



General-Purpose AC Servo

MITSUBISHI SERVO AMPLIFIERS & MOTORS  
**MELSERVO-J4**

Multi-network Interface AC Servo

MODEL

**MR-J4-\_\_TM\_\_**

SERVO AMPLIFIER  
INSTRUCTION MANUAL  
(PROFINET)

## ● 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".



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



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

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



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



Indicates what must be done. For example, grounding is indicated by .

In this Instruction Manual, instructions at a lower level than the above, instructions for other functions, and so on are classified into "POINT".

After reading this Instruction Manual, keep it accessible to the operator.

## 1. To prevent electric shock, note the following

### WARNING

- Before wiring and inspections, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Then, confirm that the voltage between P+ and N- is safe with a voltage tester and others. 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.
- During power-on or operation, do not open the front cover of the servo amplifier. Otherwise, it may cause an electric shock.
- Do not operate the servo amplifier with the front cover removed. High-voltage terminals and charging area are exposed and you may get an electric shock.
- Except for wiring and periodic inspection, do not remove the front cover of the servo amplifier even if the power is off. The servo amplifier is charged and you may get an electric shock.
- To prevent an electric shock, always connect the protective earth (PE) terminal (marked  $\oplus$ ) 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 main circuit power supply (L1, L2, and 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 main circuit power supply (L1, L2, and 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.
- 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 voltage specified in the Instruction Manual should be applied to each terminal. Otherwise, a burst, damage, etc. may occur.
- Connect cables to the correct terminals. Otherwise, a burst, damage, etc. may occur.

## CAUTION

- 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 fault, 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 front cover when transporting 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.
- 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 strike the servo amplifier and servo motor. Isolate them from all impact loads.
- When you keep or use the equipment, please fulfill the following environment.

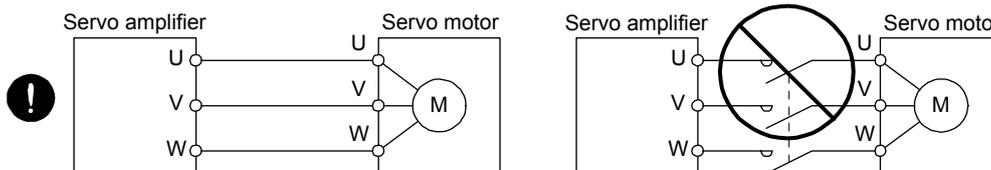
Items		Environment
Ambient temperature	Operation	0 °C to 55 °C (non-freezing)
	Storage	-20 °C to 65 °C (non-freezing)
Ambient humidity	Operation	90 %RH or less (non-condensing)
	Storage	
Ambience		Indoors (no direct sunlight), free from corrosive gas, flammable gas, oil mist, dust, and dirt
Altitude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

- When the equipment 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 the metal cabinet.
- When fumigants that contain halogen materials such as fluorine, chlorine, bromine, and iodine are used for disinfecting and protecting wooden packaging from insects, they cause malfunction when entering our products. Please take necessary precautions to ensure that remaining materials from fumigant do not enter our products, or treat packaging with methods other than fumigation (heat method). Additionally, disinfect and protect wood from insects before packing products.

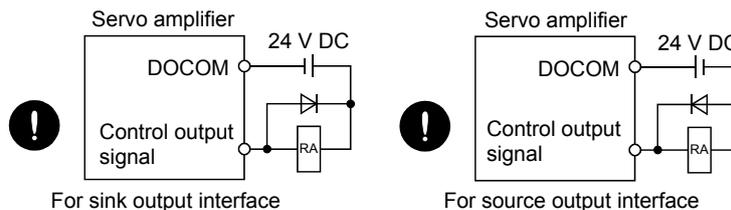
## (2) Wiring

### ⚠ CAUTION

- Wire the equipment correctly and securely. Otherwise, the servo motor may operate unexpectedly.
- Do not install a power capacitor, surge killer, or radio noise filter (FR-BIF(-H) option) on the servo amplifier output side.
- To avoid a malfunction, connect the wires to the correct phase terminals (U, V, and W) of the servo amplifier and servo motor.
- Connect the servo amplifier power output (U, V, and W) to the servo motor power input (U, V, and W) directly. Do not let a magnetic contactor, etc. intervene. Otherwise, it may cause a malfunction.



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



- When the cable is not tightened enough to the terminal block, the cable or terminal block may generate heat because of the poor contact. Be sure to tighten the cable with specified torque.
- Connecting a servo motor for different axis to the U, V, W, or CN2 may cause a malfunction.
- Configure a circuit to turn off EM2 or EM1 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.

## (3) Test run and adjustment

### ⚠ CAUTION

- Before operation, check the parameter settings. Improper settings may cause some machines to perform unexpected operation.
- Never adjust or change the parameter values extremely as it will make operation unstable.
- Do not close to moving parts at servo-on status.

