MITSUBISHI ELECTRIC

General-Purpose AC Servo

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-JE

Ethernet Interface

MODEL

MR-JE-_C

SERVO AMPLIFIER

INSTRUCTION MANUAL

(CC-Link IE Field Network Basic)

B

● 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.

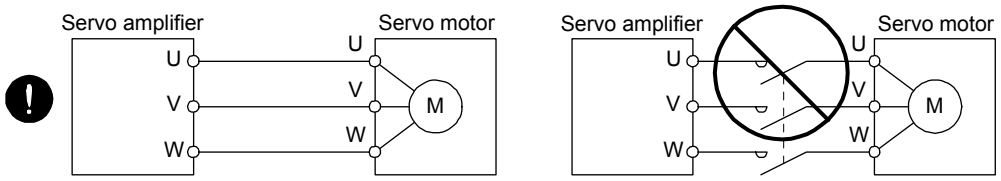
Item		Environment
Ambient temperature	Operation	0 °C to 55 °C (non-freezing)
	Storage	-20 °C to 65 °C (non-freezing)
Ambient humidity	Operation	5 %RH to 90 %RH (non-condensing)
	Storage	
Ambience		Indoors (no direct sunlight), free from corrosive gas, flammable gas, oil mist, dust, and dirt
Altitude		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.
- 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.

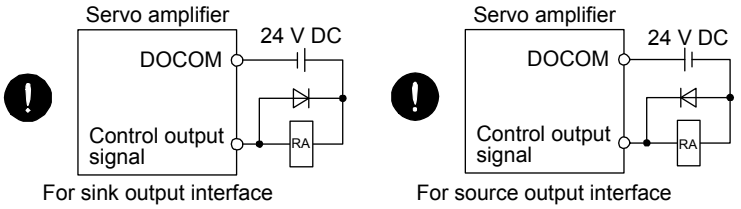
(2) Wiring

⚠ 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.
- 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.

⚠ CAUTION
●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

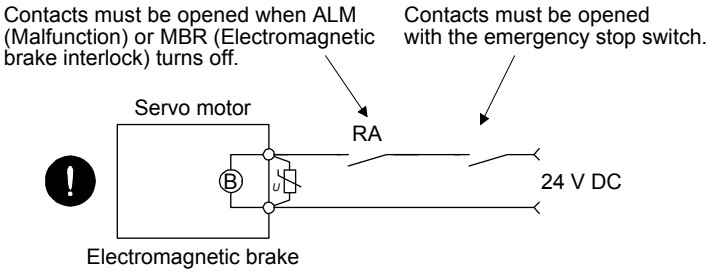
⚠ CAUTION
●When it is assumed that a hazardous condition may occur due to a power failure or product malfunction, use a servo motor with an external brake to prevent the condition. ●For equipment in which the moving part of the machine may collide against the load side, install a limit switch or stopper 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.

⚠ CAUTION

●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

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 (Profile Mode)	SH(NA)030254ENG
MELSERVO HG-KN/HG-SN Servo Motor Instruction Manual	SH(NA)030135ENG
MELSERVO EMC Installation Guidelines	IB(NA)67310ENG

«Cables used for wiring»

Wires mentioned in this Instruction Manual are selected based on the ambient temperature of 40 °C.

«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

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1. FUNCTIONS AND CONFIGURATION

1.1 Outline of CC-Link IE Field Network Basic

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.

1.1.1 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.

1.2 Function List

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.	
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.	
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)"
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".	
Touch probe function	The touch probe function is available only in the profile mode. When the touch probe 1 signal turns on, the current position latch function will latch the current position. The latched data can be read with communication commands.	Section 7.4.8
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.	

Function	Description	Detailed explanation
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.	
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. When the position control mode is used, the input pulses can be multiplied by 1/10 to 4000. When the profile position mode is used, the position commands can be multiplied by 1/27649 to 8484.	
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, and program operation 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".	

Function	Description	Detailed explanation
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.)	
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/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, driving the servo motor is also possible. This function is used with servo amplifiers with software version A3 or later.	"MELSERVO MR-JE-_C Servo Amplifier Instruction Manual (Modbus/TCP)"
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, 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, 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

1.3 Communication specifications

1.3.1 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 chapter 2.
Physical layer	1000BASE-T
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).

1.3.2 SLMP communication specifications

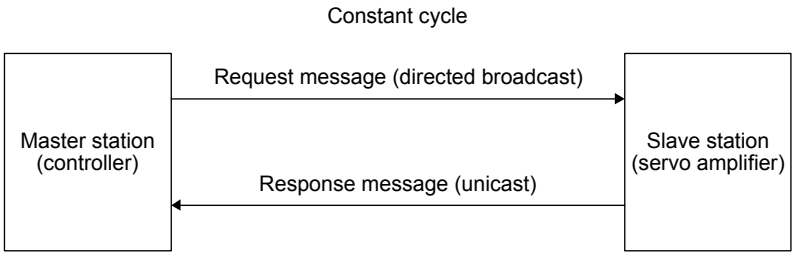
Function		Description
Communication protocol		UDP/TCP (Note)
Port No.	iQSS	No. 45237 (NodeSearch and IPAddressSet only)
	UDP	No. 5010
	TCP (Note)	No. 5012
IP address		IPv4 range: 0.0.0.0 to 255.255.255.255 Use the same network address for both the master and slave stations. Default value: 192.168.3.0
Subnet mask		Default value: 255.255.255.0
Message format		Refer to chapter 3.
Physical layer		1000BASE-T
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. CC-Link IE FIELD NETWORK BASIC PROTOCOL

2.1 Summary

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 library to drive a servo motor and return monitor data.



2.2 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 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 7.2.3.

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)			
(Note) Device No.	Index	Device	
RWwn00	6060	Control mode	Modes of operation
RWwn01	6040	Control command	Controlword
RWwn02	2D01	Control input 1	Control DI 1
RWwn03	2D02	Control input 2	Control DI 2
RWwn04	2D03	Control input 3	Control DI 3
RWwn05	607A	Position command (pp)	Target position
RWwn06			
RWwn07	60FF	Speed command (pv)	Target velocity
RWwn08			
RWwn09	2D20	Speed limit value (tq)	Velocity limit value
RWwn0A			
RWwn0B	6071	Torque command (tq)	Target torque
RWwn0C	6081	Command speed (pp)	Profile velocity
RWwn0D			
RWwn0E	6083	Acceleration time constant (pp, pv)	Profile acceleration
RWwn0F			
RWwn10	6084	Deceleration time constant (pp, pv)	Profile deceleration
RWwn11			
RWwn12	6087	Amount of torque command change (per second) (tq)	Torque slope
RWwn13			
RWwn14	60E0	Torque limit value (forward)	Positive torque limit value
RWwn15	60E1	Torque limit value (reverse)	Negative torque limit value
RWwn16			
RWwn17	60B8	Touch probe function setting	Touch probe function
RWwn18	60F2	Positioning operation setting	Positioning option code
RWwn19	2D05	Control input 5	Control DI 5
RWwn1A			
RWwn1B			
RWwn1C			
RWwn1D			
RWwn1E			
RWwn1F			

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

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

2.4 Mapping data details of link device

Refer to chapter 7.

MEMO

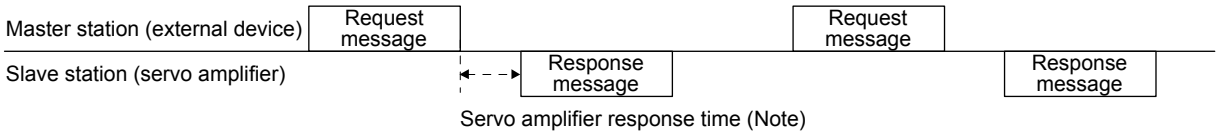
3. SLMP

3.1 Summary

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.

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.

3.2 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						
			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	Footer
		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: H5000 At a response: HD000
Subheader (QnA compatible 4E frame)	6 bytes	Big	At a request: H5400 + Serial number + H0000 At a response: HD400 + Serial number + H0000
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	Fixed to H03FF
Request destination multi-drop station No.	1 bytes		Fixed to H00
Request data length	2 bytes	Little	Specify the data length from the monitoring timer to the request data in hexadecimal. Example) For 24 bytes: H1800
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. ・H0000: Waiting until the processing is completed ・H0001 to HFFFF (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 3.3.
Sub command	2 bytes	Little	Refer to section 3.3.
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 3.5 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.

3.3 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 3.4.1
		0002h	Writes data specified by using the CiA 402 object from the external device to the servo amplifier.	Section 3.4.2
		0005h	Reads data of consecutive sub commands specified by using the CiA 402 object from the servo amplifier to the external device.	Section 3.4.3
		0006h	Writes data of consecutive sub commands specified by using the CiA 402 object from the external device to the servo amplifier.	Section 3.4.4
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.	

3.4 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.

3.4.1 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.

(1) 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 (3) in this section for details.					

(2) Response message

(a) 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) in this section for details.						

(b) At abnormal completion

The response message is the same as that of 3.2 (2) (b).

(3) Item list

Item	Size	Endian	Description
Command	2 bytes	Little	H4020
Sub command	2 bytes	Little	H0001
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		Fixed to H00
Number of data value	2 bytes	Little	Read data: Fixed to H00
Read data	Variable	Little	The response data of the object is stored.

3.4.2 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.

(1) 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 (3) in this section for details.						

(2) Response message

(a) 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 (3) in this section for details.					

(b) At abnormal completion

The response message is the same as that of 3.2 (2) (b).

(3) Item list

Item	Size	Endian	Description
Command	2 bytes	Little	H4020
Sub command	2 bytes	Little	H0002
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		Fixed to H00
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.

3.4.3 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.

(1) 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) in this section for details.					

(2) Response message

(a) 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) in this section for details.						

(b) At abnormal completion

The response message is the same as that of 3.2 (2) (b).

(3) Item list

Item	Size	Endian	Description
Command	2 bytes	Little	H4020
Sub command	2 bytes	Little	H0005
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		Fixed to H00
Number of data value	2 bytes	Little	Read data: Fixed to H00
Read data	Variable	Little	The response data of the object is stored.

3.4.4 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.

(1) 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 (3) in this section for details.						

(2) Response message

(a) 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 (3) in this section for details.					

(b) At abnormal completion

The response message is the same as that of 3.2 (2) (b).

(3) Item list

Item	Size	Endian	Description
Command	2 bytes	Little	H4020
Sub command	2 bytes	Little	H0006
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		Fixed to H00
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.

3.5 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.

4. STARTUP

POINT

- Setting [Pr. PN02 Communication error detection time] to several milliseconds 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 several milliseconds 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" and "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)" for other startup settings.

