● 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](image)
Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

![CAUTION](image)
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.

![Circle with slash](image)
Indicates what must not be done. For example, "No Fire" is indicated by 📣.

![Circle](image)
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.

<table>
<thead>
<tr>
<th>Item</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>Operation 0 °C to 55 °C (non-freezing)</td>
</tr>
<tr>
<td></td>
<td>Storage -20 °C to 65 °C (non-freezing)</td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>Operation 5 %RH to 90 %RH (non-condensing)</td>
</tr>
<tr>
<td></td>
<td>Storage</td>
</tr>
<tr>
<td>Ambience</td>
<td>Indoors (no direct sunlight), free from corrosive gas, flammable gas, oil mist, dust, and dirt</td>
</tr>
<tr>
<td>Altitude</td>
<td>2000 m or less above sea level (Contact your local sales office for the altitude for options.)</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>5.9 m/s², at 10 Hz to 55 Hz (directions of X, Y and Z axes)</td>
</tr>
</tbody>
</table>

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

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

(2) Wiring

CAUTION

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

![Connection Diagrams](image)

- 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.

![Control Output Signal](image)

- 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

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

(4) Usage

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

**CAUTION**

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

![Diagram](image)

- 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 EEPROM, 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 EEPROM reaches the end of its useful life.

- Write to the EEPROM due to parameter setting changes
- Write to the EEPROM due to device changes
- Write to the EEPROM due to point table setting changes

Compliance with global standards

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

About the manual

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

Relevant manuals

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MELSERVO MR-JE-__C Servo Amplifier Instruction Manual</td>
<td>SH(NA)030257ENG</td>
</tr>
<tr>
<td>MELSERVO-JE Servo Amplifier Instruction Manual (Troubleshooting)</td>
<td>SH(NA)030166ENG</td>
</tr>
<tr>
<td>MELSERVO MR-JE-__C Servo Amplifier Instruction Manual (Positioning Mode)</td>
<td>SH(NA)030277ENG</td>
</tr>
<tr>
<td>MELSERVO MR-JE-__C Servo Amplifier Instruction Manual (Profile Mode)</td>
<td>SH(NA)030254ENG</td>
</tr>
<tr>
<td>MELSERVO HG-KN/HG-SN Servo Motor Instruction Manual</td>
<td>SH(NA)030135ENG</td>
</tr>
<tr>
<td>MELSERVO EMC Installation Guidelines</td>
<td>IB(NA)67310ENG</td>
</tr>
</tbody>
</table>

U.S. customary units

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

<table>
<thead>
<tr>
<th>Quantity</th>
<th>SI (metric) unit</th>
<th>U.S. customary unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>1 [kg]</td>
<td>2.2046 [lb]</td>
</tr>
<tr>
<td>Length</td>
<td>1 [mm]</td>
<td>0.03937 [inch]</td>
</tr>
<tr>
<td>Torque</td>
<td>1 [N•m]</td>
<td>141.6 [oz•inch]</td>
</tr>
<tr>
<td>Moment of inertia</td>
<td>1 [× 10^-4 kg•m²]</td>
<td>5.4675 [oz•inch²]</td>
</tr>
<tr>
<td>Load (thrust load/axial load)</td>
<td>1 [N]</td>
<td>0.2248 [lbf]</td>
</tr>
<tr>
<td>Temperature</td>
<td>N [°C] × 9/5 + 32</td>
<td>N [°F]</td>
</tr>
</tbody>
</table>
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1. FUNCTIONS AND CONFIGURATION

1.1 Function List

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

Ethernet communication (CC-Link IE field network Basic, SLMP and Modbus/TCP) and RS-485 communication (Modbus RTU) are exclusively independent functions.
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Detailed explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model adaptive control</td>
<td>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 &quot;MR-JE-C Servo Amplifier Instruction Manual&quot;.</td>
<td></td>
</tr>
<tr>
<td>Roll feed display function</td>
<td>Positioning is performed based on the specified travel distance from a status display &quot;0&quot; of current/command positions at start. This function is available with servo amplifiers with software version A4 or later.</td>
<td>&quot;MR-JE- C Servo Amplifier Instruction Manual (Positioning Mode)&quot;</td>
</tr>
<tr>
<td>Touch probe function setting</td>
<td>Current position latch function: When the touch probe 1 signal turns on, the current position is latched. The latched data can be read with communication commands.</td>
<td>&quot;MR-JE- C Servo Amplifier Instruction Manual (Positioning Mode)&quot;</td>
</tr>
<tr>
<td>Touch probe function setting</td>
<td>Interrupt positioning function: The touch probe function is available in the profile mode or the positioning mode. When the touch probe 1 signal turns on, this function converts the remaining distance to the travel distance set in [Pr. PT30 Touch probe sensor - Travel distance before stop (lower four digits)] and [Pr. PT31 Touch probe sensor - Travel distance before stop (upper four digits)]. This function is available with servo amplifiers with software version A4 or later.</td>
<td>&quot;MR-JE- C Servo Amplifier Instruction Manual (Positioning Mode)&quot;</td>
</tr>
<tr>
<td>Infinite feed function (When degree is set)</td>
<td>When the unit of position data of the profile mode is set to degree, the detection of [AL. E3.1 Multi-revolution counter travel distance excess warning] is disabled and the home position is retained even if the servo motor rotates 32768 revolutions or more in the same direction. Thus, the current position is restored after the power is cycled. This function can be used with the absolute position detection system.</td>
<td>&quot;MR-JE- C Servo Amplifier Instruction Manual (Profile Mode)&quot;</td>
</tr>
<tr>
<td>Command pulse selection</td>
<td>Command pulse train form can be selected from among three different types.</td>
<td>&quot;MR-JE- C Servo Amplifier Instruction Manual&quot;</td>
</tr>
<tr>
<td>High-resolution encoder</td>
<td>High-resolution encoder of 131072 pulses/rev is used for the encoder of the servo motor compatible with the MELSERVO-JE series.</td>
<td></td>
</tr>
<tr>
<td>Gain switching function</td>
<td>You can switch gains during rotation and during stop, and can use an input device to switch gains during operation.</td>
<td></td>
</tr>
<tr>
<td>Advanced vibration suppression control II</td>
<td>This function suppresses vibration or residual vibration at an arm end.</td>
<td>&quot;MR-JE- C Servo Amplifier Instruction Manual&quot;</td>
</tr>
<tr>
<td>Machine resonance suppression filter</td>
<td>This filter function (notch filter) decreases the gain of the specific frequency to suppress the resonance of the mechanical system.</td>
<td></td>
</tr>
<tr>
<td>Shaft resonance suppression filter</td>
<td>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.</td>
<td>&quot;MR-JE- C Servo Amplifier Instruction Manual&quot;</td>
</tr>
<tr>
<td>Adaptive filter II</td>
<td>The servo amplifier detects mechanical resonance and sets filter characteristics automatically to suppress mechanical vibration.</td>
<td></td>
</tr>
<tr>
<td>Low-pass filter</td>
<td>Suppresses high-frequency resonance which occurs as the servo system response is increased.</td>
<td></td>
</tr>
<tr>
<td>Machine analyzer function</td>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>
# 1. FUNCTIONS AND CONFIGURATION

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Detailed explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robust filter</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Slight vibration suppression control</td>
<td>Suppresses vibration of ±1 pulse generated at a servo motor stop.</td>
<td></td>
</tr>
<tr>
<td>Electronic gear</td>
<td>The position control is performed based on a value obtained by multiplying the position command from the controller by the set electronic gear ratio.</td>
<td></td>
</tr>
<tr>
<td>S-pattern acceleration/deceleration time constant</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Auto tuning</td>
<td>Automatically adjusts the gain to optimum value if load applied to the servo motor shaft varies.</td>
<td></td>
</tr>
<tr>
<td>Regenerative option</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Alarm history clear</td>
<td>Clears alarm histories.</td>
<td></td>
</tr>
<tr>
<td>Input signal selection (device settings)</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Output signal selection (device settings)</td>
<td>The output devices including MBR (Electromagnetic brake interlock) can be assigned to certain pins of the CN3 connector.</td>
<td></td>
</tr>
<tr>
<td>Output signal (DO) forced output</td>
<td>Turns on/off the output signals forcibly independently of the servo status. Use this function for checking output signal wiring, etc.</td>
<td></td>
</tr>
<tr>
<td>Torque limit</td>
<td>Limits the servo motor torque.</td>
<td></td>
</tr>
<tr>
<td>Speed limit</td>
<td>Servo motor speed can be limited to any value.</td>
<td></td>
</tr>
<tr>
<td>Automatic VC offset</td>
<td>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.</td>
<td>&quot;MR-JE-_C Servo Amplifier Instruction Manual&quot;</td>
</tr>
<tr>
<td>Alarm code output</td>
<td>If an alarm has occurred, the corresponding alarm number is outputted in 3-bit code.</td>
<td></td>
</tr>
<tr>
<td>Test operation mode</td>
<td>Jog operation, positioning operation, motor-less operation, DO forced output, program operation, and single-step feed MR Configurator2 is necessary for this function.</td>
<td>&quot;MR-JE-_C Servo Amplifier Instruction Manual&quot;</td>
</tr>
<tr>
<td>MR Configurator2</td>
<td>Using a personal computer, you can perform the parameter setting, test operation, monitoring, and others.</td>
<td>Section 6.2 &quot;MR-JE-_C Servo Amplifier Instruction Manual&quot;</td>
</tr>
<tr>
<td>One-touch tuning</td>
<td>Gain adjustment is performed just by one click on MR Configurator2. This function is available with MR Configurator2 or via a network.</td>
<td>&quot;MR-JE-_C Servo Amplifier Instruction Manual&quot;</td>
</tr>
<tr>
<td>Tough drive function</td>
<td>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.</td>
<td>&quot;MR-JE-_C Servo Amplifier Instruction Manual&quot;</td>
</tr>
<tr>
<td>Drive recorder function</td>
<td>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 &quot;.1&quot;.</td>
<td>&quot;MR-JE-_C Servo Amplifier Instruction Manual&quot;</td>
</tr>
<tr>
<td>Servo amplifier life diagnosis function</td>
<td>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.)</td>
<td></td>
</tr>
</tbody>
</table>
# 1. FUNCTIONS AND CONFIGURATION

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Detailed explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power monitoring function</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Machine diagnosis function</td>
<td>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.)</td>
<td></td>
</tr>
<tr>
<td>Modbus RTU</td>
<td>The Modbus RTU uses dedicated message frames for the Ethernet communication between a master and slaves. The dedicated message frame has a message field called Function which reads and writes data, and parameter setting (reading and writing) of the servo amplifier and monitoring can be done with this message field. In the profile mode or positioning mode, driving the servo motor is also possible. This function is available with servo amplifiers with software version A4 or later.</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>Modbus/TCP</td>
<td>The Modbus/TCP uses dedicated message frames for the Ethernet communication between a client (master) and servers (slaves). The dedicated message frames have functions for reading and writing data, you can set the parameters of servo amplifiers and monitor it by using this function. In the profile mode or positioning mode, driving the servo motor is also possible. This function is used with servo amplifiers with software version A3 or later.</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>CC-Link IE Field Network Basic</td>
<td>CC-Link IE Field Network Basic enables fixed cycle communication between the master and slave stations using a general-purpose Ethernet connector. The parameters of servo amplifiers can be set (read/written) and monitored. In the profile mode or positioning mode, driving the servo motor is also possible.</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>SLMP</td>
<td>SLMP (SeamLess Message Protocol) is a protocol to access SLMP-compatible devices from external devices (such as a personal computer and an HMI) or programmable controller CPU via Ethernet. The parameters of servo amplifiers can be set (read/written) and monitored. In the profile mode or positioning mode, driving the servo motor is also possible.</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>IP address filtering function</td>
<td>Register the range of IP addresses in advance to limit the network devices allowed to be connected to the servo amplifier.</td>
<td></td>
</tr>
<tr>
<td>Operation specification IP address function</td>
<td>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.</td>
<td>Chapter 5</td>
</tr>
<tr>
<td>Lost motion compensation function</td>
<td>This function improves the response delay generated when the machine moving direction is reversed.</td>
<td>“MR-JE-_C Servo Amplifier Instruction Manual”</td>
</tr>
<tr>
<td>Limit switch</td>
<td>Limits travel intervals using LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end).</td>
<td></td>
</tr>
<tr>
<td>Software limit</td>
<td>Limits travel intervals by address using parameters. Enables the same function with the limit switch by setting parameters.</td>
<td>Section 7.4.5</td>
</tr>
<tr>
<td>Analog override</td>
<td>Limits a servo motor speed with analog inputs. The value can be changed to 0% to 200% of the set speed. This function is available with servo amplifiers with software version A4 or later.</td>
<td>“MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)”</td>
</tr>
<tr>
<td>Digital override</td>
<td>A commanded speed multiplied by an override value selected with OVR (Override selection) will be an actual servo motor speed. The value can be changed to 0% to 360% of the set speed. This function is available with servo amplifiers with software version A4 or later.</td>
<td></td>
</tr>
</tbody>
</table>
2. CC-Link IE Field Network Basic/SLMP

2.1 Outline

CC-Link IE Field Network Basic is a standard Ethernet-based protocol used to perform cyclic communication by the installed software without using a dedicated ASIC. You can establish a highly flexible system because CC-Link IE Field Network Basic can be used together with TCP/IP communications.

Up to 64 axes of servo amplifiers (up to 16 axes of servo amplifiers per group) can be monitored by the controller.

In the profile position mode, positioning operation can be performed based on the position data (target position) given via the controller.

In the point table mode (pt), you can perform positioning operation by specifying the pre-configured point table number (1 to 255) with a controller.

2.1.1 Features

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

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

2.1 Communication specifications of CC-Link IE Field Network Basic

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

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: $L_s = N_s + N_m$
   MELSEC iQ-F: $L_s = SM + \left(\frac{(N_s + N_m)}{SM}\right)$
   $L_s$: Link scan time, $N_s$: Response time of slave station, $N_m$: Request time of master station, $SM$: Sequence scan time

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

2.2.2 SLMP communication specifications

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

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

2.3 Outline of CC-Link IE Field Network Basic protocol

In CC-Link IE Field Network Basic, a command that a master station (controller) sends to slave stations (servo amplifiers) is called a request message, and a command that the slave stations (servo amplifiers) send back to the master station (controller) is called a response message.

The master station (controller) sends the request message using the directed broadcast to all slave stations (servo amplifiers). When the servo amplifier receives the request message, it acquires data for own station and returns the response message to the master station (controller) using the unicast after the servo amplifier response time. The servo amplifier response time differs depending on the command to send. Use link devices (RW, RW, RX, and RY) for data communications. Sending and receiving the request message and response message at a constant cycle allow the master station (controller) to perform link refresh.

The servo amplifier reads the received data as an object dictionary to drive a servo motor and return monitor data.

```
Constant cycle
Master station (controller)  
<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Request message (directed</td>
</tr>
<tr>
<td>broadcast)</td>
</tr>
<tr>
<td>Response message (unicast)</td>
</tr>
<tr>
<td>Slave station (servo amplifier)</td>
</tr>
</tbody>
</table>
```

2 - 3
2. CC-Link IE Field Network Basic/SLMP

2.3.1 Message format

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

(1) Request message format

<table>
<thead>
<tr>
<th>Ethernet header</th>
<th>IP header</th>
<th>UDP header</th>
<th>CCIEF Basic header</th>
<th>Command, etc.</th>
<th>Link device (for 16 stations) (RY, RWw)</th>
</tr>
</thead>
</table>

(2) Response message format

<table>
<thead>
<tr>
<th>Ethernet header</th>
<th>IP header</th>
<th>UDP header</th>
<th>CCIEF Basic header</th>
<th>Slave station notification information</th>
<th>Link device (RX, RWr)</th>
</tr>
</thead>
</table>

2.3.2 Link device

In cyclic communication, communication data of the request message and response message is read as object data (RWwn, RWrn, RYn, RXn) of the servo amplifier. Table 2.1 and 2.2 list initial settings. The setting of the response message can be changed. When changing it from the initial setting, refer to section 7.4.6.