#### (4) Usage

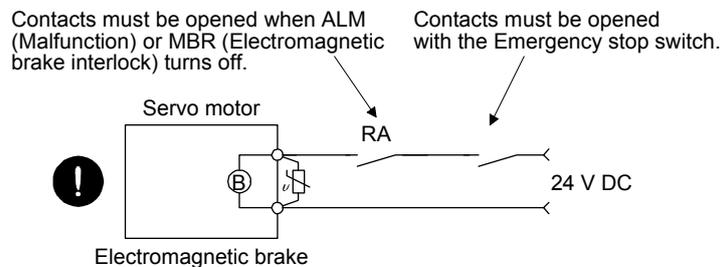
### ⚠ CAUTION

- Provide an external emergency stop circuit to ensure that operation can be stopped and power switched off immediately.
- Do not disassemble, repair, or modify the equipment.
- 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.
- 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 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.

#### (5) Corrective actions

### ⚠ CAUTION

- Ensure safety by confirming the power off, etc. before performing corrective actions. Otherwise, it may cause an accident.
- When it is assumed that a hazardous condition may occur due to a power failure or product malfunction, use a servo motor with an electromagnetic brake or external brake to prevent the condition.
- Configure an electromagnetic brake circuit which is interlocked with an external emergency stop switch.



- When any alarm has occurred, eliminate its cause, ensure safety, and deactivate the alarm before restarting operation.
- Provide an adequate protection to prevent unexpected restart after an instantaneous power failure.

## (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 Specifications and 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

### STO function of the servo amplifier

When using the STO function of the servo amplifier, refer to chapter 13 of "MR-J4-\_TM\_ Servo Amplifier Instruction Manual".

For the MR-J3-D05 safety logic unit, refer to app. 5 of "MR-J4-\_TM\_ Servo Amplifier Instruction Manual".

### Compliance with global standards

For the compliance with global standards, refer to app. 4 of "MR-J4-\_TM\_ Servo Amplifier Instruction Manual".

«About the manuals»

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

Relevant manuals

Manual name	Manual No.
MELSERVO MR-J4-_TM_ Servo Amplifier Instruction Manual	SH(NA)030193
MELSERVO-J4 Servo Amplifier Instruction Manual (Troubleshooting)	SH(NA)030109
MELSERVO MR-D30 Instruction Manual (Note 5)	SH(NA)030132
MELSERVO Servo Motor Instruction Manual (Vol. 3) (Note 1)	SH(NA)030113
MELSERVO Linear Servo Motor Instruction Manual (Note 2)	SH(NA)030110
MELSERVO Direct Drive Motor Instruction Manual (Note 3)	SH(NA)030112
MELSERVO Linear Encoder Instruction Manual (Note 2, 4)	SH(NA)030111
EMC Installation Guidelines	IB(NA)67310

- Note
1. It is necessary for using a rotary servo motor.
  2. It is necessary for using a linear servo motor.
  3. It is necessary for using a direct drive motor.
  4. It is necessary for using a fully closed loop system.
  5. It is necessary for using an MR-D30 functional safety unit.

«Wiring»

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

«U.S. customary units»

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

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



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# 1. PROFINET COMMUNICATION

## 1. PROFINET COMMUNICATION

### 1.1 Description

PROFINET represents the communication standard for the automation which was made by PI (PROFIBUS & PROFINET International).

The PROFINET IO communication is available when the PROFINET network module (ABCC-M40-PIR manufactured by HMS Industrial Networks) is connected to the MR-J4-\_TM\_ servo amplifier. The MR-J4-\_TM\_ servo amplifier to which the PROFINET network module is connected is an IO device.

MR-J4-\_TM\_ (PROFINET) supports two cyclic communication formats conforming to PROFIdrive profile and CiA 402 drive profile. MR-J4-\_TM\_ (PROFINET) is compatible with the following control modes. Refer to chapter 6 for details.

Control mode	Symbol	Description
Profile position mode	pp	This is a positioning control mode where an end position command is received to drive the servo motor in the commutation with a controller. Use an absolute position address or relative position address for a command.
Profile velocity mode	pv	This is a control mode where a target speed command is received to drive the servo motor in the communication with a controller.
Profile torque mode	tq	This is a control mode where a target torque command is received to drive the servo motor in the communication with a controller.
Homing mode	hm	This is a control mode where the servo amplifier performs a home position return using the method directed by the controller.

MR-J4-\_TM\_ servo amplifiers comply with the following standards. Refer to the following standards for the description not written in this Instruction Manual.

