MITSUBISHI ELECTRIC

General-Purpose AC Servo

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-JE

Ethernet Interface

MODEL

MR-JE-_C

SERVO AMPLIFIER

INSTRUCTION MANUAL

(Network)

C

● 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 Instruction 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 Instruction 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 to personnel or may cause physical damage.

Note that the CAUTION level may lead to a serious consequence according to conditions.
Please follow the instructions of both levels because they are important to personnel safety.
What must not be done and what must be done are indicated by the following diagrammatic symbols.

⃠	Indicates what must not be done. For example, "No Fire" is indicated by ⃠ .
●	Indicates what must be done. For example, grounding is indicated by ⏚ .

In this Instruction Manual, instructions at a lower level than the above, instructions for other functions, and so on are classified into "POINT".
After reading this Instruction Manual, keep it accessible to the operator.

1. To prevent electric shock, note the following

⚠ WARNING

- ●Before wiring and inspections, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Otherwise, an electric shock may occur. In addition, when confirming whether the charge lamp is off or not, always confirm it from the front of the servo amplifier.
- ●Ground the servo amplifier and servo motor securely.
- ●Any person who is involved in wiring and inspection should be fully competent to do the work.
- ●Do not attempt to wire the servo amplifier and servo motor until they have been installed. Otherwise, it may cause an electric shock.
- ●Do not operate switches with wet hands. Otherwise, it may cause an electric shock.
- ●The cables should not be damaged, stressed, loaded, or pinched. Otherwise, it may cause an electric shock.
- ●To prevent an electric shock, always connect the protective earth (PE) terminal (marked ⏚) of the servo amplifier to the protective earth (PE) of the cabinet.
- ●To avoid an electric shock, insulate the connections of the power supply terminals.

2. To prevent fire, note the following

⚠ CAUTION

- ●Install the servo amplifier, servo motor, and regenerative resistor on incombustible material. Installing them directly or close to combustibles will lead to smoke or a fire.
- ●Always connect a magnetic contactor between the power supply and the power supply (L1/L2/L3) of the servo amplifier, in order to configure a circuit that shuts down the power supply on the side of the servo amplifier's power supply. If a magnetic contactor is not connected, continuous flow of a large current may cause smoke or a fire when the servo amplifier malfunctions.
- ●Always connect a molded-case circuit breaker, or a fuse to each servo amplifier between the power supply and the power supply (L1/L2/L3) of the servo amplifier, in order to configure a circuit that shuts down the power supply on the side of the servo amplifier's power supply. If a molded-case circuit breaker or fuse is not connected, continuous flow of a large current may cause smoke or a fire when the servo amplifier malfunctions.
- ●When using the regenerative resistor, switch power off with the alarm signal. Otherwise, a regenerative transistor malfunction or the like may overheat the regenerative resistor, causing smoke or a fire.
- ●When you use a regenerative option with an MR-JE-40C to MR-JE-100C, remove the built-in regenerative resistor and wiring from the servo amplifier.
- ●Provide adequate protection to prevent screws and other conductive matter, oil and other combustible matter from entering the servo amplifier and servo motor.

3. To prevent injury, note the following

⚠ CAUTION

- ●Only the power/signal specified in the Instruction Manual must be supplied/applied to each terminal. Otherwise, an electric shock, fire, injury, etc. may occur.
- ●Connect cables to the correct terminals. Otherwise, a burst, damage, etc. may occur.
- ●Ensure that polarity (+/-) is correct. Otherwise, a burst, damage, etc. may occur.
- ●The servo amplifier heat sink, regenerative resistor, servo motor, etc., may be hot while the power is on and for some time after power-off. Take safety measures such as providing covers to avoid accidentally touching them by hands and parts such as cables.

4. Additional instructions

The following instructions should also be fully noted. Incorrect handling may cause a malfunction, injury, electric shock, fire, etc.

(1) Transportation and installation

⚠ CAUTION

- ●Transport the products correctly according to their mass.
- ●Stacking in excess of the specified number of product packages is not allowed.
- ●Do not hold the lead of the built-in regenerative resistor, cables, or connectors when carrying the servo amplifier. Otherwise, it may drop.
- ●Install the servo amplifier and the servo motor in a load-bearing place in accordance with the Instruction Manual.
- ●Do not get on or put heavy load on the equipment. Otherwise, it may cause injury.
- ●The equipment must be installed in the specified direction.
- ●Leave specified clearances between the servo amplifier and the cabinet walls or other equipment.
- ●Do not install or operate the servo amplifier and servo motor which have been damaged or have any parts missing.
- ●Do not block the intake and exhaust areas of the servo amplifier. Otherwise, it may cause a malfunction.
- ●Do not drop or apply heavy impact on the servo amplifiers and the servo motors. Otherwise, injury, malfunction, etc. may occur.
- ●Do not strike the connector. Otherwise, a connection failure, malfunction, etc. may occur.
- ●When you keep or use the equipment, please fulfill the following environment.

Item		Environment
Ambient temperature	Operation	0 °C to 55 °C (non-freezing)
	Storage	-20 °C to 65 °C (non-freezing)
Ambient humidity	Operation	5 %RH to 90 %RH (non-condensing)
	Storage	
Ambience		Indoors (no direct sunlight), free from corrosive gas, flammable gas, oil mist, dust, and dirt
Altitude		2000 m or less above sea level (Contact your local sales office for the altitude for options.)
Vibration resistance		5.9 m/s^2, at 10 Hz to 55 Hz (directions of X, Y and Z axes)

- ●When the product has been stored for an extended period of time, contact your local sales office.
- ●When handling the servo amplifier, be careful about the edged parts such as corners of the servo amplifier.
- ●The servo amplifier must be installed in a metal cabinet.

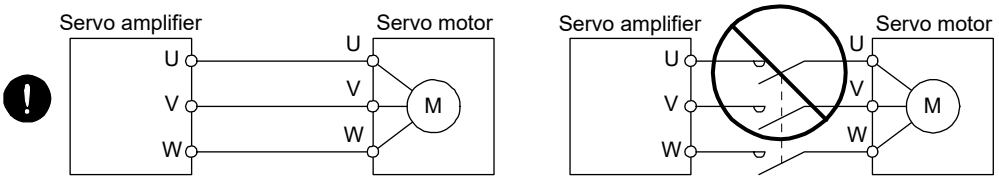
⚠ CAUTION

- When fumigants that contain halogen materials such as fluorine, chlorine, bromine, and iodine are used for disinfecting and protecting wooden packaging from insects, they cause malfunction when entering our products. Please take necessary precautions to ensure that remaining materials from fumigant do not enter our products, or treat packaging with methods other than fumigation (heat method). Additionally, disinfect and protect wood from insects before packing products.
- To prevent a fire or injury from occurring in case of an earthquake or other natural disasters, securely install, mount, and wire the servo motor in accordance with the Instruction Manual.

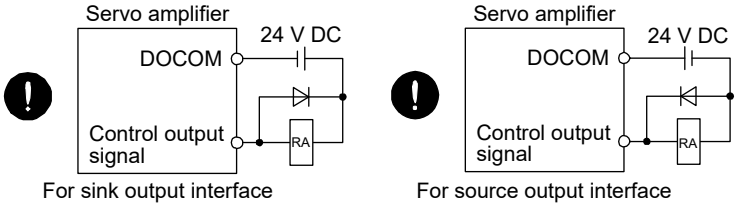
(2) Wiring

⚠ CAUTION

- Before removing the CNP1 connector of MR-JE-40C to MR-JE-100C, disconnect the lead wires of the regenerative resistor from the CNP1 connector.
- Wire the equipment correctly and securely. Otherwise, the servo motor may operate unexpectedly.
- Make sure to connect the cables and connectors by using the fixing screws and the locking mechanism. Otherwise, the cables and connectors may be disconnected during operation.
- Do not install a power capacitor, surge killer, or radio noise filter (optional FR-BIF) on the servo amplifier output side.
- To avoid a malfunction, connect the wires to the correct phase terminals (U/V/W) of the servo amplifier and servo motor.
- Connect the servo amplifier power output (U/V/W) to the servo motor power input (U/V/W) directly. Do not let a magnetic contactor, etc. intervene. Otherwise, it may cause a malfunction.



- The connection diagrams in this instruction manual are shown for sink interfaces, unless stated otherwise.
- The surge absorbing diode installed to the DC relay for control output should be fitted in the specified direction. Otherwise, the emergency stop and other protective circuits may not operate.



- When the cable is not tightened enough to the terminal block, the cable or terminal block may generate heat because of the poor contact. Be sure to tighten the cable with specified torque.
- Connecting a servo motor of the wrong axis to U, V, W, or CN2 of the servo amplifier may cause a malfunction.

⚠ CAUTION

- ●Configure a circuit to turn off EM2 or EM1 when the power supply is turned off to prevent an unexpected restart of the servo amplifier.
- ●To prevent malfunction, avoid bundling power lines (input/output) and signal cables together or running them in parallel to each other. Separate the power lines from the signal cables.

(3) Test run and adjustment

⚠ CAUTION

- ●When executing a test run, follow the notice and procedures in this instruction manual. Otherwise, it may cause a malfunction, damage to the machine, or injury.
- ●Before operation, check the parameter settings. Improper settings may cause some machines to operate unexpectedly.
- ●Never adjust or change the parameter values extremely as it will make operation unstable.
- ●Do not get close to moving parts during the servo-on status.

(4) Usage

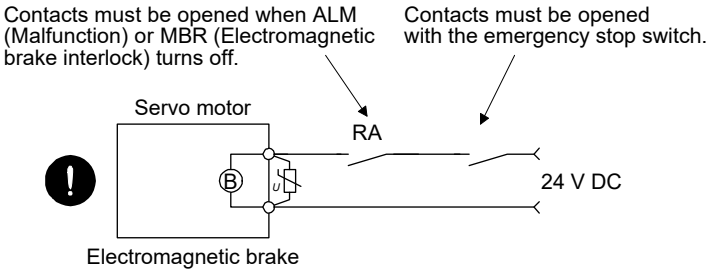
⚠ CAUTION

- ●When it is assumed that a hazardous condition may occur due to a power failure or product malfunction, use a servo motor with an external brake to prevent the condition.
- ●For equipment in which the moving part of the machine may collide against the load side, install a limit switch or stopper to the end of the moving part. The machine may be damaged due to a collision.
- ●Do not disassemble, repair, or modify the product. Otherwise, an electric shock, fire, injury, etc. may occur. Disassembled, repaired, and/or modified products are not covered under warranty.
- ●Before resetting an alarm, make sure that the run signal of the servo amplifier is off in order to prevent a sudden restart. Otherwise, it may cause an accident.
- ●Use a noise filter, etc. to minimize the influence of electromagnetic interference. Electromagnetic interference may be given to the electronic equipment used near the servo amplifier.
- ●Burning or breaking a servo amplifier may cause a toxic gas. Do not burn or break it.
- ●Use the servo amplifier with the specified servo motor.
- ●Correctly wire options and peripheral equipment, etc. in the correct combination. Otherwise, an electric shock, fire, injury, etc. may occur.
- ●The electromagnetic brake on the servo motor is designed to hold the motor shaft and should not be used for ordinary braking.
- ●For such reasons as incorrect wiring, service life, and mechanical structure (e.g. where a ball screw and the servo motor are coupled via a timing belt), the electromagnetic brake may not hold the motor shaft. To ensure safety, install a stopper on the machine side.
- ●If the dynamic brake is activated at power-off, alarm occurrence, etc., do not rotate the servo motor by an external force. Otherwise, it may cause a fire.

(5) Corrective actions

⚠ CAUTION

- Ensure safety by confirming the power off, etc. before performing corrective actions. Otherwise, it may cause an accident.
- If it is assumed that a power failure, machine stoppage, or product malfunction may result in a hazardous situation, use a servo motor with an electromagnetic brake or provide an external brake system for holding purpose to prevent such hazard.
- When any alarm has occurred, eliminate its cause, ensure safety, and deactivate the alarm before restarting operation.
- If the molded-case circuit breaker or fuse is activated, be sure to remove the cause and secure safety before switching the power on. If necessary, replace the servo amplifier and recheck the wiring. Otherwise, it may cause smoke, fire, or an electric shock.
- Provide an adequate protection to prevent unexpected restart after an instantaneous power failure.
- Configure an electromagnetic brake circuit which is interlocked with an external emergency stop switch.



- To prevent an electric shock, injury, or fire from occurring after an earthquake or other natural disasters, ensure safety by checking conditions, such as the installation, mounting, wiring, and equipment before switching the power on.

(6) Maintenance, inspection and parts replacement

⚠ CAUTION

- 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.
- It is recommended that the servo amplifier be replaced every 10 years when it is used in general environment.
- When using a servo amplifier whose power has not been turned on for a long time, contact your local sales office.

(7) General instruction

- To illustrate details, the equipment in the diagrams of this Instruction Manual may have been drawn without covers and safety guards. When the equipment is operated, the covers and safety guards must be installed as specified. Operation must be performed in accordance with this Instruction Manual.

● DISPOSAL OF WASTE ●

Please dispose a servo amplifier, battery (primary battery) and other options according to your local laws and regulations.

⚠ EEP-ROM life

The number of write times to the EEP-ROM, which stores parameter settings, etc., is limited to 100,000. If the total number of the following operations exceeds 100,000, the servo amplifier may malfunction when the EEP-ROM reaches the end of its useful life.

- Write to the EEP-ROM due to parameter setting changes
- Write to the EEP-ROM due to device changes
- Write to the EEP-ROM due to point table setting changes

Compliance with global standards

For the compliance with global standards, refer to app. 3 of "MR-JE-_C Servo Amplifier Instruction Manual".

«About the manual»

You must have this Instruction Manual and the following manuals to use this servo. Ensure to prepare them to use the servo safely.

Relevant manuals

Manual name	Manual No.
MELSERVO MR-JE-_C Servo Amplifier Instruction Manual	SH(NA)030257ENG
MELSERVO-JE Servo Amplifier Instruction Manual (Troubleshooting)	SH(NA)030166ENG
MELSERVO MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)	SH(NA)030277ENG
MELSERVO MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)	SH(NA)030254ENG
MELSERVO HG-KN/HG-SN Servo Motor Instruction Manual	SH(NA)030135ENG
MELSERVO EMC Installation Guidelines	IB(NA)67310ENG

«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]

MEMO

CONTENTS

MEMO

1. FUNCTIONS AND CONFIGURATION

1.1 Function List

POINT
●Ethernet communication (CC-Link IE field network Basic, SLMP and Modbus/TCP) and RS-485 communication (Modbus RTU) are exclusively independent functions.

The following table lists the functions of this servo. For details of the functions, refer to each section indicated in the detailed explanation field.

Function	Description	Detailed explanation
Position control mode (P) (pulse train input)	This servo amplifier is used as a position control servo.	"MR-JE-_C Servo Amplifier Instruction Manual"
Speed control mode (S) (Analog input/DI input)	This servo amplifier is used as a speed control servo.	
Torque control mode (T) (Analog input)	This servo amplifier is used as a torque control servo.	
Position/speed control switching mode (P/S)	Using an input device, control can be switched between position control and speed control.	
Speed/torque control switch mode (S/T)	Using an input device, control can be switched between speed control and torque control.	
Torque/position control switch mode (T/P)	Using an input device, control can be switched between torque control and position control.	
Positioning mode (Point table method) (CP)	Set 1 to 255 point tables in advance, and select any point table to perform operation in accordance with the set values. To select point tables, use external input signals or communication function. This function is available with servo amplifiers with software version A4 or later.	"MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)"
Positioning mode (Indexer method) (PS)	Set the station positions divided into 2 to 255 in advance to perform operation to the station positions. To select station positions, use external input signals or communication function. This function is available with servo amplifiers with software version A4 or later.	
Profile position mode (pp)	The servo amplifier operates in the profile position mode.	"MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)"
Profile velocity mode (pv)	The servo amplifier operates in the profile velocity mode.	
Profile torque mode (tq)	The servo amplifier operates in the profile torque mode.	
Homing mode (hm)	The servo amplifier operates in the home position return mode.	"MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)"/ "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)"

Function		Description	Detailed explanation
Absolute position detection system		Setting a home position once makes home position return unnecessary at every power-on.	"MR-JE-_C Servo Amplifier Instruction Manual"/ "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)"/ "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)"
Model adaptive control		This function achieves a high response and stable control following the ideal model. The two-degrees-of-freedom model adaptive control enables you to set a response to the command and a response to the disturbance separately. Additionally, this function can be disabled. To disable this function, refer to section 7.4 of "MR-JE-C_ Servo Amplifier Instruction Manual".	
Roll feed display function		Positioning is performed based on the specified travel distance from a status display "0" of current/command positions at start. This function is available with servo amplifiers with software version A4 or later.	"MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)"
Touch probe function setting	Current position latch function	The touch probe function is available in the profile mode or the positioning mode. When the touch probe 1 signal turns on, the current position is latched. The latched data can be read with communication commands.	
	Interrupt positioning function	The touch probe function is available in the profile mode or the positioning mode. When the touch probe 1 signal turns on, this function converts the remaining distance to the travel distance set in [Pr. PT30 Touch probe sensor - Travel distance before stop (lower four digits)] and [Pr. PT31 Touch probe sensor - Travel distance before stop (upper four digits)]. This function is available with servo amplifiers with software version A4 or later.	
Infinite feed function (When degree is set)		When the unit of position data of the profile mode is set to degree, the detection of [AL. E3.1 Multi-revolution counter travel distance excess warning] is disabled and the home position is retained even if the servo motor rotates 32768 revolutions or more in the same direction. Thus, the current position is restored after the power is cycled. This function can be used with the absolute position detection system.	"MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)"
Command pulse selection		Command pulse train form can be selected from among three different types.	"MR-JE-_C Servo Amplifier Instruction Manual"
High-resolution encoder		High-resolution encoder of 131072 pulses/rev is used for the encoder of the servo motor compatible with the MELSERVO-JE series.	
Gain switching function		You can switch gains during rotation and during stop, and can use an input device to switch gains during operation.	"MR-JE-_C Servo Amplifier Instruction Manual"
Advanced vibration suppression control II		This function suppresses vibration or residual vibration at an arm end.	
Machine resonance suppression filter		This filter function (notch filter) decreases the gain of the specific frequency to suppress the resonance of the mechanical system.	
Shaft resonance suppression filter		When a load is mounted to the servo motor shaft, resonance by shaft torsion during driving may generate a mechanical vibration of high frequency. The shaft resonance suppression filter suppresses the vibration.	
Adaptive filter II		The servo amplifier detects mechanical resonance and sets filter characteristics automatically to suppress mechanical vibration.	
Low-pass filter		Suppresses high-frequency resonance which occurs as the servo system response is increased.	
Machine analyzer function		Analyzes the frequency characteristic of the mechanical system by simply connecting an MR Configurator2 installed personal computer and the servo amplifier. MR Configurator2 is necessary for this function.	

Function	Description	Detailed explanation
Robust filter	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.	"MR-JE-_C Servo Amplifier Instruction Manual"
Slight vibration suppression control	Suppresses vibration of ±1 pulse generated at a servo motor stop.	
Electronic gear	The position control is performed based on a value obtained by multiplying the position command from the controller by the set electronic gear ratio.	
S-pattern acceleration/deceleration time constant	Enables smooth acceleration and deceleration. Set S-pattern acceleration/deceleration time constants with [Pr. PC03]. As compared with linear acceleration/deceleration, the acceleration/deceleration time will be longer for the S-pattern acceleration/deceleration time constants regardless of command speed.	
Auto tuning	Automatically adjusts the gain to optimum value if load applied to the servo motor shaft varies.	
Regenerative option	Use a regenerative option when the built-in regenerative resistor of the servo amplifier does not have sufficient regenerative capacity for a large regenerative power generated.	
Alarm history clear	Clears alarm histories.	
Input signal selection (device settings)	ST1 (Forward rotation start), ST2 (Reverse rotation start), and SON (Servo-on) and other input device can be assigned to certain pins of the CN3 connector.	
Output signal selection (device settings)	The output devices including MBR (Electromagnetic brake interlock) can be assigned to certain pins of the CN3 connector.	
Output signal (DO) forced output	Turns on/off the output signals forcibly independently of the servo status. Use this function for checking output signal wiring, etc.	
Torque limit	Limits the servo motor torque.	
Speed limit	Servo motor speed can be limited to any value.	
Automatic VC offset	Voltage is automatically offset to stop the servo motor if it does not come to a stop when VC (Analog speed command) is 0 V. MR Configurator2 is necessary for this function.	
Alarm code output	If an alarm has occurred, the corresponding alarm number is outputted in 3-bit code.	"MR-JE-_C Servo Amplifier Instruction Manual"
Test operation mode	Jog operation, positioning operation, motor-less operation, DO forced output, program operation, and single-step feed MR Configurator2 is necessary for this function.	
MR Configurator2	Using a personal computer, you can perform the parameter setting, test operation, monitoring, and others.	
One-touch tuning	Gain adjustment is performed just by one click on MR Configurator2. This function is available with MR Configurator2 or via a network.	Section 6.2 "MR-JE-_C Servo Amplifier Instruction Manual"
Tough drive function	This function makes the equipment continue operating even under the condition that an alarm occurs. The tough drive function includes two types: the vibration tough drive and the instantaneous power failure tough drive.	"MR-JE-_C Servo Amplifier Instruction Manual"
Drive recorder function	This function continuously monitors the servo status and records the status transition before and after an alarm for a fixed period of time. You can check the recorded data by clicking the Waveform-Display button in the drive recorder window of MR Configurator2. However, the drive recorder is not available when: 1. You are using the graph function of MR Configurator2. 2. You are using the machine analyzer function. 3. [Pr. PF21] is set to "-1".	
Servo amplifier life diagnosis function	You can check the cumulative energization time and the number of on/off times of the inrush relay. This function gives an indication of the replacement time for parts of the servo amplifier including a capacitor and a relay before they malfunction. This function is available with MR Configurator2 or via a network. (Refer to section 6.4.)	

Function	Description	Detailed explanation
Power monitoring function	This function calculates the power running energy and the regenerative power from the data in the servo amplifier such as speed and current. Power consumption and others are displayed on MR Configurator2.	
Machine diagnosis function	From the data in the servo amplifier, this function estimates the friction and vibrational component of the drive system in the equipment and recognizes an error in the machine parts, including a ball screw and bearing. This function is available with MR Configurator2 or via a network. (Refer to section 6.3.)	
Modbus RTU	The Modbus RTU uses dedicated message frames for the Ethernet communication between a master and slaves. The dedicated message frame has a message field called Function which reads and writes data, and parameter setting (reading and writing) of the servo amplifier and monitoring can be done with this message field. In the profile mode or positioning mode, driving the servo motor is also possible. This function is available with servo amplifiers with software version A4 or later.	Chapter 4
Modbus/TCP	The Modbus/TCP uses dedicated message frames for the Ethernet communication between a client (master) and servers (slaves). The dedicated message frames have functions for reading and writing data, you can set the parameters of servo amplifiers and monitor it by using this function. In the profile mode or positioning mode, driving the servo motor is also possible. This function is used with servo amplifiers with software version A3 or later.	Chapter 3
CC-Link IE Field Network Basic	CC-Link IE Field Network Basic enables fixed cycle communication between the master and slave stations using a general-purpose Ethernet connector. The parameters of servo amplifiers can be set (read/written) and monitored. In the profile mode or positioning mode, driving the servo motor is also possible.	Chapter 2
SLMP	SLMP (SeamLess Message Protocol) is a protocol to access SLMP-compatible devices from external devices (such as a personal computer and an HMI) or programmable controller CPU via Ethernet. The parameters of servo amplifiers can be set (read/written) and monitored. In the profile mode or positioning mode, driving the servo motor is also possible.	Chapter 3
IP address filtering function	Register the range of IP addresses in advance to limit the network devices allowed to be connected to the servo amplifier.	Chapter 5
Operation specification IP address function	In Ethernet communication (CC-Link IE Field Network Basic, SLMP, or Modbus/TCP), to limit the network devices to which the operation right is given, set the range of the device IP addresses. Monitoring/parameter reading can be performed with the network devices having no operation right.	
Lost motion compensation function	This function improves the response delay generated when the machine moving direction is reversed.	"MR-JE-_C Servo Amplifier Instruction Manual"
Limit switch	Limits travel intervals using LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end).	
Software limit	Limits travel intervals by address using parameters. Enables the same function with the limit switch by setting parameters.	Section 7.4.5
Analog override	Limits a servo motor speed with analog inputs. The value can be changed to 0% to 200% of the set speed. This function is available with servo amplifiers with software version A4 or later.	"MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)"
Digital override	A commanded speed multiplied by an override value selected with OVR (Override selection) will be an actual servo motor speed. The value can be changed to 0% to 360% of the set speed. This function is available with servo amplifiers with software version A4 or later.	

2. CC-Link IE Field Network Basic/SLMP

2.1 Outline

CC-Link IE Field Network Basic is a standard Ethernet-based protocol used to perform cyclic communication by the installed software without using a dedicated ASIC. You can establish a highly flexible system because CC-Link IE Field Network Basic can be used together with TCP/IP communications.
Up to 64 axes of servo amplifiers (up to 16 axes of servo amplifiers per group) can be monitored by the controller.
In the profile position mode, positioning operation can be performed based on the position data (target position) given via the controller.
In the point table mode (pt), you can perform positioning operation by specifying the pre-configured point table number (1 to 255) with a controller.

2.1.1 Features

(1) High-speed communication
High-speed communication can be established by cyclic transmission of not only bit data but also word data.
The maximum communication speed is 100 Mbps.

(2) General-purpose Ethernet supported
Dedicated control wiring is unnecessary, and Ethernet network can be integrated.

2.2 Communication specifications

2.2.1 Communication specifications of CC-Link IE Field Network Basic

Function	Description
Communication protocol	UDP
Port No.	No. 61450 (cyclic data) No. 61451 (NodeSearch and IPAddressSet dedicated for CC-Link IE Field Network Basic only)
Cyclic data	32 points (64 bytes)
IP address	IPv4 range: 0.0.0.1 to 223.255.255.254 Use the same network address for both the master and slave stations. Default value: 192.168.3.0
Subnet mask	Default value: 255.255.255.0
Message format	Refer to section 2.3.1.
Physical layer	100BASE-TX
Communication connector	RJ45, 1 port (CN1)
Communication cable	CAT5e, shielded twisted pair (4 pair) straight cable
Network topology	Star
Variable communication speed	100 Mbps
Transmission speed between stations	Max. 100 m
Number of nodes	Max. 64 stations (max. number of connections per group: 16 stations) Number of usable stations: 1 station per MR-JE-_C servo amplifier
Standard response time (Note 1) (Link scan time/timeout time (Note 2, 3))	10 ms

Note 1. Standard response time refers to the time from when the servo amplifier receives a command from the master station until when it returns a response to the master station.

2. Calculate the link scan time as follows. Also, use the standard response time for Ns.
   MELSEC iQ-R/MELSEC-Q/L: Ls = Ns + Nm
   MELSEC iQ-F: Ls = SM + {(Ns + Nm)/SM}
   Ls: Link scan time, Ns: Response time of slave station, Nm: Request time of master station, SM: Sequence scan time

3. Check the current link scan time (when all the slave stations are in a normal state) using the CC-Link IE Field Network Basic diagnosis function. Then, set the timeout time approximately 5 times the link scan time (example: 50 ms when the current link scan time is 10 ms).

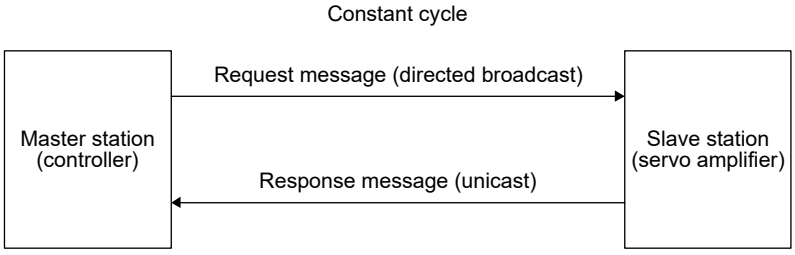
2.2.2 SLMP communication specifications

Function		Description
Communication protocol		UDP/TCP (Note)
Port No.	iQSS	No. 45237 (NodeSearch and IPAddressSet only)
	UDP	No. 5010
	TCP (Note)	No. 5012
IP address		IPv4 range: 0.0.0.0 to 255.255.255.255 Use the same network address for both the master and slave stations. Default value: 192.168.3.0
Subnet mask		Default value: 255.255.255.0
Message format		Refer to section 2.4.2.
Physical layer		100BASE-TX
Communication connector		RJ45, 1 port (CN1)
Communication cable		CAT5e, shielded twisted pair (4 pair) straight cable
Network topology		Star
Variable communication speed		100 Mbps
Transmission speed between stations		Max. 100 m
Maximum number of connections	UDP	No limit
	TCP (Note)	1

Note. TCP is supported by servo amplifiers with software version A3 or later.

2.3 Outline of CC-Link IE Field Network Basic protocol

In CC-Link IE Field Network Basic, a command that a master station (controller) sends to slave stations (servo amplifiers) is called a request message, and a command that the slave stations (servo amplifiers) send back to the master station (controller) is called a response message.
The master station (controller) sends the request message using the directed broadcast to all slave stations (servo amplifiers). When the servo amplifier receives the request message, it acquires data for own station and returns the response message to the master station (controller) using the unicast after the servo amplifier response time. The servo amplifier response time differs depending on the command to send.
Use link devices (RWr, RWw, RX, and RY) for data communications. Sending and receiving the request message and response message at a constant cycle allow the master station (controller) to perform link refresh.
The servo amplifier reads the received data as an object dictionary to drive a servo motor and return monitor data.



2.3.1 Message format

The following shows the request message format to be used when the master station (controller) sends a message, and the response message format to be used when the slave stations (servo amplifiers) return a message.
Messages are sent by using UDP/IP.

(1) Request message format

Ethernet header	IP header	UDP header	CCIEF Basic header	Command, etc.	Link device (for 16 stations) (RY, RWw)

(2) Response message format

Ethernet header	IP header	UDP header	CCIEF Basic header	Slave station notification information	Link device (RX, RWr)

2.3.2 Link device

In cyclic communication, communication data of the request message and response message is read as object data (RWwn, RWrn, RYn, RXn) of the servo amplifier. Table 2.1 and 2.2 list initial settings.
The setting of the response message can be changed. When changing it from the initial setting, refer to section 7.4.6.
Table 2.1 RYn/RXn mapping (supporting the position/speed/torque control mode, profile mode, and home position return mode)

Master station → Servo amplifier (RYn)			
(Note) Device No.	Device	Symbol	Remark
RYn0 to RY (n + 3) E	Not used		
RY (n + 3) F	Cyclic communication ready command	CSR	

Servo amplifier → Master station (RXn)			
(Note) Device No.	Device	Symbol	Remark
RXn0 to RX (n + 3) E	Not used		
RX (n + 3) F	Cyclic communication ready	SSR	

Note. "n" depends on the station No. setting.

Table 2.2 RWwn/RWrn mapping
(supporting the position/speed/torque control mode, profile mode, and home position return mode)

Master station → Servo amplifier (RWwn)		
Device No. (Note)	Index	Device
RWwn00	6060	Modes of operation
RWwn01	6040	Controlword
RWwn02	2D01	Control DI 1
RWwn03	2D02	Control DI 2
RWwn04	2D03	Control DI 3
RWwn05	607A	Target position
RWwn06		
RWwn07	60FF	Target velocity
RWwn08		
RWwn09	2D20	Velocity limit value
RWwn0A		
RWwn0B	6071	Target torque
RWwn0C	6081	Profile velocity
RWwn0D		
RWwn0E	6083	Profile acceleration
RWwn0F		
RWwn10	6084	Profile deceleration
RWwn11		
RWwn12	6087	Torque slope
RWwn13		
RWwn14	60E0	Positive torque limit value
RWwn15	60E1	Negative torque limit value
RWwn16		
RWwn17	60B8	Touch probe function
RWwn18	60F2	Positioning option code
RWwn19	2D05	Control DI 5
RWwn1A		
RWwn1B		
RWwn1C		
RWwn1D		
RWwn1E		
RWwn1F		

Servo amplifier → Master station (RWrn)		
Device No. (Note)	Index	Device
RWrn00	6061	Modes of operation display
RWrn01		
RWrn02	6041	Statusword
RWrn03	6064	Position actual value
RWrn04		
RWrn05	606C	Velocity actual value
RWrn06		
RWrn07	60F4	Following error actual value
RWrn08		
RWrn09	6077	Torque actual value
RWrn0A	2D11	Status DO 1
RWrn0B	2D12	Status DO 2
RWrn0C	2D13	Status DO 3
RWrn0D	2A42	Current alarm 2
RWrn0E	60B9	Touch probe status
RWrn0F	60BA	Touch probe pos1 pos value
RWrn10		
RWrn11	60BB	Touch probe pos1 neg value
RWrn12		
RWrn13	2C12	External Input signal display1
RWrn14		
RWrn15		
RWrn16		
RWrn17		
RWrn18		
RWrn19		
RWrn1A		
RWrn1B		
RWrn1C		
RWrn1D		
RWrn1E		
RWrn1F		

Note. "n" depends on the station No. setting.

Table 2.3 RWwn/RWrn mapping (pt/idx/jg/hm)

Master station → Servo amplifier (RWwn)		
Device No. (Note)	Index	Device
RWwn00	6060	Modes of operation
RWwn01	6040	Controlword
RWwn02	2D01	Control DI 1
RWwn03	2D02	Control DI 2
RWwn04	2D03	Control DI 3
RWwn05	2D60	Target point table
RWwn06	6081	Profile velocity
RWwn07		
RWwn08	6083	Profile acceleration
RWwn09		
RWwn0A	6084	Profile deceleration
RWwn0B		
RWwn0C	60B8	Touch probe function
RWwn0D	2DD1	Target speed No.
RWwn0E		
RWwn0F		
RWwn10		
RWwn11		
RWwn12		
RWwn13		
RWwn14		
RWwn15		
RWwn16		
RWwn17		
RWwn18		
RWwn19		
RWwn1A		
RWwn1B		
RWwn1C		
RWwn1D		
RWwn1E		
RWwn1F		

Servo amplifier → Master station (RWrn)		
Device No. (Note)	Index	Device
RWrn00	6061	Modes of operation display
RWrn01	6041	Statusword
RWrn02	6064	Position actual value
RWrn03		
RWrn04	606C	Velocity actual value
RWrn05		
RWrn06	60F4	Following error actual value
RWrn07		
RWrn08	6077	Torque actual value
RWrn09	2D11	Status DO 1
RWrn0A	2D12	Status DO 2
RWrn0B	2D13	Status DO 3
RWrn0C	2D15	Status DO 5
RWrn0D	2D17	Status DO 7
RWrn0E	2D68	Point Demand value
RWrn0F	2D69	Point actual value
RWrn10	2D6A	M code actual value
RWrn11	2A42	Current alarm 2
RWrn12	60B9	Touch probe status
RWrn13	60BA	Touch probe pos1 pos value
RWrn14		
RWrn15	60BB	Touch probe pos1 neg value
RWrn16		
RWrn17		
RWrn18		
RWrn19		
RWrn1A		
RWrn1B		
RWrn1C		
RWrn1D		
RWrn1E		
RWrn1F		

Note. "n" depends on the station No. setting.