4.1 CC-Link IE Field Network Basic initial communication setting

Start the cyclic communication in the following procedure.

Network setting	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 4.2.) (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).

4.2 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 3.3 for details on the command.
The IP address you set can be checked in the system configuration window of MR Configurator 2.
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.

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 List of communication-related parameters

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].
- The following parameters cannot be used with CC-Link IE Field Network Basic communication.
  - [Pr. PN10 Ethernet communication time-out selection]
  - [Pr. PN23 KeepAlive time]

No.	Symbol	Name	Initial value	Unit
PN01		For manufacturer setting	0h	
PN02	CERT	Communication error detection time	1000 ms	[ms]
PN03		For manufacturer setting	0000h	
PN04			0000h	
PN05			0000h	
PN06			0000h	
PN07			0000h	
PN08			0000h	
PN09			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]

No.	Symbol	Name	Initial value	Unit
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 communication-related parameters

POINT

●Set a value to each "x" in the "Setting digit" columns.

No./symbol/ name	Setting digit	Function	Initial value [unit]
PN02 CERT Communica-tion error detection time		Set the time until [AL. 86.1 Network communication error 1] is detected. Setting "0" will disable the detection of [AL. 86.1 Network communication error 1]. Setting range: 0 to 1000	1000 [ms]
PN10 *CONN Ethernet communica-tion time-out selection		Set the network number of the servo amplifier. Set the time until [AL. 86.4 Network communication error 4] is detected. Setting "0" will disable the detection of [AL. 86.4 Network communication error 4]. This parameter is enabled with SLMP. 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 will be 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. 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.

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 will be 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. 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 will be 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. Setting range: 0 to 255	3

No./symbol/ name	Setting digit	Function	Initial value [unit]
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 will be 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. 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). 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). 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). 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). Setting range: 0 to 255	0
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). 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). 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). 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). Setting range: 0 to 255	1

No./symbol/ name	Setting digit	Function	Initial value [unit]
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 function is disabled. 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 function is disabled. 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 function is disabled. Setting range: 0 to 255	0
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 function is disabled. Setting range: 0 to 255	0
PN28 *IPAF2 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" will disable the function. Setting range: 0 to 256	256
PN29 *IPAF3 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" will disable the function. Setting range: 0 to 256	256
PN30 *IPAF4 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" will disable the function. 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 set to all "0", the function is disabled. When the function is enabled, 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) 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 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 function is disabled. When the function is enabled, 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) 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 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 function is disabled. When the function is enabled, 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) 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 out of the range, communication to the servo amplifier cannot be established. Setting range: 0 to 255	0
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 function is disabled. When the function is enabled, 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) 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 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" will disable the function. Setting range: 0 to 256	256

No./symbol/ name	Setting digit	Function	Initial value [unit]
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" will disable the function. Setting range: 0 to 256	256

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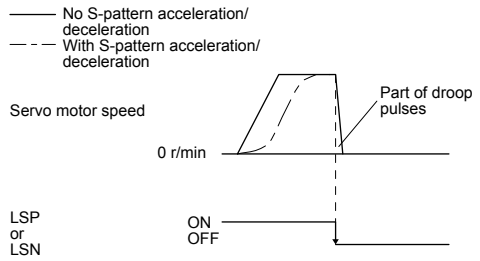
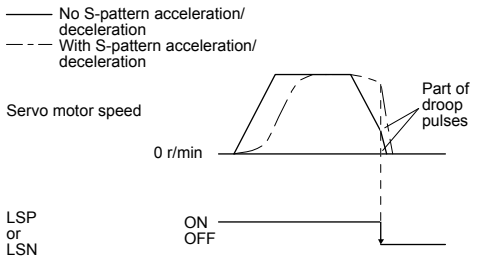
6. MANUFACTURER FUNCTIONS

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.

Operation status		Remark
During rotation at constant speed	During deceleration to a stop	
		Travels for the droop pulse portion and stops the servo motor. A difference will be generated between the command position and the current position. Perform a home position return again.

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).
Profile velocity mode (pv)	Input the speed command of the direction opposite to the limit to Target velocity (60FFh).

6.2 One-touch tuning

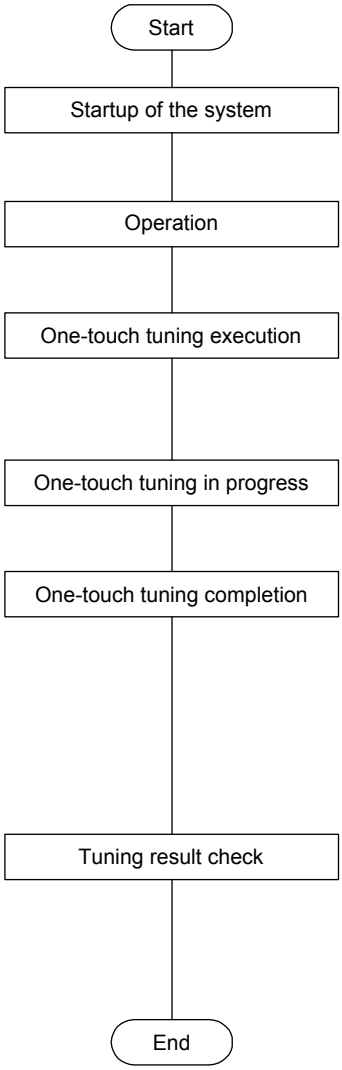
Refer to "MR-JE-_C Servo Amplifier Instruction Manual" for one-touch tuning. Using One-touch tuning mode (2D50h) allows one-touch tuning from the master station (controller).

(1) Related object

Index	Sub-address	Read/write	Name	Data type	Initial value	Description
2D50h	0	Read/write	One-touch tuning mode	1 bytes	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	0	Reading	One-touch tuning status	1 bytes	0	Regardless of whether one-touch tuning is properly completed or not, the setting value changes to 100% at the completion. Unit: %
2D52h	0	Writing	One-touch tuning Stop	2 bytes	0	Writing "1EA5h" stops one-touch tuning. Writing a value other than "1EA5h" will trigger the error code "CCD4h".
2D53h	0	Writing	One-touch tuning Clear	2 bytes	0	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	0	Reading	One-touch tuning Error Code	2 bytes	0	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" and "MR-JE-_C Servo Amplifier Instruction Manual (Profile 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.

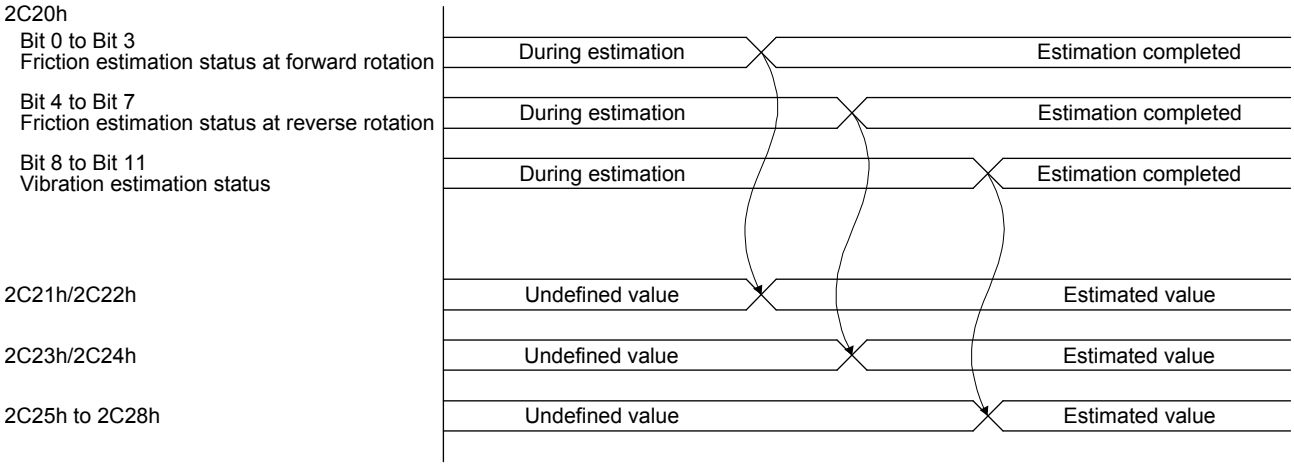
Gains and filters will be adjusted automatically. During one-touch tuning, the progress can be checked with One-touch tuning status (2D51h).

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	Sub-address	Read/write	Name	Data type	Initial value	Description
2C20h	0	Reading	Machine diagnostic status	2 bytes		Refer to section 7.1.
2C21h	0	Reading	Static friction torque at forward rotation	2 bytes		Static friction at forward rotation torque is displayed in increments of 0.1%.
2C22h	0	Reading	Dynamic friction torque at forward rotation (at rated speed)	2 bytes		Kinetic friction at forward rotation torque at the rated speed is displayed in increments of 0.1%.
2C23h	0	Reading	Static friction torque at reverse rotation	2 bytes		Static friction at reverse rotation torque is displayed in increments of 0.1%.
2C24h	0	Reading	Dynamic friction torque at reverse rotation (at rated speed)	2 bytes		Kinetic friction at reverse rotation torque at the rated speed is displayed in increments of 0.1%.
2C25h	0	Reading	Oscillation frequency during motor stop	2 bytes		Vibration frequency at stop/servo-lock Vibration frequency during stop/servo-lock is displayed in increments of 1 Hz.
2C26h	0	Reading	Vibration level during motor stop	2 bytes		Vibration level at stop/servo-lock Vibration level during stop/servo-lock is displayed in increments of 0.1%.
2C27h	0	Reading	Oscillation frequency during motor operating	2 bytes		Vibration frequency during operation Vibration frequency during operation is displayed in increments of 1 Hz.
2C28h	0	Reading	Vibration level during motor operating	2 bytes		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	Sub-address	Read/write	Name	Data type	Initial value	Description
2C18h	0	Reading	Power ON cumulative time	4 bytes		The cumulative energization time of the servo amplifier is returned.
2C19h	0	Reading	Inrush relay ON/OFF number	4 bytes		The number of on/off times of the inrush relay of the servo amplifier is returned.

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7. OBJECT LIBRARY

Each data such as control parameters, command values, and feedback values is handled as an object composed of an address, 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 library.