Document	Version
Profile Drive Technology PROFIdrive Technical Specification	V4.1
Profiles for decentralized periphery Technical Specification for PROFINET IO	V2.3Ed2
Application Layer protocol for decentralized periphery Technical Specification for PROFINET IO	V2.3Ed2
Application Layer services for decentralized periphery Technical Specification for PROFINET IO	V2.3Ed2

# 1. PROFINET COMMUNICATION

The following table shows explanation of terms applied to PROFINET standard used in this manual.

Term	Explanation
PROFINET (PROFINET IO)	PROFINET has two application types: PROFINET IO and PROFINET CBA. This product is compatible with PROFINET IO. PROFINET IO is based on a communication between controllers and other devices. PROFINET CBA is based on a communication between controllers with components.
PROFdrive	This is an application profile defined with PROFINET and PROFIBUS for electric-powered drives such as servo amplifiers. The communication data format and functional range are provided.
RT, IRT	These are the communication methods of Process Data (cyclic communication) for PROFINET IO. RT means Real-Time (asynchronous communication) and IRT means Isochronous Real-Time (synchronous communication).
Process Data	This is the name of cyclic communication data (Cyclic Data Exchange) for PROFINET communication. This is also called I/O data. The data format of cyclic communication is called Telegram in this manual.
Acyclic communication (Acyclic Data Exchange)	This is the name of acyclic communication (request/response pattern) for PROFINET communication.
GSD file	This is the XML format file (GSDML file) of communication specifications and characteristics supported with this product. Use this when you set up this product (selection of Telegram and setting of transmission cycle) with the PROFINET configuration tool.
PNU	This is an abbreviation for parameter number used in PROFINET communication. The network variables used in PROFINET communication are described as PROFdrive parameters and the parameters of servo amplifiers are described as parameters (or servo parameters). The PROFdrive parameters are described as follows. Example) PROFdrive parameter 922 → P922
Array [n]	The PROFdrive parameter whose Data Type is "Array [n]" is in an array structure and subindex (Sub) will be used to access each element in the array. The subindices of PROFdrive parameters are described as follows. Example) PROFdrive parameter 980, subindex 2 → P980.2
AR, CR	These are AR (Application Relationship) and CR (Communication Relationship). AR is established between the controller and device. Each CR (IO CR for cyclic communication and Record Data CR for acyclic communication) in AR will transmit/receive data.
R, W, R/W	The following shows description of Access. R: Readable W: Writable R/W: Readable and writable

# 1. PROFINET COMMUNICATION

## 1.2 Communication specifications

The following shows the communication specifications.

Item	Description	Remark
PROFINET communication specifications	PROFINET IO Real Time (RT) communication PROFIdrive v4.1	
Physical layer	100BASE-TX	
Communication connector	RJ45, 2 ports (port 1, port 2)	
Communication cable	CAT5e, shielded twisted pair (4 pair) straight cable	Double-shielded type recommended
Network topology	Line, Star, Ring, or a connection topology where the topologies are used together	
Variable communication speed	100 Mbps (Full duplex)	
Transmission speed between stations	Max. 100 m	
Number of nodes	Compliant with the specifications of the standard Ethernet	
Conformance class	Conformance class B (CC-B)	
Real time class	RT_Class_1	
Acyclic Data Exchange	Transmitting/Receiving: 1 channel each	
Process Data (Cyclic Data Exchange)	Transmission cycle: 1, 2, 4, 8, 16, 32, 64, 128, 256, 512 (ms) Variable mapping: compatible	Transmission cycle = $31.25 \mu\text{s} \times \text{SendClockFactor} \times \text{ReductionRatio}$ <ul style="list-style-type: none"> <li>• Setting range of SendClockFactor (= 32)</li> <li>• Setting range of ReductionRatio (= 1, 2, 4, 8, 16, 32, 64, 128, 256, 512)</li> </ul> Variable mapping <ul style="list-style-type: none"> <li>• Maximum size: 48 bytes each transmitting/receiving</li> <li>• Maximum number of mapping: 24 each transmitting/receiving</li> </ul>
Byte order	Big endian	
LED display	Network Status, Module Status, LINK/Activity (port 1, port 2)	

# 1. PROFINET COMMUNICATION

## 1.3 Startup

The following describes the setting and startup of the PROFINET communication. Refer to section 4.1 of "MR-J4-\_TM\_ Servo Amplifier Instruction Manual" for the startup procedure other than the network setting.

### (1) Connection with the controller

Set up the controller following the manual of the controller used. For the setup, the General Station Description (GSD) file listing the information about the communication setting of devices is available. Install the EDS file to a configuration tool to be used. Refer to the manual of each configuration tool for how to use the GSD file.

### (2) Station name

This is used for identifying of servo amplifier from the controller. Set up the controller following the manual of the controller used.

### (3) Parameter setting

Set the control mode with [Pr. PA01 Operation mode]. Refer to section 5.2.1 of "MR-J4-\_TM\_ Servo Amplifier Instruction Manual" for the parameter setting.

