "9"
PA01.2 = "A"
PA01.3 = "B"
PA01.4 = "C"
PA01.5 = "D"
PA01.6 = "E"
PA01.7 = "F"

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

[Pr. PA01] = F E D C B A 9 8

Detail No.
PA01.0-1 = "98"
PA01.2-4 = "CBA"
PA01.5 = "D"
PA01.6 = "E"
PA01.7 = "F"

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	Description
PA04.3	*AOP	Forced stop deceleration function selection	Set "Forced stop deceleration function" to enabled/disabled. Initial value: 1h (enabled)

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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CONTENTS

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1 SPECIFICATIONS

1.1 Outline

MR-JET-_G-N1 are EtherCAT servo amplifiers. 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.

EtherCAT®

1.2 Model designation

Rating plate

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

SER.A9X001001	Serial number
MODEL MR-JET-10G-N1	Model
POWER :100W	Capacity
INPUT :3AC/AC 200-240V 0.9A/1.5A 50/60Hz	Applicable power supply
OUTPUT:3PH 0-240V 0-590Hz 1.3A	Rated output
STD.:IEC/EN/UL61800-5-1 GB12668.501 MAN.:IB(NA) 0300492	Standard, manual number
Max. Surrounding Air Temp.: 55℃	Ambient temperature
IP20/UL Open Type	IP rating
R-R-MEK-TC301A463G51	KC certification number
DATE:2019-10	Year and month of manufacture
MADE IN JAPAN	Country of origin

Model

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

M R - J E T - 1 0 G - N 1

Series

Rated output

Symbol	Rated output [kW]
10	0.1
20	0.2
40	0.4
70	0.75
100	1
200	2
300	3

1.3 Servo amplifier/motor combinations

Refer to "Servo amplifier/motor combinations" in the following manual.
📖MR-JET User's Manual (Hardware)

1.4 Servo amplifier standard specifications

MR-JET-_G-N1

Model: MR-JET-_-N1		10G	20G	40G	70G	100G	200G	300G
Output	Voltage	3-phase 0 V AC to 240 V AC						
	Rated current [A]	1.3	1.8	2.8	5.8	6.0	11.0	11.0
Power supply input	Voltage/Frequency	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz				3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz [4]		3-phase 200 V AC to 240 V AC, 50 Hz/ 60 Hz
	Rated current [A] [3]	0.9	1.5	2.6	3.8	5.0	10.5	14.0
	Permissible voltage fluctuation	3-phase or 1-phase 170 V AC to 264 V AC				3-phase or 1-phase 170 V AC to 264 V AC [4]		3-phase 170 V AC to 264 V AC
	Permissible frequency fluctuation	Within ±5 %						
	Power supply capacity [kVA]	Refer to "Power supply capacity and generated loss" in the following manual. 📖MR-JET User's Manual (Hardware)						
	Inrush current [A]	Refer to "Inrush current at power-on" in the following manual. 📖MR-JET User's Manual (Hardware)						
Interface power supply	Voltage	24 V DC ±10 %						
	Current capacity [A]	0.3 [1]						
Control method		Sine-wave PWM control, current control method						
Dynamic brake		Built-in						
EtherCAT	Communication cycle	125 μs, 250 μs, 500 μs, 1 ms, 2 ms, 4 ms, 8 ms						
Communication function	USB	Connection to a personal computer or other devices (MR Configurator2-compatible)						
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative 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						
	UL standard	UL 61800-5-1						
Structure (IP rating)		Natural cooling, open (IP20)					Force cooling, open (IP20)	
Close mounting [2]	3-phase power supply input	Possible						
	1-phase power supply input	Possible				Impossible		—
Mass [kg]		0.8			1.6		2.1	

*1 This value is applicable when all I/O signals are used. Reducing the number of I/O points decreases the current capacity.
*2 If closely mounting the servo amplifiers, operate them at an ambient temperature of 0 ˚C to 45 ˚C or at 75 % or less of the effective load ratio.
*3 This current value is applicable when a 3-phase power supply is used.
*4 If using 1-phase 200 V AC to 240 V AC power supply, operate the servo amplifier at 75 % or less of the effective load ratio.

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) and homing" in the following manual. 📖MR-JET User's Manual (Function)
Function on positioning operation		Absolute position detection/external limit switch/software position limit/ Function for positioning to the home, etc.

Environment

Item	Operation	Transportation	Storage
Ambient temperature	0 ˚C to 55 ˚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 (in each of the X, Y, and Z directions): 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	Between main circuit (power supply/power terminal) and PE: 1500 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-JET User's Manual (Hardware)

1.5 Function block diagram

The following shows the function block diagram of this servo amplifier.
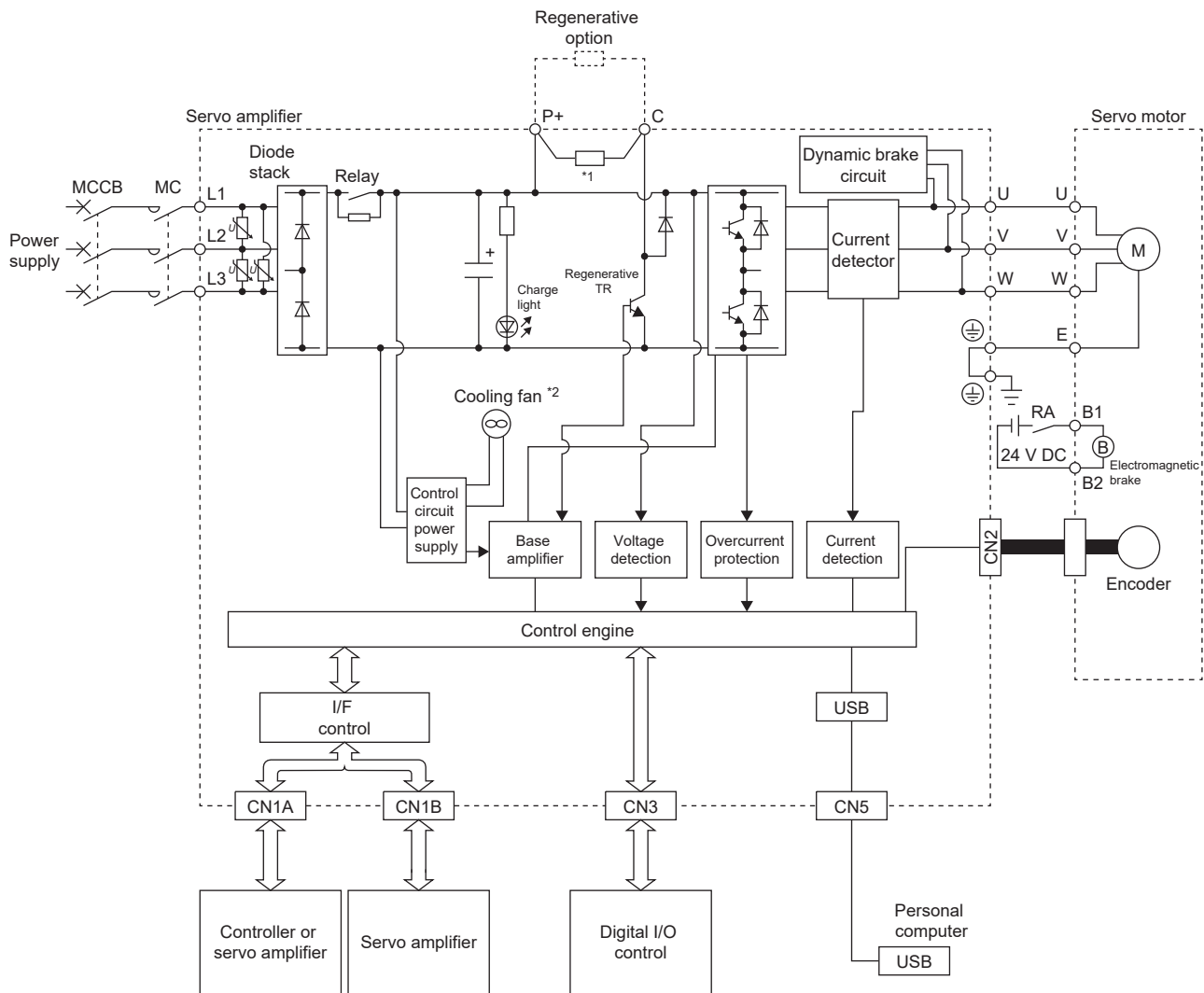
*1 The regenerative resistor is not built into the MR-JET-10G-N1 and MR-JET-20G-N1.
*2 Servo amplifiers with the rated output symbol of 200 (MR-JET-200G-N1) or greater have a cooling fan.

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 servo amplifier and servo motor is optional or a recommended product.

The following is an example using MR-JET-40G-N1.
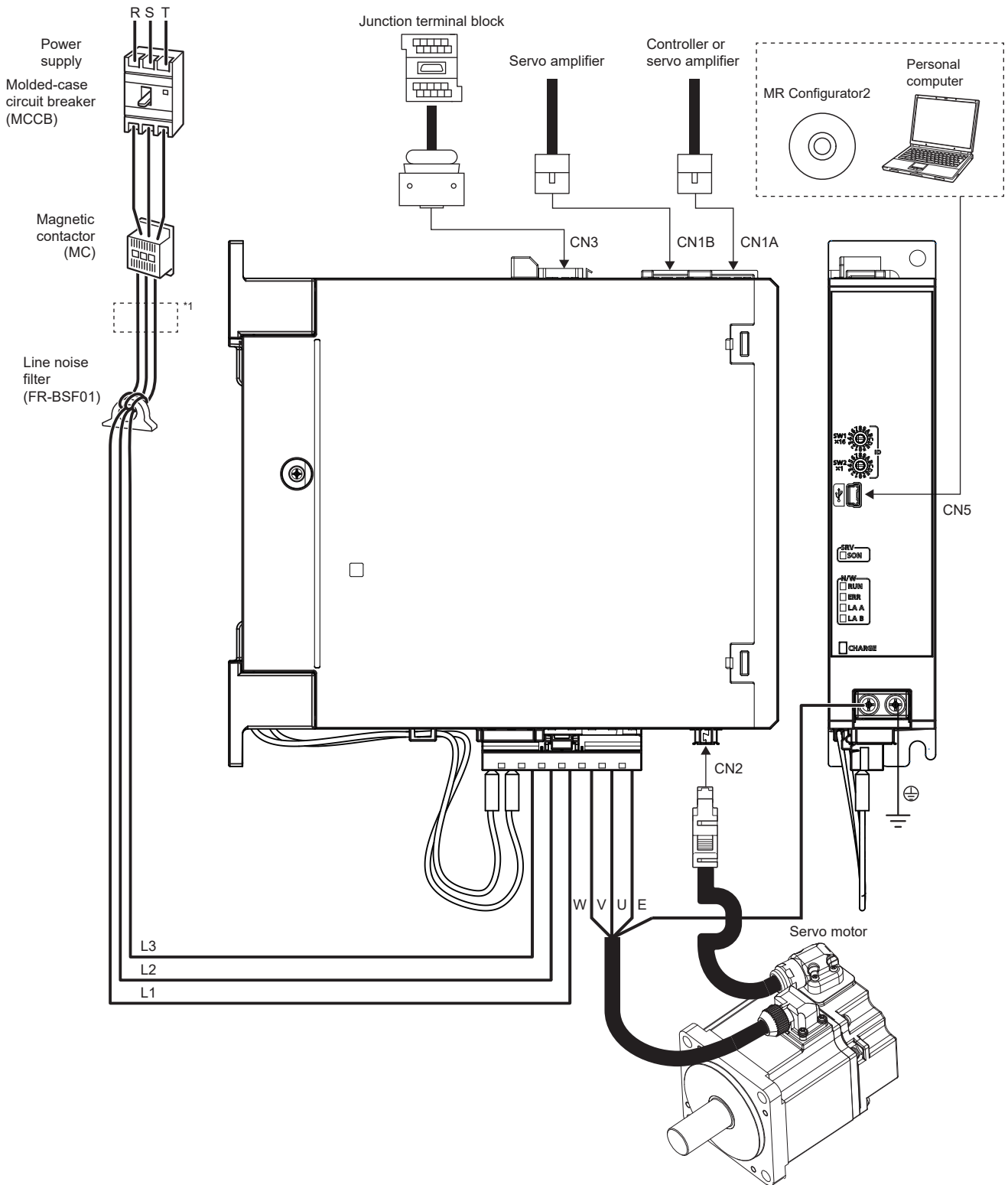
*1   The power factor improving AC reactor can also be used.