Table 2.1 RYn/RXn mapping (supporting the position/speed/torque control mode, profile mode, and home position return mode)

<table>
<thead>
<tr>
<th>(Note) Device No.</th>
<th>Device</th>
<th>Symbol</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>RYn0 to RY (n + 3) E</td>
<td>Not used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY (n + 3) F</td>
<td>Cyclic communication ready command</td>
<td>CSR</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(Note) Device No.</th>
<th>Device</th>
<th>Symbol</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>RXn0 to RX (n + 3) E</td>
<td>Not used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RX (n + 3) F</td>
<td>Cyclic communication ready</td>
<td>SSR</td>
<td></td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>Master station → Servo amplifier (RWwn)</th>
<th>Servo amplifier → Master station (RWrn)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Device No.</strong></td>
<td><strong>Index</strong></td>
</tr>
<tr>
<td>RWwn00</td>
<td>6060</td>
</tr>
<tr>
<td>RWwn01</td>
<td>6040</td>
</tr>
<tr>
<td>RWwn02</td>
<td>2D01</td>
</tr>
<tr>
<td>RWwn03</td>
<td>2D02</td>
</tr>
<tr>
<td>RWwn04</td>
<td>2D03</td>
</tr>
<tr>
<td>RWwn05</td>
<td>607A</td>
</tr>
<tr>
<td>RWwn06</td>
<td></td>
</tr>
<tr>
<td>RWwn07</td>
<td>60FF</td>
</tr>
<tr>
<td>RWwn08</td>
<td></td>
</tr>
<tr>
<td>RWwn09</td>
<td>2D20</td>
</tr>
<tr>
<td>RWwn0A</td>
<td></td>
</tr>
<tr>
<td>RWwn0B</td>
<td>6071</td>
</tr>
<tr>
<td>RWwn0C</td>
<td>6081</td>
</tr>
<tr>
<td>RWwn0D</td>
<td>6083</td>
</tr>
<tr>
<td>RWwn0E</td>
<td></td>
</tr>
<tr>
<td>RWwn0F</td>
<td></td>
</tr>
<tr>
<td>RWwn10</td>
<td>6084</td>
</tr>
<tr>
<td>RWwn11</td>
<td></td>
</tr>
<tr>
<td>RWwn12</td>
<td>6087</td>
</tr>
<tr>
<td>RWwn13</td>
<td></td>
</tr>
<tr>
<td>RWwn14</td>
<td>60E0</td>
</tr>
<tr>
<td>RWwn15</td>
<td>60E1</td>
</tr>
<tr>
<td>RWwn16</td>
<td></td>
</tr>
<tr>
<td>RWwn17</td>
<td>60B8</td>
</tr>
<tr>
<td>RWwn18</td>
<td>60F2</td>
</tr>
<tr>
<td>RWwn19</td>
<td>2D05</td>
</tr>
<tr>
<td>RWwn1A</td>
<td></td>
</tr>
<tr>
<td>RWwn1B</td>
<td></td>
</tr>
<tr>
<td>RWwn1C</td>
<td></td>
</tr>
<tr>
<td>RWwn1D</td>
<td></td>
</tr>
<tr>
<td>RWwn1E</td>
<td></td>
</tr>
<tr>
<td>RWwn1F</td>
<td></td>
</tr>
</tbody>
</table>

Note. "n" depends on the station No. setting.
### Table 2.3 RWwn/RWrn mapping (pt/idx/jg/hm)

<table>
<thead>
<tr>
<th>Device No. (Note)</th>
<th>Index</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>RWwn00</td>
<td>6060</td>
<td>Modes of operation</td>
</tr>
<tr>
<td>RWwn01</td>
<td>6040</td>
<td>Controlword</td>
</tr>
<tr>
<td>RWwn02</td>
<td>2D01</td>
<td>Control DI 1</td>
</tr>
<tr>
<td>RWwn03</td>
<td>2D02</td>
<td>Control DI 2</td>
</tr>
<tr>
<td>RWwn04</td>
<td>2D03</td>
<td>Control DI 3</td>
</tr>
<tr>
<td>RWwn05</td>
<td>2D60</td>
<td>Target point table</td>
</tr>
<tr>
<td>RWwn06</td>
<td>6081</td>
<td>Profile velocity</td>
</tr>
<tr>
<td>RWwn07</td>
<td>6083</td>
<td>Profile acceleration</td>
</tr>
<tr>
<td>RWwn0A</td>
<td>6084</td>
<td>Profile deceleration</td>
</tr>
<tr>
<td>RWwn0B</td>
<td>60B8</td>
<td>Touch probe function</td>
</tr>
<tr>
<td>RWwn0C</td>
<td>2DD1</td>
<td>Target speed No.</td>
</tr>
<tr>
<td>RWwn0D</td>
<td>6077</td>
<td>Torque actual value</td>
</tr>
<tr>
<td>RWwn0E</td>
<td>2D11</td>
<td>Status DO 1</td>
</tr>
<tr>
<td>RWwn0F</td>
<td>2D12</td>
<td>Status DO 2</td>
</tr>
<tr>
<td>RWwn10</td>
<td>2D13</td>
<td>Status DO 3</td>
</tr>
<tr>
<td>RWwn11</td>
<td>2D15</td>
<td>Status DO 4</td>
</tr>
<tr>
<td>RWwn12</td>
<td>2D17</td>
<td>Status DO 5</td>
</tr>
<tr>
<td>RWwn13</td>
<td>2D68</td>
<td>Point Demand value</td>
</tr>
<tr>
<td>RWwn14</td>
<td>2D69</td>
<td>Point actual value</td>
</tr>
<tr>
<td>RWwn15</td>
<td>2D6A</td>
<td>M code actual value</td>
</tr>
<tr>
<td>RWwn16</td>
<td>2A42</td>
<td>Current alarm 2</td>
</tr>
<tr>
<td>RWwn17</td>
<td>60B9</td>
<td>Touch probe status</td>
</tr>
<tr>
<td>RWwn18</td>
<td>60BA</td>
<td>Touch probe pos1 pos value</td>
</tr>
<tr>
<td>RWwn19</td>
<td>60BB</td>
<td>Touch probe pos1 neg value</td>
</tr>
<tr>
<td>RWwn1A</td>
<td>6061</td>
<td>Modes of operation display</td>
</tr>
<tr>
<td>RWwn1B</td>
<td>6041</td>
<td>Statusword</td>
</tr>
<tr>
<td>RWwn1C</td>
<td>6064</td>
<td>Position actual value</td>
</tr>
<tr>
<td>RWwn1D</td>
<td>606C</td>
<td>Velocity actual value</td>
</tr>
<tr>
<td>RWwn1E</td>
<td>605</td>
<td>Following error actual value</td>
</tr>
<tr>
<td>RWwn1F</td>
<td>60F4</td>
<td>Following error actual value</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device No. (Note)</th>
<th>Index</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>RWrn00</td>
<td>6061</td>
<td>Modes of operation display</td>
</tr>
<tr>
<td>RWrn01</td>
<td>6041</td>
<td>Statusword</td>
</tr>
<tr>
<td>RWrn02</td>
<td>6064</td>
<td>Position actual value</td>
</tr>
<tr>
<td>RWrn03</td>
<td>606C</td>
<td>Velocity actual value</td>
</tr>
<tr>
<td>RWrn04</td>
<td>605</td>
<td>Following error actual value</td>
</tr>
<tr>
<td>RWrn05</td>
<td>60F4</td>
<td>Following error actual value</td>
</tr>
</tbody>
</table>

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

#### 2.3.3 Mapping data details of link device

Refer to chapter 7.
2. CC-Link IE Field Network Basic/SLMP

2.4 SLMP

2.4.1 Outline

POINT

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

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

In SLMP, a command that a master station (external device) sends to slave stations (servo amplifiers) is called a request message, and a command that the slave stations (servo amplifiers) send back to the master station (external device) is called a response message.

When the servo amplifier receives the request message, it returns the response message to the external device after the servo amplifier response time.

The external device cannot send the next request message until it completes receiving the response message.

<table>
<thead>
<tr>
<th>Master station (external device)</th>
<th>Request message</th>
<th>Response message</th>
<th>Request message</th>
<th>Response message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slave station (servo amplifier)</td>
<td>Request message</td>
<td>Response message</td>
<td>Response message</td>
<td></td>
</tr>
</tbody>
</table>

Servo amplifier response time (Note)

Note. The servo amplifier response time differs depending on the command to send.
2. CC-Link IE Field Network Basic/SLMP

2.4.2 Message format

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

(1) Request message format

Ethernet header | IP header | UDP header | SLMP 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 | Footer

(2) Response message format

(a) At normal completion

(b) At abnormal completion

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

(a) At normal completion

(b) At abnormal completion

Error information
<table>
<thead>
<tr>
<th>Item</th>
<th>Size</th>
<th>Endian</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Header</td>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Subheader (QnA compatible 3E frame)</td>
<td>2 bytes</td>
<td>Big</td>
<td>At a request: 5000h&lt;br&gt;At a response: D000h</td>
</tr>
<tr>
<td>Subheader (QnA compatible 4E frame)</td>
<td>6 bytes</td>
<td>Big</td>
<td>At a request: 5400h + Serial number + 0000h&lt;br&gt;At a response: D4000h + Serial number + 0000h</td>
</tr>
<tr>
<td>Request destination network No.</td>
<td>1 byte</td>
<td></td>
<td>Specify the network No. of the access destination. Specify it in hexadecimal. Store a value of a request message.</td>
</tr>
<tr>
<td>Request destination station No.</td>
<td>1 byte</td>
<td></td>
<td>Specify the station number of the access destination. Specify it in hexadecimal. Store a value of a request message.</td>
</tr>
<tr>
<td>Request destination unit I/O No.</td>
<td>2 bytes</td>
<td>Little</td>
<td>03FFh (fixed)</td>
</tr>
<tr>
<td>Request destination multi-drop station No.</td>
<td>1 byte</td>
<td></td>
<td>00h (fixed)</td>
</tr>
<tr>
<td>Request data length</td>
<td>2 bytes</td>
<td>Little</td>
<td>Specify the data length from the monitoring timer to the request data in hexadecimal. Example) For 24 bytes: 1800h</td>
</tr>
</tbody>
</table>
| Monitoring timer                 | 2 bytes | Little | Set the waiting time until the servo amplifier that had received a request message from an external device completes read or write processing. When the servo amplifier cannot return a response message within the waiting time, the response message will be discarded.  
0000h: Waiting until the processing is completed  
0001h to FFFFh (1 to 65535): Waiting time (Unit: 0.25 s) |
| Request data                     | Variable | Little | Specify the command, sub command, and data that indicate the request content.                                                                 |
| Command                          | 2 bytes | Little | Refer to section 2.4.3.                                                                                                                     |
| Sub command                      | 2 bytes | Little | Refer to section 2.4.3.                                                                                                                     |
| Response data length             | 2 bytes | Little | The data length from the end code to the response data (at normal completion) or error information (at abnormal completion) is stored in hexadecimal. (Unit: byte) |
| End code                         | 2 bytes | Little | The command processing result is stored. 0 is stored at normal completion. An error code of the servo amplifier is stored at abnormal completion. Refer to section 2.4.5 for the error code. |
| Response data                    | Variable | Little | The read data and others corresponding to the command are stored at normal completion.                                                                 |
| Error information                | 9 bytes |        | The network No. (responding station) (1 byte), station No. (responding station) (1 byte), request destination module I/O No. (2 bytes), and request destination multi-drop station No. (1 byte) of a station that responds an error are stored at abnormal completion. Numbers that do not correspond to the content of the request message may be stored because the information of the station that responds an error is stored at abnormal completion. The command (2 bytes) and sub command (2 bytes) in which an error occurs are also stored. |
| Footer                           |      |        | This footer is for TCP/IP and UDP/IP. Add the footer on the external device side before sending a message. TCP/IP is supported by servo amplifiers with software version A3 or later. |
2. CC-Link IE Field Network Basic/SLMP

2.4.3 Command

The following table lists applicable commands.

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

2.4.4 CiA 402 read/write command

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

<table>
<thead>
<tr>
<th>Service</th>
<th>Command</th>
<th>Sub command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDO Upload</td>
<td>4020h</td>
<td>0001h</td>
<td>Reads data specified by using the CiA 402 object from the servo amplifier to the external device.</td>
</tr>
<tr>
<td>SDO Download</td>
<td>4020h</td>
<td>0002h</td>
<td>Writes data specified by using the CiA 402 object from the external device to the servo amplifier.</td>
</tr>
<tr>
<td>SDO Object SubID Block Upload</td>
<td>4020h</td>
<td>0005h</td>
<td>Reads data of consecutive sub commands specified by using the CiA 402 object from the servo amplifier to the external device.</td>
</tr>
<tr>
<td>SDO Object SubID Block Download</td>
<td>4020h</td>
<td>0006h</td>
<td>Writes data of consecutive sub commands specified by using the CiA 402 object from the external device to the servo amplifier.</td>
</tr>
</tbody>
</table>

(1) SDO Upload (CiA 402 object read)

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

(a) Request message (command and the following)

<table>
<thead>
<tr>
<th>Command</th>
<th>Sub command</th>
<th>Index</th>
<th>Sub Index</th>
<th>Reserved</th>
<th>Number of data value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20h</td>
<td>40h</td>
<td>01h</td>
<td>00h</td>
<td></td>
<td>L H</td>
</tr>
</tbody>
</table>

(b) Response message

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

<table>
<thead>
<tr>
<th>End code</th>
<th>Index</th>
<th>Sub Index</th>
<th>Reserved</th>
<th>Number of data value</th>
<th>Read data</th>
</tr>
</thead>
<tbody>
<tr>
<td>00h</td>
<td>00h</td>
<td></td>
<td></td>
<td>L H</td>
<td>L or H (variable)</td>
</tr>
</tbody>
</table>

2) At abnormal completion

The response message is the same as that of section 2.4.2 (2) (b).
2. CC-Link IE Field Network Basic/SLMP

(c) Item list

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

(2) SDO Download (CiA 402 object write)

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

(a) Request message (command and the following)

<table>
<thead>
<tr>
<th>Command</th>
<th>Sub command</th>
<th>Index</th>
<th>Sub Index</th>
<th>Reserved</th>
<th>Number of data value</th>
<th>Write data</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>H</td>
<td>L</td>
<td>H</td>
<td>-</td>
<td>-</td>
<td>L or H (variable)</td>
</tr>
<tr>
<td>20h</td>
<td>40h</td>
<td>02h</td>
<td>00h</td>
<td>Refer to (2) (c) in this section for details.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Response message

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

<table>
<thead>
<tr>
<th>End code</th>
<th>Index</th>
<th>Sub Index</th>
<th>Reserved</th>
<th>Number of data value</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>H</td>
<td>L</td>
<td>H</td>
<td>-</td>
</tr>
<tr>
<td>00h</td>
<td>00h</td>
<td>Refer to (2) (c) in this section for details.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2) At abnormal completion

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

(c) Item list

<table>
<thead>
<tr>
<th>Item</th>
<th>Size</th>
<th>Endian</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command</td>
<td>2 bytes</td>
<td>Little</td>
<td>4020h</td>
</tr>
<tr>
<td>Sub command</td>
<td>2 bytes</td>
<td>Little</td>
<td>0002h</td>
</tr>
<tr>
<td>Index</td>
<td>2 bytes</td>
<td>Little</td>
<td>Specify Index of the object. (Refer to chapter 7.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For the response message, the value specified in the request message is stored.</td>
</tr>
<tr>
<td>Sub Index</td>
<td>1 bytes</td>
<td>Little</td>
<td>Specify Sub Index of the object. (Refer to chapter 7.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For the response message, the value specified in the request message is stored.</td>
</tr>
<tr>
<td>Reserved</td>
<td>1 bytes</td>
<td>Little</td>
<td>00h (fixed)</td>
</tr>
<tr>
<td>Number of data value</td>
<td>2 bytes</td>
<td>Little</td>
<td>Write data: Specify the size in hexadecimal.</td>
</tr>
<tr>
<td>Write data</td>
<td>Variable</td>
<td>Little</td>
<td>Specify the write data of the object.</td>
</tr>
</tbody>
</table>
(3) SDO Object SubID Block Upload (CiA 402 object sub ID continuous read)
When the slave stations (servo amplifiers) receive the CiA 402 object sub ID continuous read request
from the master station (external device), they return a value of the object corresponding to the specified
Index or consecutive Sub Index.

(a) Request message (command and the following)

<table>
<thead>
<tr>
<th>Command</th>
<th>Sub command</th>
<th>Index</th>
<th>Sub Index</th>
<th>Reserved</th>
<th>Number of data value</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H</td>
<td>L H</td>
<td>L H</td>
<td>-</td>
<td>-</td>
<td>L H</td>
</tr>
<tr>
<td>20h 40h</td>
<td>05h 00h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Refer to (3) (c) in this section for details.

(b) Response message
1) At normal completion (end code and the following)

<table>
<thead>
<tr>
<th>End code</th>
<th>Index</th>
<th>Sub Index</th>
<th>Reserved</th>
<th>Number of data value</th>
<th>Read data</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H</td>
<td>L H</td>
<td>-</td>
<td>-</td>
<td>L H</td>
<td>L or H (variable)</td>
</tr>
<tr>
<td>00h 00h</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Refer to (3) (c) in this section for details.

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

(c) Item list

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

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

(a) Request message (command and the following)

<table>
<thead>
<tr>
<th>Command</th>
<th>Sub command</th>
<th>Index</th>
<th>Sub Index</th>
<th>Reserved</th>
<th>Number of data value</th>
<th>Write data</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H</td>
<td>L H</td>
<td>L H</td>
<td>-</td>
<td>-</td>
<td>L H</td>
<td>L or H (variable)</td>
</tr>
<tr>
<td>20h 40h</td>
<td>06h 00h</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Refer to (4) (c) in this section for details.