### (4) IP address setting

Set an IP address using the "AnybusIPconfig" tool offered by HMS Industrial Networks, axis selection rotary switch (SW2/SW3) on the display of the servo amplifier, and controller. Change the IP address with the axis selection rotary switch (SW2/SW3) before powering on the servo amplifier. When you set it with automatic setting of the controller, the controller setting will be prioritized. The IP address you set can be checked with the "AnybusIPconfig" tool or system configuration window of MR Configurator 2. You can set an IP address as follows.

Axis selection rotary switch (SW2/SW3)	IP address setting value
00h	An IP address set by the "AnybusIPconfig" tool is used.
01h to FEh	Although an IP address set by the "AnybusIPconfig" tool is used, the forth octet value is replaced with a value set with the axis selection rotary switch (SW2/SW3). The DHCP function is disabled. Set a hexadecimal value with the axis selection rotary switch (SW2/SW3). The hexadecimal value is converted into a decimal value and set as the fourth octet of the IP address.
FFh	The DHCP function is enabled.

### (5) Setting tool

The following lists the tools used for starting up.

Tool	Explanation	Manufacturer
MR Configurator 2 (Ver. 1.55H or later)	This software is used to configure various settings of the servo amplifier and helps maintenance works.	You can purchase this software from Mitsubishi Electric Corporation.
AnybusIPconfig	This tool is used to set an IP address to the PROFINET network module (ABCC-M40-PIR).	You can get this tool from the website of HMS Industrial Networks.

# 1. PROFINET COMMUNICATION

## 1.4 Network disconnection procedure

To disconnect the network by stopping device operation or other means, follow the procedure shown below.

- (1) When the servo motor is during operation, stop the servo motor depending on the operation mode.
- (2) When the servo amplifier is in servo-on status, set the off command for Controlword to establish the servo-off status.
- (3) Stop the Process Data communication referring to the instruction manual of controller.
- (4) Shut off the power of the servo amplifier and controller.

## 1.5 Object dictionary (OD)

This product supports object dictionary which conforms to CiA 402 Drive Profile and converts PROFIdrive parameter number (PNU) to index number to access each entry in the object dictionary.

Each data set that devices have such as control parameters, command values, and feedback values is handled as an object composed of an object name, object type, data type, and other elements. The object data can be exchanged between the master and slave devices. The aggregate of these objects is called object dictionary (OD).

### 1.5.1 Section definition of object dictionary

The object dictionary is categorized by PNU depending on the contents of data as shown in the following table.

The object group of Manufacturer-specific is defined between P1000 and P59999. All of the other objects comply with definitions of the PROFIdrive standard. The following correspondence table shows PNU and description of objects. Refer to the Reference column for the chapters and the section where the details of each object are described.

Section definition of object dictionary

PNU	Description	Reference
900 to 999	PROFIdrive-specific parameters	Section 4.3
4096 to 59999	Manufacturer-specific PROFIdrive parameters (including object group provided in CiA 402 Drive Profile)	Section 9.3

Outline of Manufacturer-specific PROFIdrive parameters

PNU	Description	Index No. of CiA 402 standard	Reference
4096 to 8191	CoE communication area	1000h to 1FFFh	Section 8.14, chapter 9
8192 to 10239	Parameter	2000h to 25FFh	Section 8.14, chapter 9
10752 to 10879	Servo control command/monitor	2A00h to 2FFFh	Chapter 6, chapter 9
24576 to 28671	CiA 402 drive profile area	6000h to 6FFFh	Chapter 5, chapter 6, chapter 9



## 2. PROFINET NETWORK MODULE (ABCC-M40-PIR)

### 2. PROFINET NETWORK MODULE (ABCC-M40-PIR)

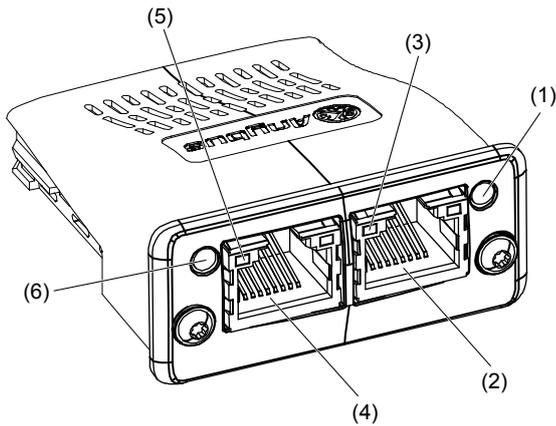
The PROFINET communication with an MR-J4-\_TM\_ servo amplifier requires the PROFINET network module (ABCC-M40-PIR). The following shows the details.