7.1 Object library list

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
1000	0	Supported profile information (Device Type) The servo drive defined with the CiA 402 profile is indicated.	4 bytes	Reading	Impos-sible	00020192h	00020192h (fixed)			
1001	0	Alarm information (Error Register) The error occurrence is returned. Bit 0: Turns on when an alarm has occurred. Bit 1 to Bit 7: Unused	1 bytes	Reading	Impos-sible		00h to 01h			
1008	0	Servo amplifier model (Manufacturer Device Name) The model name of the servo amplifier is returned.	Character string	Reading	Impos-sible					
1009	0	Hardware version (Manufacturer Hardware Version) The hardware version of the network module is returned.	Character string	Reading	Impos-sible					
100A	0	Servo amplifier software version (Manufacturer Software Version) The software version of the servo amplifier is returned.	Character string	Reading	Impos-sible					
1010	0	Writing command to EEP-ROM (Store parameters) The number of entries is returned.	1 bytes	Reading	Impos-sible	1	01h			
	1	Saving all parameters (Save all parameters) [Writing] Writing "save" (= 65766173h) saves all the objects which 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.	4 bytes	Read/ write	Impos-sible	00000001h				
1011	0	Restoring default EEP-ROM parameters (Restore default parameters) The number of entries is returned.	1 bytes	Reading	Impos-sible	1	01h (fixed)			
	1	Restoring all default parameters (Restore all default parameters) The parameter of the servo amplifier can be rewritten with the factory setting. When "64616F6Ch" (= reverse order of ASCII code of "load") is written to Restore all default parameters (1011h: 1) and the power is cycled, the parameter is initialized.	4 bytes	Read/ write	Impos-sible	00000001h				
1018	0	Device information (Identity Object) The number of entries is returned.	1 bytes	Reading	Impos-sible	4	04h (fixed)			
	1	Vendor ID (Vendor ID) The vendor ID of a servo amplifier is returned.	4 bytes	Reading	Impos-sible	00000002h	00000002h (fixed)			
	2	Product number (Product Code) The servo amplifier serial number is returned.	4 bytes	Reading	Impos-sible	00001003h	00001003h (fixed)			
	3	Revision number (Revision Number) The revision number of a servo amplifier is returned.	4 bytes	Reading	Impos-sible		00000000h to FFFFFFFFh			
	4	Serial number (Serial Number) The serial number of the network module is returned.	4 bytes	Reading	Impos-sible	00000000h	00000000h to FFFFFFFFh			

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
1A00	0	Response message mapping (Transmit PDO Mapping) The number of objects to be mapped is set.	1 bytes	Read/ write	Impos-sible	15	00h to 20h (32)			
	1 to 32	Response message mappings 1 to 32 (Mapped Object 001 to 032) The object to be mapped is set. Bit 0 to Bit 7: Length of the object to be mapped (Bit unit) Bit 8 to Bit 15: Sub Index of the object to be mapped Bit 16 to Bit 31: Index of the object to be mapped	4 bytes	Read/ write	Impos-sible	60610008h	00000000h to FFFFFFFFh			
2001 to 2021	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".	4 bytes	Read/ write	Impos-sible				○	PA01 to PA32
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".	4 bytes	Read/ write	Impos-sible				○	PB01 to PB64
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".	4 bytes	Read/ write	Impos-sible				○	PC01 to PC80
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".	4 bytes	Read/ write	Impos-sible				○	PD01 to PD48
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".	4 bytes	Read/ write	Impos-sible				○	PE01 to PE64
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".	4 bytes	Read/ write	Impos-sible				○	PF01 to PF48
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)."	4 bytes	Read/ write	Impos-sible				○	PT01 to PT80
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.	4 bytes	Read/ write	Impos-sible				○	PN01 to PN48

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
2A00 to 2A0F	0	Alarm history 0 to Alarm history 15 (Alarm history newest) The number of entries in the latest alarm of the alarm history is returned.	1 bytes	Read	Impos-sible	3	03h (fixed)		○	
	1	Alarm No. (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 number When no history exists, "0" is returned.	4 bytes	Reading	Impos-sible	0	00000000h to FFFFFFFFh		○	
	2	Alarm occurrence time (Alarm time (Hour)) Alarm occurrence time is returned. When no history exists, "0" is returned.	4 bytes	Reading	Impos-sible	0	00000000h to FFFFFFFFh	hour	○	
	3	Alarm 2 No. (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 number When no history exists, "0" is returned.	2 bytes	Reading	Impos-sible	0	0000h to FFFFh		○	
2A40	0	Alarm history clear (Clear alarm history) Writing "1EA5h" clears the alarm history.	2 bytes	Writing	Impos-sible					
2A41	0	Current alarm (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 number	4 bytes	Reading	Possible		00000000h to FFFFFFFFh			
2A42	0	Current alarm 2 (Current alarm 2) The number of the current alarm is returned. When no alarm has occurred, "0000h" is returned. Bit 0 to Bit 7: Alarm detail number Bit 8 to Bit 15: Alarm number	2 bytes	Reading	Possible		0000h to FFFFh			
2A44	0	Number of parameter errors (Parameter error number) When [AL. 37 Parameter error] has occurred, the number of the parameters which cause the error is returned. Refer to Parameter error list (2A45h) for the number of each parameter which causes the error.	2 bytes	Reading	Impos-sible		0000h to 01F4h (500)			
2A45	0	Parameter error No. (Parameter error list) When [AL. 37 Parameter error] has occurred, the number of entries of the parameter which causes the error is returned.	1 bytes	Reading	Impos-sible	20h (32)	20h (32) (fixed)			
	1 to 32	Parameter error No. 1 to 32 (Parameter error list 1 to 32) When [AL. 37 Parameter error] has occurred, the 1st to 32nd numbers of the parameter which causes the alarm is returned. Bit 0 to Bit 7: Parameter number 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 _ _]	2 bytes	Reading	Impos-sible	0	0000h to FFFFh			

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
2A46	0	Alarm reset (Reset alarm) Writing the value "1EA5h" resets an alarm. Any value other than "1EA5h" is ignored.	2 bytes	Writing	Impos-sible	0	0000h to FFFFh			
2B01	0	Cumulative feedback pulses (Cumulative feedback pulses) The cumulative feedback pulses are returned. Writing "00001EA5h" clears the cumulative feedback pulses.	4 bytes	Read/ write	Possible		80000000h to 7FFFFFFFh	pulse		
2B02	0	Servo motor speed (Servo motor speed) The servo motor speed is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	r/min		
2B03	0	Droop pulses (Droop pulses) The droop pulses (encoder unit) are returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	pulse		
2B04	0	Cumulative command pulses (Cumulative command pulses) The cumulative command pulses are returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	pulse		
2B05	0	Command pulse frequency (Command pulse frequency) The command pulse frequency is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	kpulse/s		
2B06	0	Analog speed command voltage (Analog speed command voltage) The analog speed command voltage is returned.	2 bytes	Read	Possible		8000h to 7FFFh	V		
2B07	0	Analog torque limit voltage/Analog torque command voltage (Analog torque limit voltage/Analog torque command voltage) The analog torque limit voltage/analog torque command voltage is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	V		
2B08	0	Regenerative load ratio (Regenerative load ratio) The regenerative load ratio is returned.	2 bytes	Reading	Possible		0000h to FFFFh	%		
2B09	0	Effective load ratio (Effective load ratio) The effective load ratio is returned.	2 bytes	Reading	Possible		0000h to FFFFh	%		
2B0A	0	Peak load ratio (Peak load ratio) The peak load ratio is returned.	2 bytes	Reading	Possible		0000h to FFFFh	%		
2B0B	0	Instantaneous torque (Instantaneous torque) The instantaneous torque is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	%		
2B0C	0	Position within one-revolution (Within one-revolution position) The position within one-revolution is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	pulse		
2B0D	0	Multi-revolution counter (ABS counter) Returns the multi-revolution counter.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	rev		
2B0E	0	Load to motor inertia ratio (Load to motor inertia ratio) The load to motor inertia ratio is returned.	2 bytes	Reading	Possible		0000h to FFFFh	0.01 times		
2B0F	0	Bus voltage (Bus voltage) The bus voltage is returned.	2 bytes	Reading	Possible		0000h to FFFFh	V		
2B16	0	F/B cumulative value of A/B-phase output pulse (Cumulative encoder out pulses) The feedback cumulative value of A/B-phase output pulse is returned.	4 bytes	Read	Possible		80000000h to 7FFFFFFFh	pulse		
2B25	0	Internal temperature of encoder (Internal temperature of encoder) The internal temperature of encoder is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	°C		
2B26	0	Settling time (Settling time) The settling time is returned.	2 1 bytes	Reading	Possible		8000h to 7FFFh	ms		
2B27	0	Oscillation detection frequency (Oscillation detection frequency) The oscillation detection frequency is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	Hz		
2B28	0	Number of tough drive operations (Number of tough drive operations) The number of tough drive operations is returned.	2 bytes	Reading	Possible		0000h to FFFFh	times		
2B2A	0	Internal temperature of amplifier (Internal temperature of amplifier) The internal temperature of amplifier is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	°C		

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
2B2D	0	Unit power consumption (Unit power consumption) The unit power consumption is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	W		
2B2E	0	Unit total power consumption (Unit total power consumption) The unit total power consumption is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	Wh		
2B2F	0	Current position (Current position) The current position is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh			
2B30	0	Command position (Command position) The command position is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh			
2B31	0	Command remaining distance (Command remaining distance) The command remaining distance is returned.	4 bytes	Read	Possible		80000000h to 7FFFFFFFh			
2B81	0	Cumulative feedback pulses at alarm occurrence (Alarm Monitor 1 Cumulative feedback pulses) The cumulative feedback pulses at alarm occurrence are returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	pulse		
2B82	0	Servo motor speed at alarm occurrence (Alarm Monitor 2 Servo motor speed) The servo motor speed at alarm occurrence is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	r/min		
2B83	0	Droop pulses at alarm occurrence (Alarm Monitor 3 Droop pulses) The droop pulses at alarm occurrence are returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	pulse		
2B84	0	Cumulative command pulses at alarm occurrence (Alarm Monitor 4 Cumulative command pulses) The cumulative command pulses (encoder unit) at alarm occurrence are returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	pulse		
2B85	0	Command pulse frequency at alarm occurrence (Alarm Monitor 5 Command pulse frequency) The command pulse frequency at alarm occurrence is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	kpulse/s		
2B86	0	Analog speed command voltage at alarm occurrence (Alarm Monitor 6 Analog speed command voltage) The analog speed command voltage at alarm occurrence is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	V		
2B87	0	Analog torque limit voltage/ Analog torque command voltage at alarm occurrence (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.	2 bytes	Reading	Possible		8000h to 7FFFh	V		
2B88	0	Regenerative load ratio at alarm occurrence (Alarm Monitor 8 Regenerative load ratio) The regenerative load ratio at alarm occurrence is returned.	2 bytes	Reading	Possible		0000h to FFFFh	%		
2B89	0	Effective load ratio at alarm occurrence (Alarm Monitor 9 Effective load ratio) The effective load ratio at alarm occurrence is returned.	2 bytes	Reading	Possible		0000h to FFFFh	%		
2B8A	0	Peak load ratio at alarm occurrence (Alarm Monitor 10 Peak load ratio) The peak load ratio at alarm occurrence is returned.	2 bytes	Reading	Possible		0000h to FFFFh	%		
2B8B	0	Instantaneous torque at alarm occurrence (Alarm Monitor 11 Instantaneous torque) The instantaneous torque at alarm occurrence is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	%		
2B8C	0	Position within one-revolution at alarm occurrence (Alarm Monitor 12 Within one-revolution position) The position within one-revolution at alarm occurrence is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	pulse		