(b) Response message
1) At normal completion (end code and the following)

<table>
<thead>
<tr>
<th>End code</th>
<th>Index</th>
<th>Sub Index</th>
<th>Reserved</th>
<th>Number of data value</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H</td>
<td>L H</td>
<td>-</td>
<td>-</td>
<td>L H</td>
</tr>
<tr>
<td>00h 00h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Refer to (4) (c) in this section for details.
2. CC-Link IE Field Network Basic/SLMP

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

(c) Item list

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

2.4.5 Error codes

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

<table>
<thead>
<tr>
<th>Error code</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>C059h</td>
<td>The sub command is specified incorrectly. Or, a command that is not</td>
</tr>
<tr>
<td></td>
<td>prescribed is received.</td>
</tr>
<tr>
<td>C05Ch</td>
<td>The request message is incorrect.</td>
</tr>
<tr>
<td>C061h</td>
<td>The request data length does not correspond to the number of data</td>
</tr>
<tr>
<td></td>
<td>points.</td>
</tr>
<tr>
<td>CCCAh</td>
<td>A non-existent Index is specified.</td>
</tr>
<tr>
<td>CCD0h</td>
<td>Number of data value differs from the prescribed value.</td>
</tr>
<tr>
<td>CCD1h</td>
<td>Number of data value is greater than the prescribed value.</td>
</tr>
<tr>
<td>CCD2h</td>
<td>Number of data value is smaller than the prescribed value.</td>
</tr>
<tr>
<td>CCD3h</td>
<td>A non-existent Sub Index is specified.</td>
</tr>
<tr>
<td>CCC8h</td>
<td>The Write only object is read.</td>
</tr>
<tr>
<td>CCC9h</td>
<td>(1) A value is written to the Read only object.</td>
</tr>
<tr>
<td></td>
<td>(2) A value is written to an object which is not the Read only object</td>
</tr>
<tr>
<td></td>
<td>for all AL states but for the present AL state with Write disabled.</td>
</tr>
<tr>
<td>CCC7h</td>
<td>(1) A value is written to the object mapped to a response message.</td>
</tr>
<tr>
<td></td>
<td>(2) The following writings are performed when the object mapped to a</td>
</tr>
<tr>
<td></td>
<td>response message is not allowed to be changed.</td>
</tr>
<tr>
<td></td>
<td>· A value other than &quot;0&quot; is written to Sub Index 0.</td>
</tr>
<tr>
<td></td>
<td>· A value is written to the corresponding Sub Index 1 to 32.</td>
</tr>
<tr>
<td>CCC8h</td>
<td>The object that cannot be mapped to response message is written to</td>
</tr>
<tr>
<td></td>
<td>the object mapped to a response message.</td>
</tr>
<tr>
<td>CCCCh</td>
<td>The total size of the object mapped to a response message exceeds 64</td>
</tr>
<tr>
<td></td>
<td>bytes.</td>
</tr>
<tr>
<td>CDD4h</td>
<td>A value outside the parameter range was written.</td>
</tr>
<tr>
<td>CDD5h</td>
<td>A value that is greater than the parameter range is written.</td>
</tr>
<tr>
<td>CDD6h</td>
<td>A value that is smaller than the parameter range is written.</td>
</tr>
<tr>
<td>CDDAh</td>
<td>A value is written to a parameter object outside the writing rangeem</td>
</tr>
<tr>
<td></td>
<td>set in the Parameter block setting.</td>
</tr>
</tbody>
</table>
2. CC-Link IE Field Network Basic/SLMP

2.5 STARTUP

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


#### 2.5.1 CC-Link IE Field Network Basic initial communication setting

Start the cyclic communication in the following procedure.

<table>
<thead>
<tr>
<th>Network setting</th>
<th>Communication function selection setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The initial setting is Ethernet communication. If RS-485 communication is set, change to Ethernet communication with the following parameter. (Refer to chapter 5.) Parameter (&quot;communication function selection&quot; of [Pr. PN08 Function selection N-2])</td>
</tr>
<tr>
<td>IP address setting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The initial value is 192.168.3.0. To change the initial value, set it with any of the following (1) to (3). (Refer to section 2.5.2.) (1) Identification number setting rotary switch (SW1/SW2) (2) Parameter ([Pr. PN11] to [Pr. PN14]) (3) SLMP communication (IP Address Set command)</td>
</tr>
<tr>
<td>Subnet mask setting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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)</td>
</tr>
<tr>
<td>Default gateway setting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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)</td>
</tr>
<tr>
<td>Slave station (servo amplifier) power cycling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The settings of the IP address, subnet mask, and default gateway are reflected.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication start procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master station (controller) cyclic communication start</td>
</tr>
<tr>
<td>Cyclic communication ready</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
2.5.2 IP address setting

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

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

- 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.
MEMO
3. Modbus/TCP

3.1 Outline

POINT

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

The Modbus protocol, developed for programmable controllers by Modicon Inc., has evolved into the Modbus/TCP protocol for use over TCP/IP.

The Modbus master acts as a TCP client, and the Modbus slave acts as a TCP server for client-server communication. Using the functions in the message frames enables to read or write data from/to parameters, write input commands, and check operation status of servo amplifiers.

For MR-JE-_-C servo amplifier, Modbus registers are assigned like the address assignment of CiA 402 drive profile.

A Modbus-compatible controller, the client, can communicate with the MR-JE-_-C servo amplifiers that are servers by accessing assigned holding registers.

3.2 Communication specifications

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

3.3 Function List

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

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

3.4 Outline of Modbus/TCP protocol

<table>
<thead>
<tr>
<th>Client (controller)</th>
<th>Query Message</th>
<th>Server (servo amplifier)</th>
<th>Response Message</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Query Message</td>
<td></td>
<td>Response Message</td>
</tr>
<tr>
<td>Servo amplifier response time (Note)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

POINT

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

In Modbus/TCP communication, a command that a client (controller) sends to servers (servo amplifiers) is called "Query Message", and a command that the servers return to the client is called "Response Message". When a servo amplifier receives a Query Message, it returns a Response Message to the client after the servo amplifier response time.

In Modbus/TCP communication, as in the case of TCP/IP, make sure to establish the connection before sending and receiving commands. Check that the connection has been established, and then send a Query Message.

Note. The servo amplifier response time differs depending on the command to send.
3.5 Modbus/TCP Communication Message Frame

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

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

### Message frame

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

3 - 3
3.6 Function Codes

3.6.1 List of function codes

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

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

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

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

(1) Message frame

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Starting Address</th>
<th>No. of Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>0006h</td>
<td>FFh</td>
<td>03h</td>
<td>8 bits</td>
<td>8 bits</td>
</tr>
</tbody>
</table>

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

Note. Registers can be classified into two types: registers that can be continuously accessed and particular registers that cannot be continuously accessed.

To read particular registers, read only the target registers.

For the details on whether the target registers can be continuously accessed or not, refer to chapter 7.
3. Modbus/TCP

### Response Message

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Byte Count</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>FFh</td>
<td>03h</td>
<td>8 bits</td>
<td>8 bits</td>
<td>8 bits to 8 bits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message field</th>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction Identifier</td>
<td>16 bits</td>
<td>Transaction Identifier received from the client (controller) is copied and returned.</td>
</tr>
<tr>
<td>Protocol Identifier</td>
<td>16 bits</td>
<td>The value &quot;0000h&quot; is returned.</td>
</tr>
<tr>
<td>Length Field</td>
<td>16 bits</td>
<td>The byte length from Unit Identifier to Data is returned.</td>
</tr>
<tr>
<td>Unit Identifier</td>
<td>8 bits</td>
<td>Unit Identifier received from the client (controller) is copied and returned.</td>
</tr>
<tr>
<td>Function</td>
<td>8 bits</td>
<td>When the message was received without errors, &quot;03h&quot; is returned.</td>
</tr>
<tr>
<td>Byte Count</td>
<td>16 bits</td>
<td>The Data frame size (in units of bytes) is returned.</td>
</tr>
<tr>
<td>Data (Note)</td>
<td>16 bits x n</td>
<td>Data starting from the start address specified in the Query Message is returned. Data is read in order of H (higher bits) and L (lower bits). Data is read in order starting from the start address.</td>
</tr>
</tbody>
</table>

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

### Usage example

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

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

### Query Message

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Starting Address</th>
<th>No. of Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>0006h</td>
<td>FFh</td>
<td>03h</td>
<td>2Bh 05h 00h</td>
<td>04h</td>
</tr>
</tbody>
</table>

Set the following values to each Query Message.

<table>
<thead>
<tr>
<th>Message field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction Identifier</td>
<td>Set any value.</td>
</tr>
<tr>
<td>Protocol Identifier</td>
<td>Set &quot;0000h&quot;.</td>
</tr>
<tr>
<td>Length Field</td>
<td>Set &quot;0006h&quot;.</td>
</tr>
<tr>
<td>Unit Identifier</td>
<td>Set &quot;FFh&quot;.</td>
</tr>
<tr>
<td>Function</td>
<td>Set &quot;03h&quot;.</td>
</tr>
<tr>
<td>Starting Address</td>
<td>Set &quot;2B05h&quot;, the start address to read.</td>
</tr>
<tr>
<td>No. of Points</td>
<td>Set &quot;04h&quot;, because the total number of read points from Modbus registers 2B05h to 2B07h is 4.</td>
</tr>
</tbody>
</table>
3. Modbus/TCP

Response Message

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Byte Count</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>000Bh</td>
<td>FFh</td>
<td>03h</td>
<td>08h</td>
<td>56h</td>
</tr>
</tbody>
</table>

The following shows the information in each Response Message.

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

3.6.3 Diagnostics (Function diagnostics: 08h)

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

(1) Message frame

Query Message

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Sub Function</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>0006h</td>
<td>FFh</td>
<td>08h</td>
<td>00h</td>
<td>00h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction Identifier</td>
<td>16 bits</td>
</tr>
<tr>
<td>Protocol Identifier</td>
<td>16 bits</td>
</tr>
<tr>
<td>Length Field</td>
<td>16 bits</td>
</tr>
<tr>
<td>Unit Identifier</td>
<td>8 bits</td>
</tr>
<tr>
<td>Function</td>
<td>8 bits</td>
</tr>
<tr>
<td>Sub Function</td>
<td>16 bits</td>
</tr>
<tr>
<td>Data</td>
<td>16 bits</td>
</tr>
</tbody>
</table>

Response Message

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Sub Function</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>0006h</td>
<td>FFh</td>
<td>08h</td>
<td>00h</td>
<td>00h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction Identifier</td>
<td>16 bits</td>
</tr>
<tr>
<td>Protocol Identifier</td>
<td>16 bits</td>
</tr>
<tr>
<td>Length Field</td>
<td>16 bits</td>
</tr>
<tr>
<td>Unit Identifier</td>
<td>8 bits</td>
</tr>
<tr>
<td>Function</td>
<td>8 bits</td>
</tr>
<tr>
<td>Sub Function</td>
<td>16 bits</td>
</tr>
<tr>
<td>Data</td>
<td>16 bits</td>
</tr>
</tbody>
</table>
3. Modbus/TCP

(2) Usage example
The following shows a setting example of when the diagnosis function is used.

**Query Message**

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Sub Function</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>0006h</td>
<td>FFh</td>
<td>08h</td>
<td>00h</td>
<td>12h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>00h</td>
<td>34h</td>
</tr>
</tbody>
</table>

Set the following values to each Query Message.

<table>
<thead>
<tr>
<th>Message field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction Identifier</td>
<td>Set any value.</td>
</tr>
<tr>
<td>Protocol Identifier</td>
<td>Set &quot;0000h&quot;.</td>
</tr>
<tr>
<td>Length Field</td>
<td>Set &quot;0006h&quot;.</td>
</tr>
<tr>
<td>Unit Identifier</td>
<td>Set &quot;FFh&quot;.</td>
</tr>
<tr>
<td>Function</td>
<td>Set &quot;08h&quot;.</td>
</tr>
<tr>
<td>Sub Function</td>
<td>Set &quot;0000h&quot;.</td>
</tr>
<tr>
<td>Data</td>
<td>When setting 1234h, set values as follows:</td>
</tr>
<tr>
<td></td>
<td>H: &quot;12h&quot;</td>
</tr>
<tr>
<td></td>
<td>L: &quot;34h&quot;</td>
</tr>
</tbody>
</table>

**Response Message**

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Sub Function</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>0006h</td>
<td>FFh</td>
<td>08h</td>
<td>00h</td>
<td>12h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>00h</td>
<td>34h</td>
</tr>
</tbody>
</table>

The following shows the information in each Response Message.

<table>
<thead>
<tr>
<th>Message field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction Identifier</td>
<td>Transaction Identifier received from the client (controller) is copied and returned.</td>
</tr>
<tr>
<td>Protocol Identifier</td>
<td>The value &quot;0000h&quot; is returned.</td>
</tr>
<tr>
<td>Length Field</td>
<td>The byte length from Unit Identifier to Data is returned.</td>
</tr>
<tr>
<td>Unit Identifier</td>
<td>Unit Identifier received from the client (controller) is copied and returned.</td>
</tr>
<tr>
<td>Function</td>
<td>When the message was received without errors, &quot;08h&quot; is returned.</td>
</tr>
<tr>
<td>Sub Function</td>
<td>The value &quot;0000h&quot; is returned.</td>
</tr>
<tr>
<td>Data</td>
<td>The value &quot;1234h&quot; set in the Query Message is returned.</td>
</tr>
<tr>
<td></td>
<td>H: &quot;12h&quot;</td>
</tr>
<tr>
<td></td>
<td>L: &quot;34h&quot;</td>
</tr>
</tbody>
</table>
3. Modbus/TCP

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

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

(1) Message frame

Query Message

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>16 bits</td>
<td>FFh</td>
<td>10h</td>
</tr>
</tbody>
</table>

Message field | Size | Description
--- | --- | ---
Transaction Identifier | 16 bits | Set any value.
Protocol Identifier | 16 bits | Set "0000h".
Length Field | 16 bits | Set the byte length from Unit Identifier to Data.
Unit Identifier | 8 bits | Set "FFh".
Function | 8 bits | Set "10h".
Starting Address (Note) | 16 bits | Set the start address of the holding registers to which data is written.
No. of Registers | 16 bits | Set the number of points of data to write starting from the start address of the holding registers to which data is written.
| 16 bits | 8 bits | 8 bits | 8 bits | 8 bits | 8 bits | 8 bits |

To write data in particular registers, write data in the target registers one by one.
For the details on whether the target registers can be continuously accessed or not, refer to chapter 7.

Response Message

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>0006h</td>
<td>FFh</td>
<td>10h</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>Data type</th>
<th>Access</th>
<th>No. of Registers</th>
<th>Continuous read/write</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2102h</td>
<td>PC02</td>
<td>U32</td>
<td>rw</td>
<td>2</td>
<td></td>
<td>00000100h</td>
</tr>
</tbody>
</table>

**Query Message**

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Starting Address</th>
<th>No. of Registers</th>
<th>Byte Count</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>000Ah</td>
<td>FFh</td>
<td>10h</td>
<td>21h 02h</td>
<td>02h</td>
<td>04h</td>
<td>01h 00h 00h 00h</td>
</tr>
</tbody>
</table>

Set the following values to each Query Message.

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

**Response Message**

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Starting Address</th>
<th>No. of Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 × 8 bits</td>
<td>0000h</td>
<td>0006h</td>
<td>FFh</td>
<td>10h</td>
<td>21h 02h</td>
<td>02h</td>
</tr>
</tbody>
</table>

The following shows the information in each Response Message.

<table>
<thead>
<tr>
<th>Message field</th>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction Identifier</td>
<td>16 bits</td>
<td>Transaction Identifier received from the client (controller) is copied and returned.</td>
</tr>
<tr>
<td>Protocol Identifier</td>
<td>16 bits</td>
<td>The value &quot;0000h&quot; is returned.</td>
</tr>
<tr>
<td>Length Field</td>
<td>16 bits</td>
<td>The byte length from Unit Identifier to Data is returned.</td>
</tr>
<tr>
<td>Unit Identifier</td>
<td>8 bits</td>
<td>Unit Identifier received from the client (controller) is copied and returned.</td>
</tr>
<tr>
<td>Function</td>
<td>8 bits</td>
<td>When the message was received without errors, &quot;10h&quot; is returned.</td>
</tr>
<tr>
<td>Starting Address</td>
<td>16 bits</td>
<td>The value &quot;2102h&quot;, the start address of the holding registers to which the data was written is returned. H: &quot;21h&quot; L: &quot;02h&quot;</td>
</tr>
<tr>
<td>No. of Registers</td>
<td>16 bits</td>
<td>The number of registers to write &quot;02h&quot; is returned.</td>
</tr>
</tbody>
</table>
3.6.5 Processing at occurrence of an error

In Modbus/TCP communication, when the Query Message sent from the client (controller) includes an incorrect value, the server (servo amplifier) returns an exception response to the client (controller). If an error is detected in the TCP/IP layer, the server (servo amplifier) returns no message to the client (controller).