2 FUNCTION

2.1 Restrictions on the MR-JET-_G_

Category	Detailed functions	Network communication cycle restrictions (minimum)
Control mode	Profile position mode (pp)	250 µs
	Profile velocity mode (pv)	250 µs
	Profile torque mode (tq)	250 µs
	Point table method ([Pr. PA01.0 Control mode selection] = "6")	250 µs

2.2 Function list

The function list of this servo amplifier 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.	A4	Refer to "CONTROL MODE" in the following manual. MR-JET User's Manual (Function)
	Cyclic synchronous velocity mode (csv)	This function operates the servo motor in the cyclic synchronous velocity mode.	A4	
	Cyclic synchronous torque mode (cst)	This function operates the servo motor in the cyclic synchronous torque mode.	A4	
	Profile position mode (pp)	This function operates the servo motor in the profile position mode.	B2	
	Profile velocity mode (pv)	This function operates the servo motor in the profile velocity mode.	B2	
	Profile torque mode (tq)	This function operates the servo motor in the profile torque mode.	B2	
	Homing mode (hm)	This function either operates the servo motor in the homing mode or performs homing.	A4	
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.	B8	
	JOG operation mode (jg)	This control mode enables desired positioning for machine adjustment and home positioning.	B8	
Test operation	Test operation mode	This function requires MR Configurator2 for JOG operation, positioning operation, motor-less operation, DO forced output, and program operation.	A4	☞ Page 37 Test operation

*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.

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.	B2	Refer to "USING A LINEAR SERVO MOTOR" in the following manual. MR-JET User's Manual (Hardware)
Encoder	High-resolution encoder	A 4194304 pulses/rev high-resolution encoder is used for the encoder of the rotary servo motor.	A4	—

*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.

Network

Functions	Detailed functions	Description	Ver. [*1]	Detailed explanation
Open network	EtherCAT communication	This function connects the servo amplifier to equipment such as a controller through EtherCAT communication.	A4	📖MR-JET-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.

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.	A4	—
Absolute position	Absolute position detection system	This function performs homing once, and thereafter does not require homing at every power-on.	A4	Refer to "ABSOLUTE POSITION DETECTION SYSTEM" in the following manual. 📖MR-JET User's Manual (Hardware)

*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.

2

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.	A4	Refer to "Quick stop" in the following manual. 📖MR-JET User's Manual (Function)
	Halt	This function stops the servo motor while the servo-on status is maintained.	A4	Refer to "Halt" in the following manual. 📖MR-JET 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.	A4	Refer to "Stroke limit function" in the following manual. 📖MR-JET 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.	A4	Refer to "Software position limit" in the following manual. 📖MR-JET 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.	A4	Refer to "Rotation/travel direction selection" in the following manual. 📖MR-JET 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.	A4	Refer to "Electronic gear function" in the following manual. 📖MR-JET User's Manual (Function)
	Acceleration/deceleration function	This function enables smooth acceleration/deceleration.	A4	Refer to "Acceleration/deceleration function" in the following manual. 📖MR-JET User's Manual (Function)
	S-pattern acceleration/deceleration time constant	This function performs smooth acceleration and deceleration.	B2	Refer to "S-pattern acceleration/deceleration time constant" in the following manual. 📖MR-JET User's Manual (Function)
	Torque limit	This function limits the servo motor torque.	A4	Refer to "Torque limit" in the following manual. 📖MR-JET User's Manual (Function)
	Speed limit	This function limits the servo motor speed in the torque control mode.	A4	Refer to "Speed limit" in the following manual. 📖MR-JET User's Manual (Function)
	Command offset	This function compensates the position/speed/torque commands by adding a desired amount of offset to the commands.	A4	Refer to "Command offset" in the following manual. 📖MR-JET User's Manual (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.	A4	Refer to "Advanced vibration suppression control II" in the following manual. 📖MR-JET 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.	A4	Refer to "Machine resonance suppression filter" in the following manual. 📖MR-JET 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.	A4	Refer to "Shaft resonance suppression filter" in the following manual. 📖MR-JET 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.	A4	Refer to "Robust filter" in the following manual. 📖MR-JET User's Manual (Adjustment)
	Slight vibration suppression control	This function suppresses vibration of ±1 pulse generated at each servo motor stop.	A4	Refer to "SLIGHT VIBRATION SUPPRESSION CONTROL" in the following manual. 📖MR-JET User's Manual (Adjustment)
Tracking control	Lost motion compensation function	This function reduces the response delay generated when the machine moving direction is reversed.	A4	Refer to "Lost motion compensation function" in the following manual. 📖MR-JET 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.	A4	Refer to "Super trace control" in the following manual. 📖MR-JET User's Manual (Adjustment)
	Path tracking model adaptive control	This function reduces tracking errors in reciprocation.	A4	Refer to "Path tracking model adaptive control" in the following manual. 📖MR-JET User's Manual (Adjustment)

[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.

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.	A4	Refer to "Quick tuning" in the following manual. 📖MR-JET 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.	A4	Refer to "ADJUSTMENT FUNCTION TYPES" in the following manual. 📖MR-JET User's Manual (Adjustment)
	One-touch tuning	Gain adjustment is performed with this function just by pressing buttons on the servo amplifier or by clicking a button once on MR Configurator2. One-touch tuning can also be performed via a network.	A4	Refer to "One-touch tuning" in the following manual. 📖MR-JET 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 commands and disturbances separately. This function can also be disabled.	A4	Refer to "MODEL ADAPTIVE CONTROL" in the following manual. 📖MR-JET 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.	A4	Refer to "GAIN SWITCHING FUNCTION" in the following manual. 📖MR-JET User's Manual (Adjustment)
Adjustment support	Machine analyzer	This function analyzes the frequency characteristic of the mechanical system by simply connecting the servo amplifier with an MR Configurator2 installed personal computer.	A4	Refer to "Adjustment functions available in combination with MR Configurator2" in the following manual. 📖MR-JET User's Manual (Adjustment)

*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.

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.	A4	Refer to "Assigning I/O devices" in the following manual. 📖MR-JET 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.	A4	
	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.	A4	☞ Page 43 Output signal (DO) forced output
LED	Status display	This function shows the servo status on the 7-segment LED display.	A4	☞ Page 23 Switch setting and display of the servo amplifier
Monitor	Power monitoring function	This function calculates the running power and the regenerative power from the data in the servo amplifier such as speed and current. The power consumption and other values are displayed on MR Configurator2.	A4	Refer to "MONITORING" in the following manual. 📖MR-JET User's Manual (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.

Option

Functions	Detailed functions	Description	Ver. [*1]	Detailed explanation
Regenerative capacity enhancement	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.	A4	Refer to "Regenerative option" in the following manual. MR-JET User's Manual (Hardware)

*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.

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.	A4	☞ Page 28 STARTUP

*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.

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.	A4	Refer to "Alarm function" in the following manual. MR-JET User's Manual (Function)
	Alarm history clear	This function clears alarm histories.	A4	Refer to "Alarm history" in the following manual. MR-JET User's Manual (Function)
Power error detection	Disconnection detection function	This function detects a disconnection in the servo motor power supply output.	A4	Refer to "Disconnection/incorrect wiring detection function" in the following manual. MR-JET 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.	A4	Refer to "Forced stop deceleration function" in the following manual. MR-JET 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.	A4	Refer to "Electromagnetic brake interlock function" in the following manual. MR-JET 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.	A4	Refer to "Vertical axis freefall prevention function" in the following manual. MR-JET 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.	A4	Refer to "Dynamic brake characteristics" in the following manual. MR-JET User's Manual (Hardware)

*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.

Instantaneous power failure measures

Functions	Detailed functions	Description	Ver. [*1]	Detailed explanation
Tough drive	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.	A4	Refer to "Tough drive function" in the following manual. MR-JET User's Manual (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.

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.	A4	Refer to "Drive recorder" in the following manual. 📖MR-JET User's Manual (Function)
	Graph function	This function obtains the servo status in the graph.	A4	Refer to "Graph function" in the following manual. 📖MR-JET 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 servo amplifier or by the malfunction of the cables/encoder.	A4	Refer to "Encoder communication diagnosis function" in the following manual. 📖MR-JET User's Manual (Function)
Service life diagnosis	Servo amplifier life diagnosis function	This function enables checking of the cumulative energization time, the number of the inrush relay on/off times, and the number of dynamic brake usage times. It gives an indication of the replacement time for parts on the servo amplifier with a service life (such as the capacitor and the relay) before they malfunction. MR Configurator2 is required for this function.	A4	Refer to "Servo amplifier life diagnosis function" in the following manual. 📖MR-JET 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.	A4	
	Machine diagnosis function	This function uses the data in the servo amplifier 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.	A4	Refer to "Machine diagnosis" in the following manual. 📖MR-JET User's Manual (Function)
System diagnosis	System configuration information	This function uses MR Configurator2 to monitor the servo amplifier model, connected servo motor, encoder, and other information.	A4	Refer to "System configuration display" in the following manual. 📖MR-JET User's Manual (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.

History

Functions	Detailed functions	Description	Ver. [*1]	Detailed explanation
—	Alarm history	This function saves information of the alarm that occurred in the servo amplifier. The information is saved in chronological order and used for occasions such as analyzing the cause of the alarm.	A4	Refer to "Alarm history" in the following manual. 📖MR-JET User's Manual (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.

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-JET-_G-N1

The diagram shows the MR-JET-40G-N1 servo amplifier.
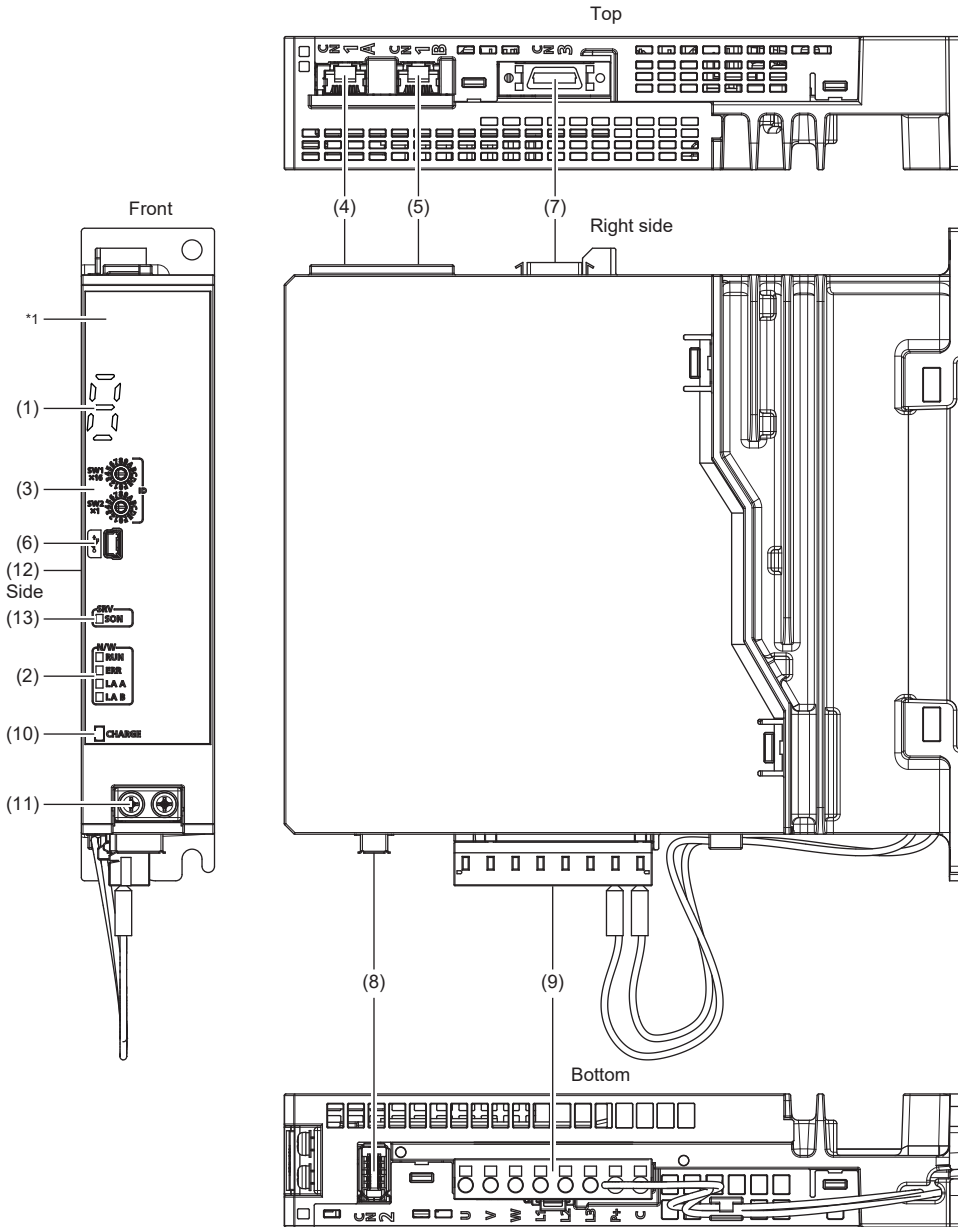
*1 Servo amplifiers are shipped from the factory with a protective sticker on the front.