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
2B8D	0	Multi-revolution counter at alarm occurrence (Alarm Monitor 13 ABS counter) The ABS counter at alarm occurrence is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	rev		
2B8E	0	Load to motor inertia ratio at alarm occurrence (Alarm Monitor 14 Load to motor inertia ratio) The load to motor inertia ratio at alarm occurrence is returned.	2 bytes	Reading	Possible		0000h to FFFFh	0.01 times		
2B8F	0	Bus voltage at alarm occurrence (Alarm Monitor 15 Bus voltage) The bus voltage at alarm occurrence is returned.	2 bytes	Reading	Possible		0000h to FFFFh	V		
2B96	0	F/B cumulative value of A/B-phase output pulse at alarm occurrence (Alarm Monitor 22 Cumulative encoder out pulses) The feedback cumulative value of A/B-phase output pulse at alarm occurrence is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	pulse		
2BA5	0	Internal temperature of encoder at alarm occurrence (Alarm Monitor 37 Internal temperature of encoder) The internal temperature of encoder at alarm occurrence is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	°C		
2BA6	0	Settling time at alarm occurrence (Alarm Monitor 38 Settling time) The settling time at alarm occurrence is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	ms		
2BA7	0	Oscillation detection frequency at alarm occurrence (Alarm Monitor 39 Oscillation detection frequency) The oscillation detection frequency at alarm occurrence is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	Hz		
2BA8	0	Number of tough drive operations at alarm occurrence (Alarm Monitor 40 Number of tough drive operations) The number of tough drive operations at alarm occurrence is returned.	2 bytes	Reading	Possible		0000h to FFFFh	times		
2BAA	0	Internal temperature of amplifier at alarm occurrence (Alarm Monitor 42 Internal temperature of amplifier) The internal temperature of amplifier at alarm occurrence is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	°C		
2BAD	0	Unit power consumption at alarm occurrence (Alarm Monitor 45 Unit power consumption) The unit power consumption at alarm occurrence is returned.	2 bytes	Reading	Possible		8000h to 7FFFh	W		
2BAE	0	Unit total power consumption at alarm occurrence (Alarm Monitor 46 Unit total power consumption) The unit total power consumption at alarm occurrence is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	Wh		
2BAF	0	Current position at alarm occurrence (Alarm Monitor 47 Current position) The current position at alarm occurrence is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh			
2BB0	0	Command position at alarm occurrence (Alarm Monitor 48 Command position) The command position at alarm occurrence is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh			
2BB1	0	Command remaining distance at alarm occurrence (Alarm Monitor 49 Command remaining distance) The command remaining distance at alarm occurrence is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh			
2C10	0	External input pin status (External Input pin display) The number of entries in external input pin status is returned.	1 bytes	Reading	Impos-sible	1	01h (fixed)			
	1	External input pin status 1 (External Input pin display1) The external input pin status is returned.	4 bytes	Reading	Possible		00000000h to FFFFFFFFh			

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
2C11	0	External output pin status (External Output pin display) The number of entries in external output pin status is returned.	1 bytes	Read	Impos-sible	1	01h (fixed)			
	1	External output pin status 1 (External Output pin display1) The external input pin status is returned.	4 bytes	Reading	Possible		00000000h to FFFFFFFFh			
2C12	0	Input device status (External Input signal display) The number of entries in input device status is returned.	1 bytes	Reading	Impos-sible	4	04h (fixed)			
	1	Input device status 1 (External Input signal display1) The input device status 1 is returned.	4 bytes	Reading	Possible		00000000h to FFFFFFFFh			
	2	Input device status 2 (External Input signal display2) The input device status 2 is returned.	4 bytes	Reading	Possible		00000000h to FFFFFFFFh			
	3	Input device status 3 (External Input signal display3) The input device status 3 is returned.	4 bytes	Reading	Possible		00000000h to FFFFFFFFh			
	4	Input device status 4 (External Input signal display4) The input device status 4 is returned.	4 bytes	Reading	Possible		00000000h to FFFFFFFFh			
2C18	0	Power ON cumulative time (Power ON cumulative time) The cumulative time after power on of the servo amplifier is returned.	4 bytes	Reading	Impos-sible	0	00000000h to FFFFFFFFh	hour		
2C19	0	Number of inrush relay ON/OFF times (Number of inrush relay on/off times) The number of on/off times of the inrush relay of the servo amplifier is returned.	4 bytes	Reading	Impos-sible	0	00000000h to FFFFFFFFh	times		

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
2C20	0	Machine diagnostic status (Machine diagnostic status) [Bit 0 to Bit 3: Friction estimation status at forward rotation] 0: Normal (Friction is being estimated.) 1: Normal (Estimation is completed.) 2: Warning (The servo motor may rotate in one direction too frequently.) 3: Warning (The servo motor speed may 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 constants 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 (Friction is being estimated.) 1: Normal (Estimation is completed.) 2: Warning (The servo motor may rotate in one direction too frequently.) 3: Warning (The servo motor speed may 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 constants 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.	2 bytes	Reading	Impos-sible	0	0000h to FFFFh			
2C21	0	Static friction torque at forward rotation (Static friction torque at forward rotation) Coulomb friction at forward rotation torque is returned in increments of 0.1%.	2 bytes	Reading	Impos-sible	0	8000h to 7FFFh	0.1 %		
2C22	0	Dynamic friction torque at forward rotation (at rated speed) (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%.	2 bytes	Reading	Impos-sible	0	8000h to 7FFFh	0.1 %		
2C23	0	Static friction torque at reverse rotation (Static friction torque at reverse rotation) Coulomb friction at reverse rotation torque is returned in increments of 0.1%.	2 bytes	Reading	Impos-sible	0	8000h to 7FFFh	0.1 %		

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
2C24	0	Dynamic friction torque at reverse rotation (at rated speed) (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%.	2 bytes	Reading	Impos-sible	0	8000h to 7FFFh	0.1 %		
2C25	0	Vibration frequency during stop/servo-lock (Oscillation frequency during motor stop) Vibration frequency during stop/servo-lock is returned in increments of 1 Hz.	2 bytes	Reading	Impos-sible	0	8000h to 7FFFh	Hz		
2C26	0	Vibration level during stop/servo-lock (Vibration level during motor stop) Vibration level during stop/servo-lock is returned in increments of 0.1%.	2 bytes	Reading	Impos-sible	0	8000h to 7FFFh	0.1 %		
2C27	0	Vibration frequency during operation (Oscillation frequency during motor operating) Vibration frequency during operation is returned in increments of 1 Hz.	2 bytes	Reading	Impos-sible	0	8000h to 7FFFh	Hz		
2C28	0	Vibration level during operation (Vibration level during motor operating) Vibration level during operation is returned in increments of 0.1%.	2 bytes	Reading	Impos-sible	0	8000h to 7FFFh	0.1 %		
2D01 to 2D0A	0	Control input 1 to Control input 10 (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.	2 bytes	Read/ write	Possible	0	0000h to FFFFh			
2D11 to 2D1A	0	Control output 1 to Control output 10 (Status DO 1 to Status DO 10) The on/off status of output device can be read.	2 bytes	Reading	Possible		0000h to FFFFh			
2D20	0	Speed limit value (Velocity limit value) The speed limit value is set.	4 bytes	Read/ write	Possible	50000	00000000h to permissible instantane-ous speed	0.01 r/min	○	PT52
2D28	0	Servo motor rated speed (Motor rated speed) The servo motor rated speed is returned.	4 bytes	Reading	Impos-sible		00000000h to FFFFFFFFh	r/min		
2D29	0	Servo motor maximum speed (Motor max speed) The servo motor maximum speed is returned.	4 bytes	Reading	Impos-sible		00000000h to FFFFFFFFh	r/min		
2D30	0	Device name (character string) (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).	Character string	Reading	Impos-sible					
2D31	0	Hardware version (character string) (Manufacturer Hardware Version 2) The hardware version of the servo amplifier is returned.	Character string	Reading	Impos-sible					
2D32	0	Software version (character string) (Manufacturer Software Version 2) The software version of the servo amplifier is returned.	Character string	Reading	Impos-sible					
2D33	0	Serial No. (character string) (Serial Number 2) The servo amplifier serial number is returned.	Character string	Reading	Impos-sible					
2D35	0	Encoder status display (Encoder status) The number of entries is returned.	1 bytes	Reading	Impos-sible	1	01h (fixed)			
	1	Encoder status 1 (Encoder status1) The encoder status is returned. Bit 0: Whether the servo amplifier is used in an absolute position detection system or not is returned. 0 = Incremental system 1 = Absolute position detection system Bit 1 to Bit 31: Reserved	4 bytes	Reading	Impos-sible		00000000h to 00000001h			

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2D42	0	Maximum value of multi-revolution counter (Max ABS counter) The maximum value of the multi-revolution counter is displayed.	4 bytes	Reading	Impos-sible		00000000h to FFFFFFFFh	rev		
2D50	0	One-touch tuning command (One-touch tuning mode) Setting a value of "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	1 bytes	Read/ write	Impos-sible	0	00h to 03h			
2D51	0	One-touch tuning status (One-touch tuning status) The one-touch tuning progress is returned.	1 bytes	Read	Impos-sible	0	00h to 64h	%		
2D52	0	Stop of one-touch tuning (One-touch tuning Stop) Writing "1EA5h" can stop one-touch tuning. Any value other than "1EA5h" is ignored.	2 bytes	Writing	Impos-sible	0	0000h/ 1EA5h			
2D53	0	Returning parameters changed in one-touch tuning (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: Restores the default value 0001: Restores the value before one-touch tuning.	2 bytes	Writing	Impos-sible	0	0000h to 0001h			
2D54	0	One-touch tuning error code (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: Finished normally 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	2 bytes	Reading	Impos-sible	0	0000h to C00Fh			
603F	0	Latest error No. display (Error code) The latest error No. that occurred after the power on is returned. The error number is as follows. 1000h: Generic error	2 bytes	Reading	Possible	0	0000h to FFFFh			
6040	0	Control command (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	2 bytes	Read/ write	Possible	0	0000h to FFFFh			