When an exception response occurs, a value obtained by adding "80h" to the function code sent in the Query Message is returned with an exception code. However, no exception response occurs in the following cases.

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

- Function code "10h" (Preset Multiple Registers)
  When data can be written into even one of consecutive registers, no exception response occurs.

### Response Message

<table>
<thead>
<tr>
<th>Transaction Identifier</th>
<th>Protocol Identifier</th>
<th>Length Field</th>
<th>Unit Identifier</th>
<th>Function</th>
<th>Exception Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bits</td>
<td>0000h</td>
<td>0003h</td>
<td>FFh</td>
<td>8 bits</td>
<td>8 bits</td>
</tr>
</tbody>
</table>

#### Message field

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

#### List of exception codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Error name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01h</td>
<td>ILLEGAL FUNCTION</td>
<td>The Query Message sent from the client set a function code that the server does not support.</td>
</tr>
<tr>
<td>02h</td>
<td>ILLEGAL DATA ADDRESS</td>
<td>The Query Message sent from the client set a register address that the server does not support. (Ex: No register address is set, or reading or writing data from/to registers is not available.)</td>
</tr>
<tr>
<td>03h</td>
<td>ILLEGAL DATA VALUE</td>
<td>The Query Message sent from the client set data that the register cannot handle. (Ex: A value out of the setting range is set, or &quot;0&quot; is set to No. of Registers.)</td>
</tr>
</tbody>
</table>
3. Modbus/TCP

3.7 Startup

**POINT**

- When using Modbus/TCP communication, set [Pr. PN10 Ethernet communication time-out selection] before driving the servo motor. The servo motor may continue to operate after the communication is disabled due to a communication shut-off or other causes.

- Setting [Pr. PN10 Ethernet communication time-out selection] to a small value may trigger [AL. 86.4] in the following condition: the power of the servo amplifier is cycled, or an instantaneous power failure occurs during Modbus/TCP communication.


3.7.1 Modbus/TCP initial communication setting

Make the initial communication settings in the following procedure.

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

<table>
<thead>
<tr>
<th>Communication start</th>
<th>Modbus/TCP communication start</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start Modbus/TCP communication of the client (controller).</td>
</tr>
</tbody>
</table>
3. Modbus/TCP

3.7.2 IP address setting

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

Set the IP address with the identification number setting rotary switch (SW1/SW2) on the display of the servo amplifier or MR Configurator2.

When the IP address is changed with the identification number setting rotary switch (SW1/SW2), change it before powering on the servo amplifier.

The IP address you set can be checked in the system configuration window of MR Configurator2. The IP address can be set as follows.

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

4.1 Outline

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

The Modbus protocol developed for programmable controllers is provided by Modicon Inc. The Modbus protocol uses dedicated message frames for the serial communication between a master and slaves. Using the functions in the message frames enables to read or write data from/to parameters, write input commands, and check operation status of servo amplifiers.

For MR-JE-__C servo amplifier, Modbus registers are assigned like the address assignment of CiA 402 drive profile.

A Modbus-compatible controller, the master, can communicate with the MR-JE-__C servo amplifiers that are slaves by accessing assigned holding registers.

The ASCII (American Standard Code for Information Interchange) mode and the RTU (Remote Terminal Unit) mode are provided as the serial transmission modes of the Modbus protocol. The MR-JE-__C servo amplifiers support only the RTU mode.