#### 2.1 Specifications

Category	Description
Product name	ABCC-M40-PIR
Model	AB6938-C
Manufacturer	HMS Industrial Networks
External interface	MR-J4-_TM_ servo amplifier connecting interface: Compact flash connector with standard 50 pins PROFINET communication port interface: RJ45 connector
Dimensions	52 (W) × 50 (D) × 20 (H) Except the protrusion of the PROFINET communication port connector
Mass	Approx. 30 g

#### 2.2 Parts identification

This section describes the PROFINET network module (ABCC-M40-PIR) only. Refer to section 1.7 of "MR-J4-\_TM\_ Servo Amplifier Instruction Manual" for the MR-J4-\_TM\_ servo amplifier.



No.	Name/Application	Detailed explanation
(1)	Module Status LED Indicates the module status.	Section 2.2.2
(2)	RJ45 PROFINET communication port (port 2) Connect the controller or servo amplifier.	Section 2.3
(3)	Link/Activity LED (port 2) Indicates the link status of each PROFINET communication port.	Section 2.2.3
(4)	RJ45 PROFINET communication port (port 1) Connect the controller or servo amplifier.	Section 2.3
(5)	Link/Activity LED (port 1) Indicates the link status of each PROFINET communication port.	Section 2.2.3
(6)	Network Status LED Indicates the communication status.	Section 2.2.1

## 2. PROFINET NETWORK MODULE (ABCC-M40-PIR)

### 2.3 LED display

The PROFINET Network module (ABCC-M40-PIR) has each LED of the Network Status, Module Status, and Link/Activity.

The following shows the LED indication definitions.

LED status	Definition
Lit	An LED remains lit.
Extinguished	An LED remains extinguished.
Flickering	An LED is switching between lit and extinguished at 10 Hz cycles (every 50 ms).
Blinking	For 3 s, an LED is switching between lit and extinguished at 1 Hz cycles (every 500 ms).
Single flash	An LED is lit for 200 ms and extinguished 1000 ms repeatedly.
Double flash	An LED is lit for 200 ms, extinguished for 200 ms, lit for 200 ms, and extinguished for 1000 ms repeatedly.
Triple flash	An LED is lit for 200 ms, extinguished for 200 ms, lit for 200 ms, extinguished for 200 ms, lit for 200 ms, and extinguished for 1000 ms repeatedly.

#### 2.3.1 Network Status LED

The Network Status LED indicates the PROFINET communication status. When Network Status LED is extinguished, the LED may be influenced by Link/Activity LED.

LED status	Description
Extinguished	Indicates that the power is shut off or connection with the controller has not been established.
Lit in green	Indicates that connection with the controller has been established and the controller is in RUN status.
Single flash in green	Indicates that connection with the controller has been established and the controller is in STOP status or the communication data is incorrect.
Blinking in green	Indicates that the engineering tool is checking a node on network.
Lit in red	Indicates that a serious malfunction that cannot be restored has been detected. This will light simultaneously with Module Status LED in red.
Single flash in red	Indicates that a station name has not been set.
Double flash in red	Indicates that an IP address has not been set.
Triple flash in red	Indicates that identification information differs between controller and device. It means a configuration error.

#### 2.3.2 Module Status LED

The Module Status LED indicates the status of device and an error in the PROFINET communication.

LED status	Description
Extinguished	Indicates that the power is shut off or initialization has not been completed.
Lit in green	Indicates that initialization of the network module has been completed and the module operates normally.
Single flash in green	Indicates that the network module is diagnosing itself.
Lit in red	Indicates that an exception error has detected in the network module. Indicates that a serious malfunction that cannot be restored has been detected. This will light simultaneously with Network Status LED in red.

#### 2.3.3 Link/Activity LED

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

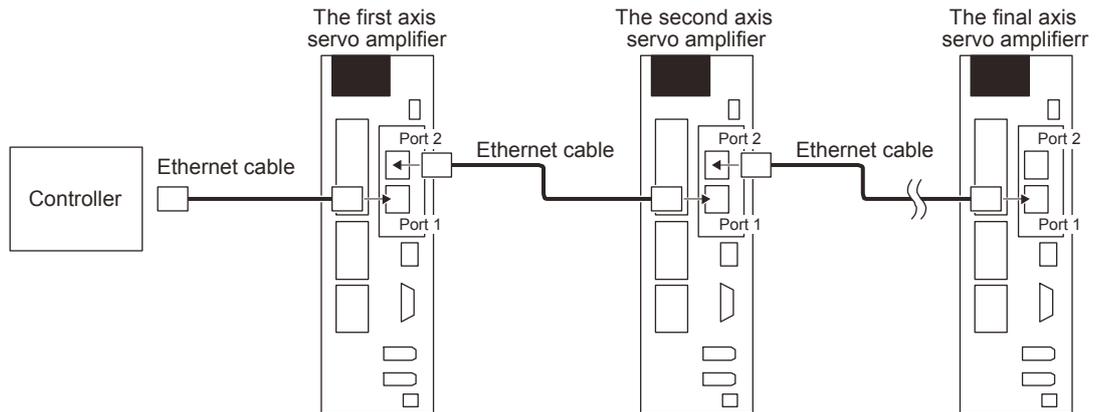
LED status	Description
Extinguished	Indicates that the power supply is shut off or the link-unestablished state.
Lit in green	Indicates that the link is established without traffic.
Flickering in green	Indicates that the link is established with traffic.