2.3.3 Mapping data details of link device

Refer to chapter 7.

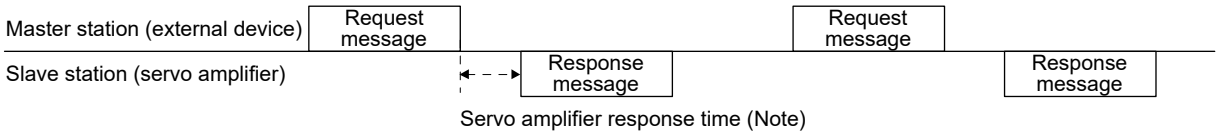
2.4 SLMP

2.4.1 Outline

POINT
●SLMP (UDP) is supported by servo amplifiers with software version A0 or later. ●SLMP (TCP) is supported by servo amplifiers with software version A3 or later. ●In SLMP (TCP), if connection with a client disconnects during establishment, the connection may not close and this may cause reconnection failure. In case you cannot reconnect, cycle the power of the servo amplifier. ●When commands are sent from multiple master stations to a servo amplifier in short intervals, the servo amplifier may fail to receive some of the commands. When the servo amplifier does not respond to the commands, set longer transmission interval. (For example, set the sending interval to approximately 10 ms when commands are periodically sent from two master stations.) ●If the servo amplifier does not receive the commands, the following situations may occur. ・The monitor data of the servo amplifier is not updated in the master station. ・The parameters of the servo amplifier are not changed in the master station.

SLMP (SeamLess Message Protocol) is a common protocol which allows applications to communicate seamlessly regardless of different types of networks and network layers. SLMP communications can be performed for the connection with external devices, such as a programmable controller, a personal computer, and HMI, that can send and receive messages by using SLMP control procedures. The MR-JE-_C servo amplifier is compatible only with the binary code. It is not compatible with the ASCII code.
For the compatibility of SLMP with external devices, refer to manuals for external devices.

In SLMP, a command that a master station (external device) sends to slave stations (servo amplifiers) is called a request message, and a command that the slave stations (servo amplifiers) send back to the master station (external device) is called a response message.
When the servo amplifier receives the request message, it returns the response message to the external device after the servo amplifier response time.
The external device cannot send the next request message until it completes receiving the response message.



Note. The servo amplifier response time differs depending on the command to send.

2.4.2 Message format

The following shows the request message format to be used when the master station (external device) sends a message, and the response message formats to be used when the slave stations (servo amplifiers) return a message.

(1) Request message format

Ethernet header	IP header	UDP header	SLMP								Footer
			Subheader	Request destination network No.	Request destination station No.	Request destination module I/O No.	Request destination multi-drop station No.	Request data length	Monitoring timer	Request data	

(2) Response message format

The response message has two different formats for normal completion and abnormal completion.

(a) At normal completion

Ethernet header	IP header	UDP header	SLMP								Footer
			Subheader	Request destination network No.	Request destination station No.	Request destination module I/O No.	Request destination multi-drop station No.	Response data length	End code	Response data	

(b) At abnormal completion

Ethernet header	IP header	UDP header	SLMP											Footer
			Subheader	Request destination network No.	Request destination station No.	Request destination module I/O No.	Request destination multi-drop station No.	Response data length						
			SLMP											
				End code	Network No. (responding station)	Station No. (responding station)	Request destination module I/O No.	Request destination multi-drop station No.	Command	Sub command				

Error information

Item	Size	Endian	Description
Header			This header is for TCP/IP and UDP/IP. Add the header on the external device side before sending a message. TCP/IP is supported by servo amplifiers with software version A3 or later.
Subheader (QnA compatible 3E frame)	2 bytes	Big	At a request: 5000h At a response: D000h
Subheader (QnA compatible 4E frame)	6 bytes	Big	At a request: 5400h + Serial number + 0000h At a response: D400h + Serial number + 0000h
Request destination network No.	1 bytes		Specify the network No. of the access destination. Specify it in hexadecimal. Store a value of a request message.
Request destination station No.	1 bytes		Specify the station number of the access destination. Specify it in hexadecimal. Store a value of a request message.
Request destination unit I/O No.	2 bytes	Little	03FFh (fixed)
Request destination multi-drop station No.	1 bytes		00h (fixed)
Request data length	2 bytes	Little	Specify the data length from the monitoring timer to the request data in hexadecimal. Example) For 24 bytes: 1800h
Monitoring timer	2 bytes	Little	Set the waiting time until the servo amplifier that had received a request message from an external device completes read or write processing. When the servo amplifier cannot return a response message within the waiting time, the response message will be discarded. ・0000h: Waiting until the processing is completed ・0001h to FFFFh (1 to 65535): Waiting time (Unit: 0.25 s)
Request data	Variable	Little	Specify the command, sub command, and data that indicate the request content.
Command	2 bytes	Little	Refer to section 2.4.3.
Sub command	2 bytes	Little	Refer to section 2.4.3.
Response data length	2 bytes	Little	The data length from the end code to the response data (at normal completion) or error information (at abnormal completion) is stored in hexadecimal. (Unit: byte)
End code	2 bytes	Little	The command processing result is stored. 0 is stored at normal completion. An error code of the servo amplifier is stored at abnormal completion. Refer to section 2.4.5 for the error code.
Response data	Variable	Little	The read data and others corresponding to the command are stored at normal completion.
Error information	9 bytes		The network No. (responding station) (1 byte), station No. (responding station) (1 byte), request destination module I/O No. (2 bytes), and request destination multi-drop station No. (1 byte) of a station that responds an error are stored at abnormal completion. Numbers that do not correspond to the content of the request message may be stored because the information of the station that responds an error is stored at abnormal completion. The command (2 bytes) and sub command (2 bytes) in which an error occurs are also stored.
Footer			This footer is for TCP/IP and UDP/IP. Add the footer on the external device side before sending a message. TCP/IP is supported by servo amplifiers with software version A3 or later.

2.4.3 Command

The following table lists applicable commands.

Name	Command	Sub command	Description	Detailed explanation
CiA 402 object read/write	4020h	0001h	Reads data specified by using the CiA 402 object from the servo amplifier to the external device.	Section 2.4.4 (1)
		0002h	Writes data specified by using the CiA 402 object from the external device to the servo amplifier.	Section 2.4.4 (2)
		0005h	Reads data of consecutive sub commands specified by using the CiA 402 object from the servo amplifier to the external device.	Section 2.4.4 (3)
		0006h	Writes data of consecutive sub commands specified by using the CiA 402 object from the external device to the servo amplifier.	Section 2.4.4 (4)
NodeSearch	0E30h	0000h	Detects the server device in the network.	
IPAddressSet	0E31h	0000h	Sets the IP address of the server device in the network.	
Model code read	0101h	0000h	Reads the servo amplifier model.	

2.4.4 CiA 402 read/write command

The MR-JE-_C servo amplifier supports the CiA 402 read/write command.

Service	SLMP		Description
	Command	Sub command	
SDO Upload	4020h	0001h	Reads data specified by using the CiA 402 object from the servo amplifier to the external device.
SDO Download	4020h	0002h	Writes data specified by using the CiA 402 object from the external device to the servo amplifier.
SDO Object SubID Block Upload	4020h	0005h	Reads data of consecutive sub commands specified by using the CiA 402 object from the servo amplifier to the external device.
SDO Object SubID Block Download	4020h	0006h	Writes data of consecutive sub commands specified by using the CiA 402 object from the external device to the servo amplifier.

(1) SDO Upload (CiA 402 object read)

When the slave stations (servo amplifiers) receive the CiA 402 object read request from the master station (external device), they return a value of the object corresponding to the specified Index or Sub Index.

(a) Request message (command and the following)

Command		Sub command		Index		Sub Index	Reserved	Number of data value	
L	H	L	H	L	H	-	-	L	H
20h	40h	01h	00h	Refer to (1) (c) in this section for details.					

(b) Response message

1) At normal completion (end code and the following)

End code		Index		Sub Index	Reserved	Number of data value		Read data
L	H	L	H	-	-	L	H	L or H (variable)
00h	00h	Refer to (1) (c) in this section for details.						

2) At abnormal completion

The response message is the same as that of section 2.4.2 (2) (b).

(c) Item list

Item	Size	Endian	Description
Command	2 bytes	Little	4020h
Sub command	2 bytes	Little	0001h
Index	2 bytes	Little	Specify Index of the object. (Refer to chapter 7.) For the response message, the value specified in the request message is stored.
Sub Index	1 bytes	Little	Specify Sub Index of the object. (Refer to chapter 7.) For the response message, the value specified in the request message is stored.
Reserved	1 bytes		00h (fixed)
Number of data value	2 bytes	Little	Read data: 00h (fixed)
Read data	Variable	Little	The response data of the object is stored.

(2) SDO Download (CiA 402 object write)

When the slave stations (servo amplifiers) receive the CiA 402 object write request from the master station (external device), they write a specified value to the object corresponding to the specified Index or Sub Index.

(a) Request message (command and the following)

Command		Sub command		Index		Sub Index	Reserved	Number of data value		Write data
L	H	L	H	L	H	-	-	L	H	L or H (variable)
20h	40h	02h	00h	Refer to (2) (c) in this section for details.						

(b) Response message

1) At normal completion (end code and the following)

End code		Index		Sub Index	Reserved	Number of data value	
L	H	L	H	-	-	L	H
00h	00h	Refer to (2) (c) in this section for details.					

2) At abnormal completion

The response message is the same as that of section 2.4.2 (2) (b).

(c) Item list

Item	Size	Endian	Description
Command	2 bytes	Little	4020h
Sub command	2 bytes	Little	0002h
Index	2 bytes	Little	Specify Index of the object. (Refer to chapter 7.) For the response message, the value specified in the request message is stored.
Sub Index	1 bytes	Little	Specify Sub Index of the object. (Refer to chapter 7.) For the response message, the value specified in the request message is stored.
Reserved	1 bytes		00h (fixed)
Number of data value	2 bytes	Little	Write data: Specify the size in hexadecimal.
Write data	Variable	Little	Specify the write data of the object.

(3) SDO Object SubID Block Upload (CiA 402 object sub ID continuous read)
When the slave stations (servo amplifiers) receive the CiA 402 object sub ID continuous read request from the master station (external device), they return a value of the object corresponding to the specified Index or consecutive Sub Index.

(a) Request message (command and the following)

Command		Sub command		Index		Sub Index	Reserved	Number of data value	
L	H	L	H	L	H	-	-	L	H
20h	40h	05h	00h	Refer to (3) (c) in this section for details.					

(b) Response message

1) At normal completion (end code and the following)

End code		Index		Sub Index	Reserved	Number of data value		Read data
L	H	L	H	-	-	L	H	L or H (variable)
00h	00h	Refer to (3) (c) in this section for details.						

2) At abnormal completion
The response message is the same as that of section 2.4.2 (2) (b).

(c) Item list

Item	Size	Endian	Description
Command	2 bytes	Little	4020h
Sub command	2 bytes	Little	0005h
Index	2 bytes	Little	Specify Index of the object. (Refer to chapter 7.) For the response message, the value specified in the request message is stored.
Sub Index	1 bytes	Little	Specify Sub Index of the object. (Refer to chapter 7.) For the response message, the value specified in the request message is stored.
Reserved	1 bytes		00h (fixed)
Number of data value	2 bytes	Little	Read data: 00h (fixed)
Read data	Variable	Little	The response data of the object is stored.

(4) SDO Object SubID Block Download (CiA 402 object sub ID continuous write)
When the slave stations (servo amplifiers) receive the CiA 402 object sub ID continuous write request from the master station (external device), they write a specified value to the object corresponding to the specified Index or consecutive Sub Index.

(a) Request message (command and the following)

Command		Sub command		Index		Sub Index	Reserved	Number of data value		Write data
L	H	L	H	L	H	-	-	L	H	L or H (variable)
20h	40h	06h	00h	Refer to (4) (c) in this section for details.						

(b) Response message

1) At normal completion (end code and the following)

End code		Index		Sub Index	Reserved	Number of data value	
L	H	L	H	-	-	L	H
00h	00h	Refer to (4) (c) in this section for details.					

2) At abnormal completion
The response message is the same as that of section 2.4.2 (2) (b).

(c) Item list

Item	Size	Endian	Description
Command	2 bytes	Little	4020h
Sub command	2 bytes	Little	0006h
Index	2 bytes	Little	Specify Index of the object. (Refer to chapter 7.) For the response message, the value specified in the request message is stored.
Sub Index	1 bytes	Little	Specify Sub Index of the object. (Refer to chapter 7.) For the response message, the value specified in the request message is stored.
Reserved	1 bytes		00h (fixed)
Number of data value	2 bytes	Little	Write data: Specify the size in hexadecimal.
Write data	Variable	Little	Specify the write data of the object.

2.4.5 Error codes

The following table lists error codes that are stored in the end code at abnormal completion in SLMP.

Error code	Cause
C059h	The sub command is specified incorrectly. Or, a command that is not prescribed is received.
C05Ch	The request message is incorrect.
C061h	The request data length does not correspond to the number of data points.
CCCAh	A non-existent Index is specified.
CCD0h	Number of data value differs from the prescribed value.
CCD1h	Number of data value is greater than the prescribed value.
CCD2h	Number of data value is smaller than the prescribed value.
CCD3h	A non-existent Sub Index is specified.
CCC8h	The Write only object is read.
CCC9h	(1) A value is written to the Read only object. (2) A value is written to an object which is not the Read only object for all AL states but for the present AL state with Write disabled.
CCC7h	(1) A value is written to the object mapped to a response message. (2) The following writings are performed when the object mapped to a response message is not allowed to be changed. ・A value other than "0" is written to Sub Index0. ・A value is written to the corresponding Sub Index 1 to 32.
CCCBh	The object that cannot be mapped to response message is written to the object mapped to a response message.
CCCCh	The total size of the object mapped to a response message exceeds 64 bytes.
CCD4h	A value outside the parameter range was written.
CCD5h	A value that is greater than the parameter range is written.
CCD6h	A value that is smaller than the parameter range is written.
CCDAh	A value is written to a parameter object outside the writing range set in the Parameter block setting.

2.5 STARTUP

POINT

- Setting [Pr. PN02 Communication error detection time] to a small value may trigger [AL. 86.1] in the following condition: the power of the servo amplifier is cycled, or an instantaneous power failure occurs during CC-Link IE Field Network Basic communication.
- Setting [Pr. PN10 Ethernet communication time-out selection] to a small value may trigger [AL. 86.4] in the following condition: the power of the servo amplifier is cycled, or an instantaneous power failure occurs during SLMP communication.

This chapter describes the network setting of the MR-JE-_C servo amplifier. Refer to "MR-JE-_C Servo Amplifier Instruction Manual", "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)", and "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)" for other startup settings.

2.5.1 CC-Link IE Field Network Basic initial communication setting

Start the cyclic communication in the following procedure.

Network setting	Communication function selection setting	[Communication function selection setting] The initial setting is Ethernet communication. If RS-485 communication is set, change to Ethernet communication with the following parameter. (Refer to chapter 5.) Parameter ("communication function selection" of [Pr. PN08 Function selection N-2])
	IP address setting	[IP address setting] The initial value is 192.168.3.0. To change the initial value, set it with any of the following (1) to (3). (Refer to section 2.5.2.) (1) Identification number setting rotary switch (SW1/SW2) (2) Parameter ([Pr. PN11] to [Pr. PN14]) (3) SLMP communication (IP Address Set command)
	Subnet mask setting	[Subnet mask setting] The initial value is 255.255.255.0. To change the initial value, set it with either of the following (1) or (2). (Refer to chapter 5.) (1) Parameter ([Pr. PN15] to [Pr. PN18]) (2) SLMP communication (IP Address Set command)
	Default gateway setting	[Default gateway setting] The initial value is 192.168.3.1. To change the initial value, set it with either of the following (1) or (2). (Refer to chapter 5.) (1) Parameter ([Pr. PN19] to [Pr. PN22]) (2) SLMP communication (IP Address Set command)
	Slave station (servo amplifier) power cycling	[Slave station (servo amplifier) power cycling] The settings of the IP address, subnet mask, and default gateway are reflected.
Communication start procedure	Master station (controller) cyclic communication start	[Cyclic communication start] Start the cyclic communication of the master station (controller).
	Cyclic communication ready	[Cyclic communication ready] Set RY (n + 3) F of the master station (controller) to "01h". For the slave stations (servo amplifiers), start importing the word device (RWw) and set RX (n + 3) F to "01h". For the master station (controller), check that RX (n + 3) F is "01h" and read the word device (RWr).

2.5.2 IP address setting

POINT

- Use a twisted pair cable with Ethernet Category 5e (1000BASE-T) or higher as an Ethernet cable. The maximum cable length between nodes is 100 m.
- Use a hub with a transmission speed of 100 Mbps or faster when branching the Ethernet communication using a switching hub.
- For the switching hub without the auto-negotiation function, set it to the transmission speed 100 Mbps and half duplex.
- The initial value of the IP address is 192.168.3.0.
- The 4th octet can be set to 1 to 255 by using the identification number setting rotary switch (SW1/SW2).
- Cycle the power of the servo amplifier after changing the parameter setting of the IP address or identification number setting rotary switch (SW1/SW2).
- The IP address range of CC-Link IE Field Network Basic is between 0.0.0.0 to 223.255.255.254. Set the IP address within the range.

Set the IP address by using the SLMP command with the identification number setting rotary switch (SW1/SW2) on the display of the servo amplifier, MR Configurator2, or controller.
When the IP address is changed with the identification number setting rotary switch (SW1/SW2), change it before powering on the servo amplifier.
The IP address can be changed by specifying a MAC address when the SLMP command (IPAddressSet) is used. Refer to section 2.4.3 for details on the command.
The IP address you set can be checked in the system configuration window of MR Configurator2.
The IP address can be set as follows.

Identification number setting rotary switch (SW1/SW2)	IP address	
00h	1st octet	The setting value of [Pr. PN11] is used.
	2nd octet	The setting value of [Pr. PN12] is used.
	3rd octet	The setting value of [Pr. PN13] is used.
	4th octet	The setting value of [Pr. PN14] is used.
01h to FFh	1st octet	The setting value of [Pr. PN11] is used.
	2nd octet	The setting value of [Pr. PN12] is used.
	3rd octet	The setting value of [Pr. PN13] is used.
	4th octet	The setting value of the identification number setting rotary switch (SW1/SW2) is used.

MEMO

3. Modbus/TCP

3.1 Outline

POINT
●Modbus/TCP is available with servo amplifiers with software version A3 or later. ●The following are shown in the "Data Type" in this instruction manual. ・I8 or U8: 2 bytes ・I16 or U16: 4 bytes ・I32 or U32: 8 bytes ・VS: VISIBLE STRING ●The following are shown in the "Access" in this instruction manual. ・"ro": Only reading is available. ・"wo": Only writing is available. ・"rw": Reading and writing are available.

The Modbus protocol, developed for programmable controllers by Modicon Inc., has evolved into the Modbus/TCP protocol for use over TCP/IP.
The Modbus master acts as a TCP client, and the Modbus slave acts as a TCP server for client-server communication. Using the functions in the message frames enables to read or write data from/to parameters, write input commands, and check operation status of servo amplifiers.
For MR-JE-_C servo amplifier, Modbus registers are assigned like the address assignment of CiA 402 drive profile.
A Modbus-compatible controller, the client, can communicate with the MR-JE-_C servo amplifiers that are servers by accessing assigned holding registers.

3.2 Communication specifications

Function		Description
Communication protocol		Modbus/TCP protocol
Conformed standard		OPEN Modbus/TCP SPECIFICATION
Port No.		No. 502
IP address		IPv4 range: 0.0.0.0 to 255.255.255.255 Use the same network address for both a client and servers. Default value: 192.168.3.0
Subnet mask		Default value (recommended): 255.255.255.0
Message format		Refer to section 3.3 to 3.5.
Physical layer		100BASE-TX
Communication connector		RJ45, 1 port (CN1)
Communication cable		CAT5e, shielded twisted pair (4 pair) straight cable
Network topology		Star
Variable communication speed		100 Mbps
Transmission speed between stations		Max. 100 m
Waiting time setting		None
Maximum number of connections		3
Server function	Number of request messages that are receivable simultaneously	1

3.3 Function List

Functions that can be implemented are as follows. Operation and maintenance of the servo amplifier can be performed remotely.

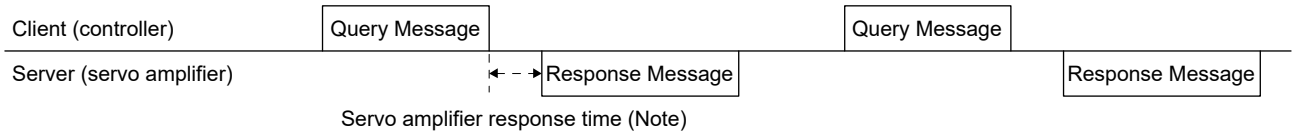
Function	Description	Detailed explanation
Status monitor	Reads the items in "Display all", the monitor function of MR Configurator2, such as the servo motor speed and droop pulses.	Section 7.3
Parameter setting	Reads and writes data from/to parameters.	
Point table setting	Reads and writes point table data.	
Current alarm read	Reads alarm numbers that currently exist.	
Alarm history read	Reads the history of up to 16 alarms.	
Parameter error number read	Reads the parameter number at occurrence of a parameter error.	
Point table error number read	Reads the point table number at occurrence of a point table error.	
I/O monitor	Reads the ON/OFF state of external I/O signals and the status of the I/O devices	Section 7.4.5 Section 7.4.6 Section 7.4.7
Servo amplifier information read	Reads the servo amplifier model and software version.	Section 7.4.1 Section 7.4.3
Motor drive	By accessing to holding registers which are assigned like the address assignment of CiA 402 drive profile, the servo motors are driven.	"MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)"/"MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)"

3.4 Outline of Modbus/TCP protocol

POINT

●If connection with a client disconnects during establishment, the connection may not close and this may cause reconnection failure. In case you cannot reconnect, cycle the power of the servo amplifier.

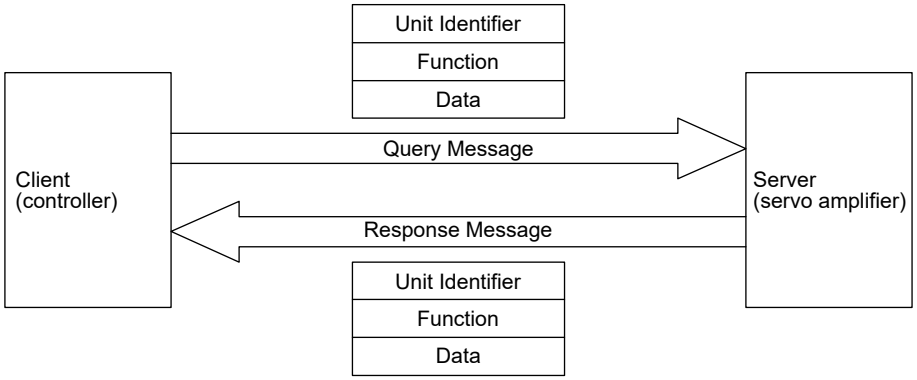
In Modbus/TCP communication, a command that a client (controller) sends to servers (servo amplifiers) is called "Query Message", and a command that the servers return to the client is called "Response Message". When a servo amplifier receives a Query Message, it returns a Response Message to the client after the servo amplifier response time.
In Modbus/TCP communication, as in the case of TCP/IP, make sure to establish the connection before sending and receiving commands. Check that the connection has been established, and then send a Query Message.



Note. The servo amplifier response time differs depending on the command to send.

3.5 Modbus/TCP Communication Message Frame

Query Messages sent from the client (controller) and Response Messages sent from the servers (servo amplifiers) are both sent in the following message frame format. Messages are sent by using TCP/IP.



A message frame is composed of six message fields.
When a server (servo amplifier) received a Query Message sent from the client (controller) without errors, the function code in the Query Message is copied into the Function in a Response Message. When a server (servo amplifier) received a Query Message with an error, the server returns a value obtained by adding "80h" to the function code value in the Query Message to the client. Judge the occurrence of an error by checking the function code in the Response Message on the controller side.

Message frame

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Data
2 × 8 bits	2 × 8 bits	2 × 8 bits	8 bits	8 bits	n × 8 bits

Message field	Size	Communication path	Description
Transaction Identifier	2 × 8 bits	Client → Server	This is the data to be added by the client for transaction management. Set a value available for transaction management.
		Server → Client	Transaction Identifier received from the client (controller) is copied and returned.
Protocol Identifier	2 × 8 bits	Client → Server	The value is fixed to "0". If the server receives a value other than "0", the received value is discarded and no value is returned.
		Server → Client	The value "0" is returned.
Length Field	2 × 8 bits	Client → Server	Set the byte length from Unit Identifier to Data.
		Server → Client	The byte length from Unit Identifier to Data is returned.
Unit Identifier	8 bits	Client → Server	The value is fixed to "255". If the server receives a value other than "255", the received value is discarded and no value is returned.
		Server → Client	Unit Identifier received from the client (controller) is copied and returned.
Function	8 bits	Client → Server	Set a function code to request to the server.
		Server → Client	Send the function code requested by the client. When a communication error has occurred, send a value obtained by adding "80h" to the function code requested by the client.
Data	n × 8 bits	Client → Server	The format changes depending on the function code selected. Refer to section 3.6 for details.
		Server → Client	

3.6 Function Codes

3.6.1 List of function codes

The MR-JE-_C servo amplifier supports the following function codes.

Code	Function name	Description
03h	Read Holding Registers	Reading data in holding registers The data in the registered holding registers can be read from the client.
08h	Diagnostics	Function diagnostics When this function code is sent from the client to a server, the server returns the received data to the client without any changes. Communication checks can be performed.
10h	Preset Multiple Registers	Writing data in multiple holding registers Consecutive multiple data sets can be written in the registered holding registers from the client.

3.6.2 Read Holding Registers (Reading data in holding registers: 03h)

Data in consecutive registers is read for the specified number of data points starting from the specified register address.

(1) Message frame

Query Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Starting Address		No. of Points	
					H	L	H	L
16 bits	0000h	0006h	FFh	03h	8 bits	8 bits	8 bits	8 bits

Message field	Size	Description
Transaction Identifier	16 bits	Set any value.
Protocol Identifier	16 bits	Set "0000h".
Length Field	16 bits	Set "0006h".
Unit Identifier	8 bits	Set "FFh".
Function	8 bits	Set "03h".
Starting Address (Note)	16 bits	Set a start address of the holding registers to read.
No. of Points	16 bits	Set the number of points of data to read starting from the start address of the holding registers from which data is read. Set the number of read points described in the list of holding registers. To read the data in continuous registers, set a value obtained by adding the number of read points of the target registers to this number.

Note. Registers can be classified into two types: registers that can be continuously accessed and particular registers that cannot be continuously accessed.
To read particular registers, read only the target registers.
For the details on whether the target registers can be continuously accessed or not, refer to chapter 7.

Response Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Byte Count	Data				
						H	L	to	H	L
16 bits	0000h	16 bits	FFh	03h	8 bits	8 bits	8 bits	to	8 bits	8 bits

Message field	Size	Description
Transaction Identifier	16 bits	Transaction Identifier received from the client (controller) is copied and returned.
Protocol Identifier	16 bits	The value "0000h" is returned.
Length Field	16 bits	The byte length from Unit Identifier to Data is returned.
Unit Identifier	8 bits	Unit Identifier received from the client (controller) is copied and returned.
Function	8 bits	When the message was received without errors, "03h" is returned.
Byte Count	16 bits	The Data frame size (in units of bytes) is returned. A value obtained by multiplying the value set for No. of Points in the Query Message by 2 is returned.
Data (Note)	16 bits × n	Data starting from the start address specified in the Query Message is returned. Data is read in order of H (higher bits) and L (lower bits). Data is read in order starting from the start address.

Note. Higher 8 bits of 1-byte data are set to "00h" when this data is returned.
To use the signed 1-byte data as 2-byte data, perform sign extension on the client (controller) side.

(2) Usage example

The following shows a setting example of when Modbus registers 2B05h (Command pulse frequency) to 2B07h (Analog torque limit voltage) are read.

Index	Name	Data type	Access	No. of Points	Continuous read/write	Register value (Read data)
2B05h	Command pulse frequency	I32	ro	2	○	12345678h
2B06h	Analog speed command voltage Analog speed limit voltage	I16	ro	1	○	1000h
2B07h	Analog torque limit voltage Analog torque command voltage	I16	ro	1	○	2000h

Query Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Starting Address		No. of Points	
					H	L	H	L
16 bits	0000h	0006h	FFh	03h	2Bh	05h	00h	04h

Set the following values to each Query Message.

Message field	Description
Transaction Identifier	Set any value.
Protocol Identifier	Set "0000h".
Length Field	Set "0006h".
Unit Identifier	Set "FFh".
Function	Set "03h".
Starting Address	Set "2B05h", the start address to read.
No. of Points	Set "04h", because the total number of read points from Modbus registers 2B05h to 2B07h is 4.

Response Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Byte Count	Data							
						H	L	H	L	H	L	H	L
16 bits	0000h	000Bh	FFh	03h	08h	56h	78h	12h	34h	10h	00h	20h	00h

The following shows the information in each Response Message.

Message field	Description
Transaction Identifier	Transaction Identifier received from the client (controller) is copied and returned.
Protocol Identifier	The value "0000h" is returned.
Length Field	The byte length from Unit Identifier to Data is returned.
Unit Identifier	Unit Identifier received from the client (controller) is copied and returned.
Function	When the message was received without errors, "03h" is returned.
Byte Count	The value "08h" is returned. This means that data of 8 frames is returned.
Data	Data starting from the start address is returned. Lower-bit value of the register 2B05h: "5678h" Higher-bit value of the register 2B05h: "1234h" Value of the register 2B06h: "1000h" Value of the register 2B07h: "2000h"

3.6.3 Diagnostics (Function diagnostics: 08h)

Use this register when performing the communication check from the client (controller). When a server (servo amplifier) receives a Query Message, it sends the received data as a Response Message without any changes to the client (controller).

(1) Message frame

Query Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Sub Function		Data	
					H	L	H	L
16 bits	0000h	0006h	FFh	08h	00h	00h	8 bits	8 bits

Message field	Size	Description
Transaction Identifier	16 bits	Set any value.
Protocol Identifier	16 bits	Set "0000h".
Length Field	16 bits	Set "0006h".
Unit Identifier	8 bits	Set "FFh".
Function	8 bits	Set "08h".
Sub Function	16 bits	Set "0000h". When a value other than "0000h" is set, a communication error occurs.
Data	16 bits	Set 2-byte length data.

Response Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Sub Function		Data	
					H	L	H	L
16 bits	0000h	0006h	FFh	08h	00h	00h	8 bits	8 bits

Message field	Size	Description
Transaction Identifier	16 bits	Transaction Identifier received from the client (controller) is copied and returned.
Protocol Identifier	16 bits	The value "0000h" is returned.
Length Field	16 bits	The byte length from Unit Identifier to Data is returned.
Unit Identifier	8 bits	Unit Identifier received from the client (controller) is copied and returned.
Function	8 bits	When the message was received without errors, "08h" is returned.
Sub Function	16 bits	The value "0000h" is returned.
Data	16 bits	The data set in the Query Message is returned.

(2) Usage example

The following shows a setting example of when the diagnosis function is used.

Query Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Sub Function		Data	
					H	L	H	L
16 bits	0000h	0006h	FFh	08h	00h	00h	12h	34h

Set the following values to each Query Message.

Message field	Description
Transaction Identifier	Set any value.
Protocol Identifier	Set "0000h".
Length Field	Set "0006h".
Unit Identifier	Set "FFh".
Function	Set "08h".
Sub Function	Set "0000h".
Data	When setting 1234h, set values as follows: H: "12h" L: "34h"

Response Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Sub Function		Data	
					H	L	H	L
16 bits	0000h	0006h	FFh	08h	00h	00h	12h	34h

The following shows the information in each Response Message.

Message field	Description
Transaction Identifier	Transaction Identifier received from the client (controller) is copied and returned.
Protocol Identifier	The value "0000h" is returned.
Length Field	The byte length from Unit Identifier to Data is returned.
Unit Identifier	Unit Identifier received from the client (controller) is copied and returned.
Function	When the message was received without errors, "08h" is returned.
Sub Function	The value "0000h" is returned.
Data	The value "1234h" set in the Query Message is returned. H: "12h" L: "34h"

3.6.4 Preset Multiple Registers (Writing data in multiple holding registers: 10h)

Data is written to consecutive holding registers for the specified number of data points starting from the specified register address.

(1) Message frame

Query Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Starting Address		No. of Registers		Byte Count	Data				
					H	L	H	L		H	L	to	H	L
16 bits	0000h	16 bits	FFh	10h	8 Bit	8 Bit	8 Bit	8 Bit	8 Bit	8 Bit	8 Bit	to	8 Bit	8 Bit

Message field	Size	Description
Transaction Identifier	16 bits	Set any value.
Protocol Identifier	16 bits	Set "0000h".
Length Field	16 bits	Set the byte length from Unit Identifier to Data.
Unit Identifier	8 bits	Set "FFh".
Function	8 bits	Set "10h".
Starting Address (Note)	16 bits	Set the start address of the holding registers to which data is written.
No. of Registers	16 bits	Set the number of points of data to write starting from the start address of the holding registers to which data is written. Set the number of write points described in the list of holding registers. To write data in continuous registers, set a value obtained by adding the number of write points of the target registers to this number.
Byte Count	16 bits	Set the size of the data to write.
Data (Note)	16 bits × n	Set the data to write.

Note. Registers can be classified into two types: registers to which data can be continuously written and particular registers to which data cannot be continuously written.
To write data in particular registers, write data in the target registers one by one.
For the details on whether the target registers can be continuously accessed or not, refer to chapter 7.

Response Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Starting Address		No. of Points	
					H	L	H	L
16 bits	0000h	0006h	FFh	10h	8 bits	8 bits	8 bits	8 bits

Message field	Size	Description
Transaction Identifier	16 bits	Transaction Identifier received from the client (controller) is copied and returned.
Protocol Identifier	16 bits	The value "0000h" is returned.
Length Field	16 bits	The byte length from Unit Identifier to Data is returned.
Unit Identifier	8 bits	Unit Identifier received from the client (controller) is copied and returned.
Function	8 bits	When the message was received without errors, "10h" is returned.
Starting Address	16 bits	The start address of the holding registers to which the data was written is returned.
No. of Registers	16 bits	The number of points of written data starting from the start address of the holding registers to which the data was written is returned.