### 4.2 Communication Specifications

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

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

```
<table>
<thead>
<tr>
<th>Start</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Parity</th>
<th>Stop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

1 frame (11 bits)

4.3 Function List

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

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

4.4 System Configuration

4.4.1 Diagrammatic sketch

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

![Diagram of Modbus RTU system configuration]

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

4.4.2 Cable connection diagram

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

Wire the cables as follows.

![Diagram of cable connection]

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

4.5 Modbus RTU Message Format

In the Modbus RTU communication, a command sent from a master (controller) to a slave (servo amplifier) is called "Query Message", and a command that the slave (servo amplifier) returns to the master (controller) is called "Response Message".

The servo amplifier that received a Query Message processes the command only after it passes through a dataless section of 3.5 bytes or larger. The servo amplifier will send a Response Message to the controller after the servo amplifier's response time has passed. When the controller sent a Query Message without securing a dataless section of 3.5 bytes or larger, the servo amplifier does not respond. Execute processing so that the controller sends the next Query Message only after it receives a Response Message sent from the servo amplifier.

Master (controller) Query Message

Dataless section (3.5 bytes or larger)

Slave (servo amplifier)

Response Message

Servo amplifier response time (Note)

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

4.6 Broadcast Communication

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

Master (controller) Query Message

Dataless section (3.5 bytes or larger)

Slave (servo amplifier)

Waiting period before sending Query Message (Note)

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

<table>
<thead>
<tr>
<th>Condition</th>
<th>No. of Registers (Number of registers to write)</th>
<th>Waiting time for sending query message</th>
</tr>
</thead>
<tbody>
<tr>
<td>For writing data of 4 bytes</td>
<td>2</td>
<td>24 [ms]</td>
</tr>
<tr>
<td>For writing data of 244 bytes</td>
<td>122</td>
<td>300 [ms]</td>
</tr>
</tbody>
</table>
4. Modbus RTU

4.7 Modbus RTU Communication Message Frame

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

A message frame is composed of four message fields.

When a slave (servo amplifier) received a Query Message sent from the master (controller) without errors, the Function Code in the Query Message is copied into the Function in a Response Message. When a slave (servo amplifier) received a Query Message with an error, the slave returns a value obtained by adding "80h" to the Function Code value in the Query Message to the master. Judge the occurrence of an error by checking the Function Code in the Response Message on the controller side.

During the dataless time of 3.5 bytes before and after the reception of a Query Message, the servo amplifier recognizes the received Query Message.

Message frame

<table>
<thead>
<tr>
<th>START</th>
<th>Address</th>
<th>Function</th>
<th>Data</th>
<th>Error Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 bytes</td>
<td>8 bits</td>
<td>8 bits</td>
<td>n × 8 bits</td>
<td>8 bits</td>
</tr>
</tbody>
</table>

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

4.8 Function Codes

4.8.1 List of function codes

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

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

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

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

(1) Message frame

Query Message

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Starting Address</th>
<th>No. of Points</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8 bits)</td>
<td>03h</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
</tr>
</tbody>
</table>

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

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

Response Message

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Byte Count</th>
<th>Data</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8 bits)</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
<td>(8 bits) to (8 bits)</td>
<td>(8 bits)</td>
</tr>
</tbody>
</table>

Message Size Description

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

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

(2) Usage example

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

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

Query Message

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Starting Address</th>
<th>No. of Points</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>02h</td>
<td>03h</td>
<td>2Bh 05h</td>
<td>00h 04h</td>
<td>(8 bits) (8 bits)</td>
</tr>
</tbody>
</table>

Set the following values to each Query Message.

<table>
<thead>
<tr>
<th>Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slave Address</td>
<td>Set the station number &quot;02h&quot;.</td>
</tr>
<tr>
<td>Function</td>
<td>Set &quot;03h&quot;.</td>
</tr>
<tr>
<td>Starting Address</td>
<td>Set &quot;2B05h&quot;, the start address to read.</td>
</tr>
<tr>
<td>No. of Points</td>
<td>Set &quot;04h&quot;, because the total number of read points from Modbus registers 2B05h to 2B07h is 4.</td>
</tr>
<tr>
<td>CRC Check</td>
<td>Data for CRC error check. This data is calculated automatically by a controller.</td>
</tr>
</tbody>
</table>

Response Message

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Byte Count</th>
<th>Data</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>02h</td>
<td>03h</td>
<td>08h</td>
<td>56h 78h 12h 34h 10h 00h 20h 00h</td>
<td>(8 bits) (8 bits)</td>
</tr>
</tbody>
</table>
4. Modbus RTU

The following shows the information in each Response Message.

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

4.8.3 Diagnostics (Function diagnostics: 08h)

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

(1) Message frame

**Query Message**

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Sub Function</th>
<th>Data</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8 bits)</td>
<td>08h</td>
<td>00h</td>
<td>00h</td>
<td>(8 bits)</td>
</tr>
</tbody>
</table>

**Response Message**

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Sub Function</th>
<th>Data</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8 bits)</td>
<td>08h</td>
<td>00h</td>
<td>00h</td>
<td>(8 bits)</td>
</tr>
</tbody>
</table>

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

- **Slave Address**: The station number of a slave (servo amplifier) is returned.
- **Function**: When the Query Message was received without errors, "08h" is returned.
- **Sub Function**: The value "0000h" is returned.
- **Data**: The data set in the Query Message is returned.
- **CRC Check**: Data for CRC error check. This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.
(2) Usage example
The following shows a setting example of when the function diagnostics of the slave address "03h" is executed.

Query Message

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Sub Function</th>
<th>Data</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>H</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>03h</td>
<td>08h</td>
<td>00h</td>
<td>00h</td>
<td>12h</td>
</tr>
</tbody>
</table>

Set the following values to each Query Message.

<table>
<thead>
<tr>
<th>Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slave Address</td>
<td>Set the station number &quot;03h&quot;.</td>
</tr>
<tr>
<td>Function</td>
<td>Set &quot;08h&quot;.</td>
</tr>
<tr>
<td>Sub Function</td>
<td>Set &quot;0000h&quot;.</td>
</tr>
<tr>
<td>Data</td>
<td>When setting 1234h, set values as follows:</td>
</tr>
<tr>
<td></td>
<td>H: &quot;12h&quot;</td>
</tr>
<tr>
<td></td>
<td>L: &quot;34h&quot;</td>
</tr>
<tr>
<td>CRC Check</td>
<td>Data for CRC error check</td>
</tr>
<tr>
<td></td>
<td>This data is calculated automatically by a controller.</td>
</tr>
</tbody>
</table>

Response Message

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Sub Function</th>
<th>Data</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>H</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>03h</td>
<td>08h</td>
<td>00h</td>
<td>00h</td>
<td>12h</td>
</tr>
</tbody>
</table>

The following shows the information in each Response Message.

<table>
<thead>
<tr>
<th>Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slave Address</td>
<td>The station number &quot;03h&quot; is returned.</td>
</tr>
<tr>
<td>Function</td>
<td>The value &quot;08h&quot; is returned. This means that the message was received without errors.</td>
</tr>
<tr>
<td>Sub Function</td>
<td>The value &quot;0000h&quot; is returned.</td>
</tr>
<tr>
<td>Data</td>
<td>The value &quot;1234h&quot; set in the Query Message is returned.</td>
</tr>
<tr>
<td></td>
<td>H: &quot;12h&quot;</td>
</tr>
<tr>
<td></td>
<td>L: &quot;34h&quot;</td>
</tr>
<tr>
<td>CRC Check</td>
<td>Data for CRC error check</td>
</tr>
<tr>
<td></td>
<td>This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.</td>
</tr>
</tbody>
</table>
4. Modbus RTU

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

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

(1) Message frame

**Query Message**

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Starting Address</th>
<th>No. of Registers</th>
<th>Byte Count</th>
<th>Data</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8 bits)</td>
<td>10h</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
</tr>
</tbody>
</table>

- **Slave Address**: 8 bits Set a station number to which the message is sent. When "0" (station number for broadcast sending) is set, this message is sent to all axes. (Note 1)
- **Function**: 8 bits Set "10h".
- **Starting Address (Note 2)**: 16 bits Set the start address of the holding registers to which data is written.
- **No. of Registers**: 16 bits Set the number of points of data to write starting from the start address of the holding registers to which data is written.
- **Byte Count**: 8 bits Set the size of the data to write.
- **Data (Note 2)**: 16 bits × n Set the data to write.
- **CRC Check**: 16 bits Data for CRC error check

This data is calculated automatically by a controller.

**Note**
1. When the broadcast communication was performed, a Response Message is not returned from the slave. To send the next Query Message continuously, send it considering the processing time of the slave. (Refer to section 4.6.)
2. Registers can be classified into two types: registers to which data can be continuously written and particular registers to which data cannot be continuously written.
   To write data in particular registers, write data in the target registers one by one.
   For the details on whether data can be continuously written into the target registers or not, refer to chapter 7.

**Response Message**

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Starting Address</th>
<th>No. of Registers</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8 bits)</td>
<td>10h</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
</tr>
</tbody>
</table>

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

This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.
4. Modbus RTU

(2) Usage example

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

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>Data type</th>
<th>Access</th>
<th>No. of Registers</th>
<th>Continuous read/write</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2102h</td>
<td>PC02</td>
<td>U32</td>
<td>nw</td>
<td>2</td>
<td></td>
<td>00000100h</td>
</tr>
</tbody>
</table>

**Query Message**

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Starting Address</th>
<th>No. of Registers</th>
<th>Byte Count</th>
<th>Data</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>02h</td>
<td>10h</td>
<td>21h</td>
<td>02h</td>
<td>04h</td>
<td>01h</td>
<td>00h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>00h</td>
<td>00h</td>
</tr>
</tbody>
</table>

Set the following values to each Query Message.

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

**Response Message**

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Starting Address</th>
<th>No. of Registers</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>02h</td>
<td>10h</td>
<td>21h</td>
<td>02h</td>
<td>02h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(8 bits)</td>
</tr>
</tbody>
</table>

The following shows the information in each Response Message.

<table>
<thead>
<tr>
<th>Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slave Address</td>
<td>The station number &quot;02h&quot; is returned.</td>
</tr>
<tr>
<td>Function</td>
<td>The value &quot;10h&quot; is returned. This means that the message was received without errors.</td>
</tr>
<tr>
<td>Starting Address</td>
<td>The value &quot;2102h&quot;, the start address of the holding registers to which the data was written is returned. H: &quot;21h&quot; L: &quot;02h&quot;</td>
</tr>
<tr>
<td>No. of Registers</td>
<td>The number of registers to write &quot;02h&quot; is returned.</td>
</tr>
<tr>
<td>CRC Check</td>
<td>Data for CRC error check This data is calculated automatically by a servo amplifier, and the result of the calculation is returned.</td>
</tr>
</tbody>
</table>
4. Modbus RTU

4.8.5 Processing at occurrence of an error

In the Modbus RTU communication, when the Query Message sent from the master (controller) includes an incorrect value, the slave (servo amplifier) returns an exception response to the master (controller). When a parity error, CRC error, overrun error, or framing error occurs, the slave (servo amplifier) does not return a message to the master (controller).

When an exception response occurs, a value obtained by adding "80h" to the function code sent in the Query Message is returned with an exception code. However, no exception response occurs in the following cases.

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

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

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function</th>
<th>Exception Code</th>
<th>CRC Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8 bits)</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
<td>(8 bits)</td>
</tr>
</tbody>
</table>

Response Message

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

List of exception codes

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

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

4.9 STARTUP

POINT

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


4.9.1 Modbus RTU initial communication setting

Make the initial communication settings in the following procedure.

- Communication function selection setting
- Slave address setting
- Baud rate setting
- Communication endian setting
- Parity setting
- Slave (servo amplifier) power cycling
- Modbus RTU communication start in the master station (controller)

[Communication function selection setting]
The initial setting is Ethernet communication. Set the communication function to be used for the RS-485 communication with the following parameter. (Refer to chapter 5.) Parameter ("Communication function selection" of [Pr. PN08 Function selection N-2])

[Slave address setting]
The initial value is 0. To change the initial value, set it with either of the following (1) or (2). (Refer to section 4.9.2.)
(1) Identification number setting rotary switch (SW1/SW2)
(2) Parameter ([Pr. PC70 Modbus RTU communication station number setting])

[Baud rate setting]
The initial value is 115200 [bps]. To change the initial value, set it with the following parameter. (Refer to chapter 5.) Parameter ("Modbus RTU communication baud rate selection" of [Pr. PC71 Function selection C-F])

[Communication endian setting]
The initial value is standard endian (little-endian). To change the initial value, set it with the following parameter. (Refer to chapter 5.) Parameter ("Modbus RTU communication endian selection" of [Pr. PC72 Function selection C-G])

[Parity setting]
The initial value is even parity and stop bit length of 1 bit. To change the initial value, set it with the following parameter. (Refer to chapter 5.) Parameter ("Protocol parity selection" of [Pr. PF45 Function selection F-12])

[Slave (servo amplifier) power cycling]
The slave address, baud rate, communication endian, and parity are reflected.

[Communication start]
Start Modbus RTU communication of the master (controller).
4. Modbus RTU

4.9.2 Slave address setting

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

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

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

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

CAUTION

Never make a drastic adjustment or change to the parameter values as doing so will make the operation unstable.

Do not change the parameter settings as described below. Doing so may cause an unexpected condition, such as failing to start up the servo amplifier.

- Changing the values of the parameters for manufacturer setting
- Setting a value out of the range
- Changing the fixed values in the digits of a parameter

When you write parameters with the controller, make sure that the identification No. of the servo amplifier is set correctly. Otherwise, the parameter settings of another identification No. may be written, possibly causing the servo amplifier to be an unexpected condition.

5.1 Parameter list

POINT

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

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

POINT

The following parameters can be used only for Modbus RTU communication.

- [Pr. PC70 Modbus RTU communication station number setting]
- [Pr. PC71 Function selection C-F]
- [Pr. PC72 Function selection C-G]

<table>
<thead>
<tr>
<th>No.</th>
<th>Symbol</th>
<th>Name</th>
<th>Initial value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC01</td>
<td>STA</td>
<td>JOG operation acceleration time constant</td>
<td>0 [ms]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acceleration time constant 1</td>
<td>0 [ms]</td>
<td></td>
</tr>
<tr>
<td>PC02</td>
<td>STB</td>
<td>JOG operation deceleration time constant</td>
<td>0 [ms]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deceleration time constant 1</td>
<td>0 [ms]</td>
<td></td>
</tr>
<tr>
<td>PC03</td>
<td>STC</td>
<td>S-pattern acceleration/deceleration time constant</td>
<td>0 [ms]</td>
<td></td>
</tr>
<tr>
<td>PC04</td>
<td>TQC</td>
<td>Torque command time constant</td>
<td>0 [ms]</td>
<td></td>
</tr>
<tr>
<td>PC05</td>
<td>SC1</td>
<td>Automatic operation speed 1</td>
<td>100.00 [r/min]</td>
<td></td>
</tr>
<tr>
<td>PC06</td>
<td>SC2</td>
<td>Automatic operation speed 2</td>
<td>500.00 [r/min]</td>
<td></td>
</tr>
<tr>
<td>PC07</td>
<td>SC3</td>
<td>Manual operation speed 1</td>
<td>1000.00 [r/min]</td>
<td></td>
</tr>
<tr>
<td>PC08</td>
<td>SC4</td>
<td>Manual operation speed 2</td>
<td>200.00 [r/min]</td>
<td></td>
</tr>
<tr>
<td>PC09</td>
<td>SC5</td>
<td>Internal speed command 5</td>
<td>300.00 [r/min]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Internal speed limit 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC10</td>
<td>SC6</td>
<td>Internal speed command 6</td>
<td>500.00 [r/min]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Internal speed limit 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC11</td>
<td>SC7</td>
<td>Internal speed command 7</td>
<td>800.00 [r/min]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Internal speed limit 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC12</td>
<td>VCM</td>
<td>Analog speed command - Maximum speed</td>
<td>0.00 [r/min]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Analog speed limit - Maximum speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Symbol</td>
<td>Name</td>
<td>Initial value</td>
<td>Unit</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>-------------------------------------------</td>
<td>---------------</td>
<td>----------</td>
</tr>
<tr>
<td>PC13</td>
<td>TLC</td>
<td>Analog torque command maximum output</td>
<td>100.0</td>
<td>[%]</td>
</tr>
<tr>
<td>PC14</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PC15</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PC16</td>
<td>MBR</td>
<td>Electromagnetic brake sequence output</td>
<td>0</td>
<td>[ms]</td>
</tr>
<tr>
<td>PC17</td>
<td>ZSP</td>
<td>Zero speed</td>
<td>50</td>
<td>[r/min]</td>
</tr>
<tr>
<td>PC18</td>
<td>*BPS</td>
<td>Alarm history clear</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PC19</td>
<td>*ENRS</td>
<td>Encoder output pulse selection</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PC20</td>
<td></td>
<td>For manufacturer setting</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PC21</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PC22</td>
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5. PARAMETERS

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

**POINT**

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

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

**POINT**

- The following parameter cannot be used with CC-Link IE Field Network Basic communication.
  - [Pr. PN10 Ethernet communication time-out selection]
- The following parameter cannot be used with Modbus/TCP communication.
  - [Pr. PN02 Communication error detection time]
- The following parameters cannot be used with Modbus RTU communication.
  - [Pr. PN02 Communication error detection time]
  - [Pr. PN10 Ethernet communication time-out selection] to [Pr. PN36 Operation specification IP address range specification]
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<tr>
<td>PN24</td>
<td>*IPAF1</td>
<td>IP address filter 1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PN25</td>
<td>*IPAF2</td>
<td>IP address filter 2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PN26</td>
<td>*IPAF3</td>
<td>IP address filter 3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PN27</td>
<td>*IPAF4</td>
<td>IP address filter 4</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PN28</td>
<td>*IPFR2</td>
<td>IP address filter 2 range setting</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>PN29</td>
<td>*IPFR3</td>
<td>IP address filter 3 range setting</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>PN30</td>
<td>*IPFR4</td>
<td>IP address filter 4 range setting</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>PN31</td>
<td>*IPOA1</td>
<td>Operation specification IP address 1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PN32</td>
<td>*IPOA2</td>
<td>Operation specification IP address 2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PN33</td>
<td>*IPOA3</td>
<td>Operation specification IP address 3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PN34</td>
<td>*IPOA4</td>
<td>Operation specification IP address 4</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PN35</td>
<td>*IPOR3</td>
<td>Operation specification IP address 3 range specification</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>PN36</td>
<td>*IPOR4</td>
<td>Operation specification IP address 4 range specification</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>PN37</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN38</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN39</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN40</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN41</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN42</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN43</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN44</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN45</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN46</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN47</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
<tr>
<td>PN48</td>
<td></td>
<td>For manufacturer setting</td>
<td>0000h</td>
<td></td>
</tr>
</tbody>
</table>
5. PARAMETERS

5.2 Detailed list of parameters

POINT


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

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

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

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

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

<table>
<thead>
<tr>
<th>No./symbol/ name</th>
<th>Setting digit</th>
<th>Function</th>
<th>Initial value [unit]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PF45 *FOP12</td>