## 2. PROFINET NETWORK MODULE (ABCC-M40-PIR)

### 2.4 Ethernet cable connection

POINT
● Use a twisted pair cable (double shielded) compliant with Ethernet Category 5e (100BASE-TX) or higher as an Ethernet cable. The maximum cable length between nodes is 100 m.

When the RJ45 PROFINET communication ports (port 1 and port 2) are not used, leave these ports open.





### 3. PROCESS DATA (CYCLIC DATA EXCHANGE)

#### 3. PROCESS DATA (CYCLIC DATA EXCHANGE)

The communication can send and receive command data/feedback data between a master (controller) and slaves (servo amplifier) at a constant cycle.

The following communication format is supported.

Telegram	Name	Description
1	Standard Telegram 1 (compliant with PROFIdrive)	This is for applications using speed control.
100	Telegram 100 (Manufacturer-specific format)	This is for applications using torque control.
102	Telegram 102 (Manufacturer-specific format)	This is for applications using position control, speed control, torque control, and home position return switching. This is compatible with variable mapping.

Note. Each telegram is selected with a configuration tool of controller. Refer to section 6.1 for the control mode compatible with each telegram.

##### (1) Standard Telegram 1

Direction	IO Data number	Name	Symbol	Data length (Bit)	Remark
Controller to Drive	1	Control word 1	STW1	16	Refer to chapter 5/ chapter 6.
	2	Speed setpoint A	NSOLL_A	16	
Drive to Controller	1	Status word 1	ZSW1	16	
	2	Speed actual value A	NIST_A	16	

##### (2) Telegram 100

Direction	IO Data number	Name	Data length (Bit)	Remark
Controller to Drive	1	Controlword	16	Refer to chapter 6.
	2	Target torque	16	
Drive to Controller	1	Statusword	16	Refer to chapter 6.
	2	Torque actual value	16	

### 3. PROCESS DATA (CYCLIC DATA EXCHANGE)

#### (3) Telegram 102

Direction	IO Data number	Name	Data length (Bit)	Remark
Controller to Drive	1	Modes of operation	8	Refer to chapter 5/ chapter 6. Map size: 48 bytes (Note)
		Reserved	8	
	2	Controlword	16	
	3	Control DI 1	16	
	4	Control DI 2	16	
	5	Control DI 3	16	
	6	Target torque	16	
	7	Torque slope	32	
	8			
	9	Target position	32	
	10			
	11	Target velocity	32	
	12			
	13	Velocity limit value	32	
	14			
	15	Profile velocity	32	
	16			
	17	Profile acceleration	32	
	18			
	19	Profile deceleration	32	
	20			
	21	Touch probe function	16	
	22	Reserved	16	
	23	Reserved	16	
24	Reserved	16		
Drive to Controller	1	Modes of operation display	8	Refer to chapter 5/ chapter 6. Map size: 48 bytes (Note)
		Reserved	8	
	2	Statusword	16	
	3	Status DO 1	16	
	4	Status DO 2	16	
	5	Status DO 3	16	
	6	Torque actual value	16	
	7	Digital inputs	32	
	8			
	9	Position actual value	32	
	10			
	11	Velocity actual value	32	
	12			
	13	Following error actual value	32	
	14			
	15	Touch probe pos1 pos value	32	
	16			
	17	Touch probe pos1 neg value	32	
	18			
	19	Touch probe pos2 pos value	32	
	20			
	21	Touch probe pos2 neg value	32	
	22			
	23	Touch probe status	16	
24	Reserved	16		

Note. When changing a mapping, set the total size 48 bytes. Use Reserve (PNU = 0) to adjust mapping size. To change a data length (Bit), set "0", "8", or "16" to subIndex for Reserve.

## 4. ACYCLIC DATA EXCHANGE

### 4. ACYCLIC DATA EXCHANGE

#### 4.1 Acyclic data exchange communication format

PROFIdrive parameters are transmitted/received between the master controller and slave with acyclic communication.

The transmission/receive will be in accordance with the following formats. The maximum size is 240 bytes. Refer to the standards of PROFIdrive for details.