(2) Usage example

The following shows a setting example for writing "0100h" in the Modbus register 2102h ([Pr. PC02]).

Index	Name	Data type	Access	No. of Registers	Continuous read/write	Setting value
2102h	PC02	U32	rw	2	○	00000100h

Query Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Starting Address		No. of Registers		Byte Count	Data			
					H	L	H	L		H	L	H	L
16 bits	0000h	000Ah	FFh	10h	21h	02h	00h	02h	04h	01h	00h	00h	00h

Set the following values to each Query Message.

Message field	Description
Transaction Identifier	Set any value.
Protocol Identifier	Set "0000h".
Length Field	Set the byte length from Unit Identifier to Data.
Unit Identifier	Set "FFh".
Function	Set "10h".
Starting Address	Set "2102h", the start address of the registers to which data is written.
No. of Registers	Set "02h", because the total number of write points of the Modbus register 2102h is 2.
Byte Count	Set "04h". This means that data of 4 frames is sent.
Data	Set values in order starting from the start address. Lower-bit value of the register 2102h: "0100h" Higher-bit value of the register 2102h: "0000h"

Response Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Starting Address		No. of Points	
					H	L	H	L
2 × 8 bits	0000h	0006h	FFh	10h	21h	02h	00h	02h

The following shows the information in each Response Message.

Message field	Size	Description
Transaction Identifier	16 bits	Transaction Identifier received from the client (controller) is copied and returned.
Protocol Identifier	16 bits	The value "0000h" is returned.
Length Field	16 bits	The byte length from Unit Identifier to Data is returned.
Unit Identifier	8 bits	Unit Identifier received from the client (controller) is copied and returned.
Function	8 bits	When the message was received without errors, "10h" is returned.
Starting Address	16 bits	The value "2102h", the start address of the holding registers to which the data was written is returned. H: "21h" L: "02h"
No. of Registers	16 bits	The number of registers to write "02h" is returned.

3.6.5 Processing at occurrence of an error

In Modbus/TCP communication, when the Query Message sent from the client (controller) includes an incorrect value, the server (servo amplifier) returns an exception response to the client (controller).
If an error is detected in the TCP/IP layer, the server (servo amplifier) returns no message to the client (controller).
When an exception response occurs, a value obtained by adding "80h" to the function code sent in the Query Message is returned with an exception code.
However, no exception response occurs in the following cases.

- Function code "03h" (Read Holding Registers)
  When data can be read from even one of consecutive registers, no exception response occurs. In this case, "0" is returned to the register data that cannot be read.
- Function code "10h" (Preset Multiple Registers)
  When data can be written into even one of consecutive registers, no exception response occurs.

Response Message

Transaction Identifier	Protocol Identifier	Length Field	Unit Identifier	Function	Exception Code
16 bits	0000h	0003h	FFh	8 bits	8 bits

Message field	Size	Description
Transaction Identifier	16 bits	Transaction Identifier received from the client (controller) is copied and returned.
Protocol Identifier	16 bits	The value "0000h" is returned.
Length Field	16 bits	The byte length from Unit Identifier to Data is returned.
Unit Identifier	8 bits	Unit Identifier received from the client (controller) is copied and returned.
Function	8 bits	A value obtained by adding "80h" to the function code of the Query Message is returned. When Function is "03h": "83h" When Function is "08h": "88h" When Function is "10h": "90h" When an unsupported Function (example: "01h") is used, "Function + 80h" (example: "81h") is returned.
Exception Code	8 bits	An exception code is set. For details of exception codes, refer to the following "List of exception codes".

List of exception codes

Code	Error name	Description
01h	ILLEGAL FUNCTION	The Query Message sent from the client set a function code that the server does not support.
02h	ILLEGAL DATA ADDRESS	The Query Message sent from the client set a register address that the server does not support. (Ex: No register address is set, or reading or writing data from/to registers is not available.)
03h	ILLEGAL DATA VALUE	The Query Message sent from the client set data that the register cannot handle. (Ex: A value out of the setting range is set, or "0" is set to No. of Registers.)

3.7 Startup

POINT
●When using Modbus/TCP communication, set [Pr. PN10 Ethernet communication time-out selection] before driving the servo motor. The servo motor may continue to operate after the communication is disabled due to a communication shut-off or other causes. ●Setting [Pr. PN10 Ethernet communication time-out selection] to a small value may trigger [AL. 86.4] in the following condition: the power of the servo amplifier is cycled, or an instantaneous power failure occurs during Modbus/TCP communication.

This chapter describes the network setting of the MR-JE-_C servo amplifier. Refer to "MR-JE-_C Servo Amplifier Instruction Manual", "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)", and "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)" for other startup settings.

3.7.1 Modbus/TCP initial communication setting

Make the initial communication settings in the following procedure.

Network setting	Communication function selection setting	[Communication function selection setting] The initial setting is Ethernet communication. If RS-485 communication is set, change to Ethernet communication with the following parameter. (Refer to chapter 5.) Parameter ("communication function selection" of [Pr. PN08 Function selection N-2])
	↓	
	IP address setting	[IP address setting] The initial value is 192.168.3.0. To change the initial value, set it with either of the following (1) or (2). (Refer to section 3.7.2.) (1) Identification number setting rotary switch (SW1/SW2) (2) Parameter ([Pr. PN11] to [Pr. PN14])
	↓	
	Subnet mask setting	[Subnet mask setting] The initial value is 255.255.255.0. Set it with the parameters ([Pr. PN15] to [Pr. PN18]). (Refer to chapter 5.)
	↓	
	Default gateway setting	[Default gateway setting] The initial value is 192.168.3.1. Set it with the parameters ([Pr. PN19] to [Pr. PN22]). (Refer to chapter 5.)
	↓	
	Server (servo amplifier) power cycling	[Server (servo amplifier) power cycling] The settings of the IP address, subnet mask, and default gateway are reflected.
	↓	
Communication start	Client (controller) Modbus/TCP communication start	[Modbus/TCP communication start] Start Modbus/TCP communication of the client (controller).

3.7.2 IP address setting

POINT

- Use a twisted pair cable with Ethernet Category 5e (1000BASE-T) or higher as an Ethernet cable. The maximum cable length between nodes is 100 m.
- Use a hub with a transmission speed of 100 Mbps or faster when branching the Ethernet communication using a switching hub.
- For the switching hub without the auto-negotiation function, set it to the transmission speed 100 Mbps and half duplex.
- The initial value of the IP address is 192.168.3.0.
- The 4th octet can be set to 1 to 255 by using the identification number setting rotary switch (SW1/SW2).
- Cycle the power of the servo amplifier after changing the parameter setting of the IP address or identification number setting rotary switch (SW1/SW2).
- The IP address range for Modbus/TCP communication is between 0.0.0.0 and 255.255.255.255. Set the IP address within the range.

Set the IP address with the identification number setting rotary switch (SW1/SW2) on the display of the servo amplifier or MR Configurator2.
When the IP address is changed with the identification number setting rotary switch (SW1/SW2), change it before powering on the servo amplifier.
The IP address you set can be checked in the system configuration window of MR Configurator2.
The IP address can be set as follows.

Identification number setting rotary switch (SW1/SW2)	IP address	
00h	1st octet	The setting value of [Pr. PN11] is used.
	2nd octet	The setting value of [Pr. PN12] is used.
	3rd octet	The setting value of [Pr. PN13] is used.
	4th octet	The setting value of [Pr. PN14] is used.
01h to FFh	1st octet	The setting value of [Pr. PN11] is used.
	2nd octet	The setting value of [Pr. PN12] is used.
	3rd octet	The setting value of [Pr. PN13] is used.
	4th octet	The setting value of the identification number setting rotary switch (SW1/SW2) is used.

4. Modbus RTU

4.1 Outline

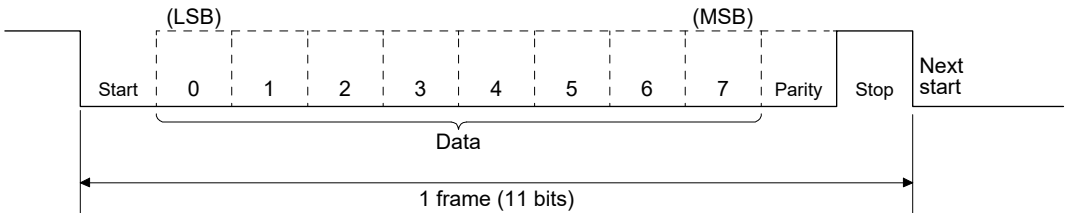
POINT
●Modbus RTU is available with servo amplifiers with software version A4 or later. ●RS-485 communication (Modbus RTU) and Ethernet communication function are mutually exclusive. They cannot be used together. In addition, MR Configurator2 cannot be used with an Ethernet port. Connect a servo amplifier to MR Configurator2 with a USB port.

The Modbus protocol developed for programmable controllers is provided by Modicon Inc.
The Modbus protocol uses dedicated message frames for the serial communication between a master and slaves. Using the functions in the message frames enables to read or write data from/to parameters, write input commands, and check operation status of servo amplifiers.
For MR-JE-_C servo amplifier, Modbus registers are assigned like the address assignment of CiA 402 drive profile.
A Modbus-compatible controller, the master, can communicate with the MR-JE-_C servo amplifiers that are slaves by accessing assigned holding registers.
The ASCII (American Standard Code for Information Interchange) mode and the RTU (Remote Terminal Unit) mode are provided as the serial transmission modes of the Modbus protocol. The MR-JE-_C servo amplifiers support only the RTU mode.

4.2 Communication Specifications

Item		Description	Remark
Communication protocol		Modbus RTU protocol	Select "RS-485 communication" with "communication function selection" of [Pr. PN08 Function selection N-2].
Conformed standard		EIA-485 (RS-485)	
Number of connectable modules		1: n (up to 32 modules), Setting: Station 1 to station 247 (Station 0: Station number for the broadcast communication) Up to 32 modules including other slave devices such as inverters can be connected.	Set the station numbers with [Pr. PC70 Modbus RTU communication station number setting].
Communication baud rate [bps]		4800/9600/19200/38400/57600/115200	Select with "Modbus RTU communication baud rate selection" of [Pr. PC71 Function selection C-F].
Control procedure		Asynchronous serial communication	
Communication method		Half duplex	
Communication specifications	Character method	Binary (fixed to 8 bits)	
	Start bit	1 bit	
	Stop bit length	Select from the following three types. ・Even parity, stop bit length of 1 bit (Initial setting) ・Odd parity, stop bit length of 1 bit ・No parity, stop bit length of 2 bits	Select with "Protocol parity selection" of [Pr. PF45 Function selection F-12].
	Parity check		
	Error check	CRC-16 method	
	Terminator	None	
Waiting time setting		None	
Master/slave type		Slave	

The following shows a communication data format of 1 frame for Modbus RTU communication.



4.3 Function List

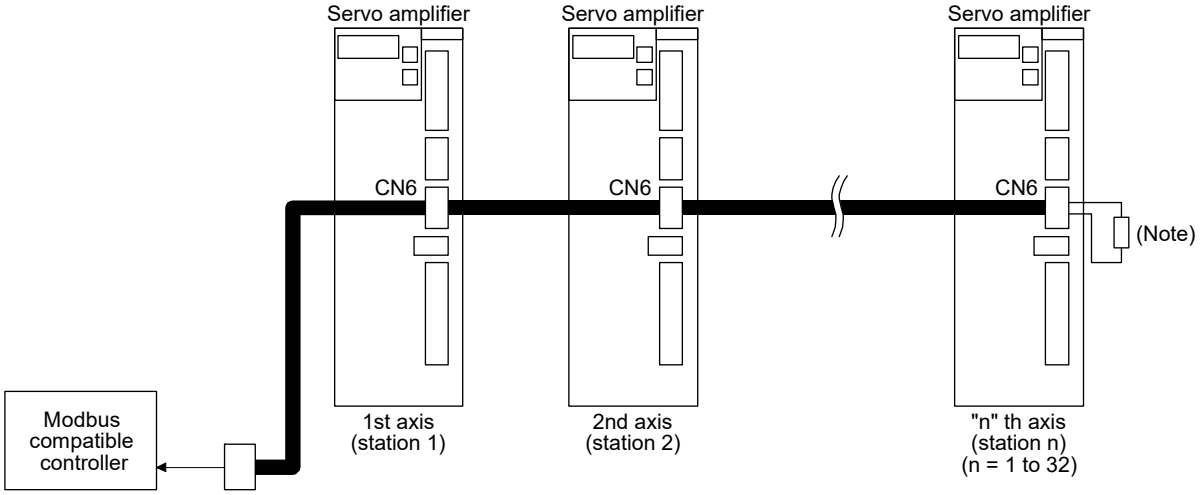
Functions that can be implemented are as follows. Operation and maintenance of the servo amplifier can be performed remotely.

Function	Description	Detailed explanation
Status monitor	Reads the items in "Display all", the monitor function of MR Configurator2, such as the servo motor speed and droop pulses.	Section 7.3
Parameter setting	Reads and writes data from/to parameters.	
Point table setting	Reads and writes point table data.	
Current alarm read	Reads alarm numbers that currently exist.	
Alarm history read	Reads the history of up to 16 alarms.	
Parameter error number read	Reads the parameter number at occurrence of a parameter error.	
Point table error number read	Reads the point table number at occurrence of a point table error.	
I/O monitor	Reads the ON/OFF state of external I/O signals and the status of the I/O devices	Section 7.4.5 Section 7.4.6 Section 7.4.7
Servo amplifier information read	Reads the servo amplifier model and software version.	Section 7.4.1 Section 7.4.3
Motor drive	By accessing to holding registers which are assigned like the address assignment of CiA 402 drive profile, the servo motors are driven.	"MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)"/"MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)"

4.4 System Configuration

4.4.1 Diagrammatic sketch

The following diagrammatic sketch shows the system configuration of Modbus RTU communication. Up to 32 axes of servo amplifiers can be operated and controlled on the same bus.

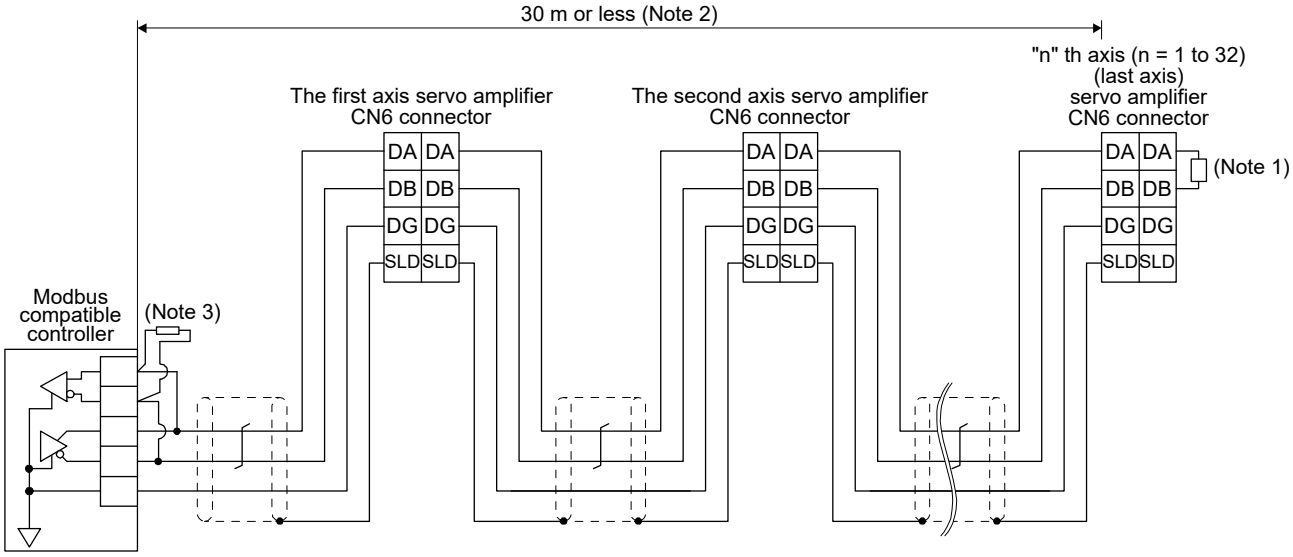


Note. If this servo amplifier is the last axis, connect a 150 Ω resistor between DA and DB, and terminate the servo amplifier.

4.4.2 Cable connection diagram

POINT
●Full duplex wiring is not supported. Connect with half duplex wiring and use a half duplex-compatible controller.

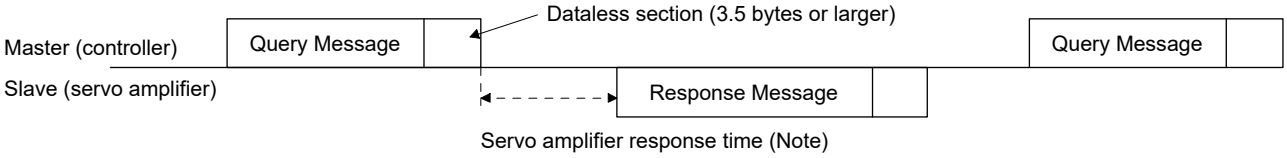
Wire the cables as follows.



Note 1. If this servo amplifier is the last axis, connect a 150 Ω resistor between DA and DB, and terminate the servo amplifier.
2. The overall length is 30 m or less in low-noise environment.
3. When a Modbus-compatible controller does not have a termination resistor, terminate the wire with a 150 Ω resistor.

4.5 Modbus RTU Message Format

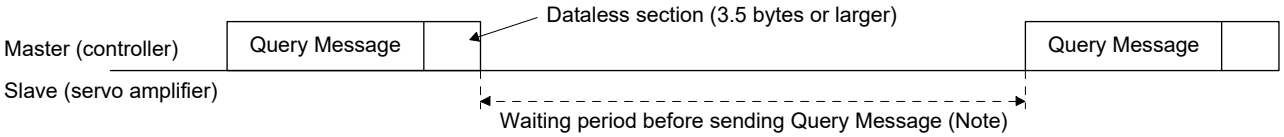
In the Modbus RTU communication, a command sent from a master (controller) to a slave (servo amplifier) is called "Query Message", and a command that the slave (servo amplifier) returns to the master (controller) is called "Response Message".
The servo amplifier that received a Query Message processes the command only after it passes through a dataless section of 3.5 bytes or larger. The servo amplifier will send a Response Message to the controller after the servo amplifier's response time has passed. When the controller sent a Query Message without securing a dataless section of 3.5 bytes or larger, the servo amplifier does not respond. Execute processing so that the controller sends the next Query Message only after it receives a Response Message sent from the servo amplifier.



Note. The servo amplifier response time differs depending on the command to send.

4.6 Broadcast Communication

The Modbus RTU communication supports the broadcast communication in which a Query Message is sent from the master (controller) to all slaves (all axes of servo amplifiers). In this case, the servo amplifiers do not return a Response Message. Execute processing so that the master sends the next Query Message after the slave processing time has passed. The broadcast communication supports only the function code: "10h" (Preset Multiple Registers).

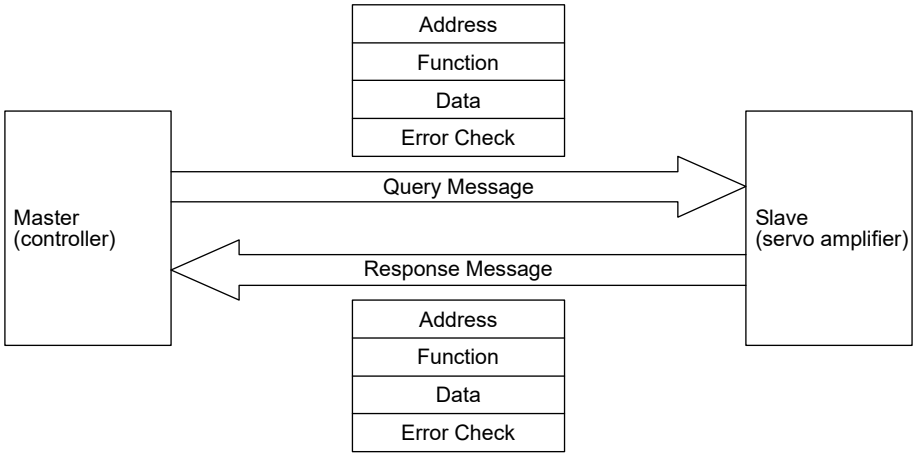


Note. The waiting period before sending Query Message varies depending on a command to be sent. Refer to the following table.

Condition	No. of Registers (Number of registers to write)	Waiting time for sending query message
For writing data of 4 bytes	2	24 [ms]
For writing data of 244 bytes	122	300 [ms]

4.7 Modbus RTU Communication Message Frame

Query Messages sent from the master (controller) and Response Messages sent from the slaves (servo amplifiers) are both sent in the following message frame format.



A message frame is composed of four message fields.
When a slave (servo amplifier) received a Query Message sent from the master (controller) without errors, the Function Code in the Query Message is copied into the Function in a Response Message. When a slave (servo amplifier) received a Query Message with an error, the slave returns a value obtained by adding "80h" to the Function Code value in the Query Message to the master. Judge the occurrence of an error by checking the Function Code in the Response Message on the controller side.
During the dataless time of 3.5 bytes before and after the reception of a Query Message, the servo amplifier recognizes the received Query Message.

Message frame

START	Address	Function	Data	Error Check		END
				L	H	
3.5 bytes	8 bits	8 bits	n × 8 bits	8 bits	8 bits	3.5 bytes

Message field	Size	Communication path	Description
Address	8 bits	Master → Slave	Set a station number. Set a value within 0 to 247 with 1-byte length (8 bits). When "0" is set, the broadcast communication is executed.
		Slave → Master	The station number of a slave (servo amplifier) is returned.
Function	8 bits	Master → Slave	Set a function code. Set a function code to request to the slave.
		Slave → Master	Send the function code requested by the master. When a communication error has occurred, send a value obtained by adding "80h" to the function code requested by the master.
Data	n × 8 bits	Master → Slave	The format changes depending on the function code selected. Refer to section 4.8 for details.
		Slave → Master	
Error Check	16 bits	Master → Slave	Send data to perform the CRC check of a received message frame.
		Slave → Master	

4.8 Function Codes

4.8.1 List of function codes

The MR-JE-_C servo amplifier supports the following function codes.

Code	Function name	Description	Broadcast communication
03h	Read Holding Registers	Reading data in holding registers The data in the registered holding registers can be read from the master.	Not supported
08h	Diagnostics	Function diagnostics When this function code is sent from the master to a slave, the slave returns the received data to the master without any changes. Communication checks can be performed.	Not supported
10h	Preset Multiple Registers	Writing data in multiple holding registers Continuous multiple data sets can be written in the registered holding registers from the master.	Supported

4.8.2 Read Holding Registers (Reading data in holding registers: 03h)

Data in consecutive registers is read for the specified number of data points starting from the specified register address.

(1) Message frame

Query Message

Slave Address	Function	Starting Address		No. of Points		CRC Check	
		H	L	H	L	L	H
(8 bits)	03h	(8 bits)	(8 bits)	(8 bits)	(8 bits)	(8 bits)	(8 bits)

Message	Size	Description
Slave Address	8 bits	Set a station number to which the message is sent. The number "0" (station number for broadcast sending) cannot be set.
Function	8 bits	Set "03h".
Starting Address (Note)	16 bits	Set a start address of the holding registers to read.
No. of Points	16 bits	Set the number of points of data to read starting from the start address of the holding registers from which data is read. Set the number of read points described in the list of holding registers. To read the data in continuous registers, set a value obtained by adding the number of read points of the target registers to this number.
CRC Check	16 bits	Data for CRC error check This data is calculated automatically by a controller.

Note. Registers can be classified into two types: registers that can be continuously accessed and particular registers that cannot be continuously accessed.
To read particular registers, read only the target registers.
For the details on whether the target registers can be continuously accessed or not, refer to the directions for use of each function of the Modbus registers described in chapter 7.

Response Message

Slave Address	Function	Byte Count	Data					CRC Check	
			H	L	to	H	L	L	H
(8 bits)	(8 bits)	(8 bits)	(8 bits)	(8 bits)	to	(8 bits)	(8 bits)	(8 bits)	(8 bits)

Message	Size	Description
Slave Address	8 bits	The station number of a slave (servo amplifier) is returned.
Function	8 bits	When the message was received without errors, "03h" is returned.
Byte Count	8 bits	The Data frame size (in units of bytes) is returned. A value obtained by multiplying the value set for No. of Points in the Query Message by 2 is returned.
Data (Note)	16 bits × n	Data starting from the start address specified in the Query Message is returned. Data is read in order of H (higher bits) and L (lower bits). Data is read in order starting from the start address.
CRC Check	16 bits	Data for CRC error check This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.

Note. Higher 8 bits of 1-byte data are set to "00h" when this data is returned. To use the signed 1-byte data as 2-byte data, perform sign extension on the master (controller) side.

(2) Usage example

The following shows a setting example of when Modbus registers 2B05h (Command pulse frequency) to 2B07h (Analog torque limit voltage) in the slave address "02" are read.

Index	Name	Data type	Access	No. of Points	Continuous read/write	Register value (Read data)
2B05h	Command pulse frequency	I32	ro	2	○	12345678h
2B06h	Analog speed command voltage	I16	ro	1	○	1000h
2B07h	Analog torque limit voltage Analog torque command voltage	I16	ro	1	○	2000h

Query Message

Slave Address	Function	Starting Address		No. of Points		CRC Check	
		H	L	H	L	L	H
02h	03h	2Bh	05h	00h	04h	(8 bits)	(8 bits)

Set the following values to each Query Message.

Message	Description
Slave Address	Set the station number "02h".
Function	Set "03h".
Starting Address	Set "2B05h", the start address to read.
No. of Points	Set "04h", because the total number of read points from Modbus registers 2B05h to 2B07h is 4.
CRC Check	Data for CRC error check This data is calculated automatically by a controller.

Response Message

Slave Address	Function	Byte Count	Data								CRC Check	
			H	L	H	L	H	L	H	L	L	H
02h	03h	08h	56h	78h	12h	34h	10h	00h	20h	00h	(8 bits)	(8 bits)

The following shows the information in each Response Message.

Message	Description
Slave Address	The station number "02h" is returned.
Function	The value "03h" is returned. This means that the message was received without errors.
Byte Count	The value "08h" is returned. This means that data of 8 frames is returned.
Data	Data starting from the start address is returned. Lower-bit value of the register 2B05h: "5678h" Higher-bit value of the register 2B05h: "1234h" Value of the register 2B06h: "1000h" Value of the register 2B07h: "2000h" The endian setting of 4-byte data can be selected with "Modbus RTU communication endian selection" of [Pr. PC72 Function selection C-G]. This example shows the case when the standard endian (initial value) is set.
CRC Check	Data for CRC error check This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.

4.8.3 Diagnostics (Function diagnostics: 08h)

Use this register when performing the communication check from the master (controller). When a slave (servo amplifier) received a Query Message, the slave sends the received data as a Response Message without any changes to the master (controller).

(1) Message frame

Query Message

Slave Address	Function	Sub Function		Data		CRC Check	
		H	L	H	L	L	H
(8 bits)	08h	00h	00h	(8 bits)	(8 bits)	(8 bits)	(8 bits)

Message	Size	Description
Slave Address	8 bits	Set a station number to which the message is sent. The number "0" (station number for broadcast sending) cannot be set.
Function	8 bits	Set "08h".
Sub Function	16 bits	Set "0000h". When a value other than "0000h" is set, a communication error occurs.
Data	16 bits	Set 2-byte length data.
CRC Check	16 bits	Data for CRC error check This data is calculated automatically by a controller.

Response Message

Slave Address	Function	Sub Function		Data		CRC Check	
		H	L	H	L	L	H
(8 bits)	08h	00h	00h	(8 bits)	(8 bits)	(8 bits)	(8 bits)

Message	Size	Description
Slave Address	8 bits	The station number of a slave (servo amplifier) is returned.
Function	8 bits	When the Query Message was received without errors, "08h" is returned.
Sub Function	16 bits	The value "0000h" is returned.
Data	16 bits	The data set in the Query Message is returned.
CRC Check	16 bits	Data for CRC error check This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.

(2) Usage example

The following shows a setting example of when the function diagnostics of the slave address "03h" is executed.

Query Message

Slave Address	Function	Sub Function		Data		CRC Check	
		H	L	H	L	L	H
03h	08h	00h	00h	12h	34h	(8 bits)	(8 bits)

Set the following values to each Query Message.

Message	Description
Slave Address	Set the station number "03h".
Function	Set "08h".
Sub Function	Set "0000h".
Data	When setting 1234h, set values as follows: H: "12h" L: "34h"
CRC Check	Data for CRC error check This data is calculated automatically by a controller.

Response Message

Slave Address	Function	Sub Function		Data		CRC Check	
		H	L	H	L	L	H
03h	08h	00h	00h	12h	34h	(8 bits)	(8 bits)

The following shows the information in each Response Message.

Message	Description
Slave Address	The station number "03h" is returned.
Function	The value "08h" is returned. This means that the message was received without errors.
Sub Function	The value "0000h" is returned.
Data	The value "1234h" set in the Query Message is returned. H: "12h" L: "34h"
CRC Check	Data for CRC error check This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.

4.8.4 Preset Multiple Registers (Writing data in multiple holding registers: 10h)

Data is written to consecutive holding registers for the specified number of data points starting from the specified register address.

(1) Message frame

Query Message

Slave Address	Function	Starting Address		No. of Registers		Byte Count	Data					CRC Check	
		H	L	H	L		H	L	to	H	L	L	H
(8 bits)	10h	(8 bits)	(8 bits)	(8 bits)	(8 bits)	(8 bits)	(8 bits)	(8 bits)	to	(8 bits)	(8 bits)	(8 bits)	(8 bits)

Message	Size	Description
Slave Address	8 bits	Set a station number to which the message is sent. When "0" (station number for broadcast sending) is set, this message is sent to all axes. (Note 1)
Function	8 bits	Set "10h".
Starting Address (Note 2)	16 bits	Set the start address of the holding registers to which data is written.
No. of Registers	16 bits	Set the number of points of data to write starting from the start address of the holding registers to which data is written. Set the number of write points described in the list of holding registers. To write data in continuous registers, set a value obtained by adding the number of write points of the target registers to this number.
Byte Count	8 bits	Set the size of the data to write.
Data (Note 2)	16 bits × n	Set the data to write.
CRC Check	16 bits	Data for CRC error check This data is calculated automatically by a controller.

Note 1. When the broadcast communication was performed, a Response Message is not returned from the slave. To send the next Query Message continuously, send it considering the processing time of the slave. (Refer to section 4.6.)

2. Registers can be classified into two types: registers to which data can be continuously written and particular registers to which data cannot be continuously written.
   To write data in particular registers, write data in the target registers one by one.
   For the details on whether data can be continuously written into the target registers or not, refer to chapter 7.

Response Message

Slave Address	Function	Starting Address		No. of Registers		CRC Check	
		H	L	H	L	L	H
(8 bits)	10h	(8 bits)	(8 bits)	(8 bits)	(8 bits)	(8 bits)	(8 bits)

Message	Size	Description
Slave Address	8 bits	The station number of a slave (servo amplifier) is returned.
Function	8 bits	When the Query Message was received without errors, "10h" is returned.
Starting Address	16 bits	The start address of the holding registers to which the data was written is returned.
No. of Registers	16 bits	The number of points of written data starting from the start address of the holding registers to which the data was written is returned.
CRC Check	16 bits	Data for CRC error check This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.

(2) Usage example

The following shows a setting example for writing "0100h" in the Modbus register 2102h ([Pr. PC02]) of the slave address "02h".

Index	Name	Data type	Access	No. of Registers	Continuous read/write	Setting value
2102h	PC02	U32	rw	2	○	00000100h

Query Message

Slave Address	Function	Starting Address		No. of Registers		Byte Count	Data				CRC Check	
		H	L	H	L		H	L	H	L	L	H
02h	10h	21h	02h	00h	02h	04h	01h	00h	00h	00h	(8 bits)	(8 bits)

Set the following values to each Query Message.

Message	Description
Slave Address	Set the station number "02h".
Function	Set "10h".
Starting Address	Set "2102h", the start address of the registers to which data is written.
No. of Registers	Set "02h", because the total number of write points of the Modbus register 2102h is 2.
Byte Count	Set "04h". This means that data of 4 frames is sent.
Data	Set values in order starting from the start address. Lower-bit value of the register 2102h: "0100h" Higher-bit value of the register 2102h: "0000h" The endian setting of 4-byte data can be selected with "Modbus RTU communication endian selection" of [Pr. PC72 Function selection C-G]. This example shows the case when the standard endian (initial value) is set.
CRC Check	Data for CRC error check This data is calculated automatically by a controller.

Response Message

Slave Address	Function	Starting Address		No. of Registers		CRC Check	
		H	L	H	L	L	H
02h	10h	21h	02h	00h	02h	(8 bits)	(8 bits)

The following shows the information in each Response Message.

Message	Description
Slave Address	The station number "02h" is returned.
Function	The value "10h" is returned. This means that the message was received without errors.
Starting Address	The value "2102h", the start address of the holding registers to which the data was written is returned. H: "21h" L: "02h"
No. of Registers	The number of registers to write "02h" is returned.
CRC Check	Data for CRC error check This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.

4.8.5 Processing at occurrence of an error

In the Modbus RTU communication, when the Query Message sent from the master (controller) includes an incorrect value, the slave (servo amplifier) returns an exception response to the master (controller).
When a parity error, CRC error, overrun error, or framing error occurs, the slave (servo amplifier) does not return a message to the master (controller).
When an exception response occurs, a value obtained by adding "80h" to the function code sent in the Query Message is returned with an exception code.
However, no exception response occurs in the following cases.

- When the function code "03h" (Read Holding Registers) is used
  When data can be read from even one of continuous registers, no exception response occurs. In this case, "0" is returned to the register data that cannot be read.
- When the function code "10h" (Preset Multiple Registers) is used
  When data can be written into even one of continuous registers, no exception response occurs.

The following shows the Response Message to be sent at occurrence of an exception response.

Response Message

Slave Address	Function	Exception Code	CRC Check	
			L	H
(8 bits)	(8 bits)	(8 bits)	(8 bits)	(8 bits)

Message	Size	Description
Slave Address	8 bits	The station number of a slave (servo amplifier) is returned.
Function	8 bits	A value obtained by adding "80h" to the function code of the Query Message is returned. When Function is "03h": "83h" When Function is "08h": "88h" When Function is "10h": "90h" When an unsupported Function (example: "01h") is used, "Function + 80h" (example: "81h") is returned.
Exception Code	8 bits	An exception code is set. For details of exception codes, refer to the following "List of exception codes".
CRC Check	16 bits	Data for CRC error check This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.