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
6041	0	Control status (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	2 bytes	Reading	Possible		0000h to FFFFh			
605A	0	Quick stop option code The operation method of deceleration to a stop can be specified.	2 bytes	Read/ write	Impos-sible	2	0002h (fixed)		○	PT69
605D	0	Halt option code Set how to decelerate the servo motor to a stop at Halt reception.	2 bytes	Read/ write	Impos-sible	1	0001h (fixed)		○	PT69
6060	0	Control mode (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	1 bytes	Read/ write	Possible	0	80h to 7Fh			
6061	0	Control mode display (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	1 bytes	Reading	Possible	-20	80h to 7Fh			
6063	0	Current position (absolute position) [ENC unit] (Position actual internal value) The current position is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	pulse		
6064	0	Current position (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.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	pos units		
6065	0	Error excessive width (Following error window) In the profile position mode (pp), when the time set with Following error time out (6066h) has elapsed with the number of droop pulses exceeding the setting value of this object, bit 13 of Statusword (6041h) is turned on. When "FFFFFFFFh" is set, Bit 13 of Statusword (6041h) is always off.	4 bytes	Read/ write	Possible	12582912	00000000h to FFFFFFFFh	pos units	○	PC75/ PC76
6066	0	Error excessive detection time (Following error time out) Refer to Following error window (6065h).	2 bytes	Read/ write	Possible	10	0000h to FFFFh	ms	○	PC77

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
6067	0	Permissible error range (Position window) In the profile position mode (pp), when the time set with Position windows time (6068h) has elapsed with the number of droop pulses equal to or lower than the setting value of this object, Bit 10 of Statusword (6041h) is turned on. [Setting range] This setting value is limited to the range of 00000000h to 0000FFFEh. When "FFFFFFFFh" is set, Position window is disabled as an exception.	4 bytes	Read/ write	Possible	100	00000000h to 0000FFFEh/ FFFFFFFFh	pos units	○	PT65
6068	0	Permissible error judgment time (Position window time) Refer to Position window (6067h).	2 bytes	Read/ write	Possible	10	0000h to FFFFh	ms	○	PT66
606B	0	Command speed (Velocity demand value) The speed command is returned.	4 bytes	Reading	Possible	0	80000000h to 7FFFFFFFh	0.01 r/min		
606C	0	Current speed (Velocity actual value) The current speed is returned.	4 bytes	Reading	Possible		80000000h to 7FFFFFFFh	0.01 r/min		
606D	0	Speed reached judgment width (Velocity window) In the profile velocity mode (pv), when the time set with Velocity window time (606Eh) has elapsed with the current speed equal to or lower than the setting value of this object, Bit 10 of Statusword (6041h) is turned on.	2 bytes	Read/ write	Possible	2000	0000h to FFFFh	0.01 r/min	○	PT67
606E	0	Speed reached judgment time (Velocity window time) Refer to Velocity window (606Dh).	2 bytes	Read/ write	Possible	10	0000h to FFFFh	ms	○	PT68
606F	0	Zero speed (Velocity threshold) In the profile velocity mode (pv), when the time set with Velocity threshold time (6070h) has elapsed with the current speed exceeding the setting value of this object, Bit 12 of Statusword (6041h) is turned off.	2 bytes	Read/ write	Possible	5000	0000h to FFFFh	0.01 r/min	○	PT63
6070	0	Zero speed judgment time (Velocity threshold time) Refer to Velocity threshold (606Fh).	2 bytes	Read/ write	Possible	10	0000h to FFFFh	ms	○	PT64
6071	0	Command torque (Target torque) Set the torque command used in the profile torque mode (tq).	2 bytes	Read/ write	Possible	0	8000h to 7FFFh	0.1 %		
6072	0	Maximum torque (nominal value) (Max torque) The maximum torque of the servo motor is returned. The value matches with the maximum torque listed in "HG-KN_/HG-SN_ Servo Motor Instruction Manual".	2 bytes	Read/ write	Possible		0000h to FFFFh	0.1 %		
6074	0	Internal torque command (Torque demand value) The torque command is returned.	2 bytes	Read	Possible	0	8000h to 7FFFh	0.1 %		
6077	0	Current torque (Torque actual value) The current torque is returned. The read data is in the unit of 0.1%.	2 bytes	Reading	Possible		8000h to 7FFFh	0.1 %		
607A	0	Position command (absolute/incremental) (Target position) In the profile position mode (pp), the range is limited depending on the unit. [Setting range] degree: -360000 to 360000 Other than degree: -999999 to 999999	4 bytes	Read/ write	Possible	0	80000000h to 7FFFFFFFh	pos units		
607B	0	Command value limit (Position range limit) The number of entries is returned.	1 bytes	Reading	Impos-sible	2	00h to 02h			

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
607B	1	Command value limit (lower limit) (Min position range limit) Set the range for limiting the command position (lower limit value). The settable values vary depending on the setting of [Pr. PT01]. [Pr. PT01] = _ 2 _ _ (degree): 00000000h to 00057E3Fh (0 to 359999) [Pr. PT01] = _ 3 _ _ (pulse): 80000000h to 7FFFFFFFh (-2147483648 to 2147483647)	4 bytes	Read/ write	Possible	00000000h (degree) 80000000h (pulse)	80000000h to 7FFFFFFFh	pos units		
	2	Command value limit (upper limit) (Max position range limit) Set the range for limiting the command position (upper limit value). The settable values vary depending on the setting of [Pr. PT01]. [Pr. PT01] = _ 2 _ _ (degree): 00000000h to 00057E3Fh (0 to 359999) [Pr. PT01] = _ 3 _ _ (pulse): 80000000h to 7FFFFFFFh (-2147483648 to 2147483647)	4 bytes	Read/ write	Possible	00057E3Fh (degree) 7FFFFFFFh (pulse)	80000000h to 7FFFFFFFh	pos units		
607C	0	Home position (Home offset) The home position is returned. Only reading the value is available. Do not perform writing because doing so causes an error.	4 bytes	Read/ write	Possible	0	80000000h to 7FFFFFFFh	pos units	○	
607D	0	Software limit (Software position limit) Set the range for limiting the command position. Target position (607Ah) is limited within the range between Min position limit (607Dh: 1) and Max position limit (607Dh: 2). When the set value of Min position limit (607Dh: 1) is equal to or greater than the set value of Max position limit (607Dh: 2), the function of Software position limit (607Dh) is disabled.	1 bytes	Reading	Impos-sible	2	02h (fixed)			
	1	Stroke limit - (Min position limit) The stroke limit value in the reverse direction is returned in units of commands.	4 bytes	Read/ write	Possible	0	80000000h to 7FFFFFFFh	pos units	○	PT17/ PT18
	2	Stroke limit + (Max position limit) The stroke limit value in the forward direction is returned in units of commands.	4 bytes	Read/ write	Possible	0	80000000h to 7FFFFFFFh	pos units	○	PT15/ PT16
607E	0	Rotation direction selection (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 bit 6 and bit 7 to set the rotation direction to position commands and speed commands. Turn on or off all of bit 5 to bit 7 to set the rotation direction to torque commands.	1 bytes	Read/ write	Possible	00h	00h to FFh		○	PA14/ PC29
607F	0	Maximum speed command (Max profile velocity) Set the maximum speed command for the profile position mode (pp) and profile velocity mode (pv). 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.	4 bytes	Read/ write	Possible	2000000	00000000h to 001E8480h (2000000)	0.01 r/min	○	PT51
6080	0	Servo motor maximum speed (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.	4 bytes	Read/ write	Possible		00000000h to FFFFFFFFh	r/min		
6081	0	Command speed (Profile velocity) The current speed command value can be read. The speed command value can also be set. Set a value in units of 0.01 r/min.	4 bytes	Read/ write	Possible	10000	00000000h to permissible instantane-ous speed	0.01 r/min	○	PT50
6083	0	Acceleration time constant (Profile acceleration) The current acceleration time constant can be read. The acceleration time constant can also be set. Set the length of time until the servo motor accelerates to the rated speed in units of ms.	4 bytes	Read/ write	Possible	0	00000000h to FFFFFFFFh	ms	○	PC01

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
6084	0	Deceleration time constant (Profile deceleration) The current deceleration time constant can be read. The deceleration time constant can also be set. Set the length of time until the servo motor decelerates from the rated speed to a stop in units of ms.	4 bytes	Read/ write	Possible	0	00000000h to FFFFFFFFh	ms	○	PC02
6085	0	Deceleration time constant at Quick stop command (Quick stop deceleration) Set a deceleration time constant for the Quick stop function. Set a time for the servo motor to stop from the rated speed. When "0" is set, the operation is performed with 100 ms. [Range] Limited within the range of 0 to 20000. When "0" is set, the operation is performed with 100 ms. The operation depends on the specification of [Pr. PC51].	4 bytes	Read/ write	Possible	100	00000000h to FFFFFFFFh	ms	○	PC51
6086	0	Acceleration/deceleration pattern (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, "-1" is always returned. Values other than "-1" cannot be set.	2 bytes	Read/ write	Possible	-1	FFFFh (-1) (fixed)			
6087	0	Torque slope Set the variation per second of the torque command used in the profile torque mode. When "0" is set, the setting value is invalid and the torque command is input with step input. [Range] Limited within the range of 0 to 10000000. When "0" is set, the setting value is invalid (step input).	4 bytes	Read/ write	Possible	0	00000000h to 00989680h	0.1%	○	PT49
6088	0	Torque command pattern (Torque profile type) Set the torque command pattern. 0: Linear interpolation method Values other than 0 cannot be set.	2 bytes	Read/ write	Possible	0	0000h (fixed)			
608F	0	Encoder information (Position encoder resolution) The number of entries is returned.	1 bytes	Reading	Impos-sible	2	02h (fixed)	pulse/ rev		
	1	Encoder resolution (Encoder increments) The encoder resolution is returned.	4 bytes	Read/ write	Possible		00000000h to FFFFFFFFh	pulse		
	2	Number of revolutions of the servo motor (fixed to 1 rev) (Motor revolutions) The fixed value "1" is returned.	4 bytes	Read/ write	Possible	1	00000001h to 00000001h	rev		
6091	0	Servo motor shaft gear ratio (Gear ratio) The number of entries is returned.	1 bytes	Reading	Impos-sible	2	02h (fixed)			
	1	Number of revolutions of the servo motor axis (electronic gear numerator) (Motor revolutions) Set the numerator of the electronic gear. Refer to [Pr. PA06] for the settable values.	4 bytes	Read/ write	Possible	1	00000001h to 00FFFFFFh (16777215)	rev	○	PA06
	2	Number of revolutions of the drive axis (electronic gear denominator) (Shaft revolutions) Set the numerator of the electronic gear. Refer to [Pr. PA07] for the settable values.	4 bytes	Read/ write	Possible	1	00000001h to 00FFFFFFh (16777215)	rev	○	PA07
6092	0	Travel distance per revolution of the drive axis (Feed constant) The number of entries is returned. Electronic gear expression: Travel distance/Number of revolutions of the drive axis	1 bytes	Reading	Impos-sible	2	02h (fixed)			