No.	Name	Application	Detailed explanation
(1)	Display section	The 1-digit, 7-segment LED display shows the servo status and alarm number.	☞ Page 23 Switch setting and display of the servo amplifier
(2)	Network status LEDs	Displays each network status.	
(3)	ID setting switches (SW1/SW2)	Set the node address of the servo amplifier.	
(4)	Ethernet cable connector (CN1A) (IN port)	Connect the controller, servo amplifier or each network connected device.	—
(5)	Ethernet cable connector (CN1B) (OUT port)	Connect the servo amplifier or each network connected device.	
(6)	USB communication connector (CN5)	Connect with a personal computer.	—
(7)	I/O signal connector (CN3)	Connect the digital I/O signals.	Refer to "Connectors and pin assignments" in the following manual. 🕮MR-JET User's Manual (Hardware)
(8)	Encoder connector (CN2)	Connect a servo motor encoder or an external encoder.	—
(9)	Power connector (CNP1)	Connect the input power supply, built-in regenerative resistor, regenerative option, and servo motor.	Refer to "Explanation of power supply system" in the following manual. 🕮MR-JET User's Manual (Hardware)
(10)	Charge light	When the main circuit is charged, this light is on. While the light is on, do not change the connections of the wires.	—
(11)	Protective earth (PE) terminal	Connect this terminal to the protective earth (PE) of the cabinet.	Refer to "Explanation of power supply system" in the following manual. 🕮MR-JET User's Manual (Hardware)
(12)	Rating plate	Indicates model, capacity, and other information.	☞ Page 9 Rating plate
(13)	Servo status LED	The servo status is displayed.	☞ Page 23 Switch setting and display of the servo amplifier

3.2 Switch setting and display of the servo amplifier

Network settings can be configured using switches on the servo amplifier. The network communication status and alarm status can also be checked on the display (1-digit, 7-segment LED) of the servo amplifier.

Switches

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

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

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

Switch identification

- 1-digit, 7-segment LED
- ID setting switch (upper digit) (SW1)
- ID setting switch (lower digit) (SW2)
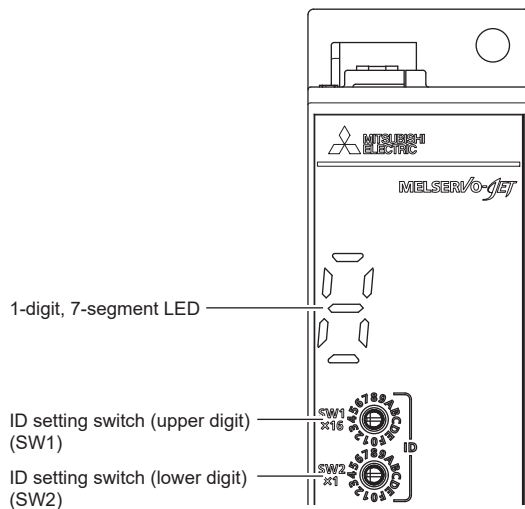
ID setting switches (SW1/SW2)

The node address can be set with the ID setting switches (SW1/SW2) of the servo amplifier. SW1 indicates an upper digit and SW2 indicates a lower digit of a hexadecimal.

To set the address to 02h, set the ID setting switches to the following positions.
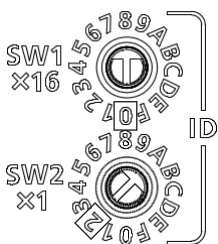
The ID setting switches are set to 01h when shipped from the factory.

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

📖 MR-JET-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 servo amplifier is started, the network connection status will be displayed.
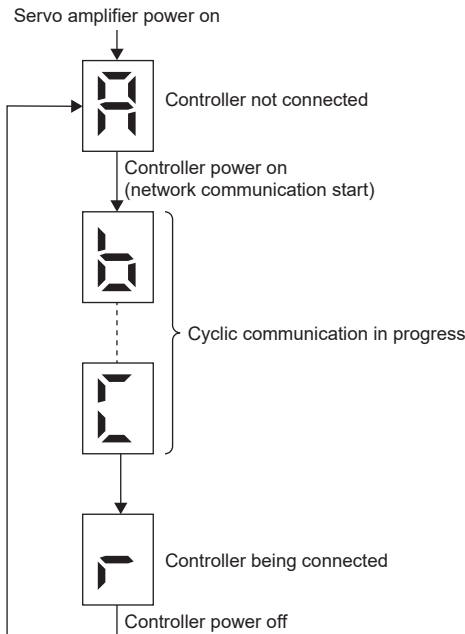
Alarm display

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.
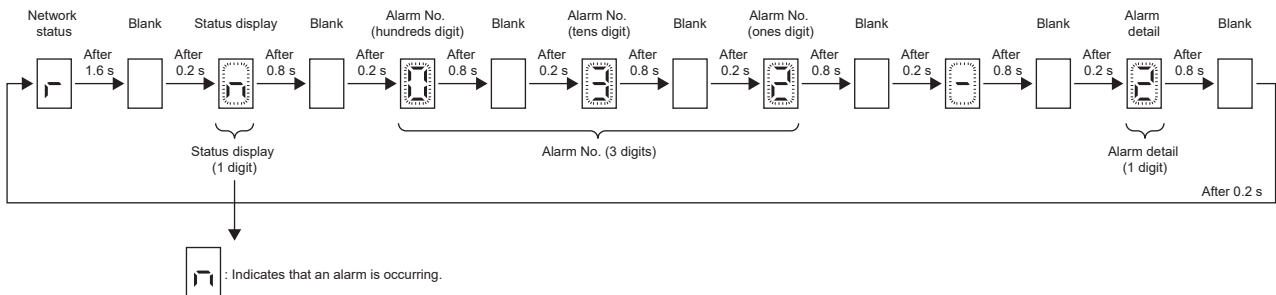
When the network is connected

The 7-segment LED display during network connection is as follows.

When the network is not connected

The 7-segment LED display during initialization is as follows.

Display	Description
A	Indicates that the servo amplifier is not connected to the controller.
b	Indicates the Pre-Operational state shown in the state transition diagram of the ESM state machine.
c	Indicates the Safe-Operational state shown in the state transition diagram of the ESM state machine.
y	Indicates the BootStrap state shown in the state transition diagram of the ESM state machine.

Other status displays

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

Status LEDs

The servo status LED shows the servo status. The network status LEDs show the network status.
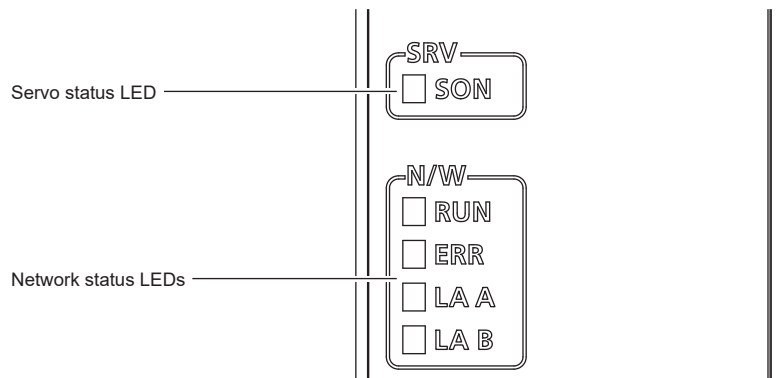
Servo status LED

LED	Description
SON (green)	Off: Indicates ready-off and servo-off status. Blinking: Indicates ready-on and servo-off status. On: Indicates ready-on and servo-on status.

Network status LEDs

LED	Description
RUN (green)	☞ Page 27 LED display
ERR (red)	
LA A (green)	Indicates the CN1A link status. ☞ Page 27 LED display
LA B (green)	Indicates the CN1B link status. ☞ Page 27 LED display

LED display

RUN (RUN LED), ERR (ERROR LED), LA A (Link/Activity), and LA B (Link/Activity) operate in accordance 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 (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 (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.

■LA A/LA B (Link/Activity LED (IN port/OUT 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

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

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 servo amplifier when the servo amplifier is connected to a personal computer which has MR Configurator2 installed. To learn more about using MR Configurator2, refer to Help in MR Configurator2.

1. Connect the servo amplifier and the personal computer with a USB cable. Turn on the servo amplifier.

Servo amplifier

CN5

USB cable
MR-J3USBCBL3M
(option)