List of exception codes

Code	Error name	Description
01h	ILLEGAL FUNCTION	The Query Message sent from the master set a function code that the slave does not support.
02h	ILLEGAL DATA ADDRESS	The Query Message sent from the master set a register address that the slave does not support. (Ex: No register address is set, or reading or writing data from/to registers is not available.)
03h	ILLEGAL DATA VALUE	The Query Message sent from the master set data that the register cannot handle. (Ex: A value out of the setting range is set, or "0" is set to No. of Registers.)

When an exception code is generated, a CRC error may occur at the same time.

4.9 STARTUP

POINT
●When using Modbus RTU communication, set [Pr. PF46 Modbus RTU communication time-out selection] before driving the servo motor. The servo motor may continue to operate after the communication is disabled due to a communication shut-off or other causes. ●Setting [Pr. PF46 Modbus RTU communication time-out selection] to a small value may trigger [AL. 8A.2 Modbus RTU communication time-out] in the following condition: the power of the servo amplifier is cycled, or an instantaneous power failure occurs during Modbus RTU communication.

This chapter describes the network setting of the MR-JE-_C servo amplifier. Refer to "MR-JE-_C Servo Amplifier Instruction Manual", "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)", and "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)" for other startup settings.

4.9.1 Modbus RTU initial communication setting

Make the initial communication settings in the following procedure.

Network setting	Communication function selection setting	[Communication function selection setting] The initial setting is Ethernet communication. Set the communication function to be used for the RS-485 communication with the following parameter. (Refer to chapter 5.) Parameter ("Communication function selection" of [Pr. PN08 Function selection N-2])
	Slave address setting	[Slave address setting] The initial value is 0. To change the initial value, set it with either of the following (1) or (2). (Refer to section 4.9.2.) (1) Identification number setting rotary switch (SW1/SW2) (2) Parameter ([Pr. PC70 Modbus RTU communication station number setting])
	Baud rate setting	[Baud rate setting] The initial value is 115200 [bps]. To change the initial value, set it with the following parameter. (Refer to chapter 5.) Parameter ("Modbus RTU communication baud rate selection" of [Pr. PC71 Function selection C-F])
	Communication endian setting	[Communication endian setting] The initial value is standard endian (little-endian). To change the initial value, set it with the following parameter. (Refer to chapter 5.) Parameter ("Modbus RTU communication endian selection" of [Pr. PC72 Function selection C-G])
	Parity setting	[Parity setting] The initial value is even parity and stop bit length of 1 bit. To change the initial value, set it with the following parameter. (Refer to chapter 5.) Parameter ("Protocol parity selection" of [Pr. PF45 Function selection F-12])
	Slave (servo amplifier) power cycling	[Slave (servo amplifier) power cycling] The slave address, baud rate, communication endian, and parity are reflected.
Communication start	Modbus RTU communication start in the master station (controller)	[Communication start] Start Modbus RTU communication of the master (controller).

4.9.2 Slave address setting

POINT

- The initial value of the slave address is 0.
- The slave address can be set from 1 to 247 by using the identification number setting rotary switch (SW1/SW2).
- Cycle the power of the servo amplifier after changing the parameter setting of the slave address or identification number setting rotary switch (SW1/SW2).
- The slave address of Modbus RTU communication is 0 to 247. Set the slave address within the range. Setting out of the range value will trigger [AL. 11.1 Rotary switch setting error].
- Up to 32 axes can be connected to one controller.

Set the slave address using the identification number setting rotary switch (SW1/SW2) or MR Configurator2 on the display section of the servo amplifier.
When the slave address is changed with the identification number setting rotary switch (SW1/SW2), change it before powering on the servo amplifier.
The set slave address can be checked in the system configuration window of MR Configurator2.
The slave address can be set as follows.

Identification number setting rotary switch (SW1/SW2)	Slave address
00h	The setting value of [Pr. PC70 Modbus RTU communication station number setting] is used.
01h to F7h (Note)	The setting value of the identification number setting rotary switch (SW1/SW2) is used.

Note. Setting F8h to FFh with the identification number setting rotary switch will trigger [AL. 11.1 Rotary switch setting error].

5. PARAMETERS

⚠CAUTION

- Never make a drastic adjustment or change to the parameter values as doing so will make the operation unstable.
- Do not change the parameter settings as described below. Doing so may cause an unexpected condition, such as failing to start up the servo amplifier.
  - Changing the values of the parameters for manufacturer setting
  - Setting a value out of the range
  - Changing the fixed values in the digits of a parameter
- When you write parameters with the controller, make sure that the identification No. of the servo amplifier is set correctly. Otherwise, the parameter settings of another identification No. may be written, possibly causing the servo amplifier to be an unexpected condition.

5.1 Parameter list

POINT

- To enable a parameter whose symbol is preceded by *, cycle the power after setting it. However, the time will be longer depending on a setting value of [Pr. PF25 Instantaneous power failure tough drive - Detection time] when "instantaneous power failure tough drive selection" is enabled in [Pr. PA20].

5.1.1 Extension setting parameters ([Pr. PC_ _])

POINT

- The following parameters can be used only for Modbus RTU communication.
  - [Pr. PC70 Modbus RTU communication station number setting]
  - [Pr. PC71 Function selection C-F]
  - [Pr. PC72 Function selection C-G]

No.	Symbol	Name	Initial value	Unit
PC01	STA	JOG operation acceleration time constant	0	[ms]
		Acceleration time constant 1	0	[ms]
PC02	STB	JOG operation deceleration time constant	0	[ms]
		Deceleration time constant 1	0	[ms]
PC03	STC	S-pattern acceleration/deceleration time constant	0	[ms]
PC04	TQC	Torque command time constant	0	[ms]
PC05	SC1	Automatic operation speed 1	100.00	[r/min]
PC06	SC2	Automatic operation speed 2	500.00	[r/min]
PC07	SC3	Manual operation speed 1	1000.00	[r/min]
PC08	SC4	Manual operation speed 2	200.00	[r/min]
PC09	SC5	Internal speed command 5	300.00	[r/min]
		Internal speed limit 5		
PC10	SC6	Internal speed command 6	500.00	[r/min]
		Internal speed limit 6		
PC11	SC7	Internal speed command 7	800.00	[r/min]
		Internal speed limit 7		
PC12	VCM	Analog speed command - Maximum speed	0.00	[r/min]
		Analog speed limit - Maximum speed		

No.	Symbol	Name	Initial value	Unit
PC13	TLC	Analog torque command maximum output	100.0	[%]
PC14		For manufacturer setting	0000h	
PC15			0000h	
PC16	MBR	Electromagnetic brake sequence output	0	[ms]
PC17	ZSP	Zero speed	50	[r/min]
PC18	*BPS	Alarm history clear	0000h	
PC19	*ENRS	Encoder output pulse selection	0000h	
PC20		For manufacturer setting	0	
PC21			0000h	
PC22	*COP1	Function selection C-1	0020h	
PC23	*COP2	Function selection C-2	0000h	
PC24	*COP3	Function selection C-3	0000h	
PC25	*COP4	Function selection C-4	0000h	
PC26	*COP5	Function selection C-5	0000h	
PC27	*COP6	Function selection C-6	0000h	
PC28		For manufacturer setting	0000h	
PC29	*COP8	Function selection C-8	0120h	
PC30	STA2	Acceleration time constant 2	0	[ms]
PC31	STB2	Deceleration time constant 2	0	[ms]
PC32	CMX2	Command input pulse multiplication numerator 2	1	
PC33	CMX3	Command input pulse multiplication numerator 3	1	
PC34	CMX4	Command input pulse multiplication numerator 4	1	
PC35	TL2	Internal torque limit 2	1000.0	[%]
PC36		For manufacturer setting	0000h	
PC37	VCO	Analog override offset	0	[mV]
PC38	TPO	Analog torque limit offset	0	[mV]
PC39		For manufacturer setting	0	
PC40			0	
PC41			0	
PC42			0	
PC43	ERZ	Error excessive alarm level	0	[rev]
PC44		For manufacturer setting	0000h	
PC45			0000h	
PC46			0	
PC47			0	
PC48			0	
PC49			0	
PC50			0000h	
PC51	RSBR	Forced stop deceleration time constant	100	[ms]
PC52		For manufacturer setting	0	
PC53			0	
PC54	RSUP1	Vertical axis freefall prevention compensation amount	0	[0.0001 rev]
PC55		For manufacturer setting	0	
PC56			100	
PC57			0000h	
PC58			0	
PC59			0000h	
PC60	*COPD	Function selection C-D	0000h	
PC61		For manufacturer setting	0000h	
PC62			0000h	
PC63			0000h	
PC64			0000h	
PC65			0000h	

No.	Symbol	Name	Initial value	Unit
PC66	LPSPL	Touch probe detection range + (lower four digits)	0	10^{STM} [μm]/$10^{(STM-4)}$ [inch]/[pulse]
PC67	LPSPH	Touch probe detection range + (upper four digits)	0	
PC68	LPSNL	Touch probe detection range - (lower four digits)	0	10^{STM} [μm]/$10^{(STM-4)}$ [inch]/[pulse]
PC69	LPSNH	Touch probe detection range - (upper four digits)	0	
PC70	*SNOM	Modbus RTU communication station number setting	0	
PC71	*COPF	Function selection C-F	0040h	
PC72	*COPG	Function selection C-G	0000h	
PC73	ERW	Error excessive warning level	0	[rev]
PC74		For manufacturer setting	0000h	
PC75	FEWL	Following error output level	0000h	10^{STM} [μm]/$10^{(STM-4)}$ [inch]/[pulse]
PC76	FEWH		00C0h	
PC77	FEWF	Following error output filtering time	10	[ms]
PC78		For manufacturer setting	0000h	
PC79			0000h	
PC80			0000h	

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

POINT

●The following parameters can be used only for Modbus RTU communication.
- [Pr. PF45 Function selection F-12]
- [Pr. PF46 Modbus RTU communication time out selection]

No.	Symbol	Name	Initial value	Unit
PF01		For manufacturer setting	0000h	
PF02			0000h	
PF03			0000h	
PF04			0	
PF05			0	
PF06			0000h	
PF07			1	
PF08			1	
PF09	*FOP5	Function selection F-5	0003h	
PF10		For manufacturer setting	0000h	
PF11			0000h	
PF12			10000	
PF13			100	
PF14			100	
PF15	DBT	Electronic dynamic brake operating time	2000	[ms]
PF16		For manufacturer setting	0000h	
PF17			10	
PF18			0000h	
PF19			0000h	
PF20			0000h	
PF21	DRT	Drive recorder switching time setting	0	[s]
PF22		For manufacturer setting	200	
PF23	OSCL1	Vibration tough drive - Oscillation detection level	50	[%]
PF24	*OSCL2	Vibration tough drive function selection	0000h	

No.	Symbol	Name	Initial value	Unit
PF25	CVAT	Instantaneous power failure tough drive - Detection time	200	[ms]
PF26		For manufacturer setting	0	
PF27			0	
PF28			0	
PF29			0000h	
PF30			0	
PF31	FRIC	Machine diagnosis function - Friction judgment speed	0	[r/min]
PF32		For manufacturer setting	50	
PF33			0000h	
PF34			0000h	
PF35			0000h	
PF36			0000h	
PF37			0000h	
PF38			0000h	
PF39			0000h	
PF40			0	
PF41			0	
PF42			0	
PF43			0	
PF44			0	
PF45	*FOP12	Function selection F-12	0000h	
PF46	MIC	Modbus RTU communication time out selection	0	[s]
PF47		For manufacturer setting	0000h	
PF48			0000h	

5.1.3 Network setting parameters ([Pr. PN_ _])

POINT

●The following parameter cannot be used with CC-Link IE Field Network Basic communication.
- [Pr. PN10 Ethernet communication time-out selection]

●The following parameter cannot be used with Modbus/TCP communication.
- [Pr. PN02 Communication error detection time]

●The following parameters cannot be used with Modbus RTU communication.
- [Pr. PN02 Communication error detection time]
- [Pr. PN10 Ethernet communication time-out selection] to [Pr. PN36 Operation specification IP address range specification]

No.	Symbol	Name	Initial value	Unit
PN01		For manufacturer setting	0h	
PN02	CERT	Communication error detection time	1000	[ms]
PN03		For manufacturer setting	0000h	
PN04			0000h	
PN05			0000h	
PN06			0000h	
PN07			0000h	
PN08	*NOP2	Function selection N-2	0000h	
PN09		For manufacturer setting	1	
PN10	EIC	Ethernet communication time-out selection	0	[s]
PN11	*IPAD1	IP address setting 1	192	
PN12	*IPAD2	IP address setting 2	168	
PN13	*IPAD3	IP address setting 3	3	
PN14	*IPAD4	IP address setting 4	0	
PN15	*SNMK1	Subnet mask setting 1	255	
PN16	*SNMK2	Subnet mask setting 2	255	
PN17	*SNMK3	Subnet mask setting 3	255	
PN18	*SNMK4	Subnet mask setting 4	0	
PN19	*DGW1	Default gateway setting 1	192	
PN20	*DGW2	Default gateway setting 2	168	
PN21	*DGW3	Default gateway setting 3	3	
PN22	*DGW4	Default gateway setting 4	1	
PN23	*KAA	KeepAlive time	3600	[s]
PN24	*IPAF1	IP address filter 1	0	
PN25	*IPAF2	IP address filter 2	0	
PN26	*IPAF3	IP address filter 3	0	
PN27	*IPAF4	IP address filter 4	0	
PN28	*IPFR2	IP address filter 2 range setting	256	
PN29	*IPFR3	IP address filter 3 range setting	256	
PN30	*IPFR4	IP address filter 4 range setting	256	
PN31	*IPOA1	Operation specification IP address 1	0	
PN32	*IPOA2	Operation specification IP address 2	0	
PN33	*IPOA3	Operation specification IP address 3	0	
PN34	*IPOA4	Operation specification IP address 4	0	
PN35	*IPOR3	Operation specification IP address 3 range specification	256	
PN36	*IPOR4	Operation specification IP address 4 range specification	256	
PN37		For manufacturer setting	0000h	
PN38			0000h	
PN39			0000h	
PN40			0000h	
PN41			0000h	
PN42			0000h	
PN43			0000h	
PN44			0000h	
PN45			0000h	
PN46			0000h	
PN47			0000h	
PN48			0000h	

5.2 Detailed list of parameters

POINT

- Refer to chapter 5 in "MR-JE-_C Servo Amplifier Instruction Manual", chapter 4 in "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)", and chapter 4 in "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)" for the parameters not given in this manual.
- Set a value to each "x" in the "Setting digit" columns.

5.2.1 Extension setting parameters ([Pr. PC_ _])

<table>
<tr><th>No./symbol/
name</th><th>Setting
digit</th><th>Function</th><th>Initial
value
[unit]</th></tr>
<tr><td>PC70
*SNOM
Modbus RTU communication station number setting</td><td></td><td>Set a station number for Modbus RTU communication.
The station number "0" does not send a response data to the master (controller). When a response from a slave (servo amplifier) is required, set a value other than "0".
To enable the parameter, set "Communication function selection" to "RS-485 communication (1 _ _ _)" in [Pr. PN08].
Refer to the following table for the relation between the setting value of the identification number setting rotary switch and the parameter setting value.
This parameter can be used only when Modbus RTU is set.
<table><tr><th>Identification number setting rotary switch (SW1/SW2)</th><th>Modbus RTU communication station number</th></tr><tr><td>00h</td><td>The setting value of [Pr. PC70] is used.</td></tr><tr><td>01h to F7h</td><td>The setting value of the identification number setting rotary switch (SW1/SW2) is used.</td></tr></table>Setting range: 0 to 247</td><td>0</td></tr>
<tr><td rowspan="4">PC71
*COPF
Function selection C-F</td><td>_ _ _ x</td><td>For manufacturer setting</td><td>0h</td></tr>
<tr><td>_ _ x _</td><td>Modbus RTU communication baud rate selection
This digit can be used only when Modbus RTU is set.
0: 9600 [bps]
1: 19200 [bps]
2: 38400 [bps]
3: 57600 [bps]
4: 115200 [bps]
6: 4800 [bps]
Setting "5" in this digit triggers [AL. 37.1] regardless of the setting value of [Pr. PN08].</td><td>4h</td></tr>
<tr><td>_ x _ _</td><td>For manufacturer setting</td><td>0h</td></tr>
<tr><td>x _ _ _</td><td>Control switching method selection
Select a control switching method.
0: Automatic selection
1: Input device (LOP (control switching))
2: Object (6060h)
This digit is not used when CC-Link IE Field Network Basic is set.
Selecting "0" in this digit automatically selects the switching method according to the input device.
・When operating input devices via DI: LOP (Control switching)
・When operating input devices via Modbus RTU, SLMP, and Modbus/TCP: Object (6060h)</td><td>0h</td></tr>
</table>

<table>
<tr><th>No./symbol/
name</th><th>Setting
digit</th><th>Function</th><th>Initial
value
[unit]</th></tr>
<tr><td rowspan="4">PC72
*COPG
Function
selection C-G</td><td>_ _ _ x</td><td>Modbus RTU communication endian selection
This digit can be used only when Modbus RTU is set.
0: Standard endian
1: Big endian
Endian indicates the order of data with the unit of 2 bytes.
For example, the following shows the order of 4-byte data "12345678h".
<table><tr><th>Order of transmitting/
receiving byte</th><th>Standard endian</th><th>Big endian</th></tr><tr><td>1</td><td>56h</td><td>12h</td></tr><tr><td>2</td><td>78h</td><td>34h</td></tr><tr><td>3</td><td>12h</td><td>56h</td></tr><tr><td>4</td><td>34h</td><td>78h</td></tr></table></td><td>0h</td></tr>
<tr><td>_ _ x _</td><td rowspan="3">For manufacturer setting</td><td>0h</td></tr>
<tr><td>_ x _ _</td><td>0h</td></tr>
<tr><td>x _ _ _</td><td>0h</td></tr>
</table>

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

<table>
<tr><th>No./symbol/
name</th><th>Setting
digit</th><th>Function</th><th>Initial
value
[unit]</th></tr>
<tr><td rowspan="4">PF45
*FOP12
Function
selection F-12</td><td>_ _ _ x</td><td>Protocol parity selection
This digit can be used only when Modbus RTU is set.
0: Even parity (stop bit length of 1 bit)
1: Odd parity (stop bit length of 1 bit)
2: No parity (stop bit length of 2 bits)</td><td>0h</td></tr>
<tr><td>_ _ x _</td><td rowspan="3">For manufacturer setting</td><td>0h</td></tr>
<tr><td>_ x _ _</td><td>0h</td></tr>
<tr><td>x _ _ _</td><td>0h</td></tr>
<tr><td>PF46
MIC
Modbus RTU
communication
time out
selection</td><td></td><td>Set the time-out period for Modbus RTU communication protocol.
When "0" is set, the time-out is not checked.
This parameter can be used only when Modbus RTU is set.

Setting range: 0 to 60</td><td>0
[s]</td></tr>
</table>

5.2.3 Network setting parameters ([Pr. PN_ _])

No./symbol/ name	Setting digit	Function	Initial value [unit]
PN02 CERT Communication error detection time		Set the time until [AL. 86.1 Network communication error 1] is detected. Setting "0" disables the detection of [AL. 86.1 Network communication error 1]. This parameter can be used only when CC-Link IE Field Network Basic is set. Setting range: 0 to 1000	1000 [ms]
PN08 *NOP8 Function selection N-8	_ _ _ x	Command interface selection Set the command interface in the positioning mode. The setting of this digit is disabled in the position control mode, speed control mode, torque control mode, and profile mode. 0: General-purpose interface 1: Communication interface	0h
	_ _ x _	For manufacturer setting	0h
	_ x _ _		0h
	x _ _ _	Communication function selection 0: Ethernet communication (CC-Link IE field network Basic, SLMP, and Modbus/TCP) 1: RS-485 communication (Modbus RTU) Communications other than selected communication function are unavailable.	0h
PN10 *CONN Ethernet communication time-out selection		Set the time until [AL. 86.4 Network communication error 4] is detected. Setting "0" disables the detection of [AL. 86.4 Network communication error 4]. This parameter is enabled with SLMP and Modbus/TCP. The detection of [AL. 86.4] starts when SLMP or Modbus/TCP is received for the first time. When an alarm is detected and then reset, the detection stops and will restart upon receipt of the next SLMP or Modbus/TCP. This parameter can be used on servo amplifiers with software version A4 or later. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 60	0 [s]
PN11 *IPAD1 IP address setting 1		Set the 1st octet of the IP address in decimal. Set the IP address assigned by the network administrator. When SLMP command (IPAdressSet) is received, the setting of the first octet is written to this parameter. Refer to table 5.1 for the relation between the setting value of the identification number setting rotary switch and the parameter setting value. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	192

Table 5.1 Relation between IP address setting and identification number setting rotary switch

Identification number setting rotary switch (SW1/SW2)	IP address	
00h	1st octet	The setting value of [Pr. PN11] is used.
	2nd octet	The setting value of [Pr. PN12] is used.
	3rd octet	The setting value of [Pr. PN13] is used.
	4th octet	The setting value of [Pr. PN14] is used.
01h to FFh	1st octet	The setting value of [Pr. PN11] is used.
	2nd octet	The setting value of [Pr. PN12] is used.
	3rd octet	The setting value of [Pr. PN13] is used.
	4th octet	The setting value of the identification number setting rotary switch (SW1/SW2) is used.

No./symbol/ name	Setting digit	Function	Initial value [unit]
PN12 *IPAD2 IP address setting 2		Set the 2nd octet of the IP address in decimal. Set the IP address assigned by the network administrator. When SLMP command (IPAdressSet) is received, the setting of the second octet is written to this parameter. Refer to table 5.1 for the relation between the setting value of the identification number setting rotary switch and the parameter setting value. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	168
PN13 *IPAD3 IP address setting 3		Set the 3rd octet of the IP address in decimal. Set the IP address assigned by the network administrator. When SLMP command (IPAdressSet) is received, the setting of the third octet is written to this parameter. Refer to table 5.1 for the relation between the setting value of the identification number setting rotary switch and the parameter setting value. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	3
PN14 *IPAD4 IP address setting 4		Set the 4th octet of the IP address in decimal. Set the IP address assigned by the network administrator. When SLMP command (IPAdressSet) is received, the setting of the fourth octet is written to this parameter. Refer to table 5.1 for the relation between the setting value of the identification number setting rotary switch and the parameter setting value. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	0
PN15 *SNMK1 Subnet mask setting 1		Set the 1st octet of the subnet mask in decimal. Set the subnet mask assigned by the network administrator. The subnet mask can also be changed simultaneously by the SLMP command (IPAdressSet). This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	255
PN16 *SNMK2 Subnet mask setting 2		Set the 2nd octet of the subnet mask in decimal. Set the subnet mask assigned by the network administrator. The subnet mask can also be changed simultaneously by the SLMP command (IPAdressSet). This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	255
PN17 *SNMK3 Subnet mask setting 3		Set the 3rd octet of the subnet mask in decimal. Set the subnet mask assigned by the network administrator. The subnet mask can also be changed simultaneously by the SLMP command (IPAdressSet). This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	255
PN18 *SNMK4 Subnet mask setting 4		Set the 4th octet of the subnet mask in decimal. Set the subnet mask assigned by the network administrator. The subnet mask can also be changed simultaneously by the SLMP command (IPAdressSet). This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	0

No./symbol/ name	Setting digit	Function	Initial value [unit]
PN19 *DGW1 Default gateway setting 1		Set the 1st octet of the default gateway in decimal. Set the default gateway assigned by the network administrator. The default gateway can also be changed simultaneously by the SLMP command (IPAdressSet). This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	192
PN20 *DGW2 Default gateway setting 2		Set the 2nd octet of the default gateway in decimal. Set the default gateway assigned by the network administrator. The default gateway can also be changed simultaneously by the SLMP command (IPAdressSet). This parameter cannot be used when Modbus RTU is set. Setting range 0 to 255	168
PN21 *DGW3 Default gateway setting 3		Set the 3rd octet of the default gateway in decimal. Set the default gateway assigned by the network administrator. The default gateway can also be changed simultaneously by the SLMP command (IPAdressSet). This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	3
PN22 *DGW4 Default gateway setting 4		Set the 4th octet of the default gateway in decimal. Set the default gateway assigned by the network administrator. The default gateway can also be changed simultaneously by the SLMP command (IPAdressSet). This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	1
PN23 *KAA KeepAlive time		Set the time interval between the transmissions of the alive check message (Keep Alive ACK) for TCP communication. If no response to the alive check message is received, the connection is forcibly closed after the time (setting value × 8 times) has elapsed. In the initial setting, the connection is closed after 8 hours (3600 [s] × 8 times = 28800 [s]) have elapsed. This parameter can be used only when Modbus/TCP is set. Setting range: 1 to 7200	3600 [s]
PN24 *IPAF1 IP address filter 1		Set the 1st octet of the IP address of the network device allowed to be connected in decimal. When [Pr. PN24] to [Pr. PN27] are all set to "0", the IP address filtering function is disabled. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	0
PN25 *IPAF2 IP address filter 2		Set the 2nd octet of the IP address of the network device allowed to be connected in decimal. When [Pr. PN24] to [Pr. PN27] are all set to "0", the IP address filtering function is disabled. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	0
PN26 *IPAF3 IP address filter 3		Set the 3rd octet of the IP address of the network device allowed to be connected in decimal. When [Pr. PN24] to [Pr. PN27] are all set to "0", the IP address filtering function is disabled. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	0

No./symbol/ name	Setting digit	Function	Initial value [unit]
PN27 *IPAF4 IP address filter 4		Set the 4th octet of the IP address of the network device allowed to be connected in decimal. When [Pr. PN24] to [Pr. PN27] are all set to "0", the IP address filtering function is disabled. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 255	0
PN28 *IPFR2 IP address filter 2 range specification		Set a value for the 2nd octet range of the IP address of the network device allowed to be connected. The range for the IP address of the network device allowed to be connected is between [Pr. PN25] and [Pr. PN28]. Set a value in decimal. Setting "256" disables the function. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 256	256
PN29 *IPFR3 IP address filter 3 range specification		Set a value for the 3rd octet range of the IP address of the network device allowed to be connected. The range for the IP address of the network device allowed to be connected is between [Pr. PN26] and [Pr. PN29]. Set a value in decimal. Setting "256" disables the function. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 256	256
PN30 *IPFR4 IP address filter 4 range specification		Set a value for the 4th octet range of the IP address of the network device allowed to be connected. The range for the IP address of the network device allowed to be connected is between [Pr. PN27] and [Pr. PN30]. Set a value in decimal. Setting "256" disables the function. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 256	256
PN31 *IPOA1 Operation specification IP address 1		Set the 1st octet of the IP address of the network device allowed to be connected in decimal. When [Pr. PN31] to [Pr. PN34] are all set to "0", the operation specification IP address function is disabled. This parameter cannot be used when Modbus RTU is set. When this function is enabled with CC-Link IE Field Network Basic communication, the servo amplifier allows the following data 1) to 3) to be imported only if the IP address of the master station (external device) matches with the operation specification IP address. If they are mismatched, the data is discarded. 1) SDO Download (command: 4020h, sub command: 0002h) 2) SDO Object SubID Block Download (command: 4020h, sub command: 0006h) 3) CC-Link IE Field Network Basic request message (RWwn) When this function is enabled with Modbus/TCP communication, the servo amplifier allows the following data 4) to be imported only if the IP address of the client (external device) matches with the operation specification IP address. If they are mismatched, the data is discarded. 4) Modbus/TCP function code 10h Monitoring, parameter setting, and test operation can be executed via Ethernet when the IP addresses of a personal computer (MR Configurator2) and GOT are within the range of the operation specification IP address. When they are out of the range, communication to the servo amplifier cannot be established. Setting range: 0 to 255	0

No./symbol/ name	Setting digit	Function	Initial value [unit]
PN32 *IPOA2 Operation specification IP address 2		Set the 2nd octet of the IP address of the network device allowed to be connected in decimal. When [Pr. PN31] to [Pr. PN34] are all set to "0", the operation specification IP address function is disabled. This parameter cannot be used when Modbus RTU is set. When this function is enabled with CC-Link IE Field Network Basic communication, the servo amplifier allows the following data 1) to 3) to be imported only if the IP address of the master station (external device) matches with the operation specification IP address. If they are mismatched, the data is discarded. 1) SDO Download (command: 4020h, sub command: 0002h) 2) SDO Object SubID Block Download (command: 4020h, sub command: 0006h) 3) CC-Link IE Field Network Basic request message (RWwn) When this function is enabled with Modbus/TCP communication, the servo amplifier allows the following data 4) to be imported only if the IP address of the client (external device) matches with the operation specification IP address. If they are mismatched, the data is discarded. 4) Modbus/TCP function code 10h Monitoring, parameter setting, and test operation can be executed via Ethernet when the IP addresses of a personal computer (MR Configurator2) and GOT are within the range of the operation specification IP address. When they are out of the range, communication to the servo amplifier cannot be established. Setting range: 0 to 255	0
PN33 *IPOA3 Operation specification IP address 3		Set the 3rd octet of the IP address of the network device allowed to be connected in decimal. When [Pr. PN31] to [Pr. PN34] are all set to "0", the operation specification IP address function is disabled. This parameter cannot be used when Modbus RTU is set. When this function is enabled with CC-Link IE Field Network Basic communication, the servo amplifier allows the following data 1) to 3) to be imported only if the IP address of the master station (external device) matches with the operation specification IP address. If they are mismatched, the data is discarded. 1) SDO Download (command: 4020h, sub command: 0002h) 2) SDO Object SubID Block Download (command: 4020h, sub command: 0006h) 3) CC-Link IE Field Network Basic request message (RWwn) When this function is enabled with Modbus/TCP communication, the servo amplifier allows the following data 4) to be imported only if the IP address of the client (external device) matches with the operation specification IP address. If they are mismatched, the data is discarded. 4) Modbus/TCP function code 10h Monitoring, parameter setting, and test operation can be executed via Ethernet when the IP addresses of a personal computer (MR Configurator2) and GOT are within the range of the operation specification IP address. When they are out of the range, communication to the servo amplifier cannot be established. Setting range: 0 to 255	0

No./symbol/ name	Setting digit	Function	Initial value [unit]
PN34 *IPOA4 Operation specification IP address 4		Set the 4th octet of the IP address of the network device allowed to be connected in decimal. When [Pr. PN31] to [Pr. PN34] are all set to "0", the operation specification IP address function is disabled. This parameter cannot be used when Modbus RTU is set. When this function is enabled with CC-Link IE Field Network Basic communication, the servo amplifier allows the following data 1) to 3) to be imported only if the IP address of the master station (external device) matches with the operation specification IP address. If they are mismatched, the data is discarded. 1) SDO Download (command: 4020h, sub command: 0002h) 2) SDO Object SubID Block Download (command: 4020h, sub command: 0006h) 3) CC-Link IE Field Network Basic request message (RWwn) When this function is enabled with Modbus/TCP communication, the servo amplifier allows the following data 4) to be imported only if the IP address of the client (external device) matches with the operation specification IP address. If they are mismatched, the data is discarded. 4) Modbus/TCP function code 10h Monitoring, parameter setting, and test operation can be executed via Ethernet when the IP addresses of a personal computer (MR Configurator2) and GOT are within the range of the operation specification IP address. When they are out of the range, communication to the servo amplifier cannot be established. Setting range: 0 to 255	0
PN35 *IPOR3 Operation specification IP address 3 range specification		Set a value for the 3rd octet range of the IP address of the network device allowed to be connected. The range for the IP address of the network device allowed to be connected is between [Pr. PN33] and [Pr. PN35]. Set a value in decimal. Setting "256" disables the function. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 256	256
PN36 *IPOA4 Operation specification IP address 4 range specification		Set a value for the 4th octet range of the IP address of the network device allowed to be connected. The range for the IP address of the network device allowed to be connected is between [Pr. PN34] and [Pr. PN36]. Set a value in decimal. Setting "256" disables the function. This parameter cannot be used when Modbus RTU is set. Setting range: 0 to 256	256

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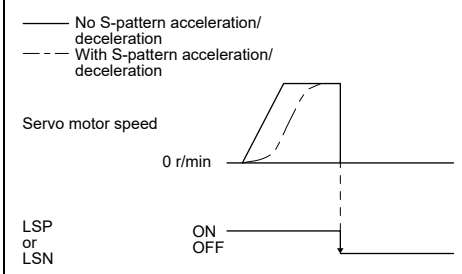
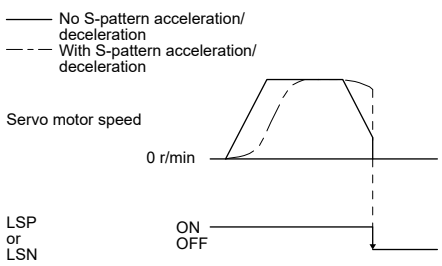
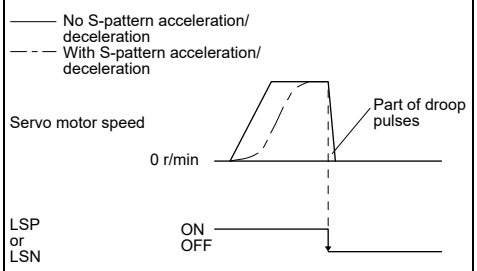
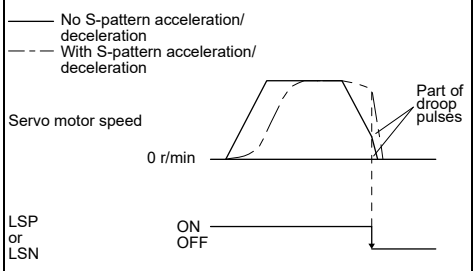
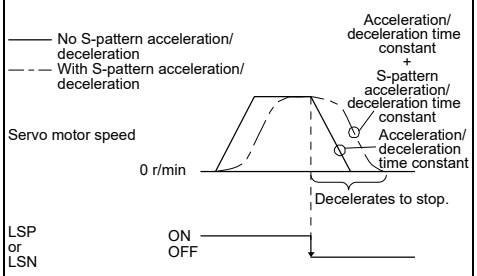
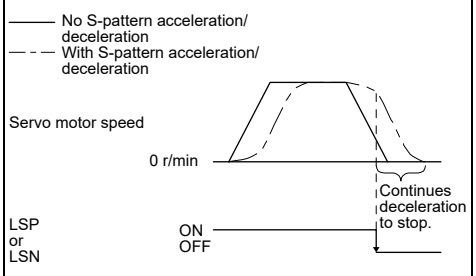
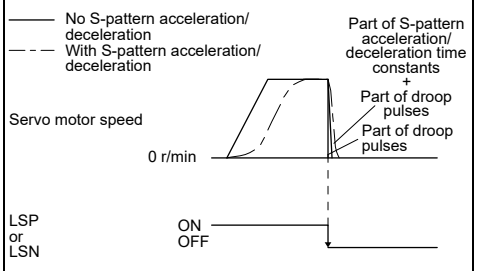
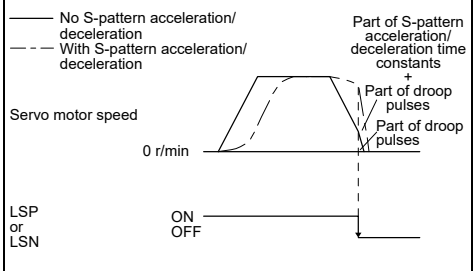
6. MANUFACTURER FUNCTIONS

6.1 Stroke end

When LSP (Forward rotation stroke end) or LSN (Reverse rotation stroke end) is turned off, a slow stop is performed by either of the following stop methods.