##### (1) Acyclic Data Exchange PROFIdrive parameter request format

Block definition	Byte n	Byte n + 1	n
Request header	Request reference	Request ID	0
	Axis-No./DO-ID	No. of parameters = i	2
1 <sup>st</sup> Parameter address	Attribute	No. of elements	4
	Parameter number (PNU)		
	Subindex		
i <sup>th</sup> Parameter address	...		4 + 6 × (i - 1)
1 <sup>st</sup> Parameter value(s) (only for request "Change parameter")	Format	No. of values	4 + 6 × i
	Values		
	...		
i <sup>th</sup> Parameter values	...		
			4 + 6 × i + ... + (Format_n × Qty_n)

##### (2) Acyclic Data Exchange PROFIdrive parameter response format

Block definition	Byte n	Byte n + 1	n
Response header	Request ref. mirrored	Response ID	0
	Axis-No./DO-ID mirrored	No. of parameters = i	2
1 <sup>st</sup> Parameter value(s) (only after request "Request")	Format	No. of values	4
	Values or Error values		
	...		
i <sup>th</sup> Parameter values	...		
			4 + ... + (Format_n × Qty_n)

## 4. ACYCLIC DATA EXCHANGE

### 4.2 Error number

The following error number will be returned depending on conditions during Acyclic communication.

Error No.	Name	Description
00h	Impermissible parameter number	Access to non-existent PROFIdrive parameter
01h	Parameter value cannot be changed	Writing to unwritable PROFIdrive parameter
02h	Low or high limit exceeded	Out of setting range
03h	Faulty subindex	Access to non-existent subindex
04h	No array	Access to PROFIdrive parameter having non-existent subindex
05h	Incorrect data type	Data type mismatch
07h	Description element cannot be changed	Changing unchangeable description element
0Fh	No text array available	Access to non-existent text
11h	Request cannot be executed because of operating state	Temporarily inaccessible due to operating state
14h	Value impermissible	Changing PROFIdrive parameter with an impermissible value
15h	Response too long	Response is over the maximum size of transmission.
16h	Parameter address impermissible	Combination of incorrect value, element No., PNU, and subindex
17h	Illegal format	Incorrect PROFIdrive parameter data format
18h	Number of values are not consistent	The number of PROFIdrive parameter values does not match the number of address elements
19h	Axis/DO nonexistent	Access to non-existent axis or object
21h	Service not supported	Out of service range (incorrect request ID)
FFh	Attempt to read to a write only parameter	Reading out write only parameter

### 4.3 PROFIdrive parameters (PROFIdrive-specific)

The following shows PROFIdrive-specific parameters supported by MR-J4-TM. For manufacturer-specific PROFIdrive parameters, refer to chapter 9.

PROFIdrive-specific parameter list

Group	PNU	Access	Name
PROFIdrive Parameters	922	R	Telegram Selection
	930	R	Operating mode
	944	R	Fault message counter
	947	R	Fault number
	964	R	Drive Unit identification
	965	R	Profile identification number
	975	R	DO identification
	980	R	Number list of defined parameter

#### 4.3.1 Telegram Selection (P922)

PNU	Sub	Access	Name	Data Type	Description	Default
922	0	R	Tgm selection	Unsigned16	The selected Telegram is returned.	1

PNU	Sub	Range	Units	EEP-ROM	Parameter
922	0	0001h to FFFFh		Impossible	

The read values are as follows.

Value	Description
1	Standard telegram 1
100	Telegram 100
102	Telegram 102

## 4. ACYCLIC DATA EXCHANGE

### 4.3.2 Operating mode (P930)

PNU	Sub	Access	Name	Data Type	Description	Default
930	0	R	Operating mode	Unsigned16	The current Operating mode is returned.	1

PNU	Sub	Range	Units	EEP-ROM	Parameter
930	0	0001h to FFFFh		Impossible	

The read values are as follows.

Value	Description
1	Speed control mode (when Standard telegram 1 is selected)
32768	Manufacturer-specific mode (when Telegram is selected other than the above)

Refer to Modes of operation display (P24673) for details of the control mode.

### 4.3.3 Fault message counter (P944)

PNU	Sub	Access	Name	Data Type	Description	Default
944	0	R	Fault counter	Unsigned16	The value of Fault message counter is returned. This value will be incremented when an alarm of servo amplifier occurs or the alarm is released.	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
944	0	0000h to FFFFh		Impossible	

### 4.3.4 Fault number (P947)

The alarm occurrence of servo amplifier after power on is displayed. When the alarm does not occur, the read value of P947.0 will be "0". The error number is as follows.

PNU	Sub	Access	Name	Data Type	Description	Default
947	0	R	Fault numbers	Array [16] Unsigned16	Unacknowledged faults	0
	8	R			Acknowledged faults	0
	Other than the values above	R			Fixed to 0	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
947	0 to 15	0000h to FFFFh		Impossible	

Value	Description
0x0000	None
0x0010	Generic error

For details of the occurrence of an alarm, refer to Alarm Objects (section 9.3.3).