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
6092	1	Travel distance (Feed) The value is set automatically according to the [Pr. PT01] setting. Setting in [Pr. PT01]: _ 2 _ _ (degree) 360000 _ 3 _ _ (pulse) Encoder resolution	4 bytes	Read/ write	Possible	360000 (degree)/ Encoder resolution (pulse)	00000001h to FFFFFFFFh	pos units		
	2	Number of revolutions of the drive axis (fixed to 1 rev) (Shaft revolutions) No value can be written as it is automatically set with [Pr. PT01]. If a value is written, this setting is disabled.	4 bytes	Read/ write	Possible	1	00000001h to 00000001h	rev	○	PT01
6098	0	Home position return types (Homing method) Set a home position return type.	1 bytes	Read/ write	Possible	37	D5h (-43) to 27h (39)		○	PT45
6099	0	Home position return speed (Homing speeds) The number of entries is returned.	1 bytes	Reading	Impos-sible	2	02h (fixed)			
	1	Home position return speed (Speed during search for switch) Set the servo motor speed at home position return.	4 bytes	Read/ write	Possible	10000	0 to permissible instantane-ous speed	0.01 r/min	○	PT05
	2	Creep speed (Speed during search for zero) Set a creep speed after proximity dog at home position return.	4 bytes	Read/ write	Possible	1000	0 to permissible instantane-ous speed	0.01 r/min	○	PT06
609A	0	Set acceleration/deceleration time constant at home position return. (Homing acceleration) Set the acceleration/deceleration time constants at home position return. Set a time for the servo motor to reach the rated speed.	4 bytes	Read/ write	Possible	0	00000000h to 00004E20h (20000)	ms	○	PT61/ PT62
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".	4 bytes	Read/ write	Impos-sible	FD410000h (degree) 00000000h (pulse)	00000000h to FFFFFFFFh			
60A9	0	SI unit velocity (SI unit velocity) The SI unit velocity is returned. FEB44700h: 0.01 r/min	4 bytes	Read/ write	Impos-sible	FEB44700h	FEB44700h (0.01 r/min)			
60B8	0	Touch probe function setting (Touch probe function) Set the command for the touch probe function.	2 bytes	Read/ write	Possible	0	0000h to FFFFh			
60B9	0	Status of the touch probe function (Touch probe status) The status of the touch probe function is returned.	2 bytes	Reading	Possible	0	0000h to FFFFh			
60BA	0	Rising edge position of touch probe (Touch probe pos1 pos value) The position latched at the rising edge of touch probe 1 is returned.	4 bytes	Reading	Possible	0	80000000h to 7FFFFFFFh	pos units		
60BB	0	Falling edge position of touch probe (Touch probe pos1 neg value) The position latched at the falling edge of touch probe 1 is returned.	4 bytes	Reading	Possible	0	80000000h to 7FFFFFFFh	pos units		
60E0	0	Forward rotation torque limit (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%.	2 bytes	Read/ write	Possible	10000	0000h to 2710h (10000)	0.1%	○	PA11/ (PA12)

Index	Sub Index	Name and function	Data type	Read/ write	Variable mapping	Initial value	Range	Unit	Saved to EEP-ROM	Para-meter
60E1	0	Reverse rotation torque limit (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%.	2 bytes	Read/ write	Possible	10000	0000h to 2710h (10000)	0.1%	○	PA12/ (PA11)
60E3	0	Supported homing method (Supported homing method) The number of supported homing methods is returned.	1 bytes	Reading	Impos-sible	39	00h to FFh			
60E3	1 to 39	Number specification of supported homing methods (1st to 39th) (1st supported homing method) Set the number of the supported home position return type.	1 bytes	Reading	Impos-sible	37	80h to 7Fh			
60F2	0	Profile position mode setting (Positioning option code) Set the profile position mode. Bit 1 to Bit 3 always notify "0". Setting a value other than "0" will cause an error. [Bit 1/Bit 0: relative option] How to handle the relative position command during pp is specified. 00: The positioning is performed with the relative position from the internal absolute target position. [Bit 3/Bit 2: change immediately option] The operation of when change set immediately (control word Bit 5) is 1 during pp is specified. 00: Normal pp mode operation (New Target position, profile velocity, acceleration, and others are reflected immediately.) [Bit 7/Bit 6: rotary axis direction option] Specify the operation of the rotation axis during pp and pt. 00: The servo motor rotates to the target position in a direction specified with a sign of the position data. 01: The servo motor rotates in the address decreasing direction regardless of the sign of the position data. 10: The servo motor rotates in the address increasing direction regardless of the sign of the position data. 11: The servo motor rotates from the current position to the target position in the shorter direction. 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.	2 bytes	Read/ write	Possible	0000h	0000h to 00C0h			
60F4	0	Droop pulses [command unit] (Following error actual value) The droop pulses are returned.	4 bytes	Read	Possible		80000000h to 7FFFFFFFh	pos units		
60FA	0	Speed command (Control effort) The speed command is returned.	4 bytes	Read	Possible	0	80000000h to 7FFFFFFFh	0.01 r/min		
60FF	0	Command speed (Target velocity) Set the speed command used in the profile velocity mode (pv).	4 bytes	Read/ write	Possible	0	80000000h to 7FFFFFFFh	0.01 r/min		
6502	0	Supported control mode (Supported drive modes) The supported control mode is returned. Bit 0: Profile position mode (pp) Bit 2: Profile velocity mode (pv) Bit 3: Profile torque mode (tq) Bit 5: Homing mode (hm)	4 bytes	Reading	Possible	0000002Dh	0000002Dh to 0000002Dh			

7.2 Object library details (objects in the 1000s)

POINT
●This section describes the objects in the 1000s. Refer to section 7.1 for details on the objects not listed here.

7.2.1 Writing command to EEP-ROM (1010h)

POINT
●Before shutting off the power after executing the writing command to EEP-ROM (Store Parameters), always check that parameters are not being saved (Bit 0 is on).

For the objects that can be saved, write "65766173h" (= reverse order of the ASCII code of "save") to the corresponding sub object of the writing command to EEP-ROM (Store Parameters) (1010h) to store the object in the EEP-ROM of the servo amplifier.
The value saved in the EEP-ROM is set to the object at the next power-on. Servo parameters can also be modified through the object library. However, the new setting is not automatically written to the EEP-ROM. To write the new setting, use the writing command to EEP-ROM (Store Parameters) (1010h).
Executing the writing command to EEP-ROM (Store Parameters) (1010h) takes about a maximum of 10 s because all parameters are written at the same time. Be careful not to shut off the power during writing.

Index	Sub Index	Name		Data type	Read/ write
1010h	0	Writing command to EEP-ROM (Store parameters)	Number of entries (Number of entries)	1 bytes	Reading
	1		Saving all parameters (Save all parameters)	4 bytes	Read/ write
	2		For manufacturer setting		
	3				
	4				
	5				

Parameter setting values can be saved in EEP-ROM.

(1) Usage

This object can read the availability 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 (Number of entries)		01h
1	Saving all parameters (Save all parameters)	Index: 2001h to 27FFh	00000001h (available)
2	For manufacturer setting		
3			
4			
5			

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

To save servo amplifier parameters in EEP-ROM, configure required settings following the table below. When bit 1 (EEP-ROM write completed) of the control output (2D11h) is "1", saving data in EEP-ROM has been completed.

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

Sub Index	Item	Setting value	Write to EEP-ROM Parameter
0	Number of entries (Number of entries)	01h	
1	Saving all parameters (Save all parameters)	00000000h	Disabled
		65766173h ("save")	Enabled
		Other than above	Error
2	For manufacturer setting		
3			
4			
5			

7.2.2 Restore default EEP-ROM parameters (1011h)

Index	Sub Index	Name		Data type	Read/ write
1011h	0	Restoring default EEP-ROM parameters (Restore default parameters)	Number of entries (Number of entries)	1 bytes	Reading
	1		Restoring all default parameters (Restore all default parameters)	4 bytes	Read/ write
	2		For manufacturer setting		
	3				
	4				
	5				

The parameter of the servo amplifier can be rewritten with the factory setting.

When "64616F6Ch" (= reverse order of ASCII code of "load") is written to Restore all default parameters (1011h: 1) and the power in cycled, the parameter is initialized.

7.2.3 Response message mapping (1A00h)

(1) Object list

Index	Sub Index	Name		Data type	Read/ write
1A00h	0	Response message mapping (Transmit PDO Mapping)	Number of entries (Number of entries)	1 bytes	Read/ write
	1		Response message mapping 1 (Mapped Object 001)	4 bytes	
	⋮		⋮		
	32		Response message mapping 32 (Mapped Object 032)		

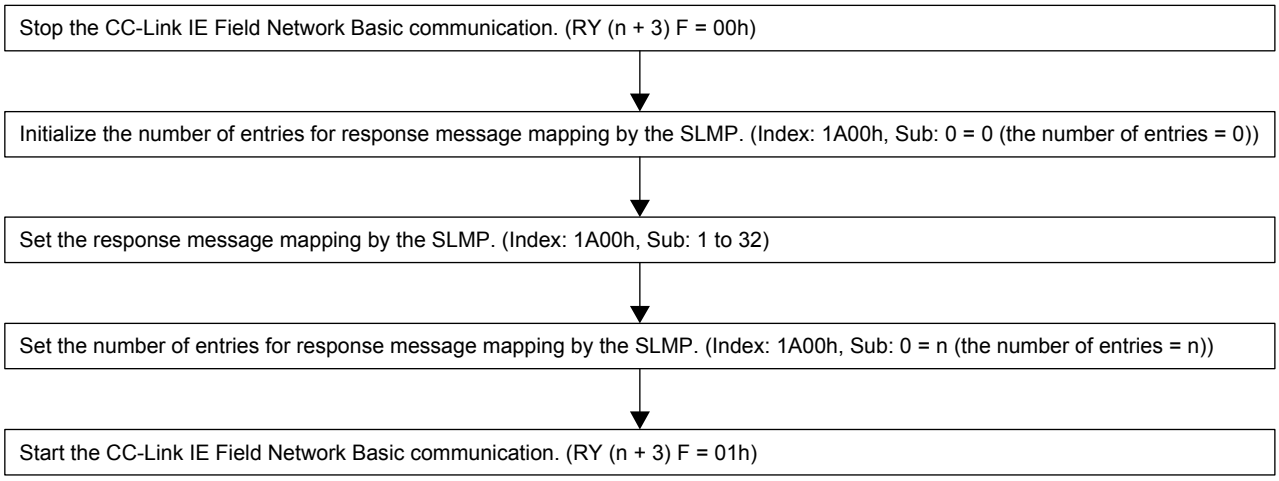
The object to be registered with response messages can be set. Set the number of objects to be registered with Transmit PDO Mapping (1A00h: 0). Set the objects to be registered with Mapped Object 001 (1A00h: 1) to Mapped Object 032 (1A00h: 32). The following shows the description of Mapped Object 001 (1A00h: 1) to Mapped Object 032 (1A00h: 32).