[Pr. PD35] setting	Operation status		Remark
	During rotation at constant speed	During deceleration to a stop	
_ _ _ 0			Erases the droop pulses and stops the servo motor. Erases the home position. A difference will be generated between the command position and the current position. Perform a home position return again.
_ _ _ 1			The servo motor stops after having traveled for the droop pulses. A difference will be generated between the command position and the current position. Perform a home position return again.
_ _ _ 2			The servo motor decelerates to a stop with the deceleration time constant currently selected with the point table. The operation is continued for the delay of the S-pattern acceleration/ deceleration time constants. The home position is maintained.
_ _ _ 3			The servo motor stops after having traveled for the droop pulses. Operation is continued for the delay of the S-pattern acceleration/ deceleration time constants. The home position is maintained.

Perform a return as follows when the stroke end is detected.

Mode	Return method
Profile position mode (pp)	Input the position command of the direction opposite to the limit to Target position (607Ah). In the stop method selection of [Pr. PD35], only "1" can be set.
Profile velocity mode (pv)	Input the speed command of the direction opposite to the limit to Target velocity (60FFh). In the stop method selection of [Pr. PD35], only "1" can be set.
Point table mode (pt)	Perform operation opposite to the limit with the JOG operation. After the servo motor moves within the limit range, execute a home position return.
Jog mode (jg)	Perform operation opposite to the limit.
Indexer mode (idx)	The return method is the same as that of the point table mode. In the stop method selection of [Pr. PD35], only "0" and "1" can be set.

6.2 One-touch tuning

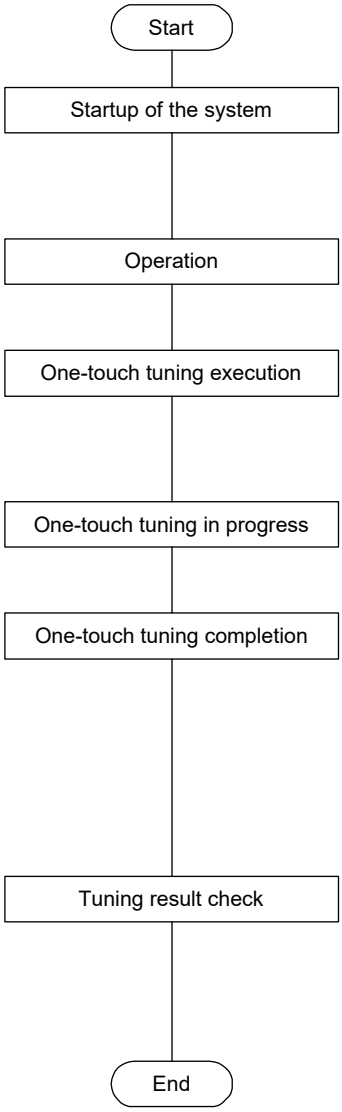
Refer to "MR-JE-_C Servo Amplifier Instruction Manual" for one-touch tuning. Using One-touch tuning mode (2D50h) allows one-touch tuning from the master station (controller).

(1) Related object

Index	Access	Name	Data type	Default	Description
2D50h	rw	One-touch tuning mode	U8	0	Setting a value of "1" to "3" starts one-touch tuning. After one-touch tuning is completed, the setting value automatically changes to "0". 0: During one-touch tuning stop 1: Basic mode 2: High mode 3: Low mode
2D51h	ro	One-touch tuning status	I8	0	Regardless of whether one-touch tuning is properly completed or not, the setting value changes to 100% at the completion. Unit: %
2D52h	wo	One-touch tuning Stop	I16		Writing "1EA5h" stops one-touch tuning. Writing a value other than "1EA5h" will trigger the error code "CCD4h".
2D53h	wo	One-touch tuning Clear	I16		The parameter changed in one-touch tuning can be returned to the value before the change. 0000h: Restores the initial value. 0001h: Restores the value before one-touch tuning. The setting value of the restored parameter is stored to the EEP-ROM.
2D54h	ro	One-touch tuning Error Code	I16	0000h	The following shows the details of the one-touch tuning error codes. 0000h: Finished normally C000h: Tuning canceled C001h: Overshoot exceeded C002h: Servo-off during tuning C003h: Control mode error C004h: Time-out C005h: Load to motor inertia ratio misestimated C00Fh: One-touch tuning disabled

(2) Procedure of one-touch tuning via a network

Perform one-touch tuning via a network in the following procedure.



Refer to "MR-JE-_C Servo Amplifier Instruction Manual", "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)", and "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)" to start the system.

Rotate the servo motor by a controller. (One-touch tuning cannot be performed if the servo motor is not operating.)

Write a value corresponding to the response mode (High mode, basic mode, or Low mode) to perform in One-touch tuning mode (2D50h) during servo motor driving to perform one-touch tuning.

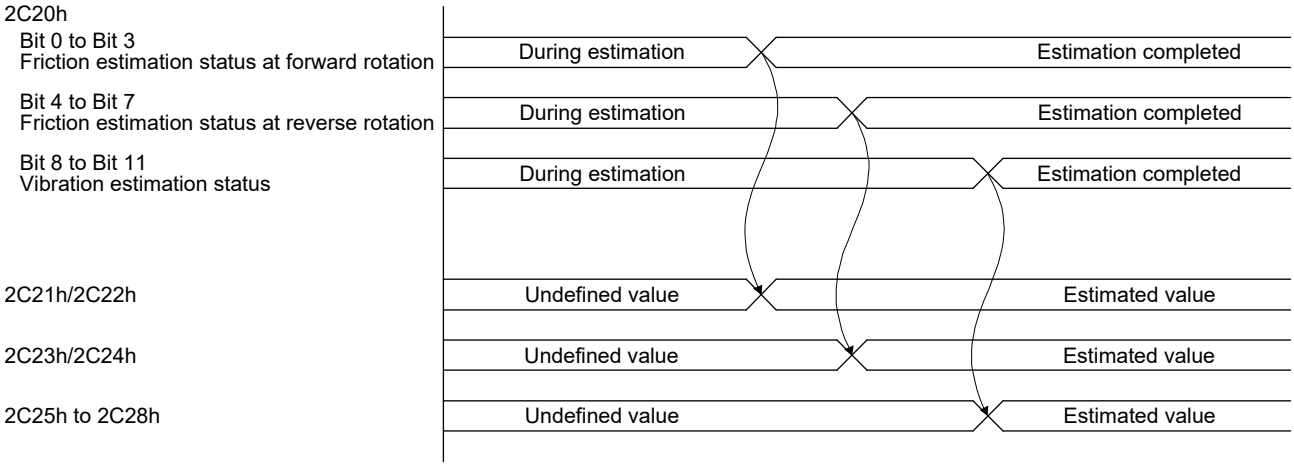
Gains and filters will be adjusted automatically. During one-touch tuning, the progress can be checked with One-touch tuning status (2D51h).

Check whether one-touch tuning is completed normally with One-touch tuning Error Code (2D54h). When the one-touch tuning is completed normally, the parameters will be set automatically. Refer to "MR-JE-_C Servo Amplifier Instruction Manual" for the parameters that are set automatically.
After a tuning error is returned, take the appropriate action according to "MR-JE-_C Servo Amplifier Instruction Manual".

Check the tuning result.
If the tuning result is not satisfactory, you can return the parameter to the value before the one-touch tuning or the initial value using One-touch tuning Clear (2D53h).

6.3 Machine diagnosis function

This function estimates the friction and vibrational component of the drive system in the equipment based on the data in the servo amplifier, and recognizes an error in the machine parts, including a ball screw and bearing. The information of the machine diagnosis function can be obtained with the following objects.



Index	Access	Name	Data Type	Default	Description
2C20h	ro	Machine diagnostic status	U16	0000h	Refer to section 7.1.
2C21h	ro	Static friction torque at forward rotation	I16	0	Static friction at forward rotation torque is displayed in increments of 0.1%.
2C22h	ro	Dynamic friction torque at forward rotation (at rated speed)	I16	0	Kinetic friction at forward rotation torque at the rated speed is displayed in increments of 0.1%.
2C23h	ro	Static friction torque at reverse rotation	I16	0	Static friction at reverse rotation torque is displayed in increments of 0.1%.
2C24h	ro	Dynamic friction torque at reverse rotation (at rated speed)	I16	0	Kinetic friction at reverse rotation torque at the rated speed is displayed in increments of 0.1%.
2C25h	ro	Oscillation frequency during motor stop	I16	0	Vibration frequency at stop/servo-lock Vibration frequency during stop/servo-lock is displayed in increments of 1 Hz.
2C26h	ro	Vibration level during motor stop	I16	0	Vibration level at stop/servo-lock Vibration level during stop/servo-lock is displayed in increments of 0.1%.
2C27h	ro	Oscillation frequency during motor operating	I16	0	Vibration frequency during operation Vibration frequency during operation is displayed in increments of 1 Hz.
2C28h	ro	Vibration level during motor operating	I16	0	Vibration level during operation Vibration level during operation is displayed in increments of 0.1%.

6.4 Servo amplifier life diagnosis function

You can check the cumulative energization time and the number of on/off times of the inrush relay based on the data in the servo amplifier. This function gives an indication of the replacement time for parts of the servo amplifier including a capacitor and a relay before they malfunction. The information of the servo amplifier life diagnosis function can be obtained with the following objects.

Index	Access	Name	Data type	Default	Description
2C18h	ro	Power ON cumulative time	U32	0	The cumulative energization time of the servo amplifier is returned.
2C19h	ro	Inrush relay ON/OFF number	U32	0	The number of on/off times of the inrush relay of the servo amplifier is returned.

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7. OBJECT DICTIONARY

Each data such as control parameters, command values, and feedback values is handled as an object composed of an Index value, object name, data type, access rule, and other elements. The object data can be exchanged between the master station (controller) and the slave stations (servo amplifiers). The aggregate of these objects is called object dictionary.

7.1 Term replacement by communication protocol

Depending on the communication protocol to be used, select the appropriate wording in the following table. Crossed cells in the table are not used in the target communication protocol.

Term	CCIEF Basic	SLMP	Modbus/TCP	Modbus RTU
Object	Object	Object	Register	Register
Index	Index	Index	Address	Address
Sub Index	Sub Index	Sub Index	Element (Sub-address) (Note)	Element (Sub-address) (Note)
Variable mapping	Variable mapping	Variable mapping		
No. of Points			No. of Points	No. of Points
No. of Registers			No. of Registers	No. of Registers
Continuous read/ continuous write			Continuous read/ continuous write	Continuous read/ continuous write
Master station	Master station	Master station	Client	Master
Slave	Slave	Slave	Server	Slave

Note. In Modbus protocol, Sub Index cannot be used if function code is 03h, 08h, or 10h. Modbus register with multiple Sub Index (4 bytes or multiple elements) requires consolidated read/consolidated write of all elements.

7.2 Saving object dictionary data to EEP-ROM

In the object dictionary data, there are data saved in the EEP-ROM and data that are not saved in the EEP-ROM. For details of each object, refer to section 7.3 in the "EEP-ROM" column.

7.3 Object dictionary list

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
1000	0	Device Type This displays the servo drive defined with the CiA 402 profile.	U32	ro	Impos-sible	00020192h	00020192h (fixed)				2	Impos-sible
1001	0	Error Register The error occurrence is returned. Bit 0: Turns on when an alarm has occurred. Bit 1 to Bit 7: Unused	U8	ro	Impos-sible	00h	00h to 01h				1	Impos-sible
1008	0	Manufacturer Device Name The model name of the servo amplifier is returned.	VS	ro	Impos-sible						16	Impos-sible
1009	0	Manufacturer Hardware Version The hardware version of the network module is returned.	VS	ro	Impos-sible						1	Impos-sible
100A	0	Manufacturer Software Version The software version of the servo amplifier is returned.	VS	ro	Impos-sible						8	Impos-sible
1010	0	Store parameters The number of entries is returned. Depending on the servo amplifier software version, the "Default" value and "Range" value are different. A3 or earlier: 1 A4 or later: 5	I8	ro	Impos-sible	1 (A3 or earlier) 5 (A4 or later)	1 (Fixed) (A3 or earlier) 5 (Fixed) (A4 or later)				11	Impos-sible
	1	Save all parameters [Writing] Writing "save" (= 65766173h) saves all the objects that can be stored in the EEP-ROM. [Reading] Bit 0: 0: The parameter cannot be saved with the command. (A parameter is being saved.) 1: The parameter can be saved with the command. (No parameter is being saved.) Bit 1: 0: The parameter is not automatically saved.	U32	rw	Impos-sible	00000001h						
	2 (Note 2)	Save communication parameters [Writing] Set "0". [Reading] "0" is always returned.	U32	rw	Impos-sible	00000000h						
	3 (Note 2)	Save application parameters [Writing] Set "0". [Reading] "0" is always returned.	U32	rw	Impos-sible	00000000h						
	4 (Note 2)	Save manufacturer defined parameters [Writing] Writing "save" (= 65766173h) saves the manufacturer definition parameter (Object of Index 2000 series) in the EEP-ROM. [Reading] Bit 0: 0: The parameter cannot be saved with the command. (A parameter is being saved.) 1: The parameter can be saved with the command. (No parameter is being saved.) Bit 1: 0: The parameter is not automatically saved.	U32	rw	Impos-sible	00000001h						
	5 (Note 2)	Save point table Writing "save" (= 65766173h) saves the point table setting value in EEP-ROM.	U32	rw	Impos-sible	00000001h						

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
1011	0	Restore default parameters The number of entries is returned. Depending on the servo amplifier software version, the "Default" value and "Range" value are different. A3 or earlier: 1 A4 or later: 5	U8	ro	Impos-sible	1 (A3 or earlier) 5 (A4 or later)	1 (Fixed) (A3 or earlier) 5 (Fixed) (A4 or later)				11	Impos-sible
	1	Restore all default parameters The setting value of the parameter and point table of the servo amplifier can be rewritten to the factory setting. Restore all default parameters (1011h: Execute the parameter initialization by writing "64616F6Ch" (= reverse order of ASCII code of "load") in 1), and turning on the power again.	U32	rw	Impos-sible	00000001h						
	2 (Note 2)	Restore communication default parameters [Writing] Set "0". [Reading] "0" is always returned.	U32	rw	Impos-sible	00000000h						
	3 (Note 2)	Restore application default parameters [Writing] Set "0". [Reading] "0" is always returned.	U32	rw	Impos-sible	00000000h						
	4 (Note 2)	Restore manufacturer defined default parameters The servo amplifier parameters can be rewritten to the factory setting. Restore manufacturer defined default parameters (1011h: Execute the parameter initialization by writing "64616F6Ch" (= reverse order of ASCII code of "load") in 4), and turning on the power again.	U32	rw	Impos-sible	00000001h						
	5 (Note 2)	Restore point table The point table setting value can be rewritten to the factory setting. Execute the point table initialization by writing "64616F6Ch" (= reverse order of ASCII code of "load") in Restore point table (1011h: 5), and turning on the power again.	U32	rw	Impos-sible	00000001h						
1018	0	Identity Object The number of entries is returned.	U8	ro	Impos-sible	4	4 (Fixed)				9	Impos-sible
	1	Vendor ID The vendor ID of a servo amplifier is returned.	U32	ro	Impos-sible	00000002h	00000002h (fixed)					
	2	Product Code The servo amplifier serial number is displayed. For Modbus/TCP and Modbus RTU, this object cannot be used.	U32	ro	Impos-sible	00001003h	00001003h (fixed)					
	3	Revision Number The revision number of a servo amplifier is returned.	U32	ro	Impos-sible		00000000h to FFFFFFFFh					
	4	Serial Number The serial number of the network module is returned.	U32	ro	Impos-sible	00000000h	00000000h to FFFFFFFFh					
1A00	0	Transmit PDO Mapping Set the number of object to be mapped.	U8	rw	Impos-sible	15	0 to 32					
	1 to 32	Mapped Object 001 to 032 Set the object to be mapped. Bit 0 to Bit 7: The length of object to be mapped (Bit unit) Bit 8 to Bit 15: Sub Index of object to be mapped Bit 16 to Bit 31: Index of object to be mapped	U32	rw	Impos-sible	60610008h	00000000h to FFFFFFFFh					

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
2001 to 2020	0	PA01 to PA32 The values of the basic setting parameters ([Pr. PA_ _]) can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual".	U32	rw	Impos-sible				○	PA01 to PA32	2	Possible
2081 to 20C0	0	PB01 to PB64 The values of the gain/filter setting parameters ([Pr. PB_ _]) can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual".	U32	rw	Impos-sible				○	PB01 to PB64	2	Possible
2101 to 2150	0	PC01 to PC80 The values of the extension setting parameters ([Pr. PC_ _]) can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual".	U32	rw	Impos-sible				○	PC01 to PC80	2	Possible
2181 to 21B0	0	PD01 to PD48 The values of the I/O setting parameters ([Pr. PD_ _]) can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual".	U32	rw	Impos-sible				○	PD01 to PD48	2	Possible
2201 to 2240	0	PE01 to PE64 The values of the extension setting 2 parameters ([Pr. PE_ _]) can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual".	U32	rw	Impos-sible				○	PE01 to PE64	2	Possible
2281 to 22B0	0	PF01 to PF48 The values of the extension setting 3 parameters ([Pr. PF_ _]) can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual".	U32	rw	Impos-sible				○	PF01 to PF48	2	Possible
2481 to 24D0	0	PT01 to PT80 The values of the positioning control parameters ([Pr. PT_ _]) can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)" and "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".	U32	rw	Impos-sible				○	PT01 to PT80	2	Possible
2581 to 25B0	0	PN01 to PN48 The values of the network setting parameters ([Pr. PN_ _]) can be obtained and set. Refer to chapter 5 for details.	U32	rw	Impos-sible				○	PN01 to PN48	2	Possible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
2801 to 28FF (Note 2)	0	Point table 001 to Point table 255 Return the configuration diagram number of point table No. 1 to 255.	U8	ro	Impos-sible	7	7 (fixed)		○		15	Impos-sible
	1	Point data The target position can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".	I32	rw	Impos-sible			pos units	○			
	2	Speed The servo motor speed can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".	I32	rw	Impos-sible		0 to permissible speed	0.01 r/min	○			
	3	Acceleration The acceleration time constant can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".	I32	rw	Impos-sible		0 to 20000	ms	○			
	4	Deceleration The acceleration time constant can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".	I32	rw	Impos-sible		0 to 20000	ms	○			
	5	Dwell The dwell can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".	I32	rw	Impos-sible		0 to 20000	ms	○			
	6	Auxiliary The auxiliary function can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".	I32	rw	Impos-sible		0 to 3, 8 to 11		○			
	7	M code The M-code can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".	I32	rw	Impos-sible		00000000h to 00000063h		○			

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
2A00 to 2A0F	0	Alarm history newest The number of entries in the latest alarm of the alarm history is returned.	U8	ro	Impos-sible	3	3 (fixed)		○		6	Impos-sible
	1	Alarm No. The number of the alarm that has occurred is returned. The description is as follows. Bit 0 to Bit 15: Alarm detail number Bit 16 to Bit 31: Alarm No. When no history exists, "0" is returned.	U32	ro	Impos-sible	00000000h	00000000h to FFFFFFFFh		○			
	2	Alarm time (Hour) Alarm occurrence time is returned. When no history exists, "0" is returned.	U32	ro	Impos-sible	0	0 to 4294967295	hour	○			
	3	Alarm2 No. The number of the alarm that has occurred is returned. The description is as follows. Bit 0 to Bit 7: Alarm detail number Bit 8 to Bit 15: Alarm No. When no history exists, "0" is returned.	U16	ro	Impos-sible	0000h	0001h to FFFFh		○			
2A40	0	Clear alarm history Writing "1EA5h" clears the alarm history.	U16	wo	Impos-sible						1	Impos-sible
2A41	0	Current alarm The number of the current alarm is returned. When no alarm has occurred, "00000000h" is returned. Bit 0 to Bit 15: Alarm detail number Bit 16 to Bit 31: Alarm No.	U32	ro	Possible	00000000h	00000000h to FFFFFFFFh				2	Impos-sible
2A42	0	Current alarm 2 The number of the current alarm is returned. When the alarm does not occur, "00000000h" is returned. Bit 0 to Bit 7: Alarm detail number Bit 8 to Bit 15: Alarm No.	U16	ro	Possible	0000h	0001h to FFFFh				1	Impos-sible
2A43 (Note 2)	0	Point table error Return the configuration diagram number of point table error.	U8	ro	Impos-sible	2	2 (fixed)				5	Impos-sible
	1	Point table error No. The point table No. in which a point table error has occurred is returned.	U32	ro	Possible	0	0 to 255					
	2	Point table error factor The error factor of the corresponding point table in which a point table error has occurred is returned. Bit 0: Target position [μm] Bit 1: reserved Bit 2: Servo motor speed [r/min] Bit 3: reserved Bit 4: Acceleration time constant [ms] Bit 5: Deceleration time constant [ms] Bit 6: Dwell time [ms] Bit 7: Auxiliary function Bit 8: M-code Bit 9: Push torque [%] Bit A: Push travel width [μm] Bit B to Bit F: reserved	U32	ro	Possible	00000000h						
2A44	0	Parameter error number When [AL. 37 Parameter error] occurred, the number of the parameters that caused the error is returned. Refer to Parameter error list (2A45h) for the number of each parameter which causes the error.	U16	ro	Impos-sible	0	0 to 500				1	Impos-sible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
2A45	0	Parameter error list When [AL. 37 Parameter error] has occurred, the number of entries of the parameter which causes the error is returned.	U8	ro	Impos-sible	32	32 (fixed)				1 + Number of reading	Impos-sible
	1 to 32	Parameter error list 1 to 32 When [AL. 37 Parameter error] has occurred, the 1st to 32nd of the parameter numbers that caused the alarm is returned. Bit 0 to Bit 7: Parameter No. Bit 8 to Bit 15: Parameter group number 00: [Pr. PA _ _] 01: [Pr. PB _ _] 02: [Pr. PC _ _] 03: [Pr. PD _ _] 04: [Pr. PE _ _] 05: [Pr. PF _ _] 06: Parameter for manufacturer setting 07: Parameter for manufacturer setting 08: Parameter for manufacturer setting 09: Parameter for manufacturer setting 0A: Parameter for manufacturer setting 0B: Parameter for manufacturer setting 0C: [Pr. PT _ _] 0E: [Pr. PN _ _]	U16	ro	Impos-sible	0000h	0001h to FFFFh					
2A46	0	Reset alarm Writing the value "1EA5h" resets an alarm. Any value other than "1EA5h" is invalid.	U16	wo	Impos-sible		0000h to FFFFh				1	Impos-sible
2A60 (Note 1)	0	SDO abort code The latest SDO Abort Code is returned.	U32	ro	Impos-sible		00000000h to FFFFFFFFh				2	Impos-sible
2A64 (Note 1)	0	Access log 1 Return the successfully accessed Last Index and Sub Index by Modbus communication. Bit 0 to Bit 15: Index Bit 16 to Bit 31: Sub Index	U32	ro	Impos-sible		00000000h to FFFFFFFFh				2	Impos-sible
2A65 (Note 1)	0	Access log 2 Return the successfully accessed number up to the last Index by Modbus communication. In addition, when Sub Index or elements are accessed in multiple addresses, the Sub Index or the element number is returned.	U16	ro	Impos-sible		0000h to FFFFh				1	Impos-sible
2A68 (Note 2)	0	Communication error count Sending the Modbus RTU communication total error count transmission. When "1EA5" is written, the error count is cleared. The counted errors are as follows. ▪ Errors detected by hardware (parity error, overrun error, and framing error) ▪ Message frame length error ▪ CRC error	U16	rw	Impos-sible		0000h to FFFFh				1	Impos-sible

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2B01	0	Cumulative feedback pulses The cumulative feedback pulses are returned. The accumulation of the feedback pulse can be cleared by writing "7845 (00001EA5h)".	I32	rw	Possible		-2147483648 to 2147483647	pulse			2	Possible
2B02	0	Servo motor speed The servo motor speed is returned.	I32	ro	Possible		-2147483648 to 2147483647	r/min			2	Possible
2B03	0	Droop pulses The droop pulses (encoder unit) are returned.	I32	ro	Possible		-2147483648 to 2147483647	pulse			2	Possible
2B04	0	Cumulative command pulses The cumulative command pulses are returned.	I32	ro	Possible		-2147483648 to 2147483647	pulse			2	Possible
2B05	0	Command pulse frequency The command pulse frequency is returned.	I32	ro	Possible		-2147483648 to 2147483647	kpulse/s			2	Possible
2B06	0	Analog speed command voltage The analog speed command voltage is returned.	I16	ro	Possible		-32768 to 32767	V			1	Possible
2B07	0	Analog torque limit voltage/Analog torque command voltage The analog torque limit voltage/analog torque command voltage is returned.	I16	ro	Possible		-32768 to 32767	V			1	Possible
2B08	0	Regenerative load ratio The regenerative load ratio is returned.	U16	ro	Possible		0 to 65535	%			1	Possible
2B09	0	Effective load ratio The effective load ratio is returned.	U16	ro	Possible		0 to 65535	%			1	Possible
2B0A	0	Peak load ratio The peak load ratio is returned.	U16	ro	Possible		0 to 65535	%			1	Possible
2B0B	0	Instantaneous torque The instantaneous torque is returned.	I16	ro	Possible		-32768 to 32767	%			1	Possible
2B0C	0	Within one-revolution position The position within one-revolution is returned.	I32	ro	Possible		-2147483648 to 2147483647	pulse			2	Possible
2B0D	0	ABS counter The multi-revolution counter value is returned.	I32	ro	Possible		-2147483648 to 2147483647	rev			2	Possible
2B0E	0	Load to motor inertia ratio The load to motor inertia ratio is returned.	U16	ro	Possible		-32768 to 32767	0.01 times			1	Possible
2B0F	0	Bus voltage The bus voltage is returned.	U16	ro	Possible		-32768 to 32767	V			1	Possible
2B16	0	Cumulative encoder out pulses The A/B-phase pulse output feedback total value is returned.	I32	ro	Possible		-2147483648 to 2147483647	pulse			2	Impos-sible
2B25	0	Internal temperature of encoder The internal temperature of encoder is returned.	I16	ro	Possible		-32768 to 32767	°C			1	Impos-sible
2B26	0	Settling time The settling time is returned.	I16	ro	Possible		-32768 to 32767	ms			1	Impos-sible
2B27	0	Oscillation detection frequency The oscillation detection frequency is returned.	I16	ro	Possible		-32768 to 32767	Hz			1	Impos-sible
2B28	0	Number of tough drive operations The number of tough drive operations is returned.	U16	ro	Possible		0 to 65535	times			1	Impos-sible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
2B2A	0	Internal temperature of amplifier The internal temperature of amplifier is returned.	I16	ro	Possible		-32768 to 32767	°C			1	Impos-sible
2B2D	0	Unit power consumption The unit power consumption is returned.	I16	ro	Possible		-32768 to 32767	W			1	Possible
2B2E	0	Unit total power consumption The unit total power consumption is returned.	I32	ro	Possible		-2147483648 to 2147483647	Wh			2	Possible
2B2F	0	Current position The current position is returned.	I32	ro	Possible		-2147483648 to 2147483647				2	Possible
2B30	0	Command position The command position is returned.	I32	ro	Possible		-2147483648 to 2147483647				2	Possible
2B31	0	Command remaining distance The command remaining distance is returned.	I32	ro	Possible		-2147483648 to 2147483647				2	Possible
2B32 (Note 2)	0	Point table No./Station position No. Point table No. or station position No. is returned.	I16	ro	Possible		0 to 255				1	Possible
2B34 (Note 2)	0	Override voltage The analog override voltage is returned. When "command interface selection" of [Pr. PN08] is "1 (communication interface)", the value of this object is fixed at "0".	I16	ro	Possible		-32768 to 32767	0.01 V			1	Possible
2B35 (Note 2)	0	Override level The override level is returned.	I16	ro	Possible		-32768 to 32767	%			1	Possible
2B81	0	Alarm Monitor 1 Cumulative feedback pulses The cumulative feedback pulses at alarm occurrence are returned.	I32	ro	Possible		-2147483648 to 2147483647	pulse			2	Possible
2B82	0	Alarm Monitor 2 Servo motor speed The servo motor speed at alarm occurrence is returned.	I32	ro	Possible		-2147483648 to 2147483647	r/min			2	Possible
2B83	0	Alarm Monitor 3 Droop pulses The droop pulses at alarm occurrence are returned.	I32	ro	Possible		-2147483648 to 2147483647	pulse			2	Possible
2B84	0	Alarm Monitor 4 Cumulative command pulses The cumulative command pulses (encoder unit) at alarm occurrence are returned.	I32	ro	Possible		-2147483648 to 2147483647	pulse			2	Possible
2B85	0	Alarm Monitor 5 Command pulse frequency The command pulse frequency at alarm occurrence is returned.	I32	ro	Possible		-2147483648 to 2147483647	kpulse/s			2	Possible
2B86	0	Alarm Monitor 6 Analog speed command voltage The analog speed command voltage is returned when the alarm occurs.	I16	ro	Possible		-32768 to 32767	V			1	Possible
2B87	0	Alarm Monitor 7 Analog torque limit voltage/ Analog torque command voltage The analog torque limit voltage/analog torque command voltage at alarm occurrence is returned.	I16	ro	Possible		-32768 to 32767	V			1	Possible
2B88	0	Alarm Monitor 8 Regenerative load ratio The regenerative load ratio at alarm occurrence is returned.	U16	ro	Possible		0 to 65535	%			1	Possible
2B89	0	Alarm Monitor 9 Effective load ratio The effective load ratio at alarm occurrence is returned.	U16	ro	Possible		0 to 65535	%			1	Possible
2B8A	0	Alarm Monitor 10 Peak load ratio The peak load ratio at alarm occurrence is returned.	U16	ro	Possible		0 to 65535	%			1	Possible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
2B8B	0	Alarm Monitor 11 Instantaneous torque The instantaneous torque at alarm occurrence is returned.	I16	ro	Possible		-32768 to 32767	%			1	Possible
2B8C	0	Alarm Monitor 12 Within one-revolution position The position within one-revolution at alarm occurrence is returned.	I32	ro	Possible		-2147483648 to 2147483647	pulse			2	Possible
2B8D	0	Alarm Monitor 13 ABS counter The ABS counter at alarm occurrence is returned.	I32	ro	Possible		-2147483648 to 2147483647	rev			2	Possible
2B8E	0	Alarm Monitor 14 Load to motor inertia ratio The load to motor inertia ratio at alarm occurrence is returned.	U16	ro	Possible		0 to 65535	0.01 times			1	Possible
2B8F	0	Alarm Monitor 15 Bus voltage The bus voltage at alarm occurrence is returned.	U16	ro	Possible		0 to 65535	V			1	Possible
2B96	0	Alarm Monitor 22 Cumulative encoder out pulses The A/B-phase pulse output feedback total value is returned at alarm occurrence.	I32	ro	Possible		-2147483648 to 2147483647	pulse			2	Possible
2BA5	0	Alarm Monitor 37 Internal temperature of encoder The internal temperature of encoder at alarm occurrence is returned.	I16	ro	Possible		-32768 to 32767	°C			1	Possible
2BA6	0	Alarm Monitor 38 Settling time The settling time at alarm occurrence is returned.	I16	ro	Possible		-32768 to 32767	ms			1	Possible
2BA7	0	Alarm Monitor 39 Oscillation detection frequency The oscillation detection frequency at alarm occurrence is returned.	I16	ro	Possible		-32768 to 32767	Hz			1	Possible
2BA8	0	Alarm Monitor 40 Number of tough drive operations The number of tough drive operations at alarm occurrence is returned.	U16	ro	Possible		0 to 65535	times			1	Possible
2BAA	0	Alarm Monitor 42 Internal temperature of amplifier The internal temperature of amplifier at alarm occurrence is returned.	I16	ro	Possible		-32768 to 32767	°C			1	Possible
2BAD	0	Alarm Monitor 45 Unit power consumption The unit power consumption at alarm occurrence is returned.	I16	ro	Possible		-32768 to 32767	W			1	Possible
2BAE	0	Alarm Monitor 46 Unit total power consumption The unit total power consumption at alarm occurrence is returned.	I32	ro	Possible		-2147483648 to 2147483647	Wh			2	Possible
2BAF	0	Alarm Monitor 47 Current position The current position at alarm occurrence is returned.	I32	ro	Possible		-2147483648 to 2147483647				2	Possible
2BB0	0	Alarm Monitor 48 Command position The command position at alarm occurrence is returned.	I32	ro	Possible		-2147483648 to 2147483647				2	Possible
2BB1	0	Alarm Monitor 49 Command remaining distance The command remaining distance at alarm occurrence is returned.	I32	ro	Possible		-2147483648 to 2147483647				2	Possible
2BB2 (Note 2)	0	Alarm Monitor 50 Point table No./Station position No. Point table No. or station position No. at alarm occurrence is returned.	I16	ro	Possible		0 to 255				1	Possible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
2BB4 (Note 2)	0	Alarm Monitor 52 Override voltage The analog override voltage at alarm occurrence is returned.	I16	ro	Possible		-32768 to 32767	0.01 V			1	Possible
2BB5 (Note 2)	0	Alarm Monitor 53 Override level The analog override voltage at alarm occurrence is returned.	I16	ro	Possible		-32768 to 32767	%			1	Possible
2C10	0	External Input pin display The number of entries in external input pin status is returned.	U8	ro	Impos-sible	1	0 to 255				3	Impos-sible
	1	External Output pin display1 The external input pin status is returned.	U32	ro	Possible		00000000h to FFFFFFFFh					
2C11	0	External Output pin display The number of entries in external output pin status is returned.	U8	ro	Impos-sible	1	0 to 255				3	Impos-sible
	1	External Output pin display1 The external input pin status is returned.	U32	ro	Possible		00000000h to FFFFFFFFh					
2C12	0	External Input signal display The number of entries in input device status is returned.	U8	ro	Impos-sible	4	0 to 255				9	Impos-sible
	1	External Input signal display1 The input device status 1 is returned.	U32	ro	Possible		00000000h to FFFFFFFFh					
	2	External Input signal display2 The input device status 2 is returned.	U32	ro	Possible		00000000h to FFFFFFFFh					
	3	External Input signal display3 The input device status 3 is returned.	U32	ro	Possible		00000000h to FFFFFFFFh					
	4	External Input signal display4 The input device status 4 is returned.	U32	ro	Possible		00000000h to FFFFFFFFh					
2C18	0	Power ON cumulative time The cumulative time after power on of the servo amplifier is returned.	U32	ro	Impos-sible	0	0 to 4294967295	hour			2	Impos-sible
2C19	0	Number of inrush relay on/off times The number of on/off times of the inrush relay of the servo amplifier is returned.	U32	ro	Impos-sible	0	0 to 4294967295	times			2	Impos-sible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
2C20	0	Machine diagnostic status [Bit 0 to Bit 3: Friction estimation status at forward rotation] 0: Normal (During estimation) 1: Normal (Estimation is completed) 2: Warning (the servo motor may tend to rotate in one direction) 3: Warning (the servo motor speed may be too slow for friction estimation) 4: Warning (the change in the servo motor speed may be small for friction estimation) 5: Warning (the acceleration/deceleration time constant may be too short for friction estimation) 6: Warning (the operation time may not be enough) When warning conditions for 2 to 6 are met at the same time, the smaller number is returned. When an estimation is completed even though a warning has once occurred, the status changes to "Estimation is completed". [Bit 4 to Bit 7: Friction estimation status at reverse rotation] 0: Normal (During estimation) 1: Normal (Estimation is completed) 2: Warning (the servo motor may tend to rotate in one direction) 3: Warning (the servo motor speed may be too slow for friction estimation) 4: Warning (the change in the servo motor speed may be small for friction estimation) 5: Warning (the acceleration/deceleration time constant may be too short for friction estimation) 6: Warning (the operation time may not be enough) When warning conditions for 2 to 6 are met at the same time, the smaller number is returned. When an estimation is completed even though a warning has once occurred, the status changes to "Estimation is completed". [Bit 8 to Bit 11: Vibration estimation status] 0: During estimation 1: Estimation is completed [Bit 12 to Bit 15: reserved] The value at reading is undefined.	U16	ro	Impos-sible	0000h	0000h to FFFFh				1	Possible
2C21	0	Static friction torque at forward rotation Positive torque static friction is returned in 0.1% unit increments.	I16	ro	Impos-sible	0	-32768 to 32767	0.1%			1	Possible
2C22	0	Dynamic friction torque at forward rotation (at rated speed) Friction torque at forward rotation torque at rated speed is returned in increments of 0.1%.	I16	ro	Impos-sible	0	-32768 to 32767	0.1%			1	Possible
2C23	0	Static friction torque at reverse rotation Reverse torque static friction is returned in 0.1% unit increments.	I16	ro	Impos-sible	0	-32768 to 32767	0.1%			1	Possible
2C24	0	Dynamic friction torque at reverse rotation (at rated speed) Friction torque at reverse rotation torque at rated speed is returned in increments of 0.1%.	I16	ro	Impos-sible	0	-32768 to 32767	0.1%			1	Possible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
2C25	0	Oscillation frequency during motor stop Vibration frequency during stop/servo-lock is returned in increments of 1 Hz.	I16	ro	Impos-sible	0	-32768 to 32767	Hz			1	Possible
2C26	0	Vibration level during motor stop Vibration level during stop/servo-lock is returned in increments of 0.1%.	I16	ro	Impos-sible	0	-32768 to 32767	0.1%			1	Possible
2C27	0	Oscillation frequency during motor operating Vibration frequency during operation is returned in increments of 1 Hz.	I16	ro	Impos-sible	0	-32768 to 32767	Hz			1	Possible
2C28	0	Vibration level during motor operating Vibration level during operation is returned in increments of 0.1%.	I16	ro	Impos-sible	0	-32768 to 32767	0.1%			1	Possible
2D01 to 2D0A	0	Control DI 1 to Control DI 10 The on/off status of input device can be read. The on/off status of input device can also be set.	U16	rw	Possible	0000h	0000h to FFFFh				1	Possible
2D11 to 2D1A	0	Status DO 1 to Status DO 10 The on/off status of output device can be read.	U16	ro	Possible		0000h to FFFFh				1	Possible
2D20	0	Velocity limit value The speed limit value is set.	I32	rw	Possible	50000	0 to instantaneous permissible speed	0.01 r/min	○	PT52	2	Impos-sible
2D28	0	Motor rated speed The servo motor rated speed is returned.	U32	ro	Impos-sible		0 to 4294967295	r/min			2	Impos-sible
2D29	0	Motor max speed The maximum speed of the servo motor is returned.	U32	ro	Impos-sible		0 to 4294967295	r/min			2	Impos-sible
2D30	0	Manufacturer Device Name 2 The model name of the servo amplifier is returned. The description is the same as that of Manufacturer Device Name (1008h).	VS	ro	Impos-sible						16	Impos-sible
2D31	0	Manufacturer Hardware Version 2 The hardware version of the servo amplifier is returned.	VS	ro	Impos-sible						1	Impos-sible
2D32	0	Manufacturer Software Version 2 The software version of the servo amplifier is returned.	VS	ro	Impos-sible						8	Impos-sible
2D33	0	Serial Number 2 The servo amplifier serial number is returned.	VS	ro	Impos-sible						8	Impos-sible
2D35	0	Encoder status The number of entries is returned.	U8	ro	Impos-sible	1	1 (fixed)				3	Impos-sible
	1	Encoder status1 The encoder status is returned. Bit 0: The servo amplifier is returned regardless of whether it is an absolute position detection system. 0 = Incremental system 1 = Absolute position detection system Bit 1 to Bit 31: Reserved	U32	ro	Impos-sible		00000000h to 00000001h					
2D42	0	Max ABS counter The maximum value of the multi-revolution counter is displayed.	U32	ro	Impos-sible		0 to 4294967295	rev			2	Impos-sible
2D50	0	One-touch tuning mode Setting "1" to "3" starts one-touch tuning. After one-touch tuning is completed, the setting value automatically changes to "0". 1: Basic setting 2: High setting 3: Low setting	U8	rw	Impos-sible	0	0 to 3				1	Impos-sible