To USB
connector

Personal computer
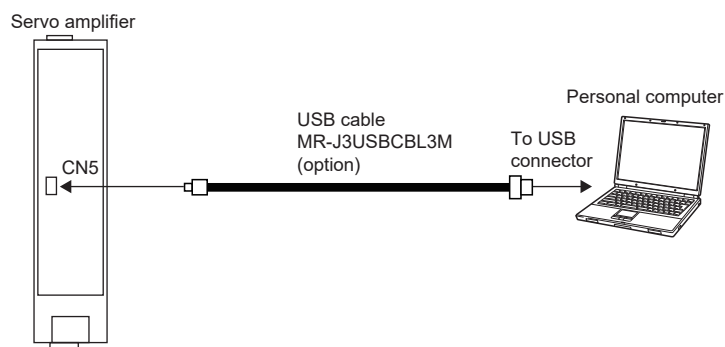
2. Start MR Configurator2 and create a new project. For the connection setting, select USB. Select the servo amplifier model.
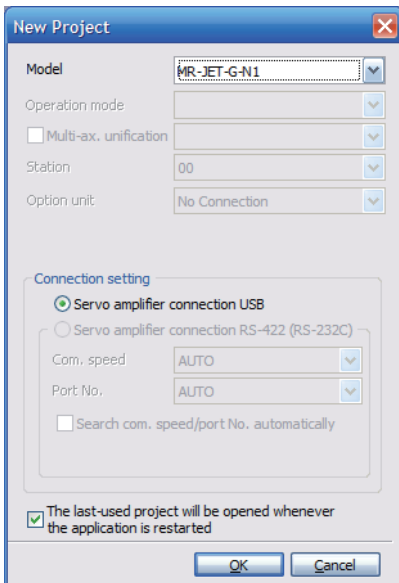
3. Selecting "Parameter" from the project tree opens the "Parameter Setting" screen.
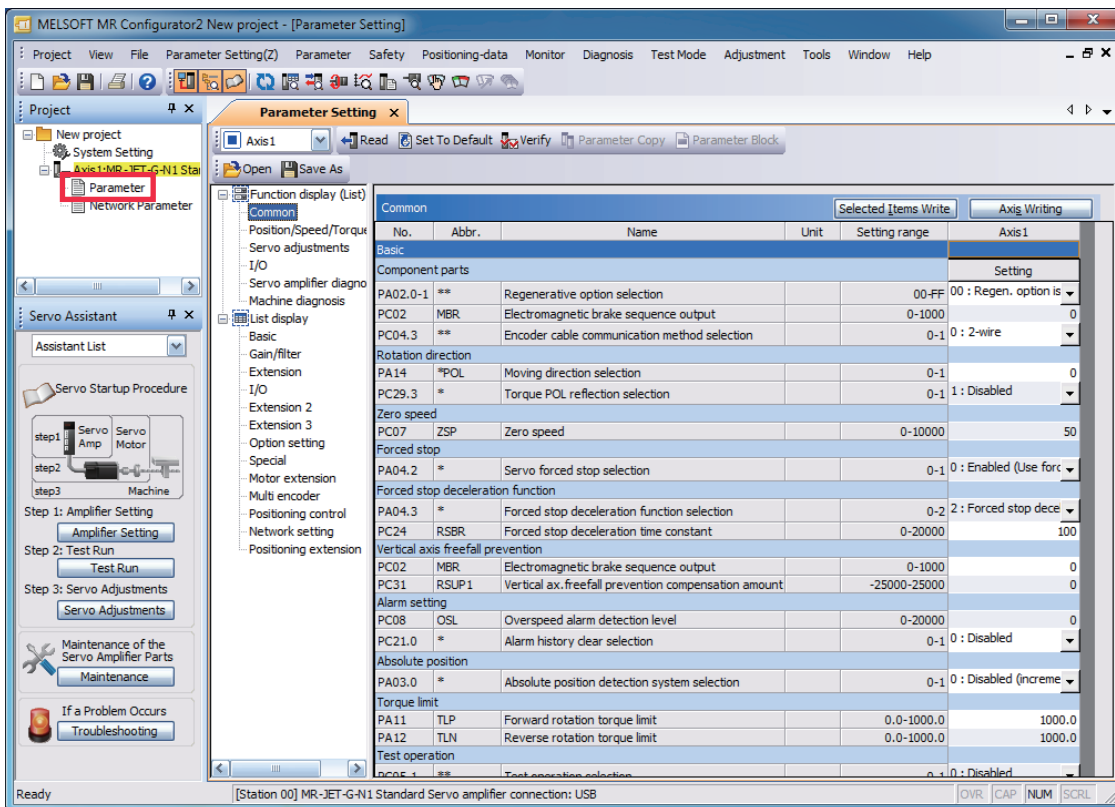
4. Select a group of servo parameters in the selection tree of the "Parameter Setting" window to display and configure the settings.
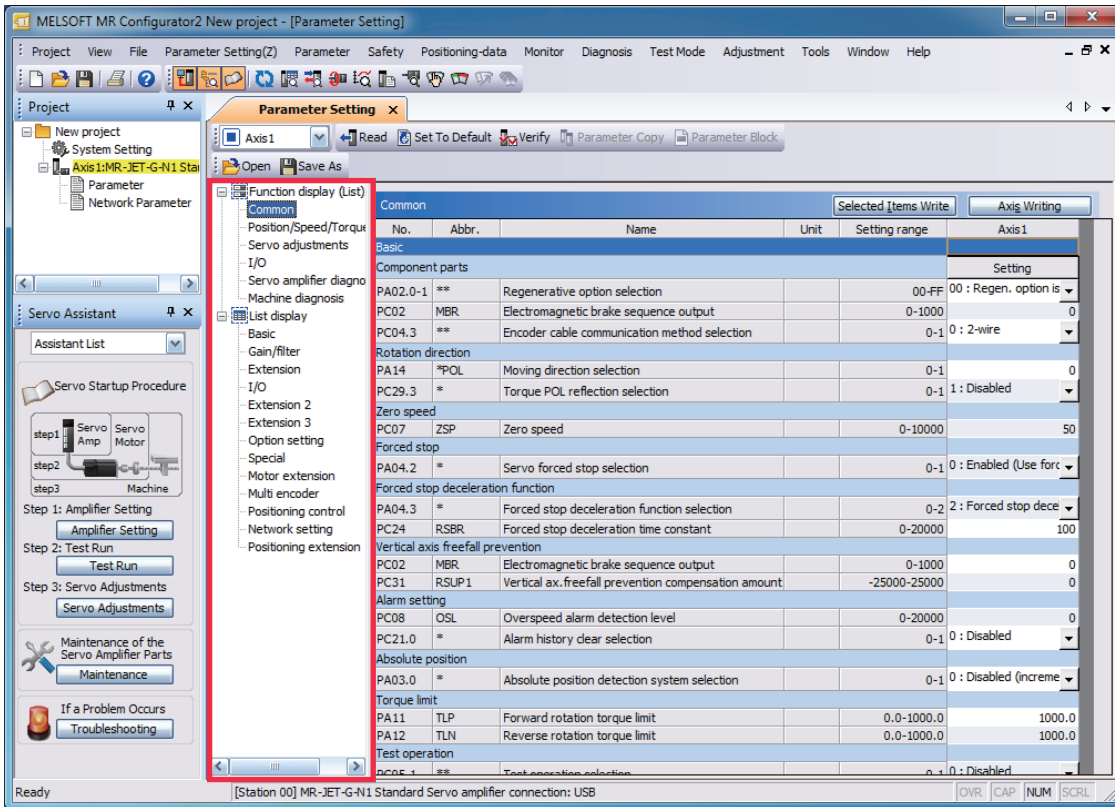
5. After changing the servo parameter, click "Selected Items Write" or "Axis Writing".
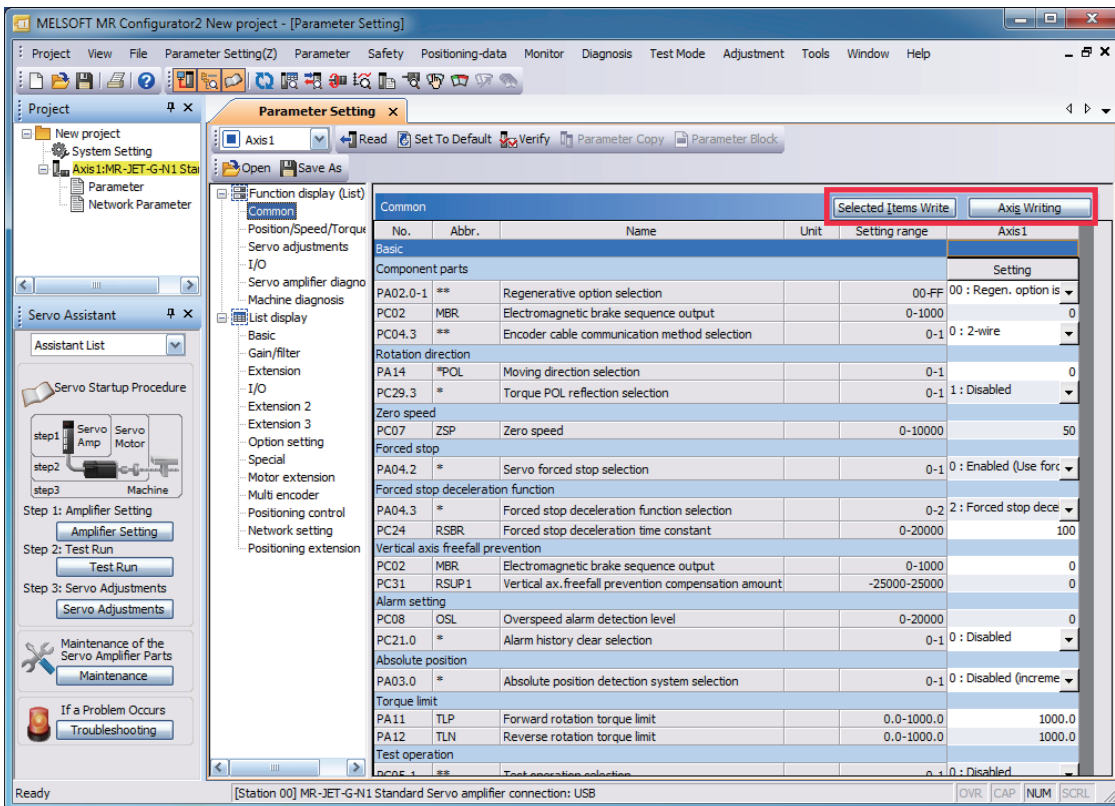
6. Abbreviated servo parameters prefixed with * and servo parameters marked with ** are enabled after the power is cycled or a software reset is performed. Click "Software Reset" in MR Configurator2 to perform the software reset.
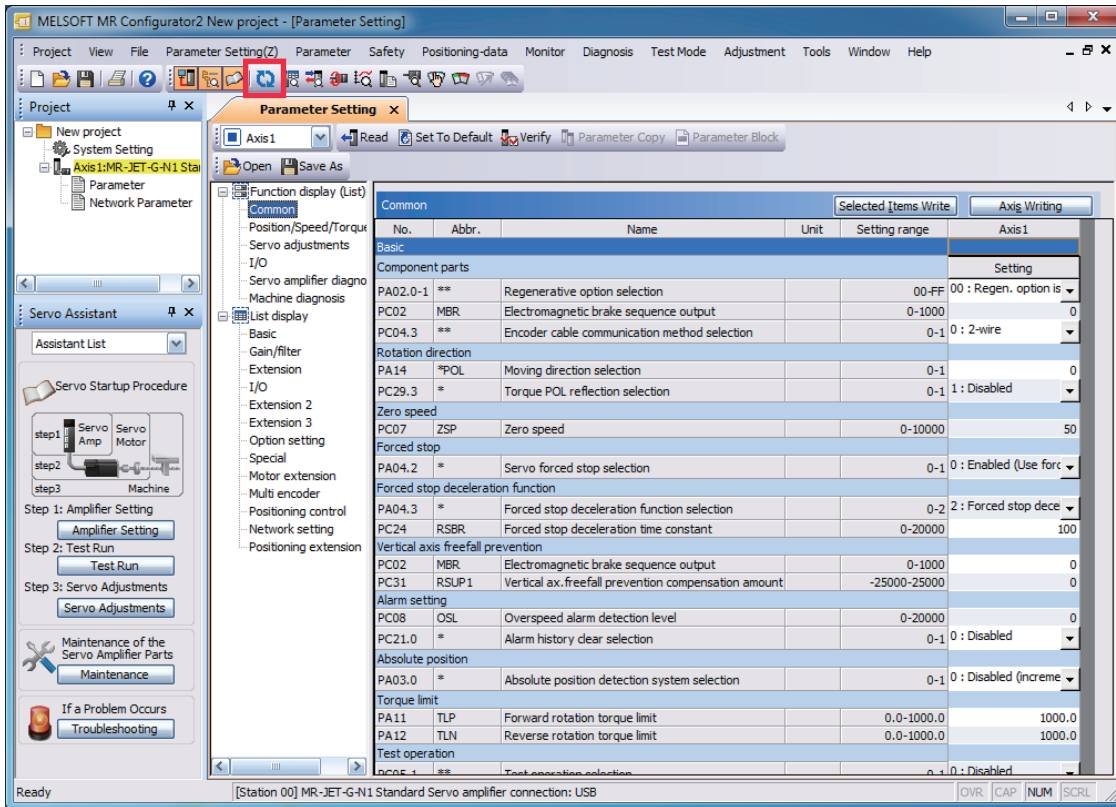
4.1 Turning on servo amplifier for the first time

> **Point**
> • For the controller settings, refer to the relevant controller manual.
> • For the gain adjustment, refer to the following manual.
> 📖MR-JET User's Manual (Adjustment)

When turning on the servo amplifier for the first time, follow the steps below.

Procedure		Description	Reference
1.	Installation and wiring	Install and wire the servo amplifier and servo motor.	📖MR-JET 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 33 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 34 Equipment configuration setting
4.	Controller-related setting	Perform necessary settings according to commands from the controller.	☞ Page 34 Controller-related setting
5.	Operation by controller command	Operate the servo motor at the lowest speed possible by giving commands to the servo amplifier from the controller, and check whether the servo motor operates correctly.	☞ Page 35 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 servo amplifier 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.

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.

1. Set [Pr. PC05.1 Test operation selection] to "1" (enabled).

2. Cycle the power of the servo amplifier. Once initialization is complete, the display will change as follows.

Test operation status display

3. Open the "JOG Mode" screen of MR Configurator2.
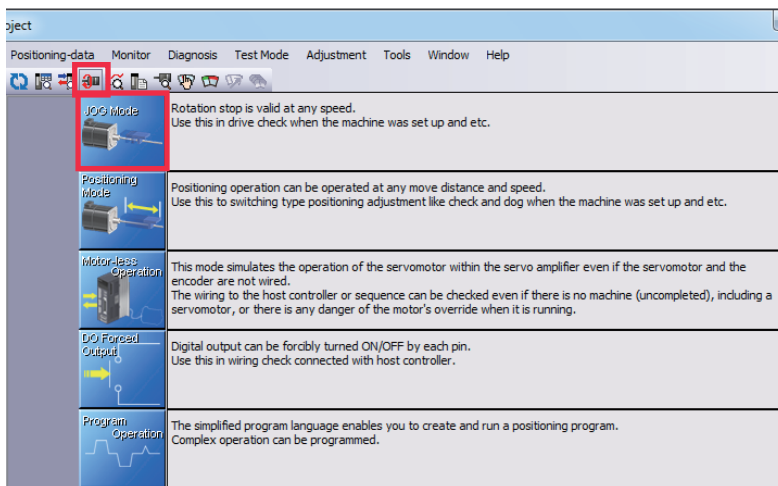
4. To operate the servo motor, input the motor speed and acceleration/deceleration time constants, then click "Forward CCW" or "Reverse CW". The servo motor operates only while the button is being clicked. Give a low speed command at first and check the operation status.
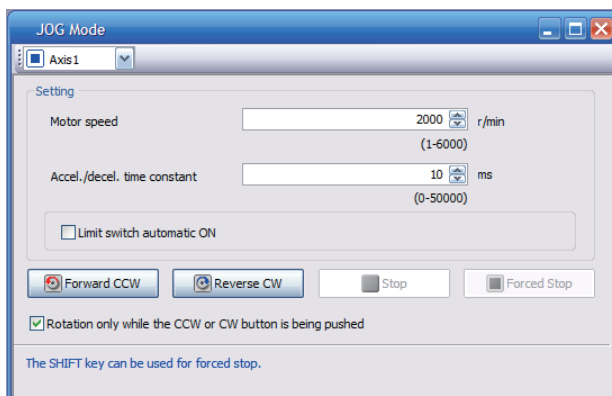
5. After the test operation is complete, set [Pr. PC05.1 Test operation selection] back to "0" (disabled).