Name	bit	Detail name	Description
Response message mappings 1 to 32 (Mapped Objects 001 to 032)	16 to 31	Index of 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 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 object to be mapped	Set the size of the object to be mapped in units of bits. For example, set "16" for 2 bytes. To set the object as unassigned (gap), set the size in units of bits.

Refer to the description about RWrn in section 2.3 Link device for details on the initial values.

(2) Usage

Change the response message mapping in the following procedure.



(3) Setting precautions

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

(b) Map the objects in the order of Sub Index 1 to 32 regardless of the object size. The necessary number of RWr devices is reserved automatically.

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

(d) Gaps can be inserted by setting objects to be mapped with Index of 0 and Sub Index of 0. Set the gap size in units of bits for the objects to be mapped.

(e) The arrangement changed by the response message mapping is not saved. The arrangement needs to be set every time the power of the servo amplifier is cycled.

7.3 Object library details (objects in the 2000s)

POINT

●This section describes the objects in the 2000s. Refer to section 7.1 for details on the objects not listed here.

7.3.1 External input pin status (2C10h)

Index	Sub Index	Name		Data type	Read/ write
2C10h	0	External input pin status (External Input pin display)	Number of entries (Number of entries)	1 bytes	Reading
	1		External input pin status 1 (External Input pin display1)	4 bytes	Reading

The ON/OFF state of the external input pins input to the servo amplifier can be read.

(1) Usage

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

External Input pin display1 displays the input pin status of the MR-JE-_C servo amplifier. 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	

7.3.2 External output pin status (2C11h)

Index	Sub Index	Name		Data type	Read/ write
2C11h	0	External output pin status (External Output pin display)	Number of entries (Number of entries)	1 bytes	Reading
	1		External output pin status 1 (External Output pin display1)	4 bytes	Reading

The ON/OFF state of external output pins output from the servo amplifier can be read.

(1) Usage

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

External Output pin display1 displays the output pin status of the MR-JE-_C servo amplifier. 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	

7.3.3 Input device status (2C12h)

Index	Sub Index	Name		Data type	Read/ write
2C12h	0	Input device status (External Input signal display)	Number of entries (Number of entries)	1 bytes	Reading
	1		Input device status 1 (External Input signal display1)	4 bytes	
	2		Input device status 2 (External Input signal display2)	4 bytes	
	3		Input device status 3 (External Input signal display3)	4 bytes	
	4		Input device status 4 (External Input signal display4)	4 bytes	

The current input device status can be read.

(1) Usage

External Input signal display1 (Input device status 1) to External Input signal display4 (Input device status 4) display the ON/OFF state of each input device of the MR-JE-_C servo amplifier. 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 indefinite.

Bit	Input device abbreviation (Note)			
	Input device status 1	Input device status 2	Input device status 3	Input device status 4
0	SON (Servo-on)			
1	LSP (Forward rotation stroke end)			
2	LSN (Reverse rotation stroke end)			
3	TL (External torque limit selection)			
4	TL1 (Internal torque limit selection)			
5	PC (Proportional control)			
6	RES (Reset)			
7	CR (Clear)			
8	SP1 (Speed selection 1)			
9	SP2 (Speed selection 2)		DOG (Proximity dog)	
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				
17				
18	EM2/EM1 (Forced stop 2/1)			
19				
20	STAB2 (Second acceleration/deceleration selection)			
21				
22				
23				
24				
25				
26				
27	CDP (Gain switching)			
28				
29				
30				
31				

Note. For details on the symbols, refer to section 3.5 in "MR-JE-_C Servo Amplifier Instruction Manual".

7.3.4 Control input (2D01h to 2D0Ah)

Index	Sub Index	Name	Data type	Read/ write
2D01h to 2D0Ah	0	Control input (Control DI1 to Control DI10)	2 bytes	Read/ write

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 DI1

Bit	Symbol	Description
0	C_EM2	This device can be used by setting "2 _ _ _" (initial value) in [Pr. PA04]. When C_EM2 is turned on, the command decelerates the servo motor to a stop. Turn C_EM2 off in the forced stop state to reset that state. In the torque control mode, C_EM2 functions the same as C_EM1.
	C_EM1	This device can be used by setting "0 _ _ _" in [Pr. PA04]. When C_EM1 is turned on, the base circuit shuts off, and the dynamic brake operates to decelerate the servo motor to a stop. Turn C_EM1 off in the forced stop state to reset that state.
1		The value at reading is undefined. Set "0" when writing.
2		
3		
4	C_CDP	Gain switching Turn on C_CDP to use 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 selected by [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 DI2

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 a long time, switch on the C_PC and TL (External torque limit selection) at the same time to make the torque 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 on C_ORST from off to reset [AL. F4 Positioning warning].

(3) Bit definition of control DI3

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	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	Acceleration time constant	Deceleration time constant
0	Pr. PC01	Pr. PC02
1	Pr. PC30	Pr. PC31

14		The value at reading is undefined. Set "0" when writing.
15		

(4) Bit definition of control DI4

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 DI5

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 input 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 DI6

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 DI7

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		

(8) Bit definition of control DI8

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		

(9) Bit definition of control DI9

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 DI10

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		

7.3.5 Control output (2D11h to 2D1Ah)

Index	Sub Index	Name	Data type	Read/ write
2D11h to 2D1Ah	0	Control output (Status DO1 to Status DO10)	2 bytes	Reading

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, 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, S_SA turns on. Set speed ± ((Set speed × 0.05) + 20) r/min When the preset speed is 20 r/min or less, SA always turns 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 will turn 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	Analog torque limit selection When TL (External torque limit selection) is turned on, S_TL turns on.
8	S_TL1	Torque limit selection When C_TL1 or TL1 (Internal torque limit selection) is turned on, 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 will turn 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 S_TLC turns on when a generated torque reaches a value set with any of [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 When [AL. 92 Battery cable disconnection warning] or [AL. 9F Battery warning] has occurred, S_BWNG turns on. 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 is available with servo amplifiers with software version A3 or later.
1		The value at reading is undefined.
2		
3	S_ZSP	Zero speed state S_ZSP turns on when the servo motor speed is zero speed or less. Zero speed can be changed with [Pr. PC17].
4	S_VLC	Limiting speed S_VLC turns on when speed reaches a value limited with any of [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, it 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. If a home position return completes once in the absolute position detection system, S_ZP2 is always on. However, it will be off with one of the conditions 1) to 3) or 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 will be enabled in the profile 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 S_RSTP turns on during a forced stop deceleration. This bit is available with servo amplifiers with software version A3 or later.
10		The value at reading is undefined.
11	S_MTTR	Transition to tough drive mode in process When a tough drive is "Enabled" in [Pr. PA20], activating the instantaneous power failure tough drive will turn on S_MTTR.
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		
6		
7		
8		
9		
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		The value at reading is undefined.
1		
2		
3		
4		
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		

7.4 Object library details (objects in the 6000s)

POINT

●This section describes the objects in the 6000s. Refer to section 7.1 for details on the objects not listed here.

7.4.1 Control status (6041h)

Index	Sub Index	Name	Data type	Read/ write
6041h	0	Control status (Statusword)	2 bytes	Reading

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.

7.4.2 Quick stop option code (605Ah)

Index	Sub Index	Name	Data type	Read/ write
605Ah	0	Quick stop option code (Quick stop option code)	2 bytes	Read/ write

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) and homing mode (hm), the servo motor decelerates to a stop with Quick stop deceleration (6085h) and the state shifts to the Switch On Disabled state. The new setting of Quick stop deceleration is reflected at all times. In the profile torque mode (tq), the state immediately shifts to the Switch On Disabled state and the servo motor stops with the dynamic brake.
3	For manufacturer setting
4	
5	
6	
7	
8	

7.4.3 Halt option code (605Dh)

(1) Object list

Index	Sub Index	Name	Data type	Read/ write
605Dh	0	Halt option code (Halt option code)	2 bytes	Read/ write

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 meaning of Halt Bit (Bit 8 of Controlword (6040h)) and the reflecting timing of the deceleration time setting.

Control mode	Halt Bit is set to "1"	Halt Bit is set to "0"	Reflecting timing of deceleration time setting
Profile position mode (pp)	The servo motor decelerates to a stop according to 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 according to Profile deceleration (6084h).	The operation restarts after the servo motor decelerates to a stop.	The new setting 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 the setting 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 state does not change from Operation Enabled (servo-on). After that, when Halt Bit is set to "0" and Homing Operation Start (Bit 4 of Controlword (6040h)) is set to "0" and then "1", home position return is performed again.		The new setting of Homing acceleration (609Ah) is reflected when Homing Operation Start (Bit 4 of Controlword (6040h)) is set to "1".

7.4.4 Control mode display (6061h)

Index	Sub Index	Name	Data type	Read/ write
6061h	0	Control mode display (Modes of operation Display)	1 bytes	Reading

The current control mode can be read.
The following table shows the correspondence between control modes and setting values.

Control mode	Setting value
Position control mode	-20
Speed control mode	-21
Torque control mode	-22
Profile position mode (pp)	1
Profile velocity mode (pv)	3
Profile torque mode (tq)	4
Homing mode (hm)	6
Test mode: JOG operation	-1
Test mode: Positioning operation	-2
Test mode: DO forced output	-4
Test mode: Machine analyzer	-6

7.4.5 Software limit (607Dh)

Index	Sub Index	Name		Data type	Read/ write
607Dh	0	Software limit (Software Position Limit)	Number of entries (Number of entries)	1 bytes	Reading
	1		Min Position Limit (Stroke limit -)	4 bytes	Read/ write
	2		Max Position Limit (Stroke limit +)	4 bytes	

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 (stroke limit -) in units of commands.
The stroke limit value in the forward direction is returned to Max Position Limit (stroke limit +) in units of commands.
The current software limit setting can also be written.
At this time, set "02h" for Number of entries.
Set the stroke limit value in the reverse direction in Min Position Limit (stroke limit -) in units of commands.
Set the stroke limit value in the forward direction in Max Position Limit (stroke limit +) in units of commands.
If Min Position Limit (stroke limit -) and Max Position Limit (stroke limit +) are set to the same value, the software limit function is disabled.