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2D51	0	One-touch tuning status The one-touch tuning progress is returned.	I8	ro	Impos-sible	0	0 to 100	%			1	Impos-sible
2D52	0	One-touch tuning Stop Writing "1EA5h" can stop one-touch tuning. Any value other than "1EA5h" is invalid.	I16	wo	Impos-sible		0000h to 1EA5h				1	Impos-sible
2D53	0	One-touch tuning Clear The parameter changed in one-touch tuning can be returned to the value before the change. The description of the setting values is as follows. 0000: Restore the default value 0001: Return the value to before one-touch tuning.	I16	wo	Impos-sible		0000h to 0001h				1	Impos-sible
2D54	0	One-touch tuning Error Code An error code of the one-touch tuning is returned. The description of the error codes is as follows. 0000: Normal completion C000: Tuning canceled C001: Overshoot exceeded C002: Servo-off during tuning C003: Control mode error C004: Time-out C005: Load to motor inertia ratio misestimated C00F: One-touch tuning disabled	I16	ro	Impos-sible	0000h	0000h to C00Fh				1	Impos-sible
2D60 (Note 2)	0	Target point table [Point table mode (pt) case] Specify a point table No. 0: Not in operation 1 to 255: Specified point table execution -1: High-speed home position return [Indexer mode (idx) case] Specify the next station No. 0 to 254 Positioning operation to specified station	I16	rw	Possible		-1 to 255				1	Impos-sible
2D68 (Note 2)	0	Point demand value Current specified point table number or the next station position number is returned. While the servo motor is stopped, the value of Target point table (2D60h) is returned.	I16	ro	Possible		0 to 255				1	Possible
2D69 (Note 2)	0	Point actual value [Point table mode (pt) case] The completed point table is returned. After homing completed, "0" is set. [Indexer mode (idx) case] The completed station No. is returned. The previous value is held until completion.	I16	ro	Possible		0 to 255				1	Possible
2D6A (Note 2)	0	M code actual value The completed M code of the point table is returned. In the indexer method, "00h" is returned.	U8	ro	Possible		00h to 63h				1	Possible
2D6B (Note 2)	0	Torque limit value 2 When the servo motor is stopping, set the torque limit value in indexer mode (idx).	U16	rw	Possible	10000	0 to 10000	0.1%		PC35	1	Possible
2D98 (Note 2)	0	Select behavior of broadcast message The setting of the broadcast communication of the Modbus RTU communication can be read and write. 0: Broadcast instruction enabled 1: Broadcast instruction disabled	U8	rw	Impos-sible	0	0 to 1				1	Impos-sible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
2D99 (Note 2)	0	Setup S/W graph trigger The graph trigger of the setup software can be set. By using RS-485 communication, the multi axis waveform data can be measured with MR Configurator2. 0: Setup software graph trigger off 1: Setup software graph trigger on	U8	wo	Impos-sible	0	0 to 1				1	Impos-sible
2D9A (Note 2)	0	Set controlword bit 4 Bit 4 of the Controlword (6040h) can be set. 0: Turn off the simultaneous start signal 1: Turn on the simultaneous start signal	U8	wo	Impos-sible	0	0 to 1				1	Impos-sible
2D9B (Note 2)	0	C_EM1/2 command The controller force stop can be performed. 0: Controller force stop OFF 1: Controller force stop ON Controller forced stop can be performed regardless of the setting of the Select behavior of broadcast message (2D98h). Forced stop can be used on all axes of the servo amplifier in the broadcast communication.	U8	wo	Impos-sible	0	0 to 1				1	Impos-sible
2DB0 (Note 2)	0	Override Enabled when the OVR is on. Set the actual ratio of the servo motor speed to the speed set by override.	U16	rw	Possible	0	0 to 200	%			1	Impos-sible
2DD1 (Note 2)	0	Target speed No. Specify the servo motor speed, acceleration time constant, and deceleration time constant in the point table number.	I16	rw	Possible		0 to 255				1	Impos-sible
603F	0	Error code The latest error No. that occurred after the power on is returned. The error number is as follows. 1000h: Generic error	U16	ro	Possible	0000h	0000h to FFFFh				1	Impos-sible
6040	0	Controlword Set control commands to control the servo amplifier. Bit 0: switch on Bit 1 enable voltage Bit 2: quick stop Bit 3: enable operation Bit 4 to Bit 6: operation mode specific Bit 7: fault reset Bit 8: halt Bit 9: operation mode specific Bit 10 to Bit 14: reserved Bit 15 operation mode specific	U16	rw	Possible	0000h	0000h to FFFFh				1	Impos-sible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
6041	0	Statusword The current control status can be checked. Bit 0: ready to switch on Bit 1: switched on Bit 2: operation enabled Bit 3: fault Bit 4: voltage enabled Bit 5: quick stop Bit 6: switch disabled Bit 7: warning Bit 8: reserved Bit 9: remote Bit 10: target reached Bit 11: internal limit active Bit 12 to Bit 13: operation mode specific Bit 14 to Bit 15: reserved	U16	ro	Possible		0000h to FFFFh				1	Impos-sible
605A	0	Quick stop option code The operation method of deceleration to a stop can be specified.	I16	rw	Impos-sible	2	2 (fixed)		○	PT69	1	Impos-sible
605D	0	Halt option code Set how to decelerate the servo motor to a stop at Halt reception.	I16	rw	Impos-sible	1	1 (fixed)		○	PT69	1	Impos-sible
6060	0	Modes of operation Set the control mode. 0: No mode assigned 1: Profile position mode (pp) 3: Profile velocity mode (pv) 4: Profile torque mode (tq) 6: Homing mode (hm) -20: Position control mode -21: Speed control mode -22: Torque control mode -100: Jog mode (jg) -101: Point table mode (pt) -103: Indexer mode (idx)	I8	rw	Possible	0	-128 to 127				1	Impos-sible
6061	0	Modes of operation display The current control mode is returned. 0: No mode assigned 1: Profile position mode (pp) 3: Profile velocity mode (pv) 4: Profile torque mode (tq) 6: Homing mode (hm) -20: Position control mode -21: Speed control mode -22: Torque control mode -100: Jog mode (jg) -101: Point table mode (pt) -103: Indexer mode (idx)	I8	ro	Possible	-20	-128 to 127				1	Impos-sible
6063	0	Position actual internal value The current position is returned.	I32	ro	Possible		-2147483648 to 2147483647	pulse			2	Impos-sible
6064	0	Position actual value The current position in the command unit on the basis of the home position is returned. When the home position is not set, the current position in the command unit on the basis of the zero point of the encoder is returned.	I32	ro	Possible		-2147483648 to 2147483647	pos units			2	Impos-sible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
6065	0	Following error window In the profile position mode (pp), JOG operation mode (jg), point table mode (pt), and indexer mode (idx), the condition in which the droop pulse exceeds the object setting value, bit 13 of Statusword (6041h) is turn on when the time set for Following error time out (6066h) has elapsed. When "4294967295" is set, Bit 13 of Statusword (6041h) is always off.	U32	rw	Possible	12582912	0 to 4294967295	pos units	○	PC75, PC76	2	Impos-sible
6066	0	Following error time out Refer to Following error window (6065h).	U16	rw	Possible	10	0 to 65535	ms	○	PC77	1	Impos-sible
6067	0	Position window In the profile position mode (pp), JOG operation mode (jg), point table mode (pt), and indexer mode (idx), the condition in which the droop pulse fell below the object setting value, bit 10 of Statusword (6041h) is turn on when the time set for Position windows time (6068h) has elapsed. [Setting range] is limited to 0 to 65534 range. As an exception, when "4294967295" is set, the Position window is disabled.	U32	rw	Possible	100	0 to 65534/4294967295	pos units	○	PT65	2	Impos-sible
6068	0	Position window time Refer to Position window (6067h).	U16	rw	Possible	10	0 to 65535	ms	○	PT66	1	Impos-sible
606B	0	Velocity demand value The speed command is returned.	I32	ro	Possible	0	-2147483648 to 2147483647	0.01 r/min			2	Impos-sible
606C	0	Velocity actual value The current speed is returned.	I32	ro	Possible		-2147483648 to 2147483647	0.01 r/min			2	Impos-sible
606D	0	Velocity window In the profile velocity mode (pv), when the current speed below this object setting value is exceeding Velocity window time (606Eh), turn on bit 10 of Statusword (6041h).	U16	rw	Possible	2000	0 to 65535	0.01 r/min	○	PT67	1	Impos-sible
606E	0	Velocity window time Refer to Velocity window (606Dh).	U16	rw	Possible	10	0 to 65535	ms	○	PT68	1	Impos-sible
606F	0	Velocity threshold In the profile velocity mode (pv), when the current speed exceeds this object setting value is continues for more than Velocity threshold time (6070h), Bit 12 of Statusword (6041h) is turned off.	U16	rw	Possible	5000	0 to 65535	0.01 r/min	○	PT63	1	Impos-sible
6070	0	Velocity threshold time Refer to Velocity threshold (606Fh).	U16	rw	Possible	10	0 to 65535	ms	○	PT64	1	Impos-sible
6071	0	Target torque Set the torque command to be used in the profile torque mode (tq).	I16	rw	Possible	0	-32768 to 32767	0.1%			1	Impos-sible
6072	0	Max torque The maximum torque of the servo motor is returned. Matches with the maximum torque listed in "HG-KN_/HG-SN_ -S100 Servo Motor Instruction Manual".	U16	rw	Possible		0 to 65535	0.1%			1	Impos-sible
6074	0	Torque demand value The torque command is returned.	I16	ro	Possible	0	-32768 to 32767	0.1%			1	Impos-sible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
6077	0	Torque actual value The current torque is returned. The read data is in of 0.1% unit.	I16	ro	Possible		-32768 to 32767	0.1%			1	Impos-sible
607A	0	Target position Set the position command to be used in the profile position mode (pp). [Setting range] Degree unit: -360000 to 360000 Other than degree unit: -999999 to 999999	I32	rw	Possible	0	-2147483648 to 2147483647	pos units			2	Impos-sible
607B	0	Position range limit The number of entries is returned.	U8	ro	Impos-sible	2	0 to 2				5	Impos-sible
	1	Min position range limit As it is automatically set by control mode and [Pr. PT 01], writing cannot be performed. When writing is performed, an error code "CCD4h" is generated. [Profile mode (pp/pv/tq) case] [Pr. PT01] = _ 2 _ _ (degree): 0 [Pr. PT01] = _3_ _ (pulse) : -2147483648 [Point table mode (pt) case] [Pr. PT01] = _0_ _ (mm) : -2147483648 [Pr. PT01] = _1_ _ (inch) : -2147483648 [Pr. PT01] = _3_ _ (pulse) : -2147483648 [Indexer mode (idx) case] "0" (Fixed)	I32	rw	Possible		-2147483648 to 2147483647	pos units				
	2	Max position range limit As it is automatically set by control mode and [Pr. PT 01], writing cannot be performed. When writing is performed, an error code "CCD4h" is generated. [Profile mode (pp/pv/tq) case] [Pr. PT01] = _ 2 _ _ (degree): 359999 [Pr. PT01] = _ 3 _ _ (pulse): 2147483647 [Point table mode (pt) case] [Pr. PT01] = _ 0 _ _ (mm): 2147483647 [Pr. PT01] = _ 1 _ _ (inch): 2147483647 [Pr. PT01] = _ 3 _ _ (pulse): 2147483647 [Indexer mode (idx) case] "Setting value of [Pr. PT 28] -1" value	I32	rw	Possible		-2147483648 to 2147483647	pos units				
607C	0	Home offset The home position is returned. Only reading the value is available. Do not write because doing so causes an error.	I32	rw	Possible	0	-2147483648 to 2147483647	pos units	○		2	Impos-sible
607D	0	Software position limit The number of entries is returned.	U8	ro	Impos-sible	2	2 (fixed)				5	Impos-sible
	1	Min position limit Set the range for limiting the command position (lower limit value). Target position (607Ah) as Min position limit (607Dh: 1) from Max position limit (607 Dh: 2) Limited within the range. Min position limit (607Dh: 1) equal or greater than Max position limit (607Dh: 2) By setting the value, the Software position limit (607Dh) function will be invalid.	I32	rw	Possible	0	-2147483648 to 2147483647	pos units	○	PT17, PT18		
	2	Max position limit Set the range (upper limit) for limiting the command position. Min position limit (607Dh: Refer to (1).	I32	rw	Possible	0	-2147483648 to 2147483647	pos units	○	PT15, PT16		

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
607E	0	Polarity The rotation direction selection can be set. Bit 7: position polarity Bit 6: velocity polarity Bit 5: torque polarity Turn on or off both bits 6 and 7 to set the rotation direction to position commands and speed commands. Turn on or off all of bits 5 to 7 to set the rotation direction to torque commands.	U8	rw	Possible	00h	00h to FFh		○	PA14, PC29	1	Impos-sible
607F	0	Max profile velocity Set the maximum speed command for profile position mode (pp), profile speed mode (pv), JOG operation mode (jg), and indexer mode (idx). When a value exceeding this object is set to Target velocity (60FFh) or Profile velocity (6081h), the speed is limited with the value of this object.	U32	rw	Possible	2000000	0 to 2000000	0.01 r/min	○	PT51	2	Impos-sible
6080	0	Max motor speed The maximum speed of the servo motor is returned. Operation cannot be performed at a speed exceeding the speed set with this object.	U32	rw	Possible		0 to 4294967295	r/min			2	Impos-sible
6081	0	Profile velocity The current speed command value can be read. In addition, the speed command value can also be set. Set a value of 0.01 r/min unit.	U32	rw	Possible	10000	0 to instantaneous permissible speed	0.01 r/min	○	PT50	2	Impos-sible
6083	0	Profile acceleration The current acceleration time constant can be read. In addition, the acceleration time constant can also be set. Set the acceleration time for the servo motor to reach the rated speed in units of ms.	U32	rw	Possible	0	0 to 4294967295	ms	○	PC01	2	Impos-sible
6084	0	Profile deceleration The current deceleration time constant can be read. In addition, the deceleration time constant can also be set. Set the deceleration time for the servo motor to stop from the rated speed in units of ms.	U32	rw	Possible	0	0 to 4294967295	ms	○	PC02	2	Impos-sible
6085	0	Quick stop deceleration Set a deceleration time constant for the Quick stop function. Set the time from the servo motor rated speed to stop. When "0" is set, the operation is performed at 100 ms. [Range] Limited within the range of 0 to 20000. Also, when "0" is set, the operation is performed with 100 ms. The operation depends on the specification of [Pr. PC51].	U32	rw	Possible	100	0 to 4294967295	ms	○	PC51	2	Impos-sible
6086	0	Motion profile type Set the acceleration/deceleration pattern in the profile position mode (pp). The description is as follows. -1: S-pattern For this object value, "-1" is always returned. Values other than "-1" cannot be set.	I16	rw	Possible	-1	-1 (fixed)				1	Impos-sible

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
6087	0	Torque slope Set the change amount per 1 s of the torque command to be used in the profile torque mode. When "0" is set, the setting value is invalid, and the torque command is the step input. [Setting range] is limited within the range of 0 to 10000000. In addition, when "0" is set, the setting value is invalid (step input).	U32	rw	Possible	0	0 to 10000000	0.1%	○	PT49	2	Impos-sible
6088	0	Torque profile type Set the torque command pattern. 0: Linear interpolation method Values other than 0 cannot be set.	I16	rw	Possible	0	0 (fixed)				1	Impos-sible
608F	0	Position encoder resolution The number of entries is returned.	U8	ro	Impos-sible	2	2 (fixed)	pulse/ rev			5	Impos-sible
	1	Encoder increments The encoder resolution is returned.	U32	rw	Possible		0 to 4294967295	pulse				
	2	Motor revolutions The fixed value "1" is returned.	U32	rw	Possible	1	1	rev				
6091	0	Gear ratio The number of entries is returned.	U8	ro	Impos-sible	2	2 (fixed)				5	Impos-sible
	1	Motor revolutions Set the denominator of the electronic gear. For details of the range of values that can be set, refer to "MR-JE-_C Servo Amplifier Instruction Manual", "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)", and "MR-JE-_C Servo Amplifier Instruction Manual (Positioning mode)".	U32	rw	Possible	1	1 to 16777215	rev	○	PA06		
	2	Shaft revolutions Set the denominator of the electronic gear. For details of the range of values that can be set, refer to "MR-JE-_C Servo Amplifier Instruction Manual", "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)", and "MR-JE-_C Servo Amplifier Instruction Manual (Positioning mode)".	U32	rw	Possible	1	1 to 16777215	rev	○	PA07		
6092	0	Feed constant The number of entries is returned. Electronic gear calculation formula: Travel distance/Number of drive axis rotation	U8	ro	Impos-sible	2	2 (fixed)				5	Impos-sible
	1	Feed The value is set automatically according to the [Pr. PT01] setting. If Indexer method (idx), the setting value of [Pr. PT28] is fixed.	U32	rw	Possible	360000 (degree)/ Encoder resolution (pulse)	0 to 4294967295	pos units				
	2	Shaft revolutions The value is set automatically according to the [Pr. PT01] setting. Only "1", "10", "100", or "1000" can be written if the setting value of [Pr. PT01] is "_ 0 _ _ (mm)" or "_ 1 _ _ (inch)". If Indexer method (idx), fixed on "1".	U32	rw	Possible	1	1/10/100/1000	rev	○	PT01		
6098	0	Homing method Set a home position return type.	I8	rw	Possible	37	-43 to 39		○	PT45	1	Impos-sible
6099	0	Homing speeds The number of entries is returned.	U8	ro	Impos-sible	2	2 (fixed)				5	Impos-sible
	1	Speed during search for switch Set the servo motor speed at home position return.	U32	rw	Possible	10000	0 to instantaneous permissible speed	0.01 r/min	○	PT05		
	2	Speed during search for zero Set a creep speed after proximity dog at home position return.	U32	rw	Possible	1000	0 to instantaneous permissible speed	0.01 r/min	○	PT06		

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
609A	0	Homing acceleration Set the acceleration/deceleration time constants at home position return. Set a time for the servo motor to reach the rated speed.	U32	rw	Possible	0	0 to 20000	ms	○	PT61	2	Impos-sible
60A8	0	SI unit position SI unit position (60A8h) is set automatically with [Pr. PT01]. The following shows the data structure. [Bit 0 to Bit 7: Reserved] [Bit 8 to Bit 15: Denominator] "00" means "Dimensionless". [Bit 16 to Bit 23: Numerator] "41" means "degree", and "00" means "Dimensionless". [Bit 24 to Bit 31: Prefix] "FD" means "milli", and "00" means "none".	U32	rw	Impos-sible	FD410000h (degree) 00000000h (pulse)	00000000h to FFFFFFFFh				2	Impos-sible
60A9	0	SI unit velocity The SI unit velocity is returned. FEB44700h: 0.01 r/min	U32	rw	Impos-sible	FEB44700h	FEB44700h				2	Impos-sible
60B8	0	Touch probe function Set the command for the touch probe function. When the "control mode selection" of [Pr. PA01] is "6 (point table method)" and the "command interface selection" of [Pr. PN08] is "0 (general purpose interface)", the initial value is "0033h". In other cases, the initial value is "0000h".	U16	rw	Possible	0000h/0033h	0000h to FFFFh				1	Possible
60B9	0	Touch probe status The status of the touch probe function is returned.	U16	ro	Possible	0000h	0000h to FFFFh				1	Possible
60BA	0	Touch probe pos1 pos value The position latched at the rising edge of touch probe 1 is returned.	I32	ro	Possible	0	-2147483648 to 2147483647	pos units			2	Possible
60BB	0	Touch probe pos1 neg value The position latched at the falling edge of touch probe 1 is returned.	I32	ro	Possible	0	-2147483648 to 2147483647	pos units			2	Possible
60E0	0	Positive torque limit value The forward rotation torque limit can be read. The forward rotation torque limit can also be set. Set a forward torque limit value in units of 0.1%.	U16	rw	Possible	10000	0 to 10000	0.1%	○	PA11/ PA12	1	Impos-sible
60E1	0	Negative torque limit value The reverse rotation torque limit can be read. The reverse rotation torque limit can also be set. Set a reverse torque limit value in units of 0.1%.	U16	rw	Possible	10000	0 to 10000	0.1%	○	PA12/ (PA11)	1	Impos-sible
60E3	0	Supported homing method The number of supported homing methods is returned. Depending on the servo amplifier software version, the "Default" values are different. A3 or earlier: 39 A4 or later: 40	U8	ro	Impos-sible	39 (A3 or earlier) 40 (A4 or later)	0 to 255				1 + Number of reading	Impos-sible
	1 to 40 (Note 3)	1st supported homing method Set the number of the supported home position return type.	I8	ro	Impos-sible	37	-128 to 127					

Index	Sub Index	Name and function	Data Type	Access	Variable mapping	Default	Range	Units	EEP-ROM	Parameter	No. of points/No. of Registers	Continuous read/ continuous write
60F2	0	Positioning option code Set the profile position mode. Bit 1 to Bit 3 always report "0". Setting a value other than "0" causes an error. [Bit 1 / Bit 0: relative option] Specify how to handle the relative position command during pp. 00: The positioning moves with the relative position from the internal absolute target position. [Bit 3 / Bit 2: change immediately option] The change set immediately (Controlword bit 5) at pp = Specify the behavior of 1. 00: Standard operation of pp mode (Immediately reflects new Target position, profile velocity, acceleration etc). [Bit 7 / Bit 6: rotary axis direction option] Specify the operation of the rotation axis during pp and pt. 00: Rotating to the target position in a direction specified with a sign of the position data. 01: Regardless of the sign of the position data, the servo motor rotates in the address decreasing direction. 10: Regardless of the sign of the position data, the servo motor rotates in the address increasing direction. 11: The servo motor rotates from the current position to the target position in the shorter distance direction. In addition, if the distances from the current position to the target position are the same for CCW and CW, the servo motor rotates in the CCW direction.	U16	rw	Possible	0000h	0000h to 00C0h			PT03	1	Impos-sible
60F4	0	Following error actual value The droop pulses are returned.	I32	ro	Possible		-2147483648 to 2147483647	pos units			2	Impos-sible
60FA	0	Control effort The speed command is returned.	I32	ro	Possible	0	-2147483648 to 2147483647	0.01 r/min			2	Impos-sible
60FF	0	Target velocity Set the speed command used in the profile velocity mode (pv).	I32	rw	Possible	0	-2147483648 to 2147483647	0.01 r/min			2	Impos-sible
6502	0	Supported drive modes The supported control mode is returned. Depending on the servo amplifier software version, the "Default" value and "Range" value are different. Refer to section 7.6.9 for details. Bit 0: Profile position mode (pp) Bit 2: Profile velocity mode (pv) Bit 3: Profile torque mode (tq) Bit 5: Homing mode (hm) Bit 16: Jog mode (jg) Bit 17: Point table mode (pt) Bit 19: Indexer mode (idx)	U32	ro	Possible	0000002Dh (A3 or earlier) 000B002Dh (A4 or later)	0000002Dh (Fixed) (A3 or earlier) 000B002Dh (Fixed) (A4 or later)				2	Impos-sible

Note 1. This object can be used on the servo amplifiers with software version A3 or later.
2. This object can be used on the servo amplifiers with software version A4 or later.
3. For servo amplifiers with software version A3 or earlier, the range of Sub Index is 1 to 39.

7.4 Object dictionary details (1000 series)

POINT
●This section describes the objects of the 1000 series. Refer to section 7.3 for details on the objects that are not listed here.

7.4.1 Manufacturer Device Name (1008h)

(1) Object list

Index	Sub Index	Name	Data Type	Access	No. of points/No. of Registers	Continuous read/ continuous write
1008h	0	Manufacturer Device Name	VS	ro	16	Impossible

The model name of the servo amplifier can be read.
This is available with servo amplifiers with software version A4 or later.

(2) Usage

Use this object to read the model name of the servo amplifier (ASCII: 16 characters).
Fill with spaces (20h) if the model name is less than 32 characters.

As an example, for MR-JE-20C it will be as follows.

Byte	0	1	2	3	4	5	6	7	8	9 to 32
Characters	M	R	-	J	E	-	2	0	C	(Space)

7.4.2 Manufacturer Hardware Version (1009h)

(1) Object list

Index	Sub Index	Name	Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
1009h	0	Manufacturer Hardware Version	VS	ro	1	Impossible

The hardware version of the network module can be read.
Can be used with servo amplifiers with software version A4 or later.

(2) Usage

Use this object to read the hardware version (ASCII: 2 characters) of the network module.
Fill with spaces (20h) if the model name is less than 2 characters.

As an example, if the hardware version is A, it will be as follows.

Byte	0	1
Characters	A	(Space)

7.4.3 Manufacturer Software Version (100Ah)

(1) Object list

Index	Sub Index	Name	Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
100Ah	0	Manufacturer Software Version	VS	ro	8	Impossible

The software version of the servo amplifier model can be read.
Can be used with servo amplifiers with software version A4 or later.

(2) Usage

Use this object to read the software version (ASCII: 16 characters) of the servo amplifier.
Fill with spaces (20h) if the model name is less than 16 characters.

As an example, if the hardware version is A, it will be as follows.

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Characters	(Space)	B	C	D	-	B	4	6	W	7	5	0	(Space)	A	4	(Space)

7.4.4 Store Parameters (1010h)

> POINT
>
> ●When shutting off the power after executing Store parameters, check that the parameter save is not being executed (bit 0 is on) before shutting off the power.

The objects can be saved in the EEP-ROM of the servo amplifier by writing "65766173h" (= reverse ASCII code of "save") to the corresponding sub object of Store Parameters (1010h).
The value saved in the EEP-ROM is set to the object at the next power-on. Parameter setting can also be changed through the object dictionary by using the necessary Store Parameters (1010h), and not by writing to the EEP-ROM immediately.
In addition, it takes 10 seconds maximum as the Store Parameters (1010h) writes all the parameters collectively. Do not shut off the power during writing.

Index	Sub Index	Name		Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
1010h	0	Store parameters	Number of entries	I8	ro	11	Impossible
	1		Save all parameters	U32	rw		
	2 (Note)		Save communication parameters	U32	rw		
	3 (Note)		Save application parameters	U32	rw		
	4 (Note)		Save manufacturer defined parameters	U32	rw		
	5 (Note)		Save Point table	U32	rw		

Note. Can be used with servo amplifiers with software version A4 or later.

Parameter and point table setting values can be saved in EEP-ROM.

(1) Usage

This object can read the compatibility of each Sub Index. The following table shows the returned values of each item.

Sub Index	Item	Saved parameter	Returned value
0	Number of entries		5 (Note)
1	Save all parameters	Index: 2001h to 27FFh, 2801h to 28FFh	00000001h (available)
2	Save communication parameters		00000000h (unavailable)
3	Save application parameters		00000000h (unavailable)
4	Save manufacturer defined parameters	Index: 2001h to 27FFh	00000001h (available)
5	Save Point table	Index: 2801h to 28FFh	00000001h (available)

Note. In servo amplifiers with software version A3 or earlier, the return value is "1".

Select the items to be saved in EEP-ROM using this object. At this time, set "00h" or "01h" for Number of entries.

When saving the servo amplifier parameter data and point table data in the EEP-ROM, set according to the following table. When bit 1 (EEP-ROM write complete) of Status DO1 (2D11h) is "1", saving to the EEP-ROM is completed.

Writing a value other than "65766173h" or "00000000h" to each item results in an error.

Sub Index	Item	Setting value	Write to EEP-ROM	
			Parameter	Point table
0	Number of entries	5 (Note)		
1	Save all parameters	00000000h	Disabled	Disabled
		65766173h ("save")	Enabled	Enabled
		Other than above	Error	Error
2	Save communication parameters	00000000h	Disabled	Disabled
		65766173h ("save")	Disabled	Disabled
		Other than above	Error	Error
3	Save application parameters	00000000h	Disabled	Disabled
		65766173h ("save")	Disabled	Disabled
		Other than above	Error	Error
4	Save manufacturer defined parameters	00000000h	Disabled	Disabled
		65766173h ("save")	Enabled	Disabled
		Other than above	Error	Error
5	Save Point table	00000000h	Disabled	Disabled
		65766173h ("save")	Disabled	Enabled
		Other than above	Error	Error

Note. For servo amplifiers with software version A3 or earlier, the setting value is "1".

7.4.5 Restore default parameters (1011h)

Index	Sub Index	Name		Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
1011h	0	Restore default parameters	Number of entries	U8	ro	11	Impossible
	1		Restore all default parameters	U32	rw		
	2 (Note)		Restore communication default parameters	U32	rw		
	3 (Note)		Restore application default parameters	U32	rw		
	4 (Note)		Restore manufacturer defined default parameters	U32	rw		
	5 (Note)		Restore point table	U32	rw		

Note. Can be used with servo amplifiers with software version A4 or later.