Equipment configuration setting

Set the servo parameters for each function according to the equipment configuration. For details, refer to the following manual.
📖MR-JET 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 manual
EtherCAT	📖MR-JET-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-JET 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-JET 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-JET 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-JET 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-JET 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.
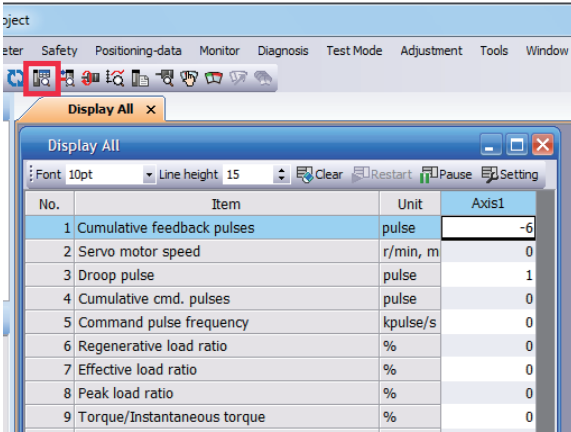
2. Display the I/O Monitor window. Confirm that there is no error in the I/O signal.
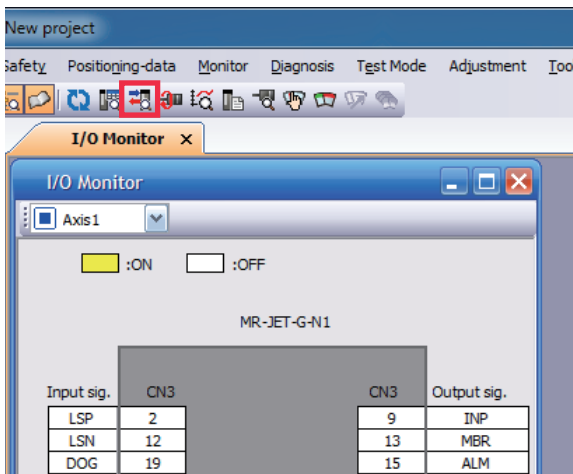
4.2 Instructions on startup

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 servo amplifier 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-JET 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.
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 servo amplifier from the network, specific procedures may be required. For details, refer to "Disconnecting the network" in the following manual.

📖MR-JET-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 servo amplifier 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

Servo amplifier parameters for which setting has been completed can be copied to another servo amplifier. Use this function when replacing the servo amplifier of equipment with another servo amplifier 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-JET 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 servo amplifier, open the project and then connect the servo amplifier and a personal computer via a USB cable. Turn on the servo amplifier.

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-JET User's Manual (Function)

Test operation mode

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

1. Set [Pr. PC05.1 Test operation selection] to "1" (enabled).

2. Cycle the power of the servo amplifier. Once initialization is complete, the display will change as follows.

Test operation status display

3. Use MR Configurator2 to perform the test operation.

☞ Page 38 Motor driving by test operation

4. After the test operation is complete, set [Pr. PC05.1 Test operation selection] back to "0" (disabled).

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.
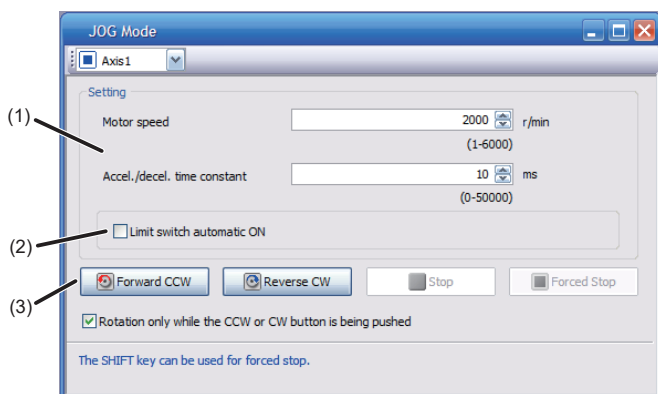
■Motor operation setting (1)

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.
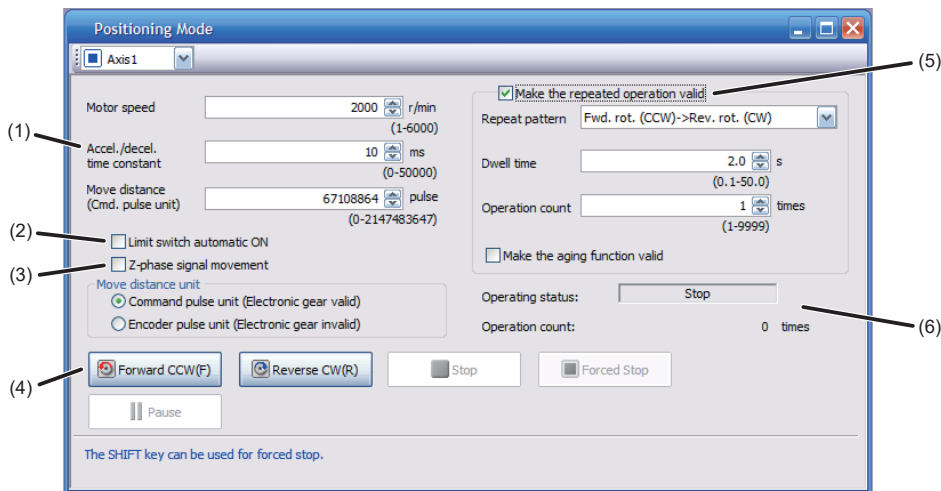
■Motor operation setting (1)

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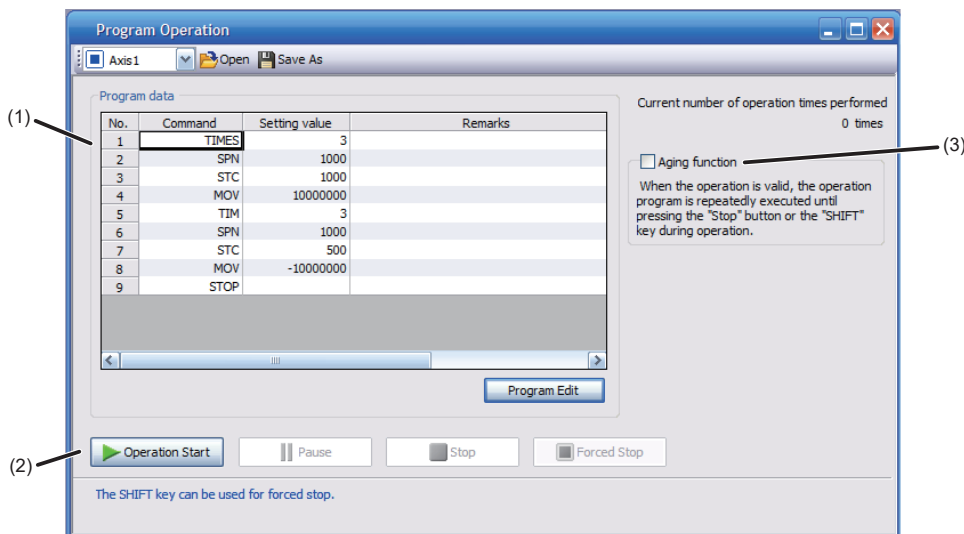
No.	Item	Screen operation
(1)	Program display	Displays the program. To edit the display item, click "Program Edit".
(2)	Operation	The servo motor can be started (CCW/CW), paused, stopped, or forcibly stopped. Clicking "Operation Start" starts the operation.
(3)	Repeat execution	Displays the number of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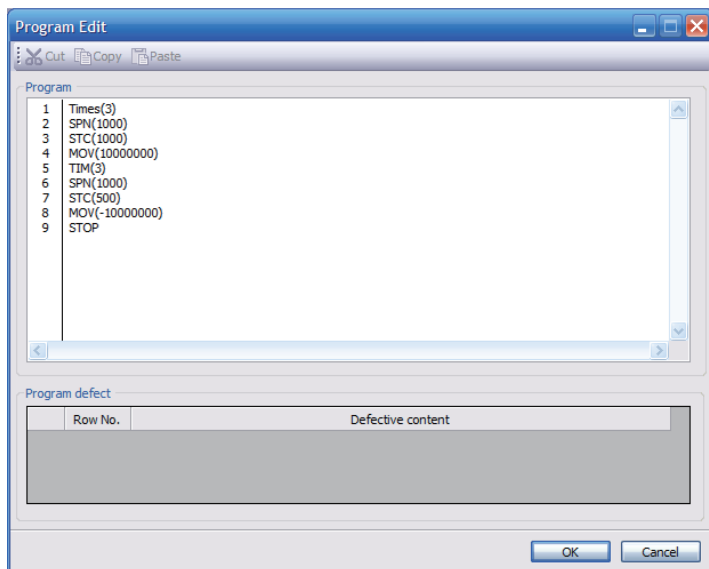
Single-step Feed

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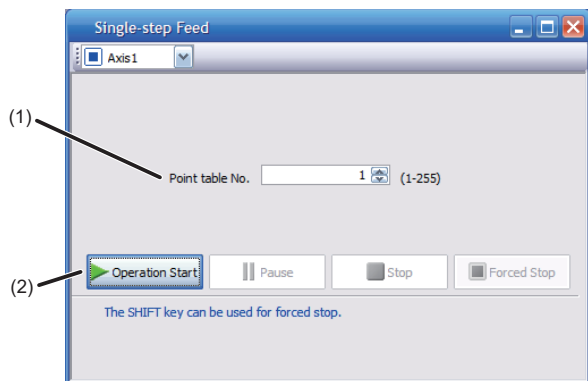
No.	Item	Screen operation
(1)	Point table No.	Specify the point table number to be operated.
(2)	Operation	The servo motor can be started (CCW/CW), paused, stopped, or forcibly stopped. Clicking "Operation Start" starts the operation in accordance with the point table.

Motor-less operation

Without connecting a servo motor to the servo amplifier, 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 servo amplifier 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).

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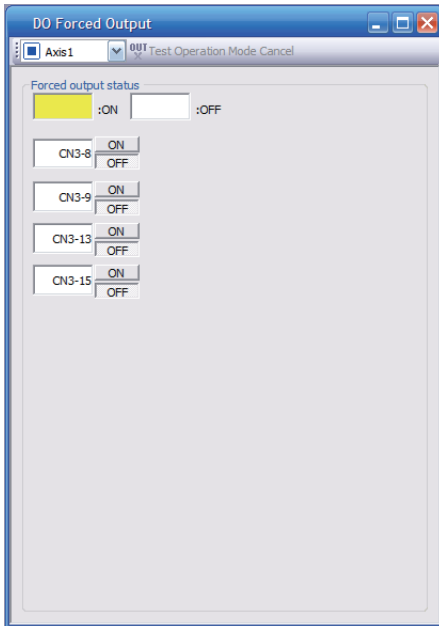
Each output signal can be turned on/off by clicking the ON/OFF button next to its name. After checking, click "Test Operation Mode Cancel" and terminate the output signal (DO) forced output.