<td>_ _ _ x</td>
<td>Protocol parity selection</td>
<td>0h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This digit can be used only when Modbus RTU is set.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: Even parity (stop bit length of 1 bit)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: Odd parity (stop bit length of 1 bit)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2: No parity (stop bit length of 2 bits)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>_ _ x _</td>
<td>For manufacturer setting</td>
<td>0h</td>
</tr>
<tr>
<td></td>
<td>_ x _ _</td>
<td>0h</td>
<td></td>
</tr>
<tr>
<td></td>
<td>x _ _ _</td>
<td>0h</td>
<td></td>
</tr>
<tr>
<td>PF46 MIC</td>
<td></td>
<td>Modbus RTU communication time out selection</td>
<td>0h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set the time-out period for Modbus RTU communication protocol.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When &quot;0&quot; is set, the time-out is not checked.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This parameter can be used only when Modbus RTU is set.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Setting range: 0 to 60</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 [s]</td>
<td></td>
</tr>
</tbody>
</table>

---

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5. PARAMETERS

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

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

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

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

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

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

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

Setting range: 0 to 255
## 5. PARAMETERS

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

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

<table>
<thead>
<tr>
<th>[Pr. PD35] setting</th>
<th>Operation status</th>
<th>During rotation at constant speed</th>
<th>During deceleration to a stop</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>servo motor speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 r/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LSP or LSN ON OFF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **0**
  - No S-pattern acceleration/deceleration
  - With S-pattern acceleration/deceleration
  - servo motor speed: 0 r/min
  - LSP or LSN: ON OFF

- **1**
  - No S-pattern acceleration/deceleration
  - With S-pattern acceleration/deceleration
  - servo motor speed: 0 r/min
  - LSP or LSN: ON OFF

- **2**
  - No S-pattern acceleration/deceleration
  - With S-pattern acceleration/deceleration
  - servo motor speed: 0 r/min
  - LSP or LSN: ON OFF

- **3**
  - No S-pattern acceleration/deceleration
  - With S-pattern acceleration/deceleration
  - servo motor speed: 0 r/min
  - LSP or LSN: ON OFF

Erases the droop pulses and stops the servo motor.

A difference will be generated between the command position and the current position.

Perform a home position return again.

The servo motor stops after having traveled for the droop pulses.

A difference will be generated between the command position and the current position.

Perform a home position return again.

The servo motor decelerates to a stop with the deceleration time constant currently selected with the point table.

The operation is continued for the delay of the S-pattern acceleration/deceleration time constants.

The home position is maintained.

The servo motor stops after having traveled for the droop pulses.

Operation is continued for the delay of the S-pattern acceleration/deceleration time constants.

The home position is maintained.
6. MANUFACTURER FUNCTIONS

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

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

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

<table>
<thead>
<tr>
<th>Index</th>
<th>Access</th>
<th>Name</th>
<th>Data Type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D50h</td>
<td>rw</td>
<td>One-touch tuning mode</td>
<td>U8</td>
<td>0</td>
<td>Setting a value of &quot;1&quot; to &quot;3&quot; starts one-touch tuning. After one-touch tuning is completed, the setting value automatically changes to &quot;0&quot;. 0: During one-touch tuning stop 1: Basic mode 2: High mode 3: Low mode</td>
</tr>
<tr>
<td>2D51h</td>
<td>ro</td>
<td>One-touch tuning status</td>
<td>I8</td>
<td>0</td>
<td>Regardless of whether one-touch tuning is properly completed or not, the setting value changes to 100% at the completion. Unit: %</td>
</tr>
<tr>
<td>2D52h</td>
<td>wo</td>
<td>One-touch tuning Stop</td>
<td>I16</td>
<td></td>
<td>Writing &quot;1EA5h&quot; stops one-touch tuning. Writing a value other than &quot;1EA5h&quot; will trigger the error code &quot;CCD4h&quot;.</td>
</tr>
<tr>
<td>2D53h</td>
<td>wo</td>
<td>One-touch tuning Clear</td>
<td>I16</td>
<td></td>
<td>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 EEPROM.</td>
</tr>
<tr>
<td>2D54h</td>
<td>ro</td>
<td>One-touch tuning Error Code</td>
<td>I16</td>
<td>0000h</td>
<td>The following shows the details of the one-touch tuning error codes. 0000h: Finished normally 0001h: Tuning canceled 0002h: Overshoot exceeded 0003h: Control mode error 0004h: Time-out 0005h: Load to motor inertia ratio misestimated 0006h: One-touch tuning disabled</td>
</tr>
</tbody>
</table>
(2) Procedure of one-touch tuning via a network
Perform one-touch tuning via a network in the following procedure.

Start

Startup of the system


Operation

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

One-touch tuning execution

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.

One-touch tuning in progress

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

One-touch tuning completion

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".

Tuning result check

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).

End
6. MANUFACTURER FUNCTIONS

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.

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

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.

<table>
<thead>
<tr>
<th>Index</th>
<th>Access</th>
<th>Name</th>
<th>Data type</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2C18h</td>
<td>ro</td>
<td>Power ON cumulative time</td>
<td>U32</td>
<td>0</td>
<td>The cumulative energization time of the servo amplifier is returned.</td>
</tr>
<tr>
<td>2C19h</td>
<td>ro</td>
<td>Inrush relay ON/OFF number</td>
<td>U32</td>
<td>0</td>
<td>The number of on/off times of the inrush relay of the servo amplifier is returned.</td>
</tr>
</tbody>
</table>
MEMO
7. OBJECT DICTIONARY

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

7.1 Term replacement by communication protocol

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

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

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

7.2 Saving object dictionary data to EEP-ROM

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

### 7.3 Object dictionary list

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name and function</th>
<th>Data Type</th>
<th>Access</th>
<th>Variable mapping</th>
<th>Default</th>
<th>Range</th>
<th>Units</th>
<th>EEP-ROM</th>
<th>Parameter No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>0</td>
<td>Device Type</td>
<td>U32</td>
<td>ro</td>
<td>Imposible</td>
<td>00020192h</td>
<td>00020192h (fixed)</td>
<td>2</td>
<td>Imposible</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1001</td>
<td>0</td>
<td>Error Register</td>
<td>U8</td>
<td>ro</td>
<td>Imposible</td>
<td>00h</td>
<td>00h to 01h</td>
<td>1</td>
<td>Imposible</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1008</td>
<td>0</td>
<td>Manufacturer Device Name</td>
<td>vs</td>
<td>ro</td>
<td>Imposible</td>
<td>0000000001h</td>
<td>0000000000h</td>
<td>2</td>
<td>Imposible</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>1009</td>
<td>0</td>
<td>Manufacturer Hardware Version</td>
<td>vs</td>
<td>ro</td>
<td>Imposible</td>
<td>0000000001h</td>
<td>0000000000h</td>
<td>2</td>
<td>Imposible</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>100A</td>
<td>0</td>
<td>Manufacturer Software Version</td>
<td>vs</td>
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<td>0000000000h</td>
<td>2</td>
<td>Imposible</td>
<td>11</td>
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<td>I8</td>
<td>ro</td>
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<td>1 (A3 or earlier)</td>
<td>1 (Fixed) (A3 or earlier)</td>
<td>11</td>
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<td>11</td>
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</tr>
<tr>
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<td>U32</td>
<td>rw</td>
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<td>Save application parameters</td>
<td>U32</td>
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<td>Save manufacturer defined parameters</td>
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<td>0000000000h</td>
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<td>11</td>
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<tr>
<td>5</td>
<td>(Note 2)</td>
<td>Save point table</td>
<td>U32</td>
<td>rw</td>
<td>Imposible</td>
<td>0000000001h</td>
<td>0000000000h</td>
<td>2</td>
<td>Imposible</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

1. Device Type: This displays the servo drive defined with the CiA 402 profile.
2. Error Register: The error occurrence is returned. Bit 0: Turns on when an alarm has occurred. Bit 1 to Bit 7: Unused
3. Manufacturer Device Name: The model name of the servo amplifier is returned.
4. Manufacturer Hardware Version: The hardware version of the network module is returned.
5. Manufacturer Software Version: The software version of the servo amplifier is returned.
6. Store parameters: The number of entries is returned. Depending on the servo amplifier software version, the "Default" value and "Range" value are different. A3 or earlier: 1 A4 or later: 5
7. Save all parameters: [Writing] Writing "save" (= 65766173h) saves all the objects that can be stored in the EEP-ROM. [Reading] Bit 0: 0: The parameter cannot be saved with the command. (A parameter is being saved.) 1: The parameter can be saved with the command. (No parameter is being saved.) Bit 1: 0: The parameter is not automatically saved.
8. Save communication parameters: [Writing] Set "0". [Reading] "0" is always returned.
9. Save application parameters: [Writing] Set "0". [Reading] "0" is always returned.
10. Save manufacturer defined parameters: [Writing] Writing "save" (= 65766173h) saves the manufacturer definition parameter (Object of Index 2000 series) in the EEP-ROM. [Reading] Bit 0: 0: The parameter cannot be saved with the command. (A parameter is being saved.) 1: The parameter can be saved with the command. (No parameter is being saved.) Bit 1: 0: The parameter is not automatically saved.
11. Save point table: Writing "save" (= 65766173h) saves the point table setting value in EEP-ROM.
<table>
<thead>
<tr>
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<th>Range</th>
<th>Units</th>
<th>EEPROM</th>
<th>Parameter</th>
<th>No of points/No. of registers</th>
<th>Continuous read/ continuous write</th>
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<td>1 (A3 or earlier) 5 (A4 or later)</td>
<td>1 (Fixed) (A3 or earlier) 5 (Fixed) (A4 or later)</td>
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<td>Impossible</td>
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<tr>
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<td>00000001h</td>
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<td>Impossible</td>
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<td>000000000h</td>
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<td>Impossible</td>
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<td>60610008h</td>
<td>00000000h to FFFFFFFFh</td>
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### 7. OBJECT DICTIONARY

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<td></td>
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<td>PN01 to PN48</td>
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<td>Possible</td>
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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".

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".

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".

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".

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".

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".

The values of the positioning control parameters ([Pr. PT_ _]) can be obtained and set. For details, refer to "MR-JE-_C Servo Amplifier Instruction Manual (Profile Mode)" and "MR-JE-_C Servo Amplifier Instruction Manual (Positioning Mode)".

The values of the network setting parameters ([Pr. PN_ _]) can be obtained and set. Refer to chapter 5 for details.
<table>
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<tr>
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<th>Sub Index</th>
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<th>Range</th>
<th>Units</th>
<th>EEPROM</th>
<th>Parameter</th>
<th>No of points/No. of registers</th>
<th>Continuous read/continuous write</th>
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<td>Point table 001 to Point table 255 Return the configuration diagram number of point table No. 1 to 255.</td>
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<td>7</td>
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<td></td>
<td></td>
<td>O</td>
<td>15</td>
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<td></td>
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<td>Impossible</td>
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<td>00000000h to 00000063h</td>
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### 7. OBJECT DICTIONARY

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<th>Index</th>
<th>Sub Index</th>
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<th>Range</th>
<th>Units</th>
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<td>ro</td>
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<td>3</td>
<td>3</td>
<td>(fixed)</td>
<td>O</td>
<td>6</td>
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<td></td>
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<td>The number of entries in the latest alarm of the alarm history is returned.</td>
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<td>Impos-sible</td>
<td>00000000h</td>
<td>00000000h to FFFFFFFFh</td>
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<tr>
<td></td>
<td></td>
<td>The number of the alarm that has occurred is returned.</td>
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<td>The description is as follows.</td>
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<td>Bit 0 to Bit 15: Alarm detail number</td>
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<td>Bit 16 to Bit 31: Alarm No.</td>
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<td>When no history exists, &quot;0&quot; is returned.</td>
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<td></td>
<td>Alarm time (Hour)</td>
<td>U32</td>
<td>ro</td>
<td>Impos-sible</td>
<td>0</td>
<td>0</td>
<td>4294967295</td>
<td>hour</td>
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<td>Alarm occurrence time is returned.</td>
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<td>When no history exists, &quot;0&quot; is returned.</td>
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<td>The number of the alarm that has occurred is returned.</td>
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<td>The description is as follows.</td>
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<td>Bit 0 to Bit 7: Alarm detail number</td>
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<td>Bit 8 to Bit 15: Alarm No.</td>
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<td>When no history exists, &quot;0&quot; is returned.</td>
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<tr>
<td>2A40</td>
<td>0</td>
<td>Clear alarm history</td>
<td>U16</td>
<td>wo</td>
<td>Impos-sible</td>
<td>0</td>
<td>0</td>
<td>255</td>
<td>O</td>
<td>1</td>
<td>Impos-sible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Writing &quot;1EA5h&quot; clears the alarm history.</td>
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<td>2A41</td>
<td>0</td>
<td>Current alarm</td>
<td>U32</td>
<td>ro</td>
<td>Possible</td>
<td>00000000h</td>
<td>00000000h to FFFFFFFFh</td>
<td>O</td>
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<td></td>
<td></td>
<td>The number of the current alarm is returned.</td>
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<td></td>
<td>When no alarm has occurred, &quot;00000000h&quot; is returned.</td>
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<td>Bit 0 to Bit 15: Alarm detail number</td>
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<td>Bit 16 to Bit 31: Alarm No.</td>
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<td>2A42</td>
<td>0</td>
<td>Current alarm 2</td>
<td>U16</td>
<td>ro</td>
<td>Possible</td>
<td>0000h</td>
<td>0001h to FFFFh</td>
<td>O</td>
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<td></td>
<td></td>
<td>The number of the current alarm is returned.</td>
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<td>When the alarm does not occur, &quot;00000000h&quot; is returned.</td>
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<td>Bit 0 to Bit 7: Alarm detail number</td>
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<td>Bit 8 to Bit 15: Alarm No.</td>
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<tr>
<td>2A43</td>
<td>0</td>
<td>Point table error</td>
<td>U8</td>
<td>ro</td>
<td>Impos-sible</td>
<td>2</td>
<td>2</td>
<td>(fixed)</td>
<td>O</td>
<td>5</td>
<td>Impos-sible</td>
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<td></td>
<td></td>
<td>Return the configuration diagram number of point table error.</td>
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<td>The point table No. in which a point table error has occurred is returned.</td>
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<td>2</td>
<td></td>
<td>Point table error No.</td>
<td>U32</td>
<td>ro</td>
<td>Possible</td>
<td>0</td>
<td>0</td>
<td>255</td>
<td>O</td>
<td>1</td>
<td>Impos-sible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The number of a point table error that has occurred.</td>
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<td></td>
<td></td>
<td>Bit 0: Target position [μm]</td>
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<td></td>
<td></td>
<td>Bit 1: reserved</td>
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<td>Bit 2: Servo motor speed [r/min]</td>
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<td>Bit 3: reserved</td>
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<td>Bit 4: Acceleration time constant [ms]</td>
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<td>Bit 5: Deceleration time constant [ms]</td>
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<td>Bit 6: Dwell time [ms]</td>
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<td>Bit 7: Auxiliary function</td>
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<td>Bit 8: M-code</td>
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<td>Bit 9: Push torque [%]</td>
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<td>Bit A: Push travel width [μm]</td>
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<td>Bit B to Bit F: reserved</td>
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<tr>
<td>2A44</td>
<td>0</td>
<td>Parameter error number</td>
<td>U16</td>
<td>ro</td>
<td>Impos-sible</td>
<td>0</td>
<td>0</td>
<td>500</td>
<td>O</td>
<td>1</td>
<td>Impos-sible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When [AL. 37 Parameter error] occurred, the number of parameters that caused the error is returned.</td>
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<td></td>
<td></td>
<td>Refer to Parameter error list (2A45h) for the number of each parameter which causes the error.</td>
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</table>
### 7. OBJECT DICTIONARY

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name and function</th>
<th>Data Type</th>
<th>Access</th>
<th>Variable mapping</th>
<th>Default</th>
<th>Range</th>
<th>Units</th>
<th>EEPROM</th>
<th>Parameter No. of Registers</th>
<th>Continuous read/write</th>
</tr>
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<tbody>
<tr>
<td>2A45</td>
<td>0</td>
<td>Parameter error list</td>
<td>U8</td>
<td>ro</td>
<td>Impos</td>
<td>32</td>
<td>32 (fixed)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>When [AL. 37 Parameter error] has occurred, the number of entries of the parameter which causes the error is returned.</td>
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<tr>
<td></td>
<td>1 to 32</td>
<td>Parameter error list 1 to 32</td>
<td>U16</td>
<td>ro</td>
<td>Impos</td>
<td>0000h</td>
<td>0000h to FFFFh</td>
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<tr>
<td></td>
<td></td>
<td>When [AL. 37 Parameter error] has occurred, the 1st to 32nd of the parameter numbers that caused the alarm is returned. Bit 0 to Bit 7: Parameter No. Bit 8 to Bit 15: Parameter group number 00: [Pr. PA _ _] 01: [Pr. PB _ _] 02: [Pr. PC _ _] 03: [Pr. PD _ _] 04: [Pr. PE _ _] 05: [Pr. PF _ _] 06: Parameter for manufacturer setting 07: Parameter for manufacturer setting 08: Parameter for manufacturer setting 09: Parameter for manufacturer setting 0A: Parameter for manufacturer setting 0B: Parameter for manufacturer setting 0C: [Pr. PT _ _] 0E: [Pr. PN _ _]</td>
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<td>2A46</td>
<td>0</td>
<td>Reset alarm</td>
<td>U16</td>
<td>wo</td>
<td>Impos</td>
<td>0000h</td>
<td>0000h to FFFFh</td>
<td></td>
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<td></td>
<td></td>
<td>Writing the value &quot;1EASh&quot; resets an alarm. Any value other than &quot;1EASh&quot; is invalid.</td>
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<td>2A60</td>
<td>0</td>
<td>SDO abort code</td>
<td>U32</td>
<td>ro</td>
<td>Impos</td>
<td>00000000h</td>
<td>00000000h to FFFFFFFFh</td>
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<td></td>
<td>(Note 1)</td>
<td>The latest SDO Abort Code is returned.</td>
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<td>2A64</td>
<td>0</td>
<td>Access log 1</td>
<td>U32</td>
<td>ro</td>
<td>Impos</td>
<td>00000000h</td>
<td>00000000h to FFFFFFFFh</td>
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<tr>
<td></td>
<td>(Note 1)</td>
<td>Return the successfully accessed Last Index and Sub Index by Modbus communication. Bit 0 to Bit 15: Index Bit 16 to Bit 31: Sub Index</td>
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<tr>
<td>2A65</td>
<td>0</td>
<td>Access log 2</td>
<td>U16</td>
<td>ro</td>
<td>Impos</td>
<td>00000000h</td>
<td>00000000h to FFFFh</td>
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<tr>
<td></td>
<td>(Note 1)</td>
<td>Return the successfully accessed number up to the last Index by Modbus communication. In addition, when Sub Index or elements are accessed in multiple addresses, the Sub Index or the element number is returned.</td>
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<tr>
<td>2A68</td>
<td>0</td>
<td>Communication error count</td>
<td>U16</td>
<td>rw</td>
<td>Impos</td>
<td>0000h</td>
<td>00000000h to FFFFh</td>
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<td></td>
<td>(Note 2)</td>
<td>Sending the Modbus RTU communication total error count transmission. When &quot;1EASh&quot; is written, the error count is cleared. The counted errors are as follows. Errors detected by hardware (parity error, overrun error, and framing error) Message frame length error CRC error</td>
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<tr>
<td>Index</td>
<td>Sub Index</td>
<td>Name and function</td>
<td>Data Type</td>
<td>Access</td>
<td>Default</td>
<td>Range</td>
<td>Units</td>
<td>Parameter</td>
<td>No. of points/No. of Registers</td>
<td>Continuous read/continuous write</td>
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<tr>
<td>2B01 0</td>
<td>Cumulative feedback pulses</td>
<td>The cumulative feedback pulses are returned. The accumulation of the feedback pulse can be cleared by writing &quot;7845 (00001EA5h)&quot;.</td>
<td>I32</td>
<td>rw</td>
<td>Possible</td>
<td>-2147483648 to 2147483647</td>
<td>pulse</td>
<td></td>
<td></td>
<td>2</td>
<td>Possible</td>
</tr>
<tr>
<td>2B02 0</td>
<td>Servo motor speed</td>
<td>The servo motor speed is returned.</td>