(1) EEP-ROM parameter default
Writing "64616F6Ch" (= reverse order of ASCII code of "load") in Restore all default parameters (1011h: 1), and by turning on the power supply again, the parameter and the point table of the servo amplifier is initialized. The following setting values can be rewritten to the factory setting.
- Basic setting parameters ([Pr. PA_ _])
- Gain/filter setting parameters ([Pr. PB_ _])
- Extension setting parameters ([Pr. PC_ _])
- I/O setting parameters ([Pr. PD_ _])
- Extension setting 2 parameters ([Pr. PE_ _])
- Extension setting 3 parameters ([Pr. PF_ _])
- Positioning control parameters ([Pr. PT_ _])
- Network setting parameters ([Pr. PN_ _])
- Point table

(2) Communication parameter default/application parameter default
Set "0" when writing.

(3) Manufacturer definition parameter default
Writing "64616F6Ch" (= reverse order of ASCII code of "load") in Restore manufacturer defined default parameters (1011h: 4), and by turning on the power supply again, the parameter of the servo amplifier is initialized. The following setting values can be rewritten to the factory setting.
- Basic setting parameters ([Pr. PA_ _])
- Gain/filter setting parameters ([Pr. PB_ _])
- Extension setting parameters ([Pr. PC_ _])
- I/O setting parameters ([Pr. PD_ _])
- Extension setting 2 parameters ([Pr. PE_ _])
- Extension setting 3 parameters ([Pr. PF_ _])
- Positioning control parameters ([Pr. PT_ _])
- Network setting parameters ([Pr. PN_ _])

(4) Point table default
Writing "64616F6Ch" (= reverse order of ASCII code of "load") in Restore point table (1011h: 5), and by turning on again the power supply, setting value of the point table can be rewritten to the factory setting.

7.4.6 Transmit PDO Mapping (1A00h)

Index	Sub Index	Name		Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
1A00h	0	Transmit PDO Mapping	Number of entries	U8	rw		
	1		Mapped Object 001	U32			
	⋮		⋮				
	32		Mapped Object 032				

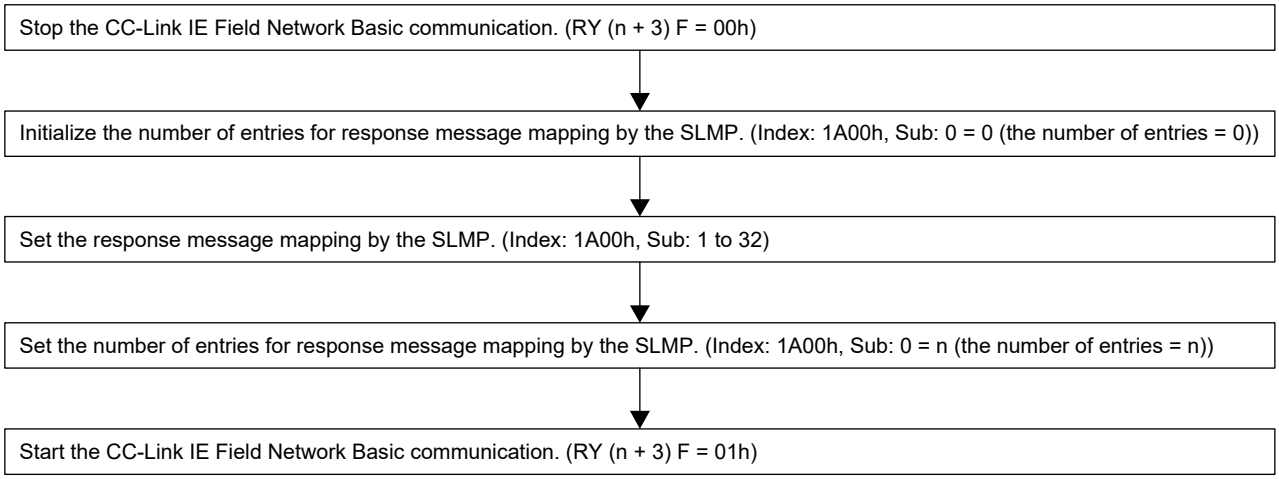
The object to be registered in the response message can be set. Set the respective number of objects to be registered in Number of entries (1A00h: 0), and the objects to be registered in Mapped Object 001 (1A00h: 1) to Mapped Object 032 (1A00h: 32). The contents of Mapped Object 001 (1A00h: 1) to Mapped Object 032 (1A00h: 32) are as follows.

Name	Bit	Detail name	Description
Mapped Object 001 to 032	16 to 31	Index of the object to be mapped	Set the Index for the object to be mapped. To set the object as unassigned (gap), set "0".
	8 to 15	Sub Index of the object to be mapped	Set the Sub Index for the object to be mapped. To set the object as unassigned (gap), set "0".
	0 to 7	Size of the object to be mapped	Set the size of the object to be mapped in bit units. Set 16 for 2 bytes. To set the object as unassigned (gap), set the size in bit units.

For the initial value, refer to Table 2.2 and Table 2.3 in section 2.5 in the "Servo amplifier → Master Station (RWrn)" column.

(1) Usage

Change the response message mapping with the following procedure.



(2) Setting precautions

(a) The response message mapping can be set while the CC-Link IE Field Network Basic Communication is stopped (RX (n + 3) F = 00h).

(b) Map the objects in the order of Sub Index 1 to 32 regardless of the object size. Only the necessary number of RWr devices are secured automatically.

(c) Keep the total size of the objects to be mapped within 64 bytes.

(d) Index of object to be mapped: 0, Sub Index: A gap can be inserted by setting it to 0. Set the gap size in bit units for the objects to be mapped.

(e) The placement changed in assignment by the response message mapping is not saved. Correct the setting when the servo amplifier is turned on again.

7.5 Object dictionary details (2000 series)

POINT

●This section describes the objects of the 2000 series. Refer to section 7.3 for details on the objects that are not listed here.

7.5.1 SDO Abort Code (2A60h)

Index	Sub Index	Name	Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
2A60h	0	SDO Abort Code	U32	ro	2	Impossible

This object is can be used with servo amplifiers with software version A3 or later.
The latest SDO Abort Code generated in Modbus Communication can be read.
By reading the latest SDO Abort Code, the access status to the object can be checked.
If there is an error with the SDO Abort Code, review the access method.

(1) Usage

Use this object to read the SDO Abort Code.
The SDO Abort Code is as follows.

SDO Abort Code	Description
0000 0000h	No problem found.
0504 0001h	Client/server command specifier not valid or unknown.
0601 0000h	Unsupported access to an object/register.
0601 0001h	Attempt to read a write only object/register.
0601 0002h	Attempt to write a read only object/register.
0602 0000h	Object/Register does not exist in the object library/Modbus registers.
0604 0041h	Object/Register cannot be mapped to the PDO.
0604 0042h	The number and length of the objects/registers to be mapped would exceed PDO length.
0607 0010h	Data type does not match, length of service parameter does not match.
0609 0011h	Sub-index/Element of register does not exist.
0609 0030h	Value range of parameter exceeded (only for write access).
0609 0031h	Value of parameter written too high.
0609 0032h	Value of parameter written too low.
0800 0000h	Generic error.
0800 0020h	Data cannot be transferred or stored to the application.
0800 0021h	Data cannot be transferred or stored to the application because of local control.
0800 0022h	Data cannot be transferred or stored to the application because of the present device state.
0800 0024h	No data available.

7.5.2 Access log 1 (2A64h)

Index	Sub Index	Name	Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
2A64h	0	Access log 1	U32	ro	2	Impossible

This object is can be used with servo amplifiers with software version A3 or later.
The access log 1 can be read.

(1) Usage

By using this object, the access log 1 can be read.
The access log 1 displays the address that was last accessed successfully in Modbus communication.

Access log 1	Response data
Higher 2 bytes	Address: xxxxh
Lower 2 bytes	For manufacturer setting: 00yyh

For example, if access to the input device status (Index: 2C12h) is successful, the read value of access log 1 is "2C120004h".

7.5.3 Access log 2 (2A65h)

Index	Sub Index	Name	Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
2A65h	0	Access log 2	U16	ro	1	Impossible

This object is available with servo amplifiers with software version A3 or later.
The access log2 can be read.

(1) Usage

By using this object, the access log2 can be read.
The access log 2 displays the number of addresses that were last accessed successfully in Modbus communication.
Use this when an access error has occurred in the continuous read/write.
For example, when an error occurs during continuous reading of the monitor (Index: 2B01h to 2B0Ah), if the read value of the access log 2 is "0006h", an error that occurred at address 2B07h can be determined.

7.5.4 Communication error count (2A68h)

Index	Sub Index	Name	Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
2A68h	0	Communication error count	U16	rw	1	Impossible

This object is available with servo amplifiers with software version A4 or later.
The Modbus RTU communication error count can be read.

(1) Usage

By using the function code "03h" (reading of maintenance register), the total number of communication errors indicated below can be read.

- Errors detected by hardware (parity error, overrun error, and framing error)
- Message frame length error
- CRC error

In addition, by writing "1EA5h" using function code "10h" (multiple maintenance register data writing), error count can be cleared.

7.5.5 External Input pin display (2C10h)

Index	Sub Index	Name		Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
2C10h	0	External Input pin display	Number of entries	U8	ro	3	Impossible
	1		External Input pin display1	U32	ro		

The ON/OFF status of the external input pin inputted to the servo amplifier can be read.

(1) Usage

Read the ON/OFF status of the external input pin by using this object. At this time, "02h" is returned to Number of entries.

The status of the input pin of MR-JE-_C servo amplifier can be checked on the External Input pin display 1. The following table shows the details. When the input of the target pin is on, "1" is returned. When the input of the target pin is off, "0" is returned. The values in the areas marked with diagonal lines are indefinite.

Bit	CN3 connector pin
0	3
1	4
2	1
3	2
4	8
5	21
6	6
7	19

Bit	CN3 connector pin
8	
9	
10	
11	
12	
13	
14	
15	

Bit	CN3 connector pin
16	
17	
18	
19	
20	
21	
22	
23	

Bit	CN3 connector pin
24	
25	
26	
27	
28	
29	
30	
31	

7.5.6 External Output pin display (2C11h)

Index	Sub Index	Name		Data Type	Access	No. of points/ No. of Registers	Continuous read/ continuous write
2C11h	0	External Output pin display	Number of entries	U8	ro	3	Impossible
	1		External Output pin display1	U32	ro		

The ON/OFF status of external output signals outputted from the servo amplifier can be read.

(1) Usage

Read the ON/OFF state of external signals with this object. At this time, "02h" is returned to Number of entries.

The status of the output pin of MR-JE-_C servo amplifier can be checked on the External Output pin display 1. The following table shows the details. When the output of the target pin is on, "1" is returned. When the output of the target pin is off, "0" is returned. The values in the areas marked with diagonal lines are indefinite.

Bit	CN3 connector pin
0	14
1	22
2	16
3	
4	
5	15
6	
7	

Bit	CN3 connector pin
8	
9	
10	
11	
12	
13	
14	
15	

Bit	CN3 connector pin
16	
17	
18	
19	
20	
21	
22	
23	

Bit	CN3 connector pin
24	
25	
26	
27	
28	
29	
30	
31	

7.5.7 External Input signal display (2C12h)

Index	Sub Index	Name		Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2C12h	0	External Input signal display	Number of entries	U8	ro	9	Impossible
	1		External Input signal display1	U32			
	2		External Input signal display2	U32			
	3		External Input signal display3	U32			
	4		External Input signal display4	U32			

The current input device status can be read.

(1) Usage

In External Input signal display1 to External Input signal display4, the ON/OFF status of the input devices of the MR-JE-_C servo amplifier can be checked. The following table shows the details. When the input of the target device is on, "1" is returned. When the input of the target device is off, "0" is returned. The values in the areas marked with diagonal lines are undefined.

Bit	Input device signal (Note 1)			
	External Input signal display1	External Input signal display2	External Input signal display3	External Input signal display4
0	SON (Servo-on)		MD0 (Operation mode selection 1) (Note 2)	
1	LSP (Forward rotation stroke end)		MD1 (Operation mode selection 2) (Note 2)	
2	LSN (Reverse rotation stroke end)			
3	TL (External torque limit selection)			
4	TL1 (Internal torque limit selection)		TP0 (Manual pulse generator multiplication 1) (Note 2)	
5	PC (Proportional control)		TP1 (Manual pulse generator multiplication 2) (Note 2)	
6	RES (Reset)		OVR (Override selection) (Note 2)	
7	CR (Clear)			
8	SP1 (Speed selection 1)			
9	SP2 (Speed selection 2)		DOG (Proximity dog)/SIG (Indexer rotation direction decision) (Note 2)	
10	SP3 (Speed selection 3)			
11	ST1/RS2 (Forward rotation start/reverse rotation selection)			
12	ST2/RS1 (Reverse rotation start/forward rotation selection)			
13	CM1 (Electronic gear setting 1)			
14	CM2 (Electronic gear setting 2)			
15	LOP (Control switching)			
16		TPR1 (Touch probe 1)		
17				
18	EM2/EM1 (Forced stop 2/1)			
19				
20	STAB2 (Second acceleration/deceleration selection)		OV0 (Digital override selection 1) (Note 2)	

Bit	Input device signal (Note 1)			
	External Input signal display1	External Input signal display2	External Input signal display3	External Input signal display4
21			OV1 (Digital override selection 2) (Note 2)	
22			OV2 (Digital override selection 3) (Note 2)	
23			OV3 (Digital override selection 4) (Note 2)	
24	TSTP (Temporary stop/restart) (Note 2)		DI0 (Point table No. selection 1/Station No. selection 1) (Note 2)	
25			DI1 (Point table No. selection 2/Station No. selection 2) (Note 2)	
26			DI2 (Point table No. selection 3/Station No. selection 3) (Note 2)	
27	CDP (Gain switching)		DI3 (Point table No. selection 4/Station No. selection 4) (Note 2)	
28			DI4 (Point table No. selection 5/Station No. selection 5) (Note 2)	
29			DI5 (Point table No. selection 6/Station No. selection 6) (Note 2)	
30			DI6 (Point table No. selection 7/Station No. selection 7) (Note 2)	
31			DI7 (Point table No. selection 8/Station No. selection 8) (Note 2)	

Note 1. For details on the signals, refer to section 3.5 in "MR-JE-_C Servo Amplifier Instruction Manual".
2. This can be used on the servo amplifiers with software version A4 or later.

7.5.8 Control DI (2D01h to 2D0Ah)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2D01h to 2D0Ah	0	Control DI1 to Control DI10	U16	rw	1	Possible

The on/off status of input device can be read.
The on/off status of input device can also be set.

The following table lists readable and writable input devices.

(1) Bit definition of control DI 1

Bit	Symbol	Description
0	C_EM2	This is enabled when [Pr. PA04] is set to "2 _ _ _" (initial value). When C_EM2 is turned on, the command decelerates the servo motor to a stop. The forced stop status can be reset by turning off the C_EM2 from the forced stop status. In the torque control mode, C_EM2 functions the same as C_EM1.
	C_EM1	This is enabled when [Pr. PA04] is set to "0 _ _ _" (initial value). When C_EM1 is turned on, the base circuit shuts off, and the dynamic brake operates to decelerate the servo motor to a stop. The forced stop status can be reset by turning off the C_EM1 from the forced stop status.
1		The value at reading is undefined. Set "0" when writing.
2		
3		
4	C_CDP	Gain switching Turning C_CDP on switches the values of [Pr. PB29] to [Pr. PB36] and [Pr. PB56] to [Pr. PB60] as the load to motor inertia ratio and gain values.
5		The value at reading is undefined. Set "0" when writing.
6		
7		
8	C_TL1	When C_TL1 is turned on, [Pr. PC35 Internal torque limit 2] can be selected. However, if the value of [Pr. PA11] (60E0h) or [Pr. PA12] (60E1h) is less than the limit value set in [Pr. PC35], the value of [Pr. PA11] (60E0h) or [Pr. PA12] (60E1h) will be enabled.
9		The value at reading is undefined. Set "0" when writing.
10		
11		
12		
13		
14		
15		

(2) Bit definition of control DI 2

Bit	Symbol	Description
0		The value at reading is undefined. Set "0" when writing.
1		
2		
3		
4		
5		
6		
7		
8	C_PC	Proportional control Turn C_PC on to switch the speed amplifier from the proportional integral type to the proportional type. If the servo motor is stopped and then rotated by even one pulse due to any external factor, it generates torque to compensate for the droop pulse and returns to the original position. When the servo motor shaft is to be locked mechanically after positioning completion (stop), switching on the C_PC upon positioning completion will suppress the unnecessary torque generated to compensate for a position mismatch. When the shaft is to be locked for an extended period of time, switch on the C_PC and TL (External torque limit selection) at the same time to make the torque equal to or less than the rated by TLA (Analog torque limit). Do not use C_PC in the torque control. When C_PC is used in the torque control, operation may be performed at a speed exceeding the speed limit value.
9		The value at reading is undefined. Set "0" when writing.
10		
11		
12		
13		
14		
15	C_ORST	Operation alarm reset Turn C_ORST on from off to reset [AL. F4 Positioning warning].

(3) Bit definition of control DI 3

Bit	Symbol	Description
0		The value at reading is undefined. Set "0" when writing.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11	C_CR	Clear Turn the C_CR on to clear the droop pulses of the position control counter on the rising edge of the C_CR. The pulse width should be 10 ms or longer. The delay time set in [Pr. PB03] is also cleared. When "_ _ _1" is set to [Pr. PD37], the droop pulses are always cleared while the CR is on. This bit can be used on servo amplifiers with software version A4 or later.
12		The value at reading is undefined. Set "0" when writing.
13	C_STAB2	Second acceleration/deceleration selection The device allows selection of the acceleration/deceleration time constant at servo motor rotation in the speed control mode or torque control mode. The S-pattern acceleration/deceleration time constant is always uniform. Bit 13: 0 → Acceleration time constant: Pr. PC01; Deceleration time constant: Pr. PC02 Bit 13: 1 → Acceleration time constant: Pr. PC30; Deceleration time constant: Pr. PC31
14		The value at reading is undefined. Set "0" when writing.
15		

(4) Bit definition of control DI 4

Bit	Symbol	Description
0		The value at reading is undefined. Set "0" when writing.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

(5) Bit definition of control DI 5

Bit	Symbol	Description
0		The value at reading is undefined. Set "0" when writing.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11	C_DOG	Proximity dog When C_DOG is turned on, a proximity dog will be detected. The polarity for dog detection can be changed with [Pr. PT29].
12		The value at reading is undefined. Set "0" when writing.
13		
14		
15		

(6) Bit definition of control DI 6

Bit	Symbol	Description
0		The value at reading is undefined. Set "0" when writing.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

(7) Bit definition of control DI 7

<table>
<tr><th>Bit</th><th>Symbol</th><th>Description</th></tr>
<tr><td>0
1
2
3</td><td></td><td>The value at reading is undefined. Set "0" when writing.</td></tr>
<tr><td>4</td><td>C_TP0</td><td>Manual pulse generator multiplication 1
Select a multiplication of the manual pulse generator in accordance with the combination with C_TP1.
When a multiplication is not selected, the value set in [Pr. PT03] is enabled.
This bit can be used on the servo amplifiers with software version A4 or later.
<table><tr><th colspan="2">Device (Note)</th><th rowspan="2">Manual pulse generator multiplication</th></tr><tr><th>C_TP0</th><th>C_TP1</th></tr><tr><td>0</td><td>0</td><td>[Pr. PT03] setting value</td></tr><tr><td>0</td><td>1</td><td>× 1</td></tr><tr><td>1</td><td>0</td><td>10 times</td></tr><tr><td>1</td><td>1</td><td>100 times</td></tr></table>Note. 0: Off, 1: On</td></tr>
<tr><td>5</td><td>C_TP1</td><td>Manual pulse generator multiplication 2
Refer to C_TP0 for details.
This bit can be used on the servo amplifiers with software version A4 or later.</td></tr>
<tr><td>6</td><td></td><td>The value at reading is undefined. Set "0" when writing.</td></tr>
<tr><td>7</td><td>C_OVR</td><td>Analog override selection
Turning C_OVR on enables VC (Analog override).
This bit can be used on the servo amplifiers with software version A4 or later.</td></tr>
<tr><td>8
9
10
11
12
13
14
15</td><td></td><td>The value at reading is undefined. Set "0" when writing.</td></tr>
</table>

(8) Bit definition of control DI 8

Bit	Symbol	Description
0		The value at reading is undefined. Set "0" when writing.
1	C_RT	Second acceleration/deceleration selection This can be used only in the indexer mode. With the C_RT off, when Controlword bit4 (New set-point) is turned on, the acceleration/deceleration time constants set in [Pr. PC01] and [Pr. PC02] are selected. With the C_RT on, when Controlword bit4 (New set-point) is turned on, the acceleration/deceleration time constants set in [Pr. PC30] and [Pr. PC31] are selected. C_RT is not received during operation. This bit can be used on the servo amplifiers with software version A4 or later.
2	C_RTCDP	Second acceleration/deceleration gain selection This can be used only in the indexer mode. This bit has the functions of C_CDP and C_RT. When C_RTCDP is off, values of the servo control gain set in [Pr. PB06], [Pr. PB08] to [Pr. PB10] are selected. When Controlword bit4 (New set-point) is turned on, the acceleration/deceleration time constants set in [Pr. PC01] and [Pr. PC02] are selected. When C_RTCDP is on, values of the servo control gain set in [Pr. PB29] to [Pr. PB32] are selected. When Controlword bit4 (New set-point) is turned on, the acceleration/deceleration time constants set in [Pr. PC30] and [Pr. PC31] are selected. This bit can be used on the servo amplifiers with software version A4 or later.
3	C_OV0	Digital override selection 1 This bit can be used on the servo amplifiers with software version A4 or later. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".
4	C_OV1	Digital override selection 2 This bit can be used on the servo amplifiers with software version A4 or later. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".
5	C_OV2	Digital override selection 3 This bit can be used on the servo amplifiers with software version A4 or later. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".
6	C_OV3	Digital override selection 4 This bit can be used on the servo amplifiers with software version A4 or later. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".
7		The value at reading is undefined. Set "0" when writing.
8		
9		
10		
11		
12		
13		
14		
15		

(9) Bit definition of control DI 9

Bit	Symbol	Description
0		The value at reading is undefined. Set "0" when writing.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

(10) Bit definition of control DI 10

Bit	Symbol	Description
0		The value at reading is undefined. Set "0" when writing.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

7.5.9 Status DO (2D11h to 2D1Ah)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2D11h to 2D1Ah	0	Status DO1 to Status DO10	U16	ro	1	Possible

The on/off status of output device can be read. The following table lists readable output devices.

(1) Bit definition of Status DO 1

Bit	Symbol	Description
0		The value at reading is undefined.
1	S_ERF	EEP-ROM write completed When a value is not written to EEP-ROM, the S_ERF turns on. While a value is being written to EEP-ROM, S_ERF turns off.
2	S_SA	Speed reached When the servo motor speed reaches the following range, the S_SA turns on. Set speed ± ((Set speed × 0.05) + 20) r/min When the preset speed is 20 r/min or less, the SA is always turned on. SA does not turn on even when the SON (Servo-on) is turned off or the servo motor speed by the external force reaches the preset speed while both ST1 (Forward rotation start) and ST2 (reverse rotation start) are off.
3	S_MBR	Electromagnetic brake interlock When a servo-off status or alarm occurs, S_MBR turns off.
4	S_CDPS	Variable gain selection S_CDPS turns on during gain switching.
5		The value at reading is undefined.
6		
7	S_TL	External torque limit selection When the TL (External torque limit selection) is turned on, the S_TL is turned on.
8	S_TL1	Internal torque limit selection When the C_TL1 or TL1 (Internal torque limit selection) is turned on, the S_TL1 turns on.
9		The value at reading is undefined.
10		
11		
12	S_INP	In-position When the number of droop pulses is in the in-position range, S_INP turns on. The in-position range can be changed with [Pr. PA10]. When the in-position range is increased, INP may be always on during low-speed rotation.
13	S_TLC	Limiting torque While the torque is being generated, the S_TLC is turned on when the torque reaches the value set by [Pr. PA11 Forward torque limit], [Pr. PA12 Reverse torque limit], or TLA (Analog torque limit).
14	S_ABSV	Absolute position undetermined S_ABSV turns on when the absolute position is undetermined.
15	S_BWNG	Battery warning The S_BWNG is turned on when [AL. 92 Battery cable disconnection warning] or [AL. 9F Battery warning] occurs. When the battery warning is not occurring, S_BWNG will turn off in 2.5 s to 3.5 s after power-on.

(2) Bit definition of status DO 2

Bit	Symbol	Description
0	S_ZPASS	Z-phase already passed 0: Z-phase unpassed after start-up 1: Z-phase passed once or more after start-up This bit can be used on the servo amplifiers with software version A3 or later.
1		The value at reading is undefined.
2		
3	S_ZSP	Zero speed detection The S_ZSP turns on when the servo motor speed is at zero speed or less. Zero speed can be changed with [Pr. PC17].
4	S_VLC	Limiting speed The S_VLC turns on when the speed reaches the limit on any of the parameter between [Pr. PC05 Internal speed limit 1] to [Pr. PC11 Internal speed limit 7]. This turns off when SON (Servo-on) turns off.
5		The value at reading is undefined.
6		
7		
8	S_PC	Under proportional control S_PC turns on under proportional control.
9		The value at reading is undefined.
10		
11		
12		
13		
14		
15	S_ZP2	Home position return completion 2 When a home position return completes normally, S_ZP2 turns on. S_ZP2 is always on unless the home position is erased. In the incremental system, this signal turns off with one of the following conditions: 1) [AL. 69 Command error] occurs. 2) Home position return is not being executed. 3) Home position return is in progress. The S_ZP2 is always on even when the home position return is completed only once in the absolute position detection system. However, it will be off with one of the above 1) to 3) conditions and together with the following: 4) The home position return is not performed after [AL. 25 Absolute position erased] or [AL. E3 Absolute position counter warning] occurred. 5) The home position return is not performed after the electronic gear ([Pr. PA06] or [Pr. PA07]) was changed. 6) The home position return is not performed after the setting of [Pr. PA03 Absolute position detection system selection] was changed from "Disabled" to "Enabled". 7) [Pr. PA14 Rotation direction selection/travel direction selection] was changed. 8) [Pr. PA01 Operation mode] was changed. This bit is enabled in the profile mode, point table mode, and indexer mode.

(3) Bit definition of status DO 3

Bit	Symbol	Description
0		The value at reading is undefined.
1		
2		
3		
4		
5		
6		
7		
8		
9	S_RSTP	Forced stop deceleration The S_RSTP turns on during a forced stop deceleration. This bit can be used on the servo amplifiers with software version A3 or later.
10		The value at reading is undefined.
11	S_MTTR	During tough drive When a tough drive is "Enabled" in [Pr. PA20], activating the instantaneous power failure tough drive turns the S_MTTR on.
12		The value at reading is undefined.
13		
14		
15		

(4) Bit definition of status DO 4

Bit	Symbol	Description
0		The value at reading is undefined.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

(5) Bit definition of status DO 5

Bit	Symbol	Description
0		The value at reading is undefined.
1		
2		
3		
4		
5	S_CPO	Rough match When a command remaining distance is lower than the rough match output range set with [Pr. PT12], S_CPO turns on. This bit can be used on the servo amplifiers with software version A4 or later.
6	S_MEND	Travel completion When the droop pulses are within the in-position output range set with [Pr. PA10] and the command remaining distance is "0", S_MEND turns on. S_MEND turns on with servo-on. This bit can be used on the servo amplifiers with software version A4 or later.
7	S_ZP	Home position return completion When a home position return is completed properly, the S_ZP turns on. In the incremental system, this signal turns off with one of the following conditions: 1) The servo motor enters the servo-off status. 2) EM2 is off. 3) RES (Reset) is on. 4) An alarm occurs. 5) LSP (Forward rotation stroke end) or LSN (Reverse rotation stroke end) is off. 6) Home position return is not being executed. 7) Software limit is being detected. 8) Home position return is in progress. The S_ZP output status is the same as the S_RD even when the home position return is completed only once in the absolute position detection system. However, it is off with one of the above conditions 1) to 8) or the following conditions 9) to 14). 9) The home position return is not performed after [AL. 25 Absolute position erased] or [AL. E3 Absolute position counter warning] occurred. 10) The home position return is not performed after the electronic gear ([Pr. PA06 Electric gear numerator] and [Pr. PA07 Electric gear denominator]) was changed. 11) The home position return is not performed after the setting of [Pr. PA03 Absolute position detection system selection] was changed from "Disabled" to "Enabled". 12) [Pr. PA14 Rotation direction selection/travel direction selection] was changed. 13) [Pr. PA01 Operation mode] was changed 14) [Pr. PT08 Home position return position data], [Pr. PT58 Number of stations per rotation (extension parameter)], or [Pr. PT28 Number of stations per rotation] was changed This bit can be used on the servo amplifiers with software version A4 or later.
8	S_PUS	During a temporary stop This is available only in the point table mode. When a deceleration begins for a stop, the S_PUS is turned on by the TSTP (Temporary stop/restart). When TSTP is enabled again and an operation is restarted, S_PUS turns off. This bit can be used on the servo amplifiers with software version A4 or later.
9		The value at reading is undefined.
10		
11		
12		
13		
14		
15		

(6) Bit definition of status DO 6

Bit	Symbol	Description
0		The value at reading is undefined.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

(7) Bit definition of status DO 7

Bit	Symbol	Description
0	S_ALMWNG	Alarm/warning When an alarm occurs, the S_ALMWNG turns off. When a warning occurs (except for [AL. 9F Battery warning]), S_ALMWNG turns on and off repeatedly approximately every 1 s. When an alarm or warning is not occurring, S_ALMWNG turns on in 4 s to 5 s after power-on. This bit can be used on the servo amplifiers with software version A4 or later.
1	S_BW9F	AL9F warning When [AL. 9F Battery warning] occurs, the S_BW9F turns on. This bit can be used on the servo amplifiers with software version A4 or later.
2	S_POT	Position range When an actual current position is within the range set with [Pr. PT19]/[Pr. PT20] and with [Pr. PT21]/[Pr. PT22], the S_POT turns on. This will be off when a home position return is not completed or base circuit shut-off is in progress. This bit can be used on the servo amplifiers with software version A4 or later.
3	S_PED	Position end When the position end output range set by [Pr. PA10] and the command remaining distance is "0", the S_PED turns on. S_PED turns on when both S_MEND and S_ZP are on. S_PED turns on when S_ZP is on with servo-on status. S_PED is off at servo-off status. This bit can be used on the servo amplifiers with software version A4 or later.
4		The value at reading is undefined.
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

(8) Bit definition of Status DO 8

Bit	Symbol	Description
0		The value at reading is undefined.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

(9) Bit definition of Status DO 9

Bit	Symbol	Description
0		The value at reading is undefined.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

(10) Bit definition of Status DO 10

Bit	Symbol	Description
0		The value at reading is undefined.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

7.5.10 Manufacturer Device Name 2 (2D30h)

(1) Object list

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2D30h	0	Manufacturer Device Name 2	VS	ro	16	Impossible

The model name of the servo amplifier can be read.
This can be used on the servo amplifiers with software version A4 or later.

(2) Usage
Refer to section 7.4.1 (2).

7.5.11 Manufacturer Hardware Version 2 (2D31h)

(1) Object list

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2D31h	0	Manufacturer Hardware Version 2	VS	ro	1	Impossible

The hardware version of the network module can be read.
This can be used on the servo amplifiers with software version A4 or later.

(2) Usage
Refer to section 7.4.2 (2).

7.5.12 Manufacturer Software Version 2 (2D32h)

(1) Object list

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2D32h	0	Manufacturer Software Version 2	VS	ro	8	Impossible

The software version of the servo amplifier can be read.
This can be used on the servo amplifiers with software version A4 or later.

(2) Usage
Refer to section 7.4.3 (2).

7.5.13 Serial Number 2 (2D33h)

(1) Object list

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2D33h	0	Serial Number 2	VS	ro	8	Impossible

The serial numbers of the servo amplifier can be read.
This can be used on the servo amplifiers with software version A4 or later.

(2) Usage

Use this object to read the serial numbers of the servo amplifier (ASCII: 16 characters)
Fill with spaces (20h) if the model name is less than 16 characters.

Following is an example of when the serial number is 123456789012.

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12 to 15
Characters	1	2	3	4	5	6	7	8	9	0	1	2	(Space)

7.5.14 Select behavior of broadcast message (2D98h)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2D98h	0	Select behavior of broadcast message	U8	rw	1	Impossible

This object can be used on the servo amplifiers with software version A4 or later.
The broadcast communication of the Modbus RTU communication can be set.
With this object, the broadcast command can be disabled for each axis.

Setting value	Description
0	Broadcast instruction enabled
1	Broadcast instruction disabled

(1) Usage

The function code "03h" (Read Holding Registers) enables the current broadcast communication setting to be read.
Use the function code "10h" (Preset Multiple Registers) to set the broadcast communication.

7.5.15 Setup S/W graph trigger (2D99h)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2D99h	0	Setup S/W graph trigger	U8	rw	1	Impossible

This object can be used on the servo amplifiers with software version A4 or later.
The graph trigger of the setup software can be set.
The broadcast communication of Modbus RTU enables the multi axis waveform data to be measured with MR Configurator2.

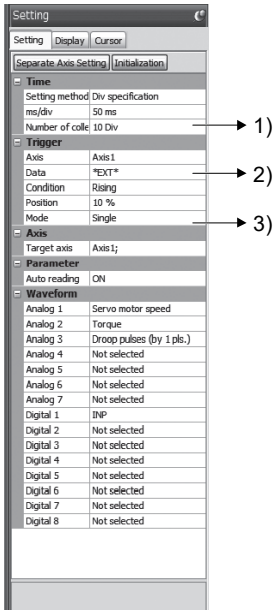
Setting value	Description
0	Setup software graph trigger off
1	Setup software graph trigger on

(1) Usage

To measure and display the multi axis graph, follow the procedure below.

(a) Setting the measuring conditions

Set the trigger conditions and each monitoring data type of the measurement target. Apply the same setting to all the target axes. Setting values are not specified except for 1) to 3).



1) Set "Number of collection Div" to a value equal to or less than 10 Div.