4.6 Servo amplifier setting initialization

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

> **Point**
>
> - The storage area of the servo amplifier has a limit for the number of writings. Do not use this function frequently.
> - Execute the initialization with the servo amplifier 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 servo amplifier that will be initialized with a personal computer. Turn on the servo amplifier.
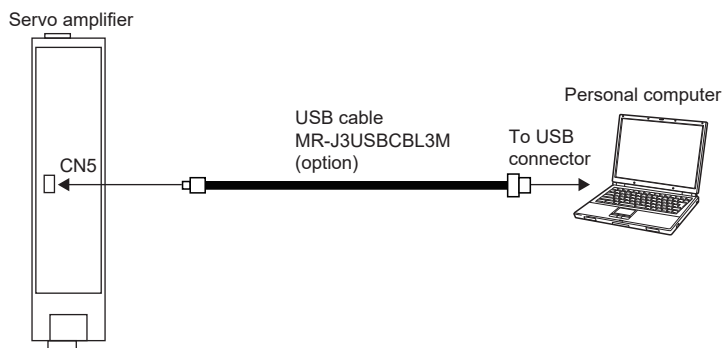
Confirm that "Reset to factory settings" is selected, then click "Write". After the writing is completed, cycle the power or reset the software.
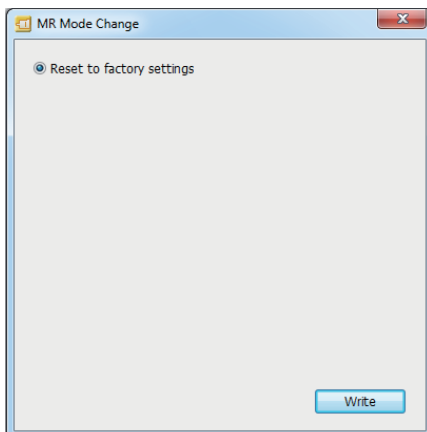
Cycling the power or resetting the software initializes the setting of the servo amplifier at startup. Confirm that the initialization has completed by reading the settings from the servo amplifier.

5 MAINTENANCE, INSPECTION AND PARTS REPLACEMENT

5.1 Inspection items

- 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 servo amplifier.

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 servo amplifier.
- Check that the wires are not coming out from the connector.
- Check for dust accumulation on the servo amplifier.
- Check for unusual noise generated from the servo amplifier.
- 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
Smoothing capacitor	10 years
Relay	Power-on, dynamic brake stop, and forced stop 100,000 times
Cooling fan	50,000 hours to 70,000 hours (7 to 8 years)

Smoothing capacitor

The service life of the capacitor is 10 years under continuous operation in air-conditioned environments (ambient temperatures of 40 °C or less at altitudes of up to 1000 m and 30 °C or less at altitudes of over 1000 m and up to 2000 m). Ripple currents or other factors will deteriorate the characteristic of the smoothing capacitor. The service life of the capacitor greatly varies depending on ambient temperature and operating conditions.

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 stop, and inputting the forced stop. In addition, the service life of a relay may vary depending on the power supply capacity.

Servo amplifier 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 servo amplifier 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

Servo amplifier	Fan units
MR-JET-200G-N1/MR-JET-300G-N1	MR-JET-FAN1

Replacement procedure

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

📖MR-JET User's Manual (Hardware)

6 COMPLIANCE WITH GLOBAL STANDARDS

6.1 Compliance with global standards

Refer to the following manual for information about compliance with global standards.
Safety Instructions and Precautions for MR-JET AC Servos (IB(NA)-0300492)

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

Rev. 15 (2007) of United Nations Recommendations on the Transport of Dangerous Goods (hereinafter Recommendations of the United Nations) was published. To reflect the Recommendations, transport regulations for lithium metal batteries are partially revised 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).
To comply with the ICAO-TI and the IMDG Code, we have modified the indication on the package for AC servo batteries.
The above change will not affect the function or performance of the product.

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.
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(-A)	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.

Change in regulations

The following points have been changed for lithium metal batteries transportation by sea or air based on the IATA Dangerous Goods Regulations 54th edition effective January 1, 2013 in addition to the revision of the Recommendations of the United Nations Rev. 15 and the ICAO-TI 2009-2010 Edition. For lithium metal batteries, battery cells alone are classified as UN3090, and batteries assembled or packed with equipment are classified as UN3091.

■Transportation of lithium metal batteries alone

Packaging requirements	Classification	Main requirements
Eight cells or fewer per package with one gram or less of lithium content per cell	UN3090 PI968 Section Ⅱ	The package must pass a 1.2 m drop test, and a handling label with a battery illustration (size: 120 × 110 mm) must be attached to the package.
Two or fewer assembled batteries per package with two grams or less of lithium content per battery		
More than eight cells per package with one gram or less of lithium content per cell	UN3090 PI968 Section IB	The package must pass a 1.2 m drop test, and a handling label with a battery illustration (size: 120 × 110 mm) must be attached to the package. The batteries must be handled according to Class 9 Dangerous Goods Regulations -e.g., attaching the Class 9 hazard label.
More than two assembled batteries per package with two grams or less of lithium content per battery		
Cells with more than one gram of lithium content per cell	UN3090 PI968 Section IA	The package must comply with Class 9 Packages and be handled according to Class 9 Dangerous Goods Regulations -e.g., attaching the Class 9 hazard label.
Assembled batteries with more than two grams of lithium content per battery		

■Transportation of lithium metal batteries packed with or contained in equipment

- For batteries packed with equipment, follow the necessary requirements of UN3091 PI969. Batteries are classified into either Section II/Section I depending on the lithium content/packaging requirements.
- For batteries assembled in equipment, follow the necessary requirements of UN3091 PI970. Batteries are classified into either Section II/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.

Ex.

Mitsubishi Electric label with battery illustration

* UN number (s)
** Telephone number for additional information
Example of Mitsubishi Electric label with battery illustration
(Available from January 1, 2017)

■Details of the package change

The following caution has been added to the packages of the corresponding batteries.

"Containing lithium metal battery. Regulations apply for transportation."

■Transportation precaution for customers

For sea or air transportation, the handling label (above Fig.) must be attached to the package of a Mitsubishi Electric cell or battery. In addition, attaching the label to the outer package of an overpack containing several packages by Mitsubishi Electric is also required. When the content of a package must be handled as dangerous goods (Class 9), the Shipper's Declaration for Dangerous Goods is required, and the package must be compliant with Class 9 Packages. Documentation like the handling label in the specified design and the Shipper's Declaration for Dangerous Goods are required for transportation. Please attach the documentation to the packages and the outer package of the overpack.

The requirements of the IATA Dangerous Goods Regulations are subject to change according to the annual revision. 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.

6

6 COMPLIANCE WITH GLOBAL STANDARDS
6.2 Handling of AC servo amplifier batteries for the United Nations Recommendations on the Transport of Dangerous Goods

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6.3 Symbol for the new 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 mark is valid only in EU.

This mark 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.

CCC mark

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).

Judgment

20 product groups divided into 158 categories are specified as the subject products (announcement No. 45, 2014). The following table shows whether the servo products are required to comply with CCC.

Model	Judgment
AC servo amplifier	Not subject
AC servo motor [*1]	Not subject
Options [*2]	Not subject

*1 Small capacity motors with a capacity of 750 W or lower are included in the catalog of products subject to CCC, but the requirements do not apply to our products for the following reasons:
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 Servo system controller	Mounting board	×	○	○	○	○	○	(15)	—
	Heat sink	×	○	○	○	○	○		
	Resin cabinet	○	○	○	○	○	○		
	Plate and screw	○	○	○	○	○	○		
Servo motor	Bracket	×	○	○	○	○	○	(15)	—
	Mounting board	×	○	○	○	○	○		
	Resin cabinet	○	○	○	○	○	○		
	Core and cable	○	○	○	○	○	○		
Cable product	Wire	○	○	○	○	○	○	(e)	Including connector set
	Connector	○	○	○	○	○	○		
Optional unit	Mounting board	×	○	○	○	○	○	(15)	—
	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 52 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	电路板组件	×	○	○	○	○	○	⑮	—
	散热片	×	○	○	○	○	○		
	树脂壳体	○	○	○	○	○	○		
	金属板、螺丝	○	○	○	○	○	○		
伺服电机	托架	×	○	○	○	○	○	⑮	—
	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	×	○	○	○	○	○	⑮	—
	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

⑮　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-JET-G User's Manual (Parameters)

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

[Pr. PA01_Operation mode (**STY)]

Initial value	Setting range	Ver.
00003000h	Refer to the relevant detail No.	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)

Operation of 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	A4

0: Standard control mode

4: Linear servo motor control mode

The setting value "4" can be used on servo amplifiers with firmware version B2 or later.

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

[Pr. PB03_For manufacturer setting]

This servo parameter is for manufacturer setting.

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

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

Initial value	Setting range	Ver.
00000000h	Refer to the relevant detail No.	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	A4

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	Ver.
1000.0 [%]	0.0 to 1000.0	A4

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.

7

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

Initial value	Setting range	Ver.
1000.0 [%]	0.0 to 1000.0	A4

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	Ver.
0 [ms]	0 to 65535	A4

Set the time until the following error output turns on.

When the state in which droop pulses ≥ [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	Ver.
0 [ms]	0 to 65535	B2

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	Ver.
0 [ms]	0 to 65535	B2

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	Ver.
00000010h	Refer to the relevant detail No.	Refer to the relevant detail No.

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

Initial value	Setting range	Ver.
1h	Refer to the text	A4

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

0: Disabled

1: Enabled

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

[Pr. PE53_Maximum torque limit 1 (TLMX1)]

Initial value	Setting range	Ver.
1000.0 [%]	0.0 to 1000.0	A4

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.

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

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

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

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

Initial value	Setting range	Ver.
1h	Refer to the text	A4

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/s2 [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] [1]	[Pr. PV01 Profile speed command extension setting] [1]	[Profile velocity (Obj. 6081h)] [1]
[Pr. PT66 Maximum profile speed] [1]	[Pr. PV03 Maximum profile speed extension setting] [1]	[Max profile velocity (Obj. 607Fh)] [1]
[Pr. PT49 Speed acceleration time constant] [1]	[Pr. PV05 Profile acceleration] [1]	[Profile acceleration (Obj. 6083h)] [1]
[Pr. PT50 Speed deceleration time constant] [1]	[Pr. PV07 Profile deceleration] [1]	[Profile deceleration (Obj. 6084h)] [1]
[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] [1]	[Pr. PV19 Speed reached 2 - Output range - Extension setting] [1]	[Velocity window (Obj. 606Dh)] [1]
[Pr. PC65 Zero speed 2 level] [1]	[Pr. PV20 Zero speed 2 level extension setting] [1]	[Velocity threshold (Obj. 606Fh)] [1]
[Pr. PT67 Speed limit]	[Pr. PV21 Speed limit extension setting]	[Velocity limit value (Obj. 2D20h)]

[1] Available on servo amplifiers with firmware version B2 or later.

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[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.

Refer to the following for the supported control modes and firmware versions.

Control mode	Setting value			
	0 (mm) [3]	1 (inch) [3]	2 (degree) [1]	3 (pulse)
Cyclic synchronous mode	—	—	— [2]	A4
Profile mode	—	—	B6	B2
Positioning mode (point table method)	B8	B8	B8	B8

*1   If [Pr. PA01.1 Operation mode selection] is set to "4" (linear servo motor control mode), [AL. 037 Parameter error] will occur.
*2   When this servo parameter is set to "2", the control mode cannot be switched to the cyclic synchronous mode.
*3   If this value is set in a mode other than the positioning mode (point table method), [AL. 037] will occur.

[Pr. PT53_Torque slope (TQS)]

Initial value	Setting range	Ver.
100.0 [%/s]	0.0 to 1000000.0	B2

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.

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

[Pr. PN02_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. PN05_For manufacturer setting]

This servo parameter is for manufacturer setting.

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

Initial value	Setting range	Ver.
00000000h	Refer to the text	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	Ver.
9	0 to 32767	A4

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.