<td>I32</td>
<td>ro</td>
<td>Possible</td>
<td>-2147483648 to 2147483647</td>
<td>r/min</td>
<td></td>
<td></td>
<td>2</td>
<td>Possible</td>
</tr>
<tr>
<td>2B03 0</td>
<td>Droop pulses</td>
<td>The droop pulses (encoder unit) are returned.</td>
<td>I32</td>
<td>ro</td>
<td>Possible</td>
<td>-2147483648 to 2147483647</td>
<td>pulse</td>
<td></td>
<td></td>
<td>2</td>
<td>Possible</td>
</tr>
<tr>
<td>2B04 0</td>
<td>Cumulative command pulses</td>
<td>The cumulative command pulses are returned.</td>
<td>I32</td>
<td>ro</td>
<td>Possible</td>
<td>-2147483648 to 2147483647</td>
<td>pulse</td>
<td></td>
<td></td>
<td>2</td>
<td>Possible</td>
</tr>
<tr>
<td>2B05 0</td>
<td>Command pulse frequency</td>
<td>The command pulse frequency is returned.</td>
<td>I32</td>
<td>ro</td>
<td>Possible</td>
<td>-2147483648 to 2147483647</td>
<td>k/pulse/s</td>
<td></td>
<td></td>
<td>2</td>
<td>Possible</td>
</tr>
<tr>
<td>2B06 0</td>
<td>Analog speed command voltage</td>
<td>The analog speed command voltage is returned.</td>
<td>I16</td>
<td>ro</td>
<td>Possible</td>
<td>-32768 to 32767</td>
<td>V</td>
<td></td>
<td></td>
<td>1</td>
<td>Possible</td>
</tr>
<tr>
<td>2B07 0</td>
<td>Analog torque limit voltage</td>
<td>The analog torque limit voltage is returned.</td>
<td>I16</td>
<td>ro</td>
<td>Possible</td>
<td>-32768 to 32767</td>
<td>V</td>
<td></td>
<td></td>
<td>1</td>
<td>Possible</td>
</tr>
<tr>
<td>2B08 0</td>
<td>Regenerative load ratio</td>
<td>The regenerative load ratio is returned.</td>
<td>U16</td>
<td>ro</td>
<td>Possible</td>
<td>0 to 65535</td>
<td>%</td>
<td></td>
<td></td>
<td>1</td>
<td>Possible</td>
</tr>
<tr>
<td>2B09 0</td>
<td>Effective load ratio</td>
<td>The effective load ratio is returned.</td>
<td>U16</td>
<td>ro</td>
<td>Possible</td>
<td>0 to 65535</td>
<td>%</td>
<td></td>
<td></td>
<td>1</td>
<td>Possible</td>
</tr>
<tr>
<td>2B0A 0</td>
<td>Peak load ratio</td>
<td>The peak load ratio is returned.</td>
<td>U16</td>
<td>ro</td>
<td>Possible</td>
<td>0 to 65535</td>
<td>%</td>
<td></td>
<td></td>
<td>1</td>
<td>Possible</td>
</tr>
<tr>
<td>2B0B 0</td>
<td>Instantaneous torque</td>
<td>The instantaneous torque is returned.</td>
<td>I16</td>
<td>ro</td>
<td>Possible</td>
<td>-32768 to 32767</td>
<td>%</td>
<td></td>
<td></td>
<td>1</td>
<td>Possible</td>
</tr>
<tr>
<td>2B0C 0</td>
<td>Within one-revolution position</td>
<td>The position within one-revolution is returned.</td>
<td>I32</td>
<td>ro</td>
<td>Possible</td>
<td>-2147483648 to 2147483647</td>
<td>pulse</td>
<td></td>
<td></td>
<td>2</td>
<td>Possible</td>
</tr>
<tr>
<td>2B0D 0</td>
<td>ABS counter</td>
<td>The multi-revolution counter value is returned.</td>
<td>I32</td>
<td>ro</td>
<td>Possible</td>
<td>-2147483648 to 2147483647</td>
<td>rev</td>
<td></td>
<td></td>
<td>2</td>
<td>Possible</td>
</tr>
<tr>
<td>2B0E 0</td>
<td>Load to motor inertia ratio</td>
<td>The load to motor inertia ratio is returned.</td>
<td>U16</td>
<td>ro</td>
<td>Possible</td>
<td>-32768 to 32767</td>
<td>0.01 times</td>
<td></td>
<td></td>
<td>1</td>
<td>Possible</td>
</tr>
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7. OBJECT DICTIONARY

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<td>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”.</td>
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<td>0</td>
<td>One-touch tuning Clear</td>
<td>I16</td>
<td>wo</td>
<td>Impos-</td>
<td>0000h</td>
<td>0000h to 001h</td>
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<td></td>
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<td>The parameter changed in one-touch tuning can be returned to the value before the change. The description of the setting values is as follows: 0000: Restore the default value 0001: Return the value to before one-touch tuning.</td>
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<tr>
<td>2D54</td>
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<td>One-touch tuning Error Code</td>
<td>I16</td>
<td>ro</td>
<td>Impos-</td>
<td>0000h</td>
<td>0000h to C00Fh</td>
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<td>An error code of the one-touch tuning is returned. The description of the error codes is as follows: 0000: Normal completion C000: Tuning canceled C001: Overshoot exceeded C002: Servo-off during tuning C003: Control mode error C004: Time-out C005: Load to motor inertia ratio misestimated C00F: One-touch tuning disabled</td>
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<tr>
<td>2D60</td>
<td>(Note 2)</td>
<td>Target point table</td>
<td>I16</td>
<td>rw</td>
<td>Possible</td>
<td>-1 to 255</td>
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<td>[Point table mode (pt) case] Specify a point table No. 0: Not in operation 1 to 255: Specified point table execution -1: High-speed home position return [Indexer mode (idx) case] Specify the next station No. 0 to 254 Positioning operation to specified station</td>
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<td>2D68</td>
<td>(Note 2)</td>
<td>Point demand value</td>
<td>I16</td>
<td>ro</td>
<td>Possible</td>
<td>0 to 255</td>
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<td>Current specified point table number or the next station position number is returned. While the servo motor is stopped, the value of Target point table (2D60h) is returned.</td>
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<td>2D69</td>
<td>(Note 2)</td>
<td>Point actual value</td>
<td>I16</td>
<td>ro</td>
<td>Possible</td>
<td>0 to 255</td>
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<td></td>
<td>[Point table mode (pt) case] The completed point table is returned. After homing completed, &quot;0&quot; is set. [Indexer mode (idx) case] The completed station No. is returned. The previous value is held until completion.</td>
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<td>2D6A</td>
<td>(Note 2)</td>
<td>M code actual value</td>
<td>U8</td>
<td>ro</td>
<td>Possible</td>
<td>00h to 63h</td>
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<td>The completed M code of the point table is returned. In the indexer method, &quot;00h&quot; is returned.</td>
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<tr>
<td>2D6B</td>
<td>(Note 2)</td>
<td>Torque limit value 2</td>
<td>U16</td>
<td>rw</td>
<td>Possible</td>
<td>10000</td>
<td>0 to 10000</td>
<td>0.1%</td>
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<td>When the servo motor is stopping, set the torque limit value in indexer mode (idx).</td>
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<tr>
<td>2D98</td>
<td>(Note 2)</td>
<td>Select behavior of broadcast message</td>
<td>U8</td>
<td>rw</td>
<td>Impos-</td>
<td>0</td>
<td>0 to 1</td>
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<td>The setting of the broadcast communication of the Modbus RTU communication can be read and write. 0: Broadcast instruction enabled 1: Broadcast instruction disabled</td>
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## 7. OBJECT DICTIONARY

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

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<td>to</td>
<td>FFFFh</td>
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<td>The current control status can be checked.</td>
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<td>Bit 9: remote</td>
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<td>Bit 10: target reached</td>
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<td>Bit 11: internal limit active</td>
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<td>Bit 12 to Bit 13: operation mode specific</td>
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<td>0.1%</td>
<td>O</td>
<td>PT49</td>
<td>2</td>
<td>Impossible</td>
</tr>
<tr>
<td>6088</td>
<td>0</td>
<td>Torque profile type</td>
<td>I16</td>
<td>rw</td>
<td>Possible</td>
<td>0</td>
<td>0 (fixed)</td>
<td></td>
<td>1</td>
<td>Impossible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6088</td>
<td>0</td>
<td>Encoder increments</td>
<td>U8</td>
<td>ro</td>
<td>Immissible</td>
<td>2</td>
<td>2 (fixed)</td>
<td>pulse/rev</td>
<td>5</td>
<td>Impossible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>608F</td>
<td>0</td>
<td>Motor revolutions</td>
<td>U32</td>
<td>rw</td>
<td>Possible</td>
<td>1</td>
<td>1 rev</td>
<td></td>
<td>O</td>
<td>PA06</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6091</td>
<td>0</td>
<td>Gear ratio</td>
<td>U8</td>
<td>ro</td>
<td>Immissible</td>
<td>2</td>
<td>2 (fixed)</td>
<td></td>
<td>5</td>
<td>Impossible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6092</td>
<td>0</td>
<td>Feed constant</td>
<td>U8</td>
<td>ro</td>
<td>Immissible</td>
<td>2</td>
<td>2 (fixed)</td>
<td></td>
<td>5</td>
<td>Impossible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6098</td>
<td>0</td>
<td>Homing method</td>
<td>I8</td>
<td>rw</td>
<td>Possible</td>
<td>37</td>
<td>-43 to 39</td>
<td></td>
<td>O</td>
<td>PT45</td>
<td>1</td>
<td>Impossible</td>
</tr>
<tr>
<td>6099</td>
<td>0</td>
<td>Homing speeds</td>
<td>U8</td>
<td>ro</td>
<td>Immissible</td>
<td>2</td>
<td>2 (fixed)</td>
<td></td>
<td>5</td>
<td>PT05</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**6087 Torque slope**
Set the change amount per 1 s of the torque command to be used in the profile torque mode. When "0" is set, the setting value is invalid, and the torque command is the step input. [Setting range] is limited within the range of 0 to 10000000. In addition, when "0" is set, the setting value is invalid (step input). [Setting range] is limited within the range of 0 to 10000000.

**6088 Torque profile type**
Set the torque command pattern.

**6088 Encoder increments**
The encoder resolution is returned.

**608F Motor revolutions**
The fixed value "1" is returned.

**6091 Gear ratio**
The number of entries is returned.

**6092 Feed constant**
The number of entries is returned.
Electronic gear calculation formula: Travel distance/Number of drive axis rotation

**6098 Homing method**
Set a home position return type.

**6099 Homing speeds**
The number of entries is returned.

**1 Speed during search for switch**
Set the servo motor speed at home position return.

**2 Speed during search for zero**
Set a creep speed after proximity dog at home position return.
## 7. OBJECT DICTIONARY

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name and function</th>
<th>Data Type</th>
<th>Access</th>
<th>Variable mapping</th>
<th>Default</th>
<th>Range</th>
<th>Units</th>
<th>EEPROM</th>
<th>Parameter</th>
<th>No. of registers</th>
<th>Continuous read/ continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>609A</td>
<td>0</td>
<td>Homing acceleration</td>
<td>U32</td>
<td>rw</td>
<td>Possible</td>
<td>0</td>
<td>0 to 20000 ms</td>
<td>ms</td>
<td>O</td>
<td>PT61</td>
<td>2</td>
<td>Impossible</td>
</tr>
<tr>
<td>60A8</td>
<td>0</td>
<td>SI unit position</td>
<td>U32</td>
<td>rw</td>
<td>Impossible</td>
<td>FD410000h (degree) 00000000h to FFFFFFFFh</td>
<td>2</td>
<td>Impossible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>609A</td>
<td>0</td>
<td>SI unit velocity</td>
<td>U32</td>
<td>rw</td>
<td>Impossible</td>
<td>FEB44700h</td>
<td>FEB44700h</td>
<td>2</td>
<td>Impossible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60B8</td>
<td>0</td>
<td>Touch probe function</td>
<td>U16</td>
<td>rw</td>
<td>Possible</td>
<td>0000h to FFFFh</td>
<td>1</td>
<td>Possible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60B9</td>
<td>0</td>
<td>Touch probe status</td>
<td>U16</td>
<td>ro</td>
<td>Possible</td>
<td>0000h to FFFFh</td>
<td>1</td>
<td>Possible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60A8</td>
<td>0</td>
<td>Touch probe pos1 pos</td>
<td>I32</td>
<td>ro</td>
<td>Possible</td>
<td>-2147483648 to 2147483647 pos units</td>
<td>2</td>
<td>Possible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60BB</td>
<td>0</td>
<td>Touch probe pos1 neg</td>
<td>I32</td>
<td>ro</td>
<td>Possible</td>
<td>-2147483648 to 2147483647 pos units</td>
<td>2</td>
<td>Possible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60E0</td>
<td>0</td>
<td>Positive torque limit value</td>
<td>U16</td>
<td>rw</td>
<td>Possible</td>
<td>10000</td>
<td>0 to 10000</td>
<td>0.1%</td>
<td>O</td>
<td>PA11/ PA12</td>
<td>1</td>
<td>Impossible</td>
</tr>
<tr>
<td>60E1</td>
<td>0</td>
<td>Negative torque limit value</td>
<td>U16</td>
<td>rw</td>
<td>Possible</td>
<td>10000</td>
<td>0 to 10000</td>
<td>0.1%</td>
<td>O</td>
<td>PA12/ (PA11)</td>
<td>1</td>
<td>Impossible</td>
</tr>
<tr>
<td>60E3</td>
<td>0</td>
<td>Supported homing method</td>
<td>U8</td>
<td>ro</td>
<td>Impossible</td>
<td>39 (A3 or earlier) 40 (A4 or later)</td>
<td>1</td>
<td>Numb er of reading Impossible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>to</td>
<td>1st supported homing method</td>
<td>I8</td>
<td>ro</td>
<td>Impossible</td>
<td>37</td>
<td>-128 to 127</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 7. OBJECT DICTIONARY

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name and function</th>
<th>Data Type</th>
<th>Access</th>
<th>Variable mapping</th>
<th>Default</th>
<th>Range</th>
<th>Units</th>
<th>EEPROM</th>
<th>Parameter</th>
<th>Continuous read/ write</th>
</tr>
</thead>
<tbody>
<tr>
<td>60F2</td>
<td>0</td>
<td>Positioning option code</td>
<td>U16</td>
<td>rw</td>
<td>Possible</td>
<td>0000h</td>
<td>0000h to 00C0h</td>
<td>PT03</td>
<td>1</td>
<td>Impossible</td>
<td></td>
</tr>
</tbody>
</table>

Set the profile position mode. Bit 1 to Bit 3 always report "0". Setting a value other than "0" causes an error.

- **Bit 1 / Bit 0: relative option**
  - 00: The positioning moves with the relative position from the internal absolute target position.
  - 10: Setting a value other than "0" causes an error.

- **Bit 3 / Bit 2: change immediately option**
  - 00: Standard operation of pp mode (Immediately reflects new Target position, profile velocity, acceleration etc).

- **Bit 7 / Bit 6: rotary axis direction option**
  - 00: Rotating to the target position in a direction specified with a sign of the position data.
  - 01: Regardless of the sign of the position data, the servo motor rotates in the address decreasing direction.

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

7.4 Object dictionary details (1000 series)

POINT

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

7.4.1 Manufacturer Device Name (1008h)

(1) Object list

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>1008h</td>
<td>0</td>
<td>Manufacturer Device Name</td>
<td>VS</td>
<td>ro</td>
<td>16</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

(2) Usage

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

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

<table>
<thead>
<tr>
<th>Byte</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9 to 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characters</td>
<td>M</td>
<td>R</td>
<td>-</td>
<td>J</td>
<td>E</td>
<td>-</td>
<td>2</td>
<td>0</td>
<td>C</td>
<td>(Space)</td>
</tr>
</tbody>
</table>

7.4.2 Manufacturer Hardware Version (1009h)

(1) Object list

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>1009h</td>
<td>0</td>
<td>Manufacturer Hardware Version</td>
<td>VS</td>
<td>ro</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

(2) Usage

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

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

<table>
<thead>
<tr>
<th>Byte</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characters</td>
<td>A</td>
<td>(Space)</td>
</tr>
</tbody>
</table>
7. OBJECT DICTIONARY

7.4.3 Manufacturer Software Version (100Ah)

(1) Object list

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of points/ No. of Registers</th>
<th>Continuous read/ continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>100Ah</td>
<td>0</td>
<td>Manufacturer Software Version</td>
<td>VS</td>
<td>ro</td>
<td>8</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

(2) Usage

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

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

<table>
<thead>
<tr>
<th>Byte</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characters</td>
<td>(Space)</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>-</td>
<td>B</td>
<td>4</td>
<td>6</td>
<td>W</td>
<td>7</td>
<td>5</td>
<td>0</td>
<td>(Space)</td>
<td>A</td>
<td>4</td>
<td>(Space)</td>
</tr>
</tbody>
</table>

7.4.4 Store Parameters (1010h)

**POINT**

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

The objects can be saved in the EEP-ROM of the servo amplifier by writing "65766173h" (= reverse ASCII code of "save") to the corresponding sub object of Store Parameters (1010h).

The value saved in the EEP-ROM is set to the object at the next power-on. Parameter setting can also be changed through the object dictionary by using the necessary Store Parameters (1010h), and not by writing to the EEPROM immediately.

In addition, it takes 10 seconds maximum as the Store Parameters (1010h) writes all the parameters collectively. Do not shut off the power during writing.

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

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

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>Sub Index</th>
<th>Item</th>
<th>Setting value</th>
<th>Write to EEP-ROM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parameter</td>
</tr>
<tr>
<td>0</td>
<td>Number of entries</td>
<td>5 (Note)</td>
<td>00000000h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>65766173h (&quot;save&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other than above</td>
</tr>
<tr>
<td>1</td>
<td>Save all parameters</td>
<td>00000000h (Available)</td>
<td>Disable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>65766173h (&quot;save&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other than above</td>
</tr>
<tr>
<td>2</td>
<td>Save communication parameters</td>
<td>00000000h (Available)</td>
<td>Disable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>65766173h (&quot;save&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other than above</td>
</tr>
<tr>
<td>3</td>
<td>Save application parameters</td>
<td>00000000h (Available)</td>
<td>Disable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>65766173h (&quot;save&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other than above</td>
</tr>
<tr>
<td>4</td>
<td>Save manufacturer defined parameters</td>
<td>00000000h (Available)</td>
<td>Disable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>65766173h (&quot;save&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other than above</td>
</tr>
<tr>
<td>5</td>
<td>Save Point table</td>
<td>00000000h (Available)</td>
<td>Disable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>65766173h (&quot;save&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other than above</td>
</tr>
</tbody>
</table>

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

7.4.5 Restore default parameters (1011h)

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

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

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

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

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

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

7.4.6 Transmit PDO Mapping (1A00h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of points/ No. of Registers</th>
<th>Continuous read/ continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A00h</td>
<td>0</td>
<td>Transmit PDO Mapping</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Number of entries</td>
<td>U8</td>
<td>rw</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mapped Object 001</td>
<td>U32</td>
<td>rw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td>Mapped Object 032</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Bit</th>
<th>Detail name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mapped Object 001 to 032</td>
<td>16 to 31</td>
<td>Index of the object to be mapped</td>
<td>Set the Index for the object to be mapped. To set the object as unassigned (gap), set &quot;0&quot;.</td>
</tr>
<tr>
<td></td>
<td>8 to 15</td>
<td>Sub Index of the object to be mapped</td>
<td>Set the Sub Index for the object to be mapped. To set the object as unassigned (gap), set &quot;0&quot;.</td>
</tr>
<tr>
<td></td>
<td>0 to 7</td>
<td>Size of the object to be mapped</td>
<td>Set the size of the object to be mapped in bit units. Set 16 for 2 bytes. To set the object as unassigned (gap), set the size in bit units.</td>
</tr>
</tbody>
</table>

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

(1) Usage

Change the response message mapping with the following procedure.

1. Stop the CC-Link IE Field Network Basic communication. (RY (n + 3) F = 00h)

2. Initialize the number of entries for response message mapping by the SLMP. (Index: 1A00h, Sub: 0 = 0 (the number of entries = 0))

3. Set the response message mapping by the SLMP. (Index: 1A00h, Sub: 1 to 32)

4. Set the number of entries for response message mapping by the SLMP. (Index: 1A00h, Sub: 0 = n (the number of entries = n))

5. Start the CC-Link IE Field Network Basic communication. (RY (n + 3) F = 01h)
7. OBJECT DICTIONARY

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

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

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

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

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

7.5 Object dictionary details (2000 series)

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

7.5.1 SDO Abort Code (2A60h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of points/ No. of Registers</th>
<th>Continuous read/ continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A60h</td>
<td>0</td>
<td>SDO Abort Code</td>
<td>U32</td>
<td>ro</td>
<td>2</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

This object is can be used with servo amplifiers with software version A3 or later. The latest SDO Abort Code generated in Modbus Communication can be read.

By reading the latest SDO Abort Code, the access status to the object can be checked.
If there is an error with the SDO Abort Code, review the access method.

(1) Usage
Use this object to read the SDO Abort Code.
The SDO Abort Code is as follows.

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

7.5.2 Access log 1 (2A64h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of points/ No. of Registers</th>
<th>Continuous read/ continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A64h</td>
<td>0</td>
<td>Access log 1</td>
<td>U32</td>
<td>ro</td>
<td>2</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Access log 1</th>
<th>Response data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher 2 bytes</td>
<td>Address: xxxxh</td>
</tr>
<tr>
<td>Lower 2 bytes</td>
<td>For manufacturer setting: 00yyh</td>
</tr>
</tbody>
</table>

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

7.5.3 Access log 2 (2A65h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of points/ No. of Registers</th>
<th>Continuous read/ continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A65h</td>
<td>0</td>
<td>Access log 2</td>
<td>U16</td>
<td>ro</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

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

7.5.4 Communication error count (2A68h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of points/ No. of Registers</th>
<th>Continuous read/ continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A68h</td>
<td>0</td>
<td>Communication error count</td>
<td>U16</td>
<td>rw</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

1) Usage
   By using the function code "03h" (reading of maintenance register), the total number of communication errors indicated below can be read.
   - Errors detected by hardware (parity error, overrun error, and framing error)
   - Message frame length error
   - CRC error
   In addition, by writing "1EA5h" using function code "10h" (multiple maintenance register data writing), error count can be cleared.

7.5.5 External Input pin display (2C10h)

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

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

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

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

<table>
<thead>
<tr>
<th>Bit</th>
<th>CN3 connector pin</th>
<th>Bit</th>
<th>CN3 connector pin</th>
<th>Bit</th>
<th>CN3 connector pin</th>
<th>Bit</th>
<th>CN3 connector pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>8</td>
<td>9</td>
<td>16</td>
<td>1</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>10</td>
<td>11</td>
<td>17</td>
<td>19</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>12</td>