7.4.6 Polarity (607Eh)

Index	Sub Index	Name	Data type	Read/ write
607Eh	0	Rotation direction selection (Polarity)	1 bytes	Read/ write

The rotation direction selection can be set.
To set the rotation direction to position commands and speed commands, turn on or off both bit 6 and bit 7 of Polarity (607Eh) or use [Pr. PA14]. To set the rotation direction to torque commands, turn on or off all of bit 5 to bit 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 bit 5 to bit 7 in combination.
6	Velocity POL The polarity is reversed when this bit is turned on. Select a rotation direction by setting bit 5 to bit 7 in combination.
7	Position POL The polarity is reversed when this bit is turned on. Select a rotation direction by setting bit 5 to bit 7 in combination.

7.4.7 Degree (60F2h)

Index	Sub Index	Name	Data type	Read/ write
60F2h	0	Profile position mode setting (Positioning option code)	2 bytes	Read/ write

Selecting "degree (_ 2 _ _)" in "Position data unit" of [Pr. PT01] allows for positioning with module coordinates (axis of rotation). The following shows the differences when "degree" is selected.

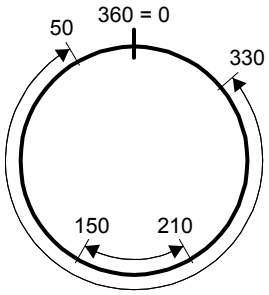
Item (Index, Sub Index)	Description
Target position (607Ah, 0)	The range will be between -360.000° and 360.000°.
Position actual value (6064h, 0)	The range will be between 0° and 359.999°.
Software position limit (607Dh, 0)	The range will be between 0° and 359.999°. A value outside the range is clamped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

Positioning operation patterns can be changed with Positioning option code (60F2h). 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 setting value is not applied immediately. The new value is applied at a positioning start (Bit 4 of Controlword is turned on) after Target reached is once turned on. The following table shows the bits and settings of Positioning option code (60F2h).

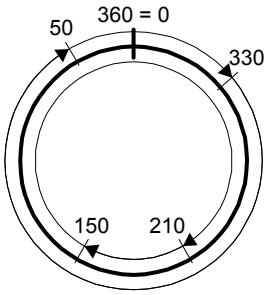
Bit 7	Bit 6	[Pr. PT03]	Rotation direction definition for the axis of rotation
0	0	_ 0 _ _	The servo motor rotates to the target position in a direction specified with a sign of the position data.
0	1	_ 2 _ _	The servo motor rotates in the address decreasing direction regardless of the sign of the position data.
1	0	_ 3 _ _	The servo motor rotates in the address increasing direction regardless of the sign of the position data.
1	1	_ 1 _ _	The servo motor rotates from the current position to the target position in the shorter direction. 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.

The following shows the operation patterns corresponding to the settings of Positioning option code (60F2h).

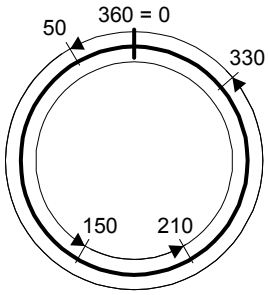
(a) When POL is disabled ([Pr. PA14] = 0)



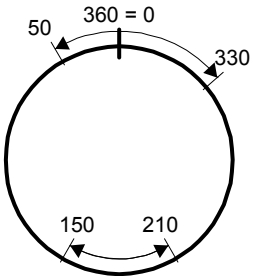
Bit 7: 0
Bit 6: 0
The servo motor rotates in a direction specified with a sign of the position data.



Bit 7: 0
Bit 6: 1
The servo motor rotates only in the address decreasing direction.

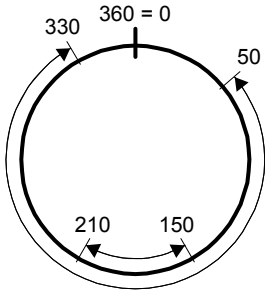


Bit 7: 1
Bit 6: 0
The servo motor rotates only in the address increasing direction.

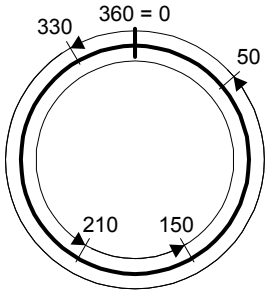


Bit 7: 1
Bit 6: 1
The servo motor rotates in the shorter direction.

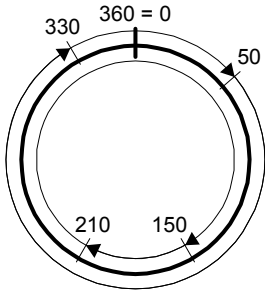
(b) When POL is enabled ([Pr. PA14] = 1)



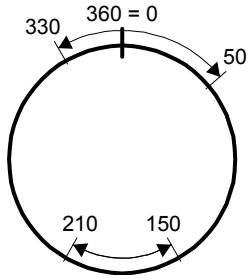
Bit 7: 0
Bit 6: 0
The servo motor rotates in a direction specified with a sign of the position data.



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.

7.4.8 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	Read/ write
60B8h	0	Touch probe function setting (Touch probe function)	2 bytes	Read/ write
60B9h	0	Status of the touch probe function (Touch probe status)	2 bytes	Reading
60BAh	0	Rising edge position of touch probe (Touch probe position positive value)	4 bytes	Reading
60BBh	0	Falling edge position of touch probe (Touch probe position negative value)	4 bytes	Reading

When the touch probe function (60B8h) is set, and TPR1 (touch probe1), an external signal, is turned on/off, the current position of the rising and falling edges are latched.
The latch status of the current position data can be checked with the touch probe status (60B9h). The latched current data can be read with the touch probe position positive value (60BAh) and the touch probe position negative value (60BBh). For details of each object, refer to sections 7.4.9 to 7.4.12.

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

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

(b) At this time, the touch probe status (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).

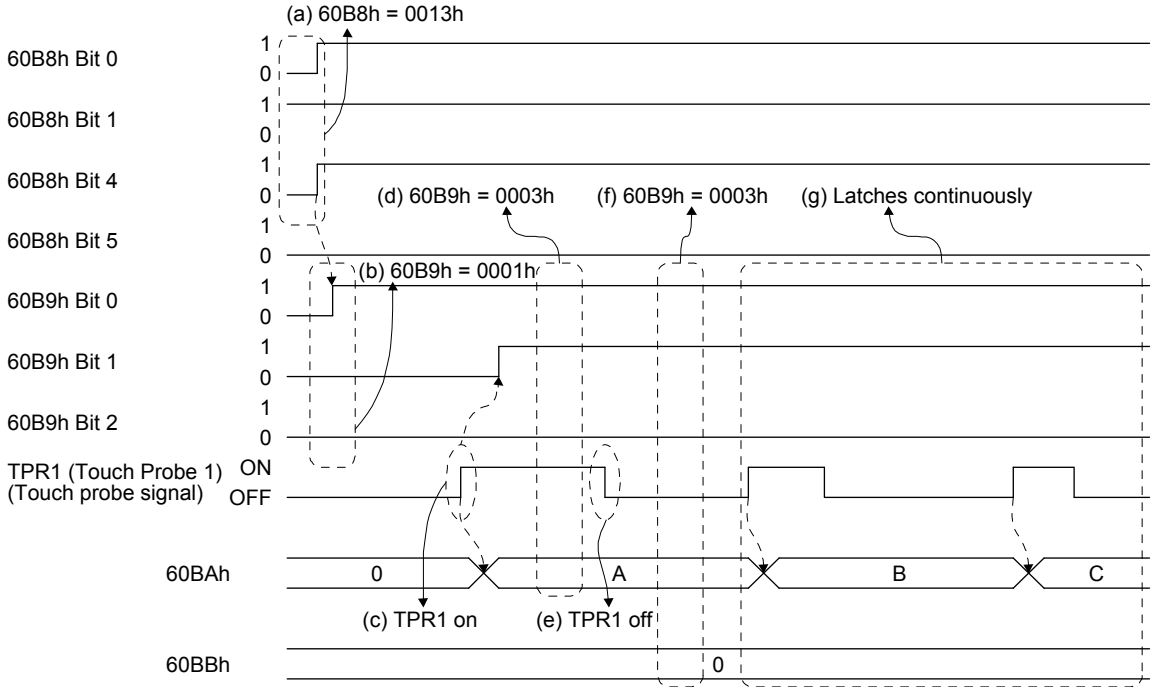
(d) The touch probe status (Touch probe status: 60B9h) changes to "0003h", and the current position at the time of TPR1 (touch probe1) on will be stored to the rising edge position of touch probe (Touch probe position positive value: 60BAh).

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

(f) The touch probe status (Touch probe status: 60B9h) remains "0003h", and the current position at the time that TPR1 (Touch probe 1) turns off will not be stored as the touch probe falling edge position (Touch probe position negative value: 60BBh).

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

The following shows a timing chart.



7.4.9 Touch probe function setting (60B8h)

Index	Sub Index	Name	Data type	Read/ write
60B8h	0	Touch probe function setting (Touch probe function)	2 bytes	Read/ write

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: Continuously latch 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.

7.4.10 Touch probe function status (60B9h)

Index	Sub Index	Name	Data type	Read/ write
60B9h	0	Status of the touch probe function (Touch probe status)	2 bytes	Reading

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, if 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 turns on, it remains on until bit 4 of the touch probe setting (60B8h) is set to "0".
With bit 2, if 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 turns on, it remains on until bit 5 of the touch probe setting (60B8h) is set to "0".

7.4.11 Rising edge position of touch probe (60BAh)

Index	Sub Index	Name	Data type	Read/ write
60BAh	0	Rising edge position of touch probe (Touch probe position positive value)	4 bytes	Reading

The current rising edge position of touch probe can be checked.

7.4.12 Falling edge position of touch probe (60BBh)

Index	Sub Index	Name	Data type	Read/ write
60BBh	0	Falling edge position of touch probe (Touch probe position negative value)	4 bytes	Reading

The current falling edge position of touch probe can be checked.

7.4.13 Supported control mode (6502h)

Index	Sub Index	Name	Data type	Read/ write
6502h	0	Supported control mode (Supported Drive Modes)	4 bytes	Reading

The supported control mode can be read.
The returned value is "0000002Dh". The following table shows the details.

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

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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.

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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