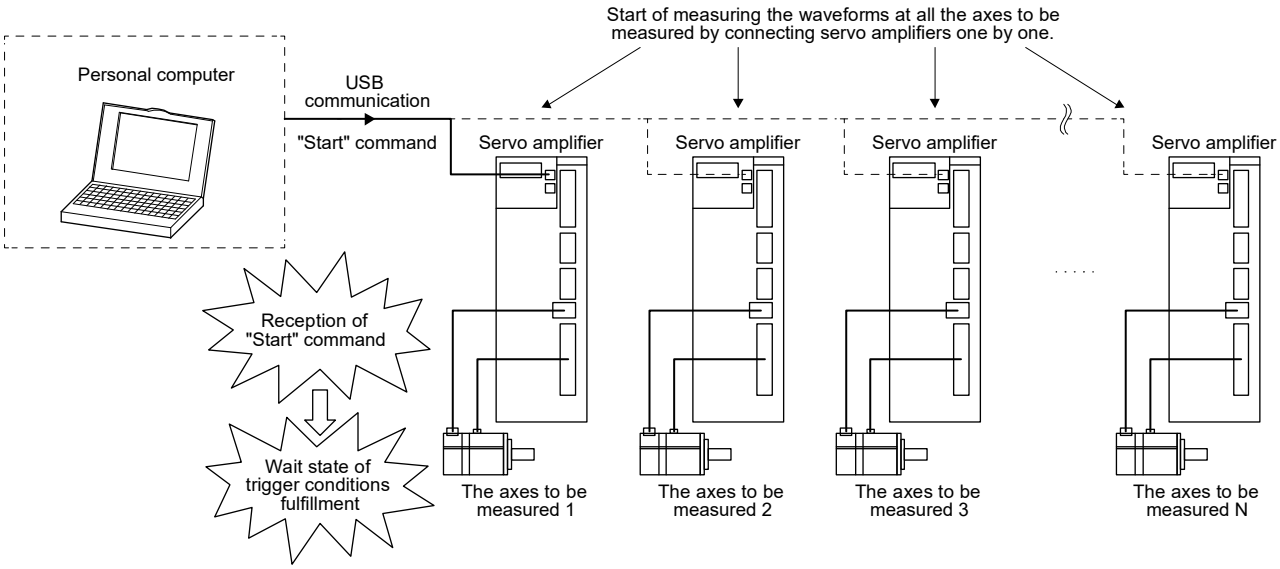
2) Set "*EXT*" for "Data".

3) Set "Single" for "Mode".

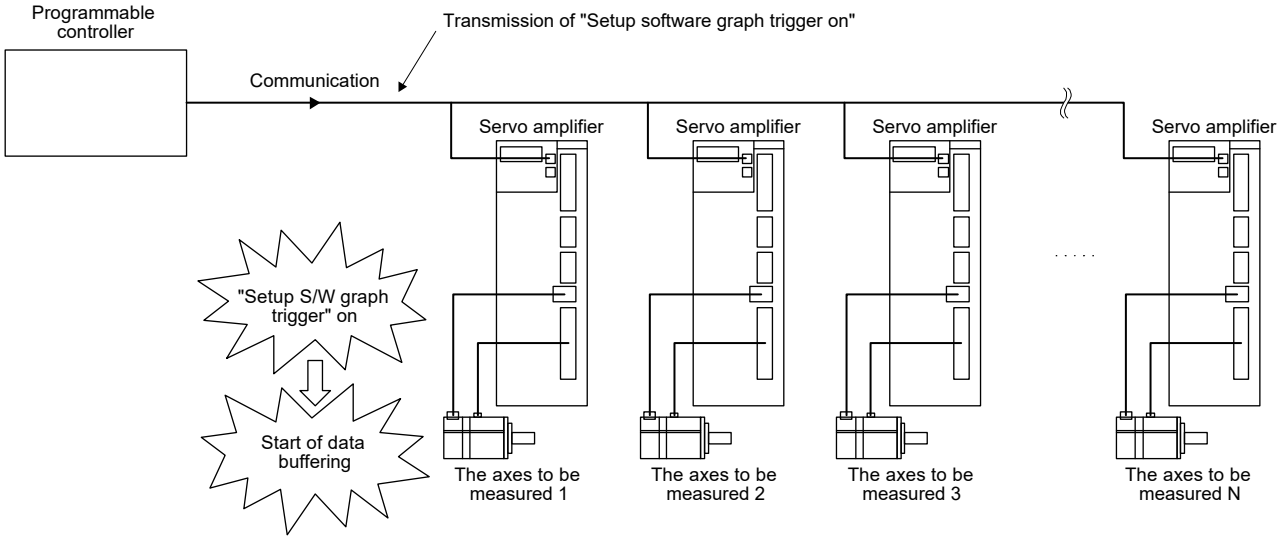
(b) Measuring the multi axis waveform data

1) After connecting the servo amplifier and MR Configurator2 with a USB cable, click "Start" to start measuring the waveform in the trigger mode.

2) Perform the operation 1) on all other target axes (servo amplifiers) to start measuring the waveforms.



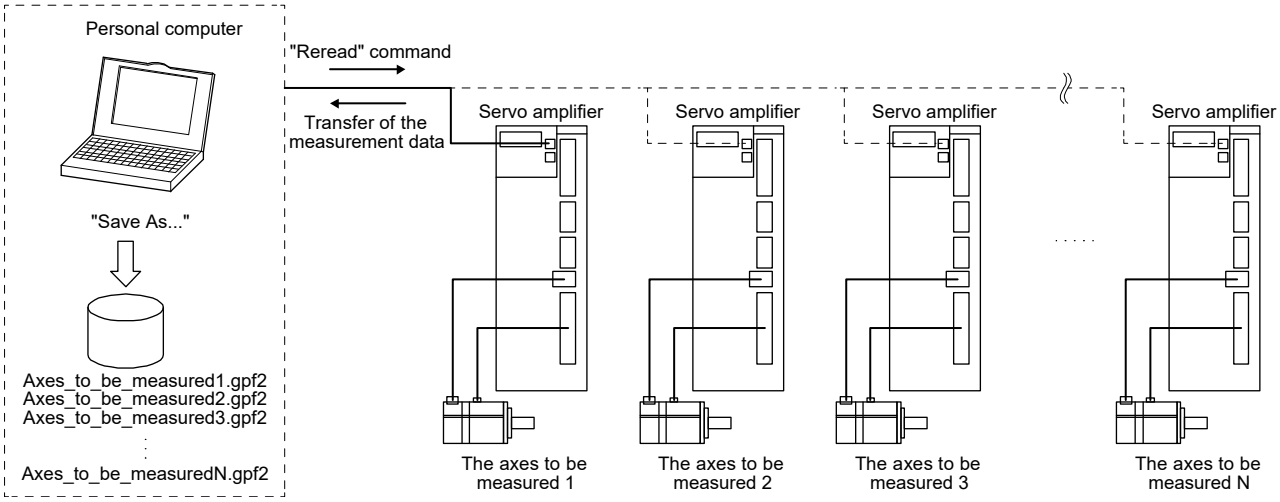
3) Set Select behavior of broadcast message (2D98h) to "0 (Broadcast command enabled)"
Refer to chapter 4 for the broadcast setting.
At the timing when the graph data is required, set "1 (Setup software graph trigger on)" for Setup S/W graph trigger (2D99h) on the broadcast communication of Modbus RTU.



(c) Saving the multi axis waveform data

1) After connecting the target axis (servo amplifier) and MR Configurator2 with a USB cable, click "Reread" to read the measurement data. Save the read data.

2) Perform the above operation on all other target axes (servo amplifiers) to save the measurement data.

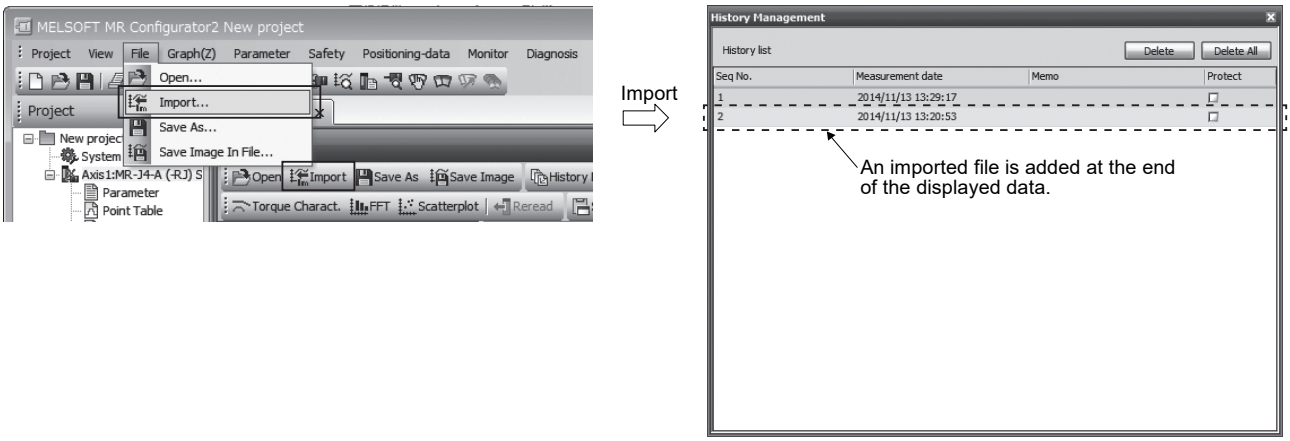


(d) Displaying the multi axis waveform data

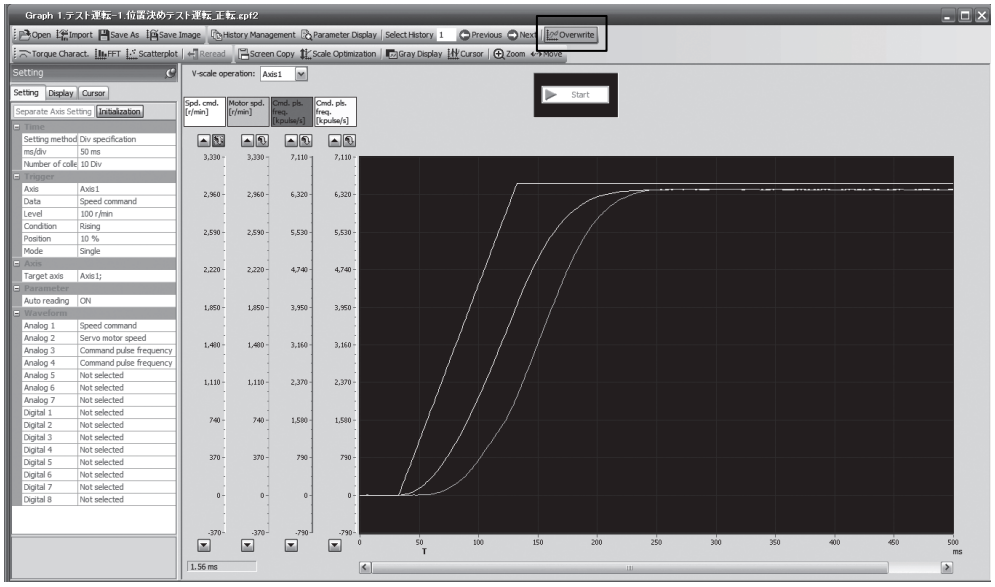
POINT

- The waveform data with different measuring conditions cannot be added to the history list on the "History Management" display.
- Set a value equal to or less than 10 Div for the numbers of waveform collection Div. The waveform data with a value exceeding 10 Div cannot be read properly at execution of "Reread".
- A maximum of 20 items can be added to the history list by importing. If the history list exceeded 20 items, delete the old ones.
- Saving data in CSV format on MR Configurator2 enables the data to be edited manually in Excel.

1) Import the data measured on multiple axes to register in the history list of "History Management" display.
Click "Import" in the "File" tab or in the "Graph" menu to select files to read.



2) After importing all the files, display the graph data with "Overwrite".
Clicking "Overwrite" enables all the histories to be checked on one window.



7.5.16 Set controlword bit4 (2D9Ah)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2D9Ah	0	Set controlword bit4	U8	rw	1	Impossible

This object can be used on the servo amplifiers with software version A4 or later.
In a system with multiple axes with different operation modes (e.g. collective system in the point table mode and indexer mode), the system can be started simultaneously using Modbus RTU broadcast communication. This setting is not needed when the same operation mode is used.
With SLMP or Modbus/TCP, specific axes can be started.

Setting value	Description
0	Simultaneous start signal off
1	Simultaneous start signal on

(1) Usage
After specifying point tables to all the stations on which simultaneous start to be performed, set "000Fh" or "002Fh" in Controlword (6040h) to make "Operation enabled" status.
Use function code "10h" (Preset Multiple Registers) to select on/off for the simultaneous start.
Set "1" in this object to execute simultaneous start. To cancel the simultaneous start, set "0" in this object and then change the point table number.

7.5.17 C_EM1/2 command (2D9Bh)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2D9Bh	0	C_EM1/2 command	U8	rw	1	Impossible

This object can be used on the servo amplifiers with software version A4 or later.
Controller operations can be forcibly stopped with function code "10h" (Preset Multiple Registers).
As this object enables controller operations to be forcibly stopped regardless of the setting in Select behavior of broadcast message (2D98h) on Modbus RTU, this object is available when executing forced stop on all axes of the servo amplifiers on the broadcast communication.
This object is also available when executing forced stop on specific axes with SLMP or Modbus/TCP.
When "Test operation selection" of [Pr. PC60] is set to "0 (disabled)", setting "1" in this object triggers [AL. E7.1].

Setting value	Description
0	Controller forced stop OFF
1	Controller forced stop ON

7.5.18 Override (2DB0h)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
2DB0h	0	Override	U16	rw	1	Impossible

This object can be used on the servo amplifiers with software version A4 or later.
Turning on OVR (Analog override selection) enables the setting. Function code "03h" (Read Holding Registers) enables the override values to be read.
Function code "10h" (Preset Multiple Registers) enables the override values to be set.
Set the override values within the range of 0% to 200%.

7.6 Detail object dictionary (6000 series)

> POINT
>
> ●This section describes the objects of the 6000 series. Refer to section 7.3 for details on the objects that are not listed here.

7.6.1 Statusword (6041h)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
6041h	0	Statusword	U16	ro	1	Impossible

The current control status can be checked.
The following table lists the bits of this object. The status can be checked with bit 0 to bit 7.

Bit	Description
0	Ready To Switch On
1	Switched On
2	Operation Enabled
3	Fault
4	Voltage Enabled
5	Quick Stop
6	Switch On Disabled
7	Warning
8	Reserved (Note 2)
9	Reserved (Note 2)
10	Target reached (Note 1)
11	Internal Limit Active
12 to 13	Operation Mode Specific (Note 1)
14 to 15	Reserved (Note 2)

Note 1. The description changes depending on the control mode.
2. The value at reading is undefined.

The following table lists the servo amplifier statuses that can be read with bit 0 to bit 7.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Status
	0			0	0	0	0	Not ready to switch on
	1			0	0	0	0	Switch on disable
	0	1		0	0	0	1	Ready to switch on
	0	1		0	0	1	1	Switch on
	0	1		0	1	1	1	Operation enabled
	0	0		0	1	1	1	Quick stop active (Note)
	0			1	1	1	1	Fault reaction active
	0			1	0	0	0	Fault
			1					Main power on (power input on)
1								Warning (warning occurrence)

Note. Not supported in the position control mode, speed control mode, and torque control mode.

Bit 11 turns on when the stroke limit, software limit, or positioning command is outside the range.

7.6.2 Quick stop option code (605Ah)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
605Ah	0	Quick stop option code	I16	rw	1	Impossible

The operation method of deceleration to a stop can be specified. The following table shows the supported methods and the operations.

Setting value	Description
1	For manufacturer setting
2	In the profile mode (pp/pv), point table mode (pt), indexer mode (idx), Jog mode (jg), and homing mode (hm), the servo motor decelerates to a stop with Quick stop deceleration (6085h), and the staus shift to the Switch On Disabled. The new setting of Quick stop deceleration is reflected at all times. In the profile torque mode (tq), the status immediately shift to the Switch On Disabled state and the servo motor stops with the dynamic brake.
3	For manufacturer setting
4	
5	
6	
7	
8	

7.6.3 Halt option code (605Dh)

(1) Object list

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
605Dh	0	Halt option code	I16	rw	1	Impossible

The following table shows descriptions of Halt option code (605Dh).

Setting value	Description
1	The description varies depending on the control mode. Refer to the following table.
2	For manufacturer setting
3	
4	

The following shows the case where Halt Bit (Bit 8 of Controlword (6040h)) is set to "1" and "0", and the reflective timing of the deceleration time setting in each control mode.

Control mode	Halt Bit is set to "1"	Halt Bit is set to "0"	Reflective timing of deceleration time setting
Profile position mode (pp)	The servo motor decelerates to a stop in accordance with Profile deceleration (6084h).	The operation restarts after the servo motor decelerates to a stop.	The new setting of Profile deceleration (6084h) is reflected when New set-point (Bit 4 of Controlword (6040h)) is set to "1".
Profile velocity mode (pv)	The servo motor decelerates to a stop in accordance with Profile deceleration (6084h).	The operation restarts after the servo motor decelerates to a stop.	The change of Profile deceleration (6084h) is reflected at all times.
Profile torque mode (tq)	Torque demand value (6074h) becomes "0" with the amount of torque change set in Torque slope (6087h) regardless of Halt option code (605Dh).	The operation restarts after Torque demand value (6074h) becomes "0".	The new setting of Torque slope (6087h) is reflected at all times.
Homing mode (hm)	When Halt Bit is set to "1", the servo motor decelerates to a stop with Homing acceleration (609Ah) and the status remain as Operation Enabled (servo-on). Then, home position return is restarted with the following procedure: (1) set Halt Bit to "0", (2) reset Homing Operation Start (Bit 4 of Controlword (6040h)) to "0", and (3) change Homing Operation Start (Bit 4 of Controlword (6040h)) to "1".		The new setting of Homing acceleration (609Ah) is reflected when Homing Operation Start (Bit 4 of Controlword (6040h)) is set to "1".
Point table mode (pt)	The servo motor decelerates to a stop in accordance with the deceleration time constant set in Point table 001 to Point table 255 (2801h to 28FFh).	The operation restarts immediately.	The new setting is reflected when the next operation starts.
Indexer mode (idx)	Halt Bit is disabled in the indexer mode.		
Jog mode (jg)	The servo motor decelerates to a stop in accordance with Profile deceleration (6084h).	The operation restarts immediately.	The new setting of Profile deceleration (6084h) is reflected when New set-point (Bit 4 of Controlword (6040h)) is set to "1".

7.6.4 Modes of operation Display (6061h)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
6061h	0	Modes of operation Display	I8	ro	1	Impossible

The current control mode can be read.
The setting value of each control mode is as follows.

Control mode	Setting value
Position control mode	-20
Speed control mode	-21
Torque control mode	-22
Point table mode (pt)	-101
Indexer mode (idx)	-103
Profile position mode (pp)	1
Profile velocity mode (pv)	3
Profile torque mode (tq)	4
Homing mode (hm)	6
Jog mode (jg)	-100
Test mode: JOG operation	-1
Test mode: Positioning operation	-2
Test mode: DO forced output	-4
Test mode: Machine analyzer	-6
Test mode: One-step feed (in the point table mode)	-10

7.6.5 Software Position Limit (607Dh)

Index	Sub Index	Name		Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
607Dh	0	Software Position Limit	Number of entries	U8	ro	5	Impossible
	1		Min Position Limit	I32	rw		
	2		Max Position Limit	I32			

The current software limit setting can be read.
At this time, "02h" is returned to Number of entries.
The stroke limit value in the reverse direction is returned to Min Position Limit in units of commands.
The stroke limit value in the forward direction is returned to Max Position Limit in units of commands.
The current software limit setting can also be written.
At this time, set "02h" for Number of entries.
For the Min Position Limit, set the stroke limit value in the reverse direction in units of commands.
For the Max Position Limit, set the stroke limit value in the forward direction in units of commands.
Setting the same value in Min Position Limit and Max Position Limit disables the software limit.

7.6.6 Polarity (607Eh)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
607Eh	0	Polarity	U8	rw	1	Impossible

The rotation direction selection can be set.
The rotation direction of a servo motor to position commands, speed commands, and torque commands can be set. To set the rotation direction to position commands and speed commands, turn on or off both bits 6 and 7 of Polarity (607Eh) or use [Pr. PA14]. To set the rotation direction to torque commands, turn on or off all of bits 5 to 7 of Polarity (607Eh), or use [Pr. PA14] and "POL reflection selection at torque mode" of [Pr. PC29]. The following table shows the descriptions of Polarity (607Eh).

Bit	Description
0	Reserved The value at reading is undefined. Set "0" when writing.
1	
2	
3	
4	
5	Torque POL The polarity is reversed when this bit is turned on. Select a rotation direction by setting bits 5 to 7 in combination.
6	Velocity POL The polarity is reversed when this bit is turned on. Select a rotation direction by setting bits 5 to 7 in combination.
7	Position POL The polarity is reversed when this bit is turned on. Select a rotation direction by setting bits 5 to 7 in combination.

7.6.7 Positioning option code (60F2h)

(1) Object list

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
60F2h	0	Positioning option code	U16	rw	1	Impossible

Selecting "degree (_ 2 _ _)" in "Position data unit" of [Pr. PT01] enables positioning to be performed on modulo coordinates (rotary shafts). The following shows the differences when "degree" is selected.

Item (Index, Sub Index)	Description
Target position (607Ah, 0)	The range changes to between -360.000° to 360.000°.
Position actual value (6064h, 0)	The range changes to between 0° to 359.999°.
Software position limit (607Dh, 0)	The range changes to between 0° to 359.999°. When a value outside the range is set, the value is clamped within the range of 0° to 359.999°.
Position range limit (607Bh, 0)	The range changes to between 0° to 359.999°.
Touch probe pos1 pos value (60BAh, 0)	The range changes to between 0° to 359.999°.
Touch probe pos1 neg value (60BBh, 0)	The range changes to between 0° to 359.999°.
Touch probe pos2 pos value (60BCh, 0)	The range changes to between 0° to 359.999°.
Touch probe pos2 neg value (60BDh, 0)	The range changes to between 0° to 359.999°.
Home offset (607Ch, 0)	The range changes to between 0° to 359.999°.

(2) Setting of the operation pattern

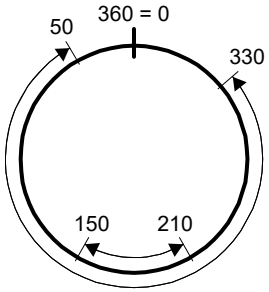
Positioning option code (60F2h) enables the positioning operation patterns to be changed. Change the setting while the servo motor is stopped (Target reached is on). If the setting is changed while the servo motor is rotating (Target reached is off), the new setting value is reflected at a positioning start (Controlword Bit 4 is on) after Target reached is turned on. The following shows the settings for the bits of Positioning option code (60F2h).

Bit 7	Bit 6	[Pr. PT03]	Rotation direction definition of rotary shafts
0	0	_ 0 _ _	The servo motor rotates to the target position in a direction specified with a sign of the position data.
0	1	_ 2 _ _	The servo motor rotates in the address decreasing direction regardless of a sign of the position data.
1	0	_ 3 _ _	The servo motor rotates in the address increasing direction regardless of a sign of the position data.
1	1	_ 1 _ _	The servo motor rotates from the current position to the target position in the shorter distance direction. In addition, if the distances from the current position to the target position are the same for CCW and CW, the servo motor rotates in the CCW direction.

(3) Sequence

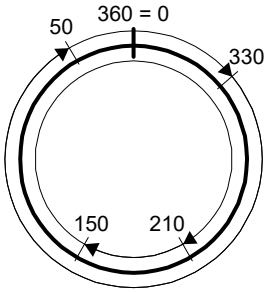
The following shows the operation patterns on each setting of Positioning option code (60F2h).

(a) When POL is disabled ([Pr. PA14] = 0)



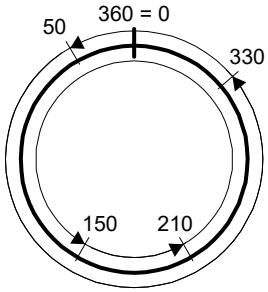
Bit 7: 0
Bit 6: 0

The servo motor rotates in a direction specified with a sign of the position data.



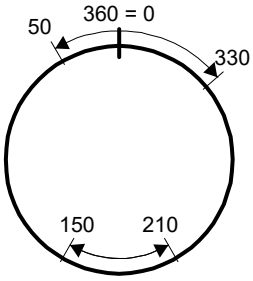
Bit 7: 0
Bit 6: 1

The servo motor rotates only in the address decreasing direction.



Bit 7: 1
Bit 6: 0

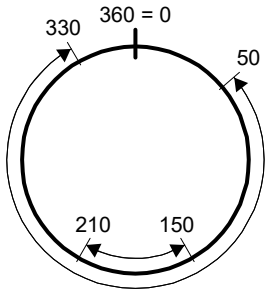
The servo motor rotates only in the address increasing direction.



Bit 7: 1
Bit 6: 1

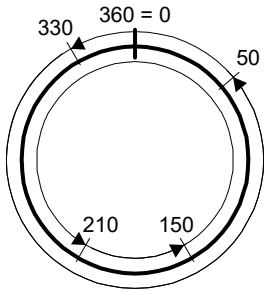
The servo motor rotates in the shorter direction.

(b) When POL is enabled ([Pr. PA14] = 1)



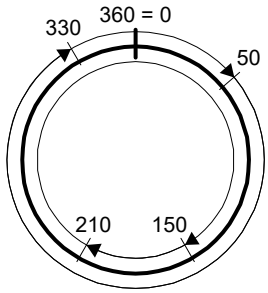
Bit 7: 0
Bit 6: 0

The servo motor rotates in a direction specified with a sign of the position data.



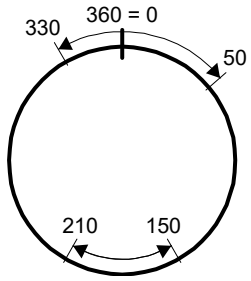
Bit 7: 0
Bit 6: 1

The servo motor rotates only in the address decreasing direction.



Bit 7: 1
Bit 6: 0

The servo motor rotates only in the address increasing direction.



Bit 7: 1
Bit 6: 1

The servo motor rotates in the shorter direction.

7.6.8 Touch probe (60B8h to 60BBh)

The current position latch data at the time of TPR1 (Touch probe 1) input can be read.

(1) Object list

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
60B8h	0	Touch probe function	U16	rw	1	Possible
60B9h	0	Touch probe status	U16	ro	1	Possible
60BAh	0	Touch probe pos1 pos value	I32	ro	2	Possible
60BBh	0	Touch probe pos1 neg value	I32	ro	2	Possible

When Touch probe function (60B8h) is set, and TPR1 (Touch probe 1), external signals, is turned on/off, the current position of the rising and falling edges are latched.
Touch probe status (60B9h) enables the latch status of the current position data to be checked. The latched current data can be read with Touch probe pos1 pos value (60BAh) and Touch probe pos1 neg value (60BBh). For details of each object, refer to (1) (a) to (d) in this section.

(a) Touch probe function (60B8h)

The current setting of the touch probe function can be checked.
Each setting of the touch probe function can also be set. The settings of this object are as follows.

Bit	Description
0	0: Latch function disabled 1: Latch function enabled
1	0: Latch with the first trigger 1: Latch continuously with trigger inputs
2	The value at reading is undefined. Set "0" when writing.
3	
4	0: Stop sampling at the rising edge of touch probe 1: Start sampling at the rising edge of touch probe
5	0: Stop sampling at the falling edge of touch probe 1: Start sampling at the falling edge of touch probe
6 to 15	The value at reading is undefined. Set "0" when writing.

Select enable/disable for the latch function with bit 0. Select "1" when using the touch probe function.
Select a trigger condition for the touch probe function with bit 1. Set "0" to latch just once when TPR1 (Touch probe 1) is inputted. Set "1" to latch every time TPR1 (Touch probe 1) is inputted.
Set a condition for the rising edge of TPR1 (Touch probe 1) with bit 4. Set "1" to latch at the rising edge.
Set a condition for the falling edge of TPR1 (Touch probe 1) with bit 5. Set "1" to latch at the falling edge.

(b) Touch probe status (60B9h)
The current status of the touch probe function can be checked. The description of this object is as follows.

Bit	Description
0	0: Latch function of touch probe is disabled 1: Latch function of touch probe is enabled
1	0: Latch is incomplete at the rising edge with the latch function of the touch probe 1: Latch is complete at the rising edge with the latch function of the touch probe
2	0: Latch is incomplete at the falling edge with the latch function of the touch probe 1: Latch is complete at the falling edge with the latch function of the touch probe
3 to 15	The value at reading is undefined.

Bit 0 indicates the status of the touch probe function. 0 indicates disabled, and 1 enabled.
With bit 1, whether the data is latched at the rising edge of the touch probe can be checked. Latched data can be read when this bit is set to "1". When this bit once turns on, it remains on until bit 4 of Touch probe function (60B8h) is set to "0".
With bit 2, whether the data is latched at the falling edge of the touch probe can be checked. Latched data can be read when this bit is set to "1". When this bit once turns on, it remains on until bit 5 of Touch probe function (60B8h) is set to "0".

(c) Touch probe pos1 pos value (60BAh)
The current rising edge position of touch probe can be checked.

(d) Touch probe pos1 neg value (60BBh)
The current falling edge position of touch probe can be checked.

(2) Usage
The following explains for latching the current position at the rising edge of TPR1 (Touch probe 1).

(a) Set "0013h" in Touch probe function (60B8h) to store the data at rising edge of TPR1 (Touch probe 1).

(b) At this point, Touch probe status (60B9h) is set to "0001h", and the latched data has not been stored yet.

(c) Use an external signal to turn on TPR1 (Touch probe 1).

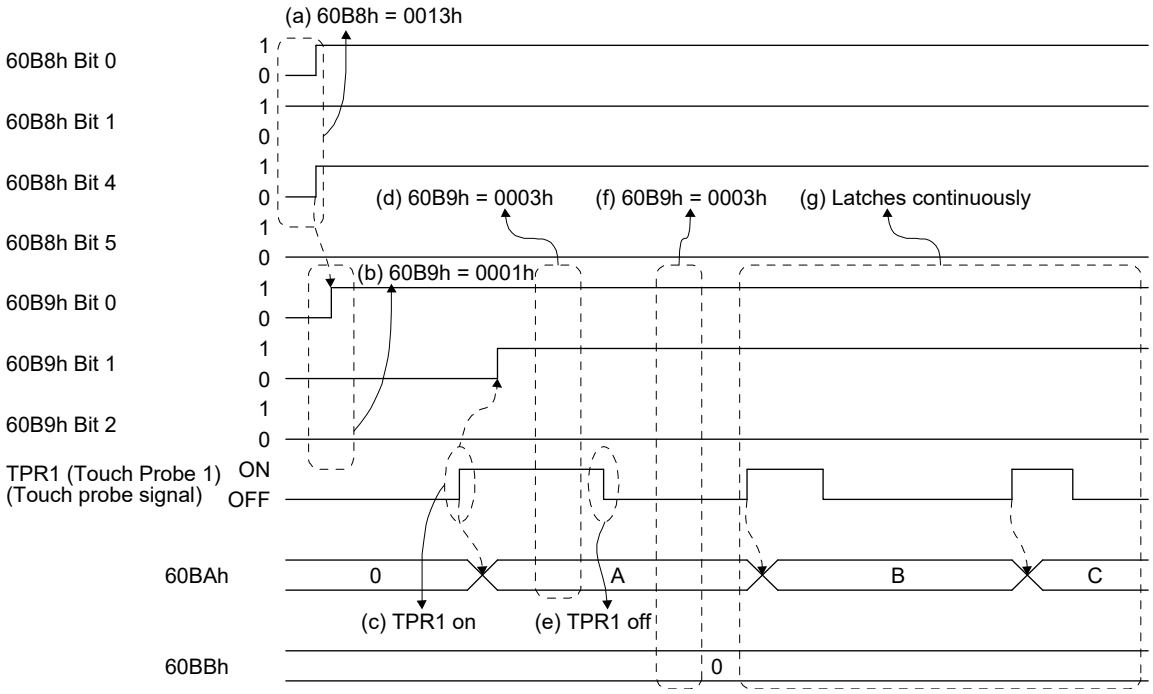
(d) Touch probe status (60B9h) changes to "0003h", and the current position of when TPR1 (Touch probe 1) is on is stored in Touch probe pos1 pos value (60BAh).

(e) Use an external signal to turn off TPR1 (Touch probe 1).

(f) Touch probe status (60B9h) remains "0003h", and the current position of when TPR1 (Touch probe 1) is off is not stored in Touch probe pos1 neg value (60BBh).

(g) Latching can be continued from (c).

The following shows a timing chart.



7.6.9 Supported Drive Modes (6502h)

Index	Sub Index	Name	Data Type	Access	No. of Points/ No. of Registers	Continuous read/ continuous write
6502h	0	Supported Drive Modes	U32	ro	2	Impossible

The supported control mode can be read.
For servo amplifiers with software version A4 or later, the response data value is "000B002Dh". For servo amplifiers with software version A3 or later, the response data value is "0000002Dh". The following table shows the details of each bit.

Bit	Supported Modes	Defined value
0	Profile position mode (pp)	1: Supported
2	Profile velocity mode (pv)	1: Supported
3	Profile torque mode (tq)	1: Supported
5	Homing mode (hm)	1: Supported
16	Jog mode (jg) (Note)	1: Supported
17	Point table mode (pt) (Note)	1: Supported
19	Indexer mode (idx) (Note)	1: Supported

Note. For servo amplifiers with software version A4 or earlier, the defined value is "1".
For servo amplifiers with software version A3 or earlier, the defined value is "0".

REVISIONS

*The manual number is given on the bottom left of the back cover.

Revision Date	*Manual Number	Revision
Mar. 2017	SH(NA)030256ENG-A	First edition
Aug. 2017	SH(NA)030256ENG-B	A maximum altitude of 2000 m above sea level is supported. Modbus/TCP is supported. 3. To prevent injury, note the following — Partially changed. 4. Additional instructions (1) Transportation and installation — Partially changed. (2) Wiring — Partially changed. (3) Test run and adjustment — Partially changed. (4) Usage — Partially changed. (5) Corrective actions — Partially changed. Section 1.2 — Partially added and partially changed. Section 1.3.2 — Partially added and partially changed. Section 2.2 — Partially changed. Section 3.1 — POINT is added. Section 3.2 (2) — Partially changed. Chapter 4 — POINT is added. Section 5.1 — CAUTION is added. POINT is added. Section 5.2 — Partially changed. Section 7.1 — Partially added and partially changed. Section 7.2.3 — Partially changed. Section 7.3.5 — Partially changed. Section 7.4.2 — Partially changed. Section 7.4.3 — Partially added and partially changed. Section 7.4.6 — Partially added and partially changed.
Oct. 2018	SH030256ENG-C	Comprehensive changes on the contents following the inclusion of CC-Link IE Field Network Basic, Modbus/TCP, and Modbus RTU.

MEMO

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]

The term of warranty for Product is twelve (12) months after your purchase or delivery of the Product to a place designated by you or eighteen (18) months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

[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;
(i) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
(ii) a failure caused by any alteration, etc. to the Product made on your side without our approval
(iii) 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
(iv) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
(v) any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
(vi) 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
(vii) 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
(viii) 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 General-Purpose AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in General-Purpose AC Servo, and a backup or fail-safe function should operate on an external system to General-Purpose AC Servo when any failure or malfunction occurs.

(2) Our General-Purpose 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.

MODEL	
MODEL CODE	

MITSUBISHI ELECTRIC CORPORATION

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