<td>13</td>
<td>18</td>
<td>20</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>14</td>
<td>15</td>
<td>19</td>
<td>21</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>16</td>
<td>17</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>5</td>
<td>21</td>
<td>24</td>
<td>25</td>
<td>22</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>28</td>
<td>29</td>
<td>23</td>
<td>30</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>7</td>
<td>19</td>
<td>31</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.5.6 External Output pin display (2C11h)

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

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

(1) **Usage**

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

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

7.5.7 External Input signal display (2C12h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Subindex</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/ No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>Number of entries</td>
<td>U8</td>
<td>ro</td>
<td>9</td>
<td>Impossible</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>External Input signal display1</td>
<td>U32</td>
<td>ro</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>External Input signal display2</td>
<td>U32</td>
<td>ro</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>External Input signal display3</td>
<td>U32</td>
<td>ro</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>External Input signal display4</td>
<td>U32</td>
<td>ro</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The current input device status can be read.

(1) Usage

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

<table>
<thead>
<tr>
<th>Bit</th>
<th>Input device signal (Note 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SON (Servo-on)</td>
</tr>
<tr>
<td>1</td>
<td>LSP (Forward rotation stroke end)</td>
</tr>
<tr>
<td>2</td>
<td>LSN (Reverse rotation stroke end)</td>
</tr>
<tr>
<td>3</td>
<td>TL (External torque limit selection)</td>
</tr>
<tr>
<td>4</td>
<td>TL1 (Internal torque limit selection)</td>
</tr>
<tr>
<td>5</td>
<td>PC (Proportional control)</td>
</tr>
<tr>
<td>6</td>
<td>RES (Reset)</td>
</tr>
<tr>
<td>7</td>
<td>CR (Clear)</td>
</tr>
<tr>
<td>8</td>
<td>SP1 (Speed selection 1)</td>
</tr>
<tr>
<td>9</td>
<td>SP2 (Speed selection 2)</td>
</tr>
<tr>
<td>10</td>
<td>SP3 (Speed selection 3)</td>
</tr>
<tr>
<td>11</td>
<td>ST1/RS2 (Forward rotation start/reverse rotation selection)</td>
</tr>
<tr>
<td>12</td>
<td>ST2/RS1 (Reverse rotation start/forward rotation selection)</td>
</tr>
<tr>
<td>13</td>
<td>CM1 (Electronic gear setting 1)</td>
</tr>
<tr>
<td>14</td>
<td>CM2 (Electronic gear setting 2)</td>
</tr>
<tr>
<td>15</td>
<td>LOP (Control switching)</td>
</tr>
<tr>
<td>16</td>
<td>TPR1 (Touch probe 1)</td>
</tr>
<tr>
<td>17</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>EM2/EM1 (Forced stop 2/1)</td>
</tr>
<tr>
<td>19</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>STAB2 (Second acceleration/deceleration selection)</td>
</tr>
</tbody>
</table>

*(Note 1)*

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

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

7.5.8 Control DI (2D01h to 2D0Ah)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D01h</td>
<td>0</td>
<td>Control DI1 to Control DI10</td>
<td>U16</td>
<td>rw</td>
<td>1</td>
<td>Possible</td>
</tr>
</tbody>
</table>

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

The following table lists readable and writable input devices.

(1) Bit definition of control DI 1

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

(2) Bit definition of control DI 2

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

<table>
<thead>
<tr>
<th>Bit</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>The value at reading is undefined. Set &quot;0&quot; when writing.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
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<td></td>
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<tr>
<td>4</td>
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<td>5</td>
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<td>7</td>
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<td>8</td>
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<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>C_CR</td>
<td>Clear&lt;br&gt;Turn the C_CR on to clear the droop pulses of the position control counter on the rising edge of the C_CR. The pulse width should be 10 ms or longer.&lt;br&gt;The delay time set in [Pr. PB03] is also cleared. When &quot;_ _ _1&quot; is set to [Pr. PD37], the droop pulses are always cleared while the CR is on.&lt;br&gt;This bit can be used on servo amplifiers with software version A4 or later.</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>The value at reading is undefined. Set &quot;0&quot; when writing.</td>
</tr>
<tr>
<td>13</td>
<td>C_STAB2</td>
<td>Second acceleration/deceleration selection&lt;br&gt;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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 13</th>
<th>Acceleration time constant</th>
<th>Deceleration time constant</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Pr. PC01</td>
<td>Pr. PC02</td>
</tr>
<tr>
<td>1</td>
<td>Pr. PC30</td>
<td>Pr. PC31</td>
</tr>
</tbody>
</table>

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

### (4) Bit definition of control DI 4

<table>
<thead>
<tr>
<th>Bit</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>The value at reading is undefined. Set &quot;0&quot; when writing.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>4</td>
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<td>5</td>
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<td>11</td>
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<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### (5) Bit definition of control DI 5

<table>
<thead>
<tr>
<th>Bit</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>The value at reading is undefined. Set &quot;0&quot; when writing.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 11  | C_DOG  | Proximity dog  
When C_DOG is turned on, a proximity dog will be detected. The polarity for dog detection can be changed with [Pr. PT29]. |
| 12  |        | The value at reading is undefined. Set "0" when writing. |
| 13  |        |             |
| 14  |        |             |
| 15  |        |             |

### (6) Bit definition of control DI 6

<table>
<thead>
<tr>
<th>Bit</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>The value at reading is undefined. Set &quot;0&quot; when writing.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(7) Bit definition of control DI 7

<table>
<thead>
<tr>
<th>Bit</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>The value at reading is undefined. Set &quot;0&quot; when writing.</td>
</tr>
</tbody>
</table>
| 1   |        | Manual pulse generator multiplication 1  
Select a multiplication of the manual pulse generator in accordance with the combination with C_TP1. 
When a multiplication is not selected, the value set in [Pr. PT03] is enabled. 
This bit can be used on the servo amplifiers with software version A4 or later. |
| 2   |        | Manual pulse generator multiplication 2  
Refer to C_TP0 for details. 
This bit can be used on the servo amplifiers with software version A4 or later. |
| 3   |        | The value at reading is undefined. Set "0" when writing. |
| 4   | C_TP0  | Analog override selection  
Turning C_OVR on enables VC (Analog override). 
This bit can be used on the servo amplifiers with software version A4 or later. |
| 5   | C_TP1  | The value at reading is undefined. Set "0" when writing. |
| 6   |        | The value at reading is undefined. Set "0" when writing. |
| 7   | C_OVR  | The value at reading is undefined. Set "0" when writing. |

### Manual pulse generator multiplication

<table>
<thead>
<tr>
<th>Device (Note)</th>
<th>Manual pulse generator multiplication</th>
</tr>
</thead>
<tbody>
<tr>
<td>C_TP0</td>
<td>C_TP1</td>
</tr>
<tr>
<td>0 0</td>
<td>[Pr. PT03] setting value</td>
</tr>
<tr>
<td>0 1</td>
<td>× 1</td>
</tr>
<tr>
<td>1 0</td>
<td>10 times</td>
</tr>
<tr>
<td>1 1</td>
<td>100 times</td>
</tr>
</tbody>
</table>

Note. 0: Off, 1: On
## 7. OBJECT DICTIONARY

### (8) Bit definition of control DI 8

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

<table>
<thead>
<tr>
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<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>The value at reading is undefined. Set &quot;0&quot; when writing.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
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</tbody>
</table>

### Bit definition of control DI 10

<table>
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<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>The value at reading is undefined. Set &quot;0&quot; when writing.</td>
</tr>
<tr>
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<tr>
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<td>15</td>
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</tbody>
</table>
The on/off status of output device can be read. The following table lists readable output devices.

### 7.5.9 Status DO (2D11h to 2D1Ah)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/ Continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D11h to 2D1Ah</td>
<td>0</td>
<td>Status DO1 to Status DO10</td>
<td>U16</td>
<td>ro</td>
<td>1</td>
<td>Possible</td>
</tr>
</tbody>
</table>

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

#### (1) Bit definition of Status DO 1

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

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

#### (3) Bit definition of status DO 3

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</tr>
<tr>
<td>9</td>
<td>S_RSTP</td>
<td>Forced stop deceleration. The S_RSTP turns on during a forced stop deceleration. This bit can be used on the servo amplifiers with software version A3 or later.</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>The value at reading is undefined.</td>
</tr>
<tr>
<td>11</td>
<td>S_MTTR</td>
<td>During tough drive. When a tough drive is &quot;Enabled&quot; in [Pr. PA20], activating the instantaneous power failure tough drive turns the S_MTTR on.</td>
</tr>
<tr>
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<td>The value at reading is undefined.</td>
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#### (4) Bit definition of status DO 4

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<td>The value at reading is undefined.</td>
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### 7. OBJECT DICTIONARY

#### (5) Bit definition of status DO 5

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

#### (6) Bit definition of status DO 6

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<tr>
<th>Bit</th>
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<td>The value at reading is undefined.</td>
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#### (7) Bit definition of status DO 7

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

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### Bit definition of Status DO 9

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7. OBJECT DICTIONARY

7.5.10 Manufacturer Device Name 2 (2D30h)

(1) Object list

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<tr>
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<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
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<tbody>
<tr>
<td>2D30h</td>
<td>0</td>
<td>Manufacturer Device Name 2</td>
<td>VS</td>
<td>ro</td>
<td>16</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

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

7.5.11 Manufacturer Hardware Version 2 (2D31h)

(1) Object list

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D31h</td>
<td>0</td>
<td>Manufacturer Hardware Version 2</td>
<td>VS</td>
<td>ro</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

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

7.5.12 Manufacturer Software Version 2 (2D32h)

(1) Object list

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D32h</td>
<td>0</td>
<td>Manufacturer Software Version 2</td>
<td>VS</td>
<td>ro</td>
<td>8</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

(2) Usage
Refer to section 7.4.3 (2).
7. OBJECT DICTIONARY

7.5.13 Serial Number 2 (2D33h)

(1) Object list

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D33h</td>
<td>0</td>
<td>Serial Number 2</td>
<td>VS</td>
<td>ro</td>
<td>8</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

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

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

<table>
<thead>
<tr>
<th>Byte</th>
<th>Characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 2 3 4 5 6 7 8 9 0 1 2 (Space)</td>
</tr>
</tbody>
</table>

7.5.14 Select behavior of broadcast message (2D98h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D98h</td>
<td>0</td>
<td>Select behavior of broadcast message</td>
<td>U8</td>
<td>rw</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Broadcast instruction enabled</td>
</tr>
<tr>
<td>1</td>
<td>Broadcast instruction disabled</td>
</tr>
</tbody>
</table>

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

7.5.15 Setup S/W graph trigger (2D99h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D99h</td>
<td>0</td>
<td>Setup S/W graph trigger</td>
<td>U8</td>
<td>rw</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Setup software graph trigger off</td>
</tr>
<tr>
<td>1</td>
<td>Setup software graph trigger on</td>
</tr>
</tbody>
</table>

(1) Usage

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

(a) Setting the measuring conditions

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

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

2) Set "EXT" for "Data".

3) Set "Single" for "Mode".
(b) Measuring the multi axis waveform data

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

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

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

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

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

(d) Displaying the multi axis waveform data

**POINT**

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

1) Import the data measured on multiple axes to register in the history list of "History Management" display.

Click "Import" in the "File" tab or in the "Graph" menu to select files to read.
2) After importing all the files, display the graph data with "Overwrite". Clicking "Overwrite" enables all the histories to be checked on one window.

7.5.16 Set controlword bit4 (2D9Ah)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/ No. of Registers</th>
<th>Continuous read/ continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D9Ah</td>
<td>0</td>
<td>Set controlword bit4</td>
<td>U8</td>
<td>rw</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Simultaneous start signal off</td>
</tr>
<tr>
<td>1</td>
<td>Simultaneous start signal on</td>
</tr>
</tbody>
</table>

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

7.5.17 C_EM1/2 command (2D9Bh)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D9Bh</td>
<td>0</td>
<td>C_EM1/2 command</td>
<td>U8</td>
<td>rw</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Controller forced stop OFF</td>
</tr>
<tr>
<td>1</td>
<td>Controller forced stop ON</td>
</tr>
</tbody>
</table>

7.5.18 Override (2DB0h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>2DB0h</td>
<td>0</td>
<td>Override</td>
<td>U16</td>
<td>rw</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

7.6 Detail object dictionary (6000 series)

POINT

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

7.6.1 Statusword (6041h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>6041h</td>
<td>0</td>
<td>Statusword</td>
<td>U16</td>
<td>ro</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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.

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

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.

<table>
<thead>
<tr>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Not ready to switch on</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Switch on disable</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>Ready to switch on</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>Switch on</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>Operation enabled</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>Quick stop active (Note)</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>Fault</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>Main power on (power input on)</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Warning (warning occurrence)</td>
</tr>
</tbody>
</table>

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. OBJECT DICTIONARY

7.6.2 Quick stop option code (605Ah)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>605Ah</td>
<td>0</td>
<td>Quick stop option code</td>
<td>I16</td>
<td>rw</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

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

7.6.3 Halt option code (605Dh)

(1) Object list

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>605Dh</td>
<td>0</td>
<td>Halt option code</td>
<td>I16</td>
<td>rw</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1             | The description varies depending on the control mode.  
Refer to the following table. |
| 2             | For manufacturer setting |
| 3             |                        |
| 4             |                        |
The following shows the case where Halt Bit (Bit 8 of Controlword (6040h)) is set to "1" and "0", and the reflective timing of the deceleration time setting in each control mode.

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

7.6.4 Modes of operation Display (6061h)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>6061h</td>
<td>0</td>
<td>Modes of operation Display</td>
<td>I8</td>
<td>ro</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

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

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

7.6.5 Software Position Limit (607Dh)

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>607Dh</td>
<td>0</td>
<td>Software Position Limit</td>
<td>U8</td>
<td>ro</td>
<td>5</td>
<td>Impossible</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Number of entries</td>
<td>I32</td>
<td>rw</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Min Position Limit</td>
<td>I32</td>
<td>rw</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

7.6.6 Polarity (607Eh)

The rotation direction selection can be set.
The rotation direction of a servo motor to position commands, speed commands, and torque commands

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>607Eh</td>
<td>0</td>
<td>Polarity</td>
<td>U8</td>
<td>rw</td>
<td>1</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

Selecting "degree (_2_ _)" in "Position data unit" of [Pr. PT01] enables positioning to be performed
on modulo coordinates (rotary shafts). The following shows the differences when "degree" is selected.

<table>
<thead>
<tr>
<th>Item (Index, Sub Index)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target position (607Ah, 0)</td>
<td>The range changes to between -360.000° to 360.000°.</td>
</tr>
<tr>
<td>Position actual value (6064h, 0)</td>
<td>The range changes to between 0° to 359.999°.</td>
</tr>
<tr>
<td>Software position limit (607Dh, 0)</td>
<td>The range changes to between 0° to 359.999°. When a value outside the range is set, the value is clamped within the range of 0° to 359.999°.</td>
</tr>
<tr>
<td>Position range limit (607Bh, 0)</td>
<td>The range changes to between 0° to 359.999°.</td>
</tr>
<tr>
<td>Touch probe pos1 pos value (60B4h, 0)</td>
<td>The range changes to between 0° to 359.999°.</td>
</tr>
<tr>
<td>Touch probe pos1 neg value (60BBh, 0)</td>
<td>The range changes to between 0° to 359.999°.</td>
</tr>
<tr>
<td>Touch probe pos2 pos value (60BCh, 0)</td>
<td>The range changes to between 0° to 359.999°.</td>
</tr>
<tr>
<td>Touch probe pos2 neg value (60BDh, 0)</td>
<td>The range changes to between 0° to 359.999°.</td>
</tr>
<tr>
<td>Home offset (607Ch, 0)</td>
<td>The range changes to between 0° to 359.999°.</td>
</tr>
</tbody>
</table>
(2) Setting of the operation pattern

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

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

(3) Sequence

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

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

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

7.6.8 Touch probe (60B8h to 60BBh)

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

(1) Object list

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

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

(a) Touch probe function (60B8h)

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

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0: Latch function disabled</td>
</tr>
<tr>
<td></td>
<td>1: Latch function enabled</td>
</tr>
<tr>
<td>1</td>
<td>0: Latch with the first trigger</td>
</tr>
<tr>
<td></td>
<td>1: Latch continuously with trigger inputs</td>
</tr>
<tr>
<td>2</td>
<td>The value at reading is undefined. Set &quot;0&quot; when writing.</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0: Stop sampling at the rising edge of touch probe</td>
</tr>
<tr>
<td></td>
<td>1: Start sampling at the rising edge of touch probe</td>
</tr>
<tr>
<td>5</td>
<td>0: Stop sampling at the falling edge of touch probe</td>
</tr>
<tr>
<td></td>
<td>1: Start sampling at the falling edge of touch probe</td>
</tr>
<tr>
<td>6 to 15</td>
<td>The value at reading is undefined. Set &quot;0&quot; when writing.</td>
</tr>
</tbody>
</table>

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. OBJECT DICTIONARY

(b) Touch probe status (60B9h)

The current status of the touch probe function can be checked. The description of this object is as follows.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
</table>
| 0   | 0: Latch function of touch probe is disabled  
   1: Latch function of touch probe is enabled |
| 1   | 0: Latch is incomplete at the rising edge with the latch function of the touch probe  
   1: Latch is complete at the rising edge with the latch function of the touch probe |
| 2   | 0: Latch is incomplete at the falling edge with the latch function of the touch probe  
   1: Latch is complete at the falling edge with the latch function of the touch probe |
| 3 to 15 | The value at reading is undefined. |

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

(c) Touch probe pos1 pos value (60BAh)

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

(d) Touch probe pos1 neg value (60BBh)

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

(2) Usage

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

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

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

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

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

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

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

(g) Latching can be continued from (c).
The following shows a timing chart.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Supported Modes</th>
<th>Defined value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Profile position mode (pp)</td>
<td>1: Supported</td>
</tr>
<tr>
<td>2</td>
<td>Profile velocity mode (pv)</td>
<td>1: Supported</td>
</tr>
<tr>
<td>3</td>
<td>Profile torque mode (tq)</td>
<td>1: Supported</td>
</tr>
<tr>
<td>5</td>
<td>Homing mode (hm)</td>
<td>1: Supported</td>
</tr>
<tr>
<td>16</td>
<td>Jog mode (g) (Note)</td>
<td>1: Supported</td>
</tr>
<tr>
<td>17</td>
<td>Point table mode (pt) (Note)</td>
<td>1: Supported</td>
</tr>
<tr>
<td>19</td>
<td>Indexer mode (idx) (Note)</td>
<td>1: Supported</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub Index</th>
<th>Name</th>
<th>Data Type</th>
<th>Access</th>
<th>No. of Points/No. of Registers</th>
<th>Continuous read/continuous write</th>
</tr>
</thead>
<tbody>
<tr>
<td>6502h</td>
<td>0</td>
<td>Supported Drive Modes</td>
<td>U32</td>
<td>ro</td>
<td>2</td>
<td>Impossible</td>
</tr>
</tbody>
</table>
### REVISIONS

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

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

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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.