7.7 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
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								
		Standard	Linear	csp	csv	cst	pp	pv	tq	hm	pt	jg
PA01	PA01.0	○	○	○	○	○	○	○	○	○	○	○
	PA01.1	○	○	○	○	○	○	○	○	○	○	○
PA02	PA02.0-1	○	○	○	○	○	○	○	○	○	○	○
PA03	PA03.0	○	○	○	○	○	○	○	○	○	○	○
PA04	PA04.2	○	○	○	○	○	○	○	○	○	○	○
	PA04.3	○	○	○	○	—	○	○	—	○	○	○
PA06	—	○	○	○	○	○	○	○	○	○	○	○
PA07	—	○	○	○	○	○	○	○	○	○	○	○
PA08	PA08.0	○	○	○	○	—	○	○	—	○	○	○
	PA08.4	○	○	○	○	—	○	○	—	○	○	○
	PA08.5	○	○	○	○	—	○	○	—	○	○	○
	PA08.6	○	○	○	○	—	○	○	—	○	○	○
PA09	—	○	○	○	○	—	○	○	—	○	○	○
PA10	—	○	○	○	—	—	○	—	—	○	○	○
PA11	—	○	○	○	○	○	○	○	○	○	○	○
PA12	—	○	○	○	○	○	○	○	○	○	○	○
PA14	—	○	○	○	○	○	○	○	○	○	○	○
PA17	—	—	○	○	○	○	○	○	○	○	○	○
PA18	PA18.0-3	—	○	○	○	○	○	○	○	○	○	○
PA19	—	○	○	○	○	○	○	○	○	○	○	○
PA20	PA20.1	○	○	○	○	—	○	○	—	○	○	○
	PA20.2	○	○	○	○	○	○	○	○	○	○	○
PA21	PA21.0	○	○	○	○	—	○	○	—	○	○	○
PA22	PA22.1	○	○	○	—	—	○	—	—	○	○	○
PA23	PA23.0-1	○	○	○	○	○	○	○	○	○	○	○
	PA23.2-4	○	○	○	○	○	○	○	○	○	○	○
PA24	PA24.0	○	○	○	○	—	○	○	—	○	○	○
PA25	—	○	○	○	—	—	○	—	—	○	○	○
PA26	PA26.0	○	○	○	○	○	○	○	○	○	○	○
PA28	PA28.4	○	○	○	○	○	○	○	○	○	○	○
PA34	—	○	○	○	○	○	○	○	○	○	○	○

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

No.	Detail No.	Operation mode		Control mode								
		Standard	Linear	csp	csv	cst	pp	pv	tq	hm	pt	jg
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	—	○	○	○	—	—	○	—	—	○	○	○
PB45	PB45.0-1	○	○	○	—	—	○	—	—	○	○	○
	PB45.2	○	○	○	—	—	○	—	—	○	○	○

No.	Detail No.	Operation mode		Control mode								
		Standard	Linear	csp	csv	cst	pp	pv	tq	hm	pt	jg
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								
		Standard	Linear	csp	csv	cst	pp	pv	tq	hm	pt	jg
PC01	—	○	○	○	—	—	○	—	—	○	○	○
PC02	—	○	○	○	○	○	○	○	○	○	○	○
PC04	PC04.3	○	○	○	○	○	○	○	○	○	○	○
PC05	PC05.0	○	—	○	○	○	○	○	○	○	○	○
	PC05.1	○	○	○	○	○	○	○	○	○	○	○
	PC05.4	○	○	○	○	○	○	○	○	○	○	○
PC06	PC06.0	○	○	○	—	—	○	—	—	○	○	○
	PC06.3	○	○	○	—	—	○	—	—	○	○	○
PC07	—	○	○	○	○	○	○	○	○	○	○	○
PC08	—	○	○	○	○	○	○	○	○	○	○	○
PC17	PC17.1	—	○	○	○	○	○	○	○	○	○	○
PC19	PC19.0	○	○	○	○	—	○	○	—	○	○	○
	PC19.4	○	○	○	○	○	○	○	○	○	○	○
	PC19.6	○	○	○	○	○	○	○	○	○	○	○
PC20	PC20.2	○	○	○	○	○	○	○	○	○	○	○
PC21	PC21.0	○	○	○	○	○	○	○	○	○	○	○
PC24	—	○	○	○	○	—	○	○	—	○	○	○
PC26	PC26.0	○	○	○	○	○	○	○	○	○	○	○
PC27	PC27.0	○	○	○	○	○	○	○	○	○	○	○
	PC27.2	○	○	○	○	○	○	○	○	○	○	○
PC29	PC29.3	○	○	○	○	○	○	○	○	○	○	○
	PC29.5	○	—	○	○	○	○	○	○	○	○	○
PC31	—	○	○	○	—	—	○	—	—	○	○	○
PC38	—	○	○	○	—	—	○	—	—	○	○	○
PC41	PC41.0	○	○	○	—	—	—	—	—	—	—	—
	PC41.3	○	○	○	○	○	○	○	○	○	○	○
PC42	PC42.0	○	○	○	○	○	○	○	○	○	○	○
PC43	—	○	○	○	○	○	○	○	○	○	○	○
PC44	—	○	○	○	○	○	○	○	○	○	○	○
PC65	—	○	○	—	—	—	—	○	—	—	—	—
PC66	—	○	○	—	—	—	—	○	—	—	—	—
PC67	—	○	○	○	—	—	○	—	—	—	○	○
PC69	—	○	○	○	—	—	○	—	—	—	○	○
PC70	—	○	○	—	—	—	○	—	—	—	○	○
PC71	—	○	○	—	—	—	○	—	—	—	○	○
PC72	—	○	○	—	—	—	—	○	—	—	—	—
PC73	—	○	○	—	—	—	—	○	—	—	—	—
PC76	PC76.1	○	○	○	○	○	○	○	○	○	○	○
	PC76.2	○	○	○	○	○	○	○	○	○	○	○
	PC76.3	○	○	○	○	○	○	○	○	○	○	○
PC78	PC78.1	○	○	○	○	○	○	○	○	○	○	○
PC79	PC79.0-1	○	○	○	○	○	○	○	○	○	○	○

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

No.	Detail No.	Operation mode		Control mode								
		Standard	Linear	csp	csv	cst	pp	pv	tq	hm	pt	jg
PD01	PD01.0-7	○	○	○	○	○	○	○	○	○	○	○
PD03	PD03.0-1	○	○	○	○	○	○	○	○	○	○	○
PD04	PD04.0-1	○	○	○	○	○	○	○	○	○	○	○
PD05	PD05.0-1	○	○	○	○	○	○	○	○	○	○	○
PD07	PD07.0-1	○	○	○	○	○	○	○	○	○	○	○
PD08	PD08.0-1	○	○	○	○	○	○	○	○	○	○	○
PD09	PD09.0-1	○	○	○	○	○	○	○	○	○	○	○
PD11	PD11.0	○	○	○	○	○	○	○	○	○	○	○
PD12	PD12.3	○	○	○	○	○	○	○	○	○	○	○
PD13	PD13.2	○	○	○	—	—	○	—	—	○	○	○
PD14	PD14.1	○	○	○	○	○	○	○	○	○	○	○
PD41	PD41.2	○	○	○	○	○	○	○	○	○	○	○
	PD41.3	○	○	○	○	○	○	○	○	○	○	○
PD60	PD60.0-7	○	○	○	○	○	○	○	○	○	○	○

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

No.	Detail No.	Operation mode		Control mode								
		Standard	Linear	csp	csv	cst	pp	pv	tq	hm	pt	jg
PE41	PE41.0	○	○	○	○	○	○	○	○	○	○	○
	PE41.6	○	○	○	○	○	○	○	○	○	○	○
PE44	—	○	○	○	—	—	○	—	—	○	○	○
PE45	—	○	○	○	—	—	○	—	—	○	○	○
PE46	—	○	○	○	—	—	○	—	—	○	○	○
PE47	—	○	○	○	○	○	○	○	○	○	○	○
PE48	PE48.0	○	○	○	—	—	○	—	—	○	○	○
	PE48.1	○	○	○	—	—	○	—	—	○	○	○
PE49	—	○	○	○	—	—	○	—	—	○	○	○
PE50	—	○	○	○	—	—	○	—	—	○	○	○
PE53	—	○	○	○	○	○	○	○	○	○	○	○

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

No.	Detail No.	Operation mode		Control mode								
		Standard	Linear	csp	csv	cst	pp	pv	tq	hm	pt	jg
PF02	PF02.4	○	○	○	○	○	○	○	○	○	○	○
	PF02.5	○	○	○	○	○	○	○	○	○	○	○
PF06	PF06.0	○	—	○	○	○	○	○	○	○	○	○
PF12	—	○	—	○	○	○	○	○	○	○	○	○
PF21	—	○	○	○	○	○	○	○	○	○	○	○
PF23	—	○	○	○	○	○	○	○	—	○	○	○
PF24	PF24.0	○	○	○	○	○	○	○	○	○	○	○
PF25	—	○	○	○	○	○	○	○	○	○	○	○
PF29	PF29.1	○	○	○	○	○	○	○	○	○	○	○
PF31	—	○	○	○	○	○	○	○	○	○	○	○
PF32	—	○	○	○	○	—	○	○	—	○	○	○
PF34	PF34.6	○	○	○	○	○	○	○	○	○	○	○
PF80	PF80.0	○	○	○	○	○	○	○	○	○	○	○
	PF80.2-3	○	○	○	○	○	○	○	○	○	○	○
PF81	PF81.0	○	○	○	○	○	○	○	○	○	○	○
PF82	PF82.0	○	○	○	○	○	○	○	○	○	○	○
	PF82.1	○	○	○	○	○	○	○	○	○	○	○
	PF82.2	○	○	○	○	○	○	○	○	○	○	○
	PF82.3	○	○	○	○	○	○	○	○	○	○	○
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								
		Standard	Linear	csp	csv	cst	pp	pv	tq	hm	pt	jg
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	—	—	○	○	○	○	○	○	○	○	○	○

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

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

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

No.	Detail No.	Operation mode		Control mode								
		Standard	Linear	csp	csv	cst	pp	pv	tq	hm	pt	jg
PN07	—	○	○	○	○	○	○	○	○	○	○	○
PN18	—	○	○	○	○	○	○	○	○	○	○	○

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

No.	Detail No.	Operation mode		Control mode								
		Standard	Linear	csp	csv	cst	pp	pv	tq	hm	pt	jg
PV01	—	○	○	—	—	—	○	—	—	—	—	○
PV03	—	○	○	—	—	—	○	○	—	—	—	○
PV05	—	○	○	—	—	—	○	○	—	—	—	○
PV07	—	○	○	—	—	—	○	○	—	—	—	○
PV09	—	○	○	○	○	—	○	○	—	○	○	○
PV11	—	○	○	—	—	—	—	—	—	○	—	—
PV13	—	○	○	—	—	—	—	—	—	○	—	—
PV15	—	○	○	—	—	—	—	—	—	○	—	—
PV17	—	○	○	—	—	—	—	—	—	○	—	—
PV19	—	○	○	—	—	—	—	○	—	—	—	—
PV20	—	○	○	—	—	—	—	○	—	—	—	—
PV21	—	○	○	—	—	○	—	—	○	—	—	—
PV23	—	○	○	○	○	○	○	○	○	○	○	○
PV24	—	○	○	○	○	○	○	○	○	○	○	○
PV25	—	○	○	○	○	○	○	○	○	○	○	○
PV26	—	○	○	○	○	○	○	○	○	○	○	○
PV29	—	○	○	—	—	—	○	○	—	○	—	○
PV31	—	○	○	—	—	—	○	○	—	○	—	○

7

7.8 Lists of servo parameter initial values

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

No.	Initial value	Remark
PA01	00003000h	—
PA02	00000000h	—
PA03	00000000h	—
PA04	00002000h	—
PA05	10000	For manufacturer setting
PA06	1	—
PA07	1	—
PA08	00000001h	—
PA09	16	—
PA10	1600	—
PA11	1000.0	—
PA12	1000.0	—
PA13	00000000h	For manufacturer setting
PA14	0	—
PA15	4000	For manufacturer setting
PA16	1	For manufacturer setting
PA17	00000000h	—
PA18	00000000h	—
PA19	000000ABh	—
PA20	00000000h	—
PA21	00000001h	—
PA22	00000000h	—
PA23	00000000h	—
PA24	00000000h	—
PA25	0	—
PA26	00000000h	—
PA27	00000000h	For manufacturer setting
PA28	00000000h	—
PA29	0	For manufacturer setting
PA30	0	For manufacturer setting
PA31	0	For manufacturer setting
PA32	00000000h	For manufacturer setting
PA33	0.0	For manufacturer setting
PA34	0	—
PA35	00000000h	For manufacturer setting
PA36	00000000h	For manufacturer setting
PA37	00000000h	For manufacturer setting
PA38	00000000h	For manufacturer setting
PA39	00000000h	For manufacturer setting
PA40	00000000h	For manufacturer setting
PA41	00000000h	For manufacturer setting
PA42	00000000h	For manufacturer setting
PA43	00000000h	For manufacturer setting
PA44	00000000h	For manufacturer setting

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

No.	Initial value	Remark
PB01	00000000h	—
PB02	00000000h	—
PB03	36000	For manufacturer setting
PB04	0	—
PB05	500	For manufacturer setting
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	For manufacturer setting
PB38	0.000	For manufacturer setting
PB39	0.000	For manufacturer setting
PB40	0.000	For manufacturer setting
PB41	00000000h	For manufacturer setting
PB42	00000000h	For manufacturer setting
PB43	00000000h	For manufacturer setting
PB44	0.00	For manufacturer setting
PB45	00000000h	—
PB46	4500	—
PB47	00000000h	—
PB48	4500	—
PB49	00000000h	—
PB50	4500	—
PB51	00000000h	—

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No.	Initial value	Remark
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	For manufacturer setting
PB62	00000000h	For manufacturer setting
PB63	00000000h	For manufacturer setting
PB64	00000000h	For manufacturer setting
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	For manufacturer setting
PB81	00000001h	—
PB82	0.0	—
PB83	00000000h	For manufacturer setting
PB84	00000000h	For manufacturer setting
PB85	00000000h	For manufacturer setting
PB86	00000000h	For manufacturer setting
PB87	00000000h	For manufacturer setting
PB88	00000000h	For manufacturer setting
PB89	00000000h	For manufacturer setting
PB90	00000000h	For manufacturer setting
PB91	00000000h	For manufacturer setting
PB92	00000000h	For manufacturer setting

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

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

No.	Initial value	Remark
PC52	00000000h	For manufacturer setting
PC53	00000000h	For manufacturer setting
PC54	00000000h	For manufacturer setting
PC55	00000000h	For manufacturer setting
PC56	00000000h	For manufacturer setting
PC57	00000000h	For manufacturer setting
PC58	00000000h	For manufacturer setting
PC59	00000000h	For manufacturer setting
PC60	00000000h	For manufacturer setting
PC61	00000000h	For manufacturer setting
PC62	00000000h	For manufacturer setting
PC63	00000000h	For manufacturer setting
PC64	00000000h	For manufacturer setting
PC65	50.00	—
PC66	10	—
PC67	00C00000h	—
PC68	00000000h	For manufacturer setting
PC69	0	—
PC70	100	—
PC71	0	—
PC72	20.00	—
PC73	0	—
PC74	10.0	For manufacturer setting
PC75	10	For manufacturer setting
PC76	00000001h	—
PC77	1000.0	For manufacturer setting
PC78	00000010h	—
PC79	00000000h	—
PC80	00000000h	For manufacturer setting
PC81	00000000h	For manufacturer setting
PC82	00000000h	For manufacturer setting
PC83	00000000h	For manufacturer setting
PC84	00000000h	For manufacturer setting
PC85	00000000h	For manufacturer setting
PC86	00000000h	For manufacturer setting
PC87	00000000h	For manufacturer setting
PC88	00000000h	For manufacturer setting
PC89	00000000h	For manufacturer setting
PC90	00000000h	For manufacturer setting

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

No.	Initial value	Remark
PD01	00000000h	—
PD02	00000000h	For manufacturer setting
PD03	0000000Ah	—
PD04	0000000Bh	—
PD05	00000022h	—
PD06	00000000h	For manufacturer setting
PD07	00000005h	—
PD08	00000004h	—
PD09	00000003h	—
PD10	00000000h	For manufacturer setting
PD11	00000007h	—
PD12	00000101h	—
PD13	00000000h	—
PD14	00000000h	—
PD15	00000000h	For manufacturer setting
PD16	00000000h	For manufacturer setting
PD17	00000000h	For manufacturer setting
PD18	00000000h	For manufacturer setting
PD19	00000000h	For manufacturer setting
PD20	0	For manufacturer setting
PD21	0	For manufacturer setting
PD22	0	For manufacturer setting
PD23	0	For manufacturer setting
PD24	00000000h	For manufacturer setting
PD25	00000000h	For manufacturer setting
PD26	00000000h	For manufacturer setting
PD27	00000000h	For manufacturer setting
PD28	00000000h	For manufacturer setting
PD29	00000000h	For manufacturer setting
PD30	0	For manufacturer setting
PD31	0	For manufacturer setting
PD32	0	For manufacturer setting
PD33	00000000h	For manufacturer setting
PD34	00000000h	For manufacturer setting
PD35	00000000h	For manufacturer setting
PD36	00000000h	For manufacturer setting
PD37	00110001h	For manufacturer setting
PD38	00000000h	For manufacturer setting
PD39	00000000h	For manufacturer setting
PD40	0	For manufacturer setting
PD41	00000000h	—
PD42	00000000h	For manufacturer setting
PD43	00000000h	For manufacturer setting
PD44	00000000h	For manufacturer setting
PD45	00000000h	For manufacturer setting
PD46	00000000h	For manufacturer setting
PD47	00000000h	For manufacturer setting
PD48	00000000h	For manufacturer setting
PD49	0	For manufacturer setting
PD50	0	For manufacturer setting
PD51	00000062h	For manufacturer setting

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

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

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

No.	Initial value	Remark
PE52	00000000h	For manufacturer setting
PE53	1000.0	—
PE54	00000000h	For manufacturer setting
PE55	00000000h	For manufacturer setting
PE56	00000000h	For manufacturer setting
PE57	00000000h	For manufacturer setting
PE58	00000000h	For manufacturer setting
PE59	00000000h	For manufacturer setting
PE60	00000000h	For manufacturer setting
PE61	0.000	For manufacturer setting
PE62	0.000	For manufacturer setting
PE63	0.000	For manufacturer setting
PE64	0.000	For manufacturer setting
PE65	0.0	For manufacturer setting
PE66	0.0	For manufacturer setting
PE67	0.0	For manufacturer setting
PE68	00000000h	For manufacturer setting
PE69	00000000h	For manufacturer setting
PE70	0.00	For manufacturer setting
PE71	0	For manufacturer setting
PE72	1.0000	For manufacturer setting
PE73	00000000h	For manufacturer setting
PE74	00000000h	For manufacturer setting
PE75	00000000h	For manufacturer setting
PE76	00000000h	For manufacturer setting
PE77	00000000h	For manufacturer setting
PE78	0	For manufacturer setting
PE79	0	For manufacturer setting
PE80	00000000h	For manufacturer setting
PE81	00000000h	For manufacturer setting
PE82	00000000h	For manufacturer setting
PE83	00000000h	For manufacturer setting
PE84	00000000h	For manufacturer setting
PE85	00000000h	For manufacturer setting
PE86	00000000h	For manufacturer setting
PE87	00000000h	For manufacturer setting
PE88	00000000h	For manufacturer setting

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

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

No.	Initial value	Remark
PF52	00000000h	For manufacturer setting
PF53	0	For manufacturer setting
PF54	0	For manufacturer setting
PF55	0	For manufacturer setting
PF56	0	For manufacturer setting
PF57	00000000h	For manufacturer setting
PF58	00000000h	For manufacturer setting
PF59	00000000h	For manufacturer setting
PF60	00000000h	For manufacturer setting
PF61	00000000h	For manufacturer setting
PF62	00000000h	For manufacturer setting
PF63	00000000h	For manufacturer setting
PF64	00000000h	For manufacturer setting
PF65	00000000h	For manufacturer setting
PF66	00000000h	For manufacturer setting
PF67	0	For manufacturer setting
PF68	0	For manufacturer setting
PF69	0	For manufacturer setting
PF70	0	For manufacturer setting
PF71	00000000h	For manufacturer setting
PF72	0	For manufacturer setting
PF73	0	For manufacturer setting
PF74	0	For manufacturer setting
PF75	0	For manufacturer setting
PF76	0	For manufacturer setting
PF77	00000000h	For manufacturer setting
PF78	00000000h	For manufacturer setting
PF79	00110010h	For manufacturer setting
PF80	00000000h	—
PF81	00000000h	—
PF82	00000000h	—
PF83	00000000h	For manufacturer setting
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	For manufacturer setting
PF97	00000000h	For manufacturer setting
PF98	00000000h	For manufacturer setting
PF99	00000000h	For manufacturer setting

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

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

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

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

No.	Initial value	Remark
PT01	00000310h	—
PT02	00000001h	—
PT03	00000000h	—
PT04	00000000h	For manufacturer setting
PT05	100.00	—
PT06	10.00	—
PT07	0	—
PT08	0	—
PT09	1000	—
PT10	100	—
PT11	15.0	—
PT12	0	—
PT13	00000000h	For manufacturer setting
PT14	0	For manufacturer setting
PT15	0	—
PT16	00000000h	For manufacturer setting
PT17	0	—
PT18	00000000h	For manufacturer setting
PT19	0	—
PT20	00000000h	For manufacturer setting
PT21	0	—
PT22	00000000h	For manufacturer setting
PT23	00000000h	For manufacturer setting
PT24	00000000h	For manufacturer setting
PT25	00000000h	For manufacturer setting
PT26	00000000h	For manufacturer setting
PT27	00000000h	For manufacturer setting
PT28	8	For manufacturer setting
PT29	00000000h	—
PT30	00000000h	For manufacturer setting
PT31	00000000h	For manufacturer setting
PT32	00000100h	For manufacturer setting
PT33	00000000h	For manufacturer setting
PT34	00000000h	—
PT35	00000000h	For manufacturer setting
PT36	00000000h	For manufacturer setting
PT37	10	For manufacturer setting
PT38	00000000h	—
PT39	100	For manufacturer setting
PT40	0	For manufacturer setting
PT41	00000010h	—
PT42	00000000h	For manufacturer setting
PT43	00000000h	For manufacturer setting
PT44	00000000h	For manufacturer setting
PT45	37	—
PT46	0	For manufacturer setting
PT47	00000000h	For manufacturer setting
PT48	00000000h	For manufacturer setting
PT49	0	—
PT50	0	—
PT51	0	—

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

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

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

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

No.	Initial value	Remark
PV01	0	—
PV02	0	For manufacturer setting
PV03	2147483647	—
PV04	0	For manufacturer setting
PV05	0	—
PV06	0	For manufacturer setting
PV07	0	—
PV08	0	For manufacturer setting
PV09	0	—
PV10	0	For manufacturer setting
PV11	500000	—
PV12	0	For manufacturer setting
PV13	100000	—
PV14	0	For manufacturer setting
PV15	0	—
PV16	0	For manufacturer setting
PV17	0	—
PV18	0	For manufacturer setting
PV19	20000	—
PV20	20	—
PV21	2147483647	—
PV22	0	For manufacturer setting
PV23	1	—
PV24	1	—
PV25	1	—
PV26	1	—
PV27	1	For manufacturer setting
PV28	1	For manufacturer setting
PV29	00000000h	—
PV30	00000000h	For manufacturer setting
PV31	00000000h	—
PV32	00000000h	For manufacturer setting

7 SERVO PARAMETERS
7.8 Lists of servo parameter initial values

8 NETWORK PARAMETERS

> **Point**
>
> Refer to the following manual for the parameters not described in this chapter.
> 📖MR-JET-G User's Manual (Parameters)

8.1 Network basic parameters

[Pr. NPA01_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. NPA02_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. NPA04_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. NPA08_For manufacturer setting]

This servo parameter is for manufacturer setting.

[Pr. NPA09_Node address setting]

Initial value	Setting range	Size	Ver.
00000000h	00000000h to 0000FFFFh	4 bytes	A4

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.

REVISIONS

Revision date	*Manual number	Description
November 2019	IB(NA)-0300495ENG-A	First edition
July 2020	IB(NA)-0300495ENG-B	■The following functions are added: Profile mode, linear servo motor control mode, S-pattern acceleration/deceleration time constants ■Added sections: Section 1.3, Section 6.4, Section 8.2
October 2020	IB(NA)-0300495ENG-C	■Servo parameters are added. ■Added/edited: Section 7.3, Section 7.4, Section 7.5, Section 7.6, Section 8.1
March 2021	IB(NA)-0300495ENG-D	■The following function is added: Positioning mode (point table method) ■Added/edited: Section 1.4, Chapter 2, Section 2.1, Section 4.1, Section 4.5, Section 7.1, Section 7.2, Section 7.3, Section 7.5, Section 7.7, Section 7.8
July 2021	IB(NA)-0300495ENG-E	■Added/edited: Section 1.4, Section 2.1, Section 2.2, Section 7.5, Section 7.6, Section 7.7, Section 7.8

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.

TRADEMARKS

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When exported from Japan, this manual does not require application to the
Ministry of Economy, Trade and Industry for service transaction permission.

Specifications are subject to change without notice.