## 4. ACYCLIC DATA EXCHANGE

### 4.3.5 Drive Unit identification (P964)

The identification information of drive unit is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
964	0	R	Device ident	Array [5] Unsigned16	Manufacturer ID	540
	1	R			Manufacturer ID of Mitsubishi Electric	
	2	R			Device type	0
	3	R			Firmware version The firmware version of the MR-J4- _TM_ servo amplifier Example: 110 means V1.10.	0000
	4	R			Firmware date (year) The firmware update year of the MR-J4- _TM_ servo amplifier (not supported)	
			Firmware date (day/month) The firmware update day/month of the MR- J4- _TM_ servo amplifier (not supported)	0000		

PNU	Sub	Range	Units	EEP-ROM	Parameter
964	0	0000h to FFFFh		Impossible	
	1	0000h to FFFFh		Impossible	
	2	0000h to FFFFh		Impossible	
	3	0000h to FFFFh		Impossible	
	4	0000h to FFFFh		Impossible	

### 4.3.6 Profile identification number (P965)

PNU	Sub	Access	Name	Data Type	Description	Default
965	0	R	Profile number	OctetString2	Profile Number 3	03h
	1	R			Profile Version Number 41	29h

PNU	Sub	Range	Units	EEP-ROM	Parameter
965	0	03h to 29h		Impossible	
	1	03h to 29h		Impossible	

## 4. ACYCLIC DATA EXCHANGE

### 4.3.7 DO identification (P975)

The identification information of drive object is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
975	0	R	DO ident	Array [8] Unsigned16	Manufacturer ID Mitsubishi Electric Corporation	540
	1	R			Drive Object type	0
	2	R			Firmware version The firmware version of the MR-J4-_TM_ servo amplifier Example: 110 means V1.10.	
	3	R			Firmware date (year) The firmware update year of the MR-J4- _TM_ servo amplifier (not supported)	0000
	4	R			Firmware date (day/month) The firmware update day/month of the MR- J4-_TM_ servo amplifier (not supported)	0000
	5	R			PROFIdrive DO type class 1: Axis	1
	6	R			PROFIdrive DO sub class 1 1: Application Class 1 supported	1
	7	R			Drive Object ID (DO-ID) Number of Drive Objects (DO)	1

PNU	Sub	Range	Units	EEP-ROM	Parameter
975	0	0000h to FFFFh		Impossible	
	1	0000h to FFFFh		Impossible	
	2	0000h to FFFFh		Impossible	
	3	0000h to FFFFh		Impossible	
	4	0000h to FFFFh		Impossible	
	5	0000h to FFFFh		Impossible	
	6	0000h to FFFFh		Impossible	
	7	0000h to FFFFh		Impossible	

### 4.3.8 Parameter Database Handling and Identification (P980)

All the supported PROFIdrive parameter numbers are listed.

PNU	Sub	Access	Name	Data Type	Description	Default
980	0 to n	R	Parameter list	Array [n] Unsigned16	Supported PROFIdrive parameter number	

PNU	Sub	Range	Units	EEP-ROM	Parameter
980	0 to n	0000h to FFFFh		Impossible	

## 4. ACYCLIC DATA EXCHANGE

### 4.4 Identification & Maintenance (I&M)

The information concerning I/O devices can be obtained.

The following record data can be read with the Acyclic communication.

Record	Access	Name	Data size	Description	Default	
I&M0	R	Manufacture ID	2 bytes	Mitsubishi Electric Corporation	540	
		Order ID	20 bytes	Model name of the MR-J4-_TM_ servo amplifier	"MR-J4-TM"	
		Serial number	16 bytes	Serial number of the PROFINET Network module (Note)		
		Hardware revision	2 bytes	The hardware version of the MR-J4-_TM_ servo amplifier		
		Software revision	4 bytes	The software version of the MR-J4-_TM_ servo amplifier		
		Revision counter	2 bytes	Version counter		
		Profile ID	2 bytes	Profile ID	Slot 0	F600h
					Slot 1	3A00h
		Profile specific type	2 bytes	Profile detail	Slot 0	0004h
					Slot 1	0000h
		IM revision	2 bytes	I&M version		0101h
IM supported	2 bytes	Supported I&M		30		

Note. The serial number of MR-J4-\_TM\_ servo amplifier can be checked with Serial Number 2 (P11571).

# 5. STATE TRANSITION

## 5. STATE TRANSITION

### 5.1 Basic State Machine

The internal state of Standard telegram1 of the MR-J4\_™\_ is controlled as follows. Figure 5.1 and Table 5.1 show the transition conditions between each state. The states are switched when the master sends a command following the table 5.1 (sets Control word 1) after the Process Data communication was established. When the state has transitioned from Switch on inhibited, which is right after the power on, to Operation with the predetermined procedure, the servo motor becomes ready to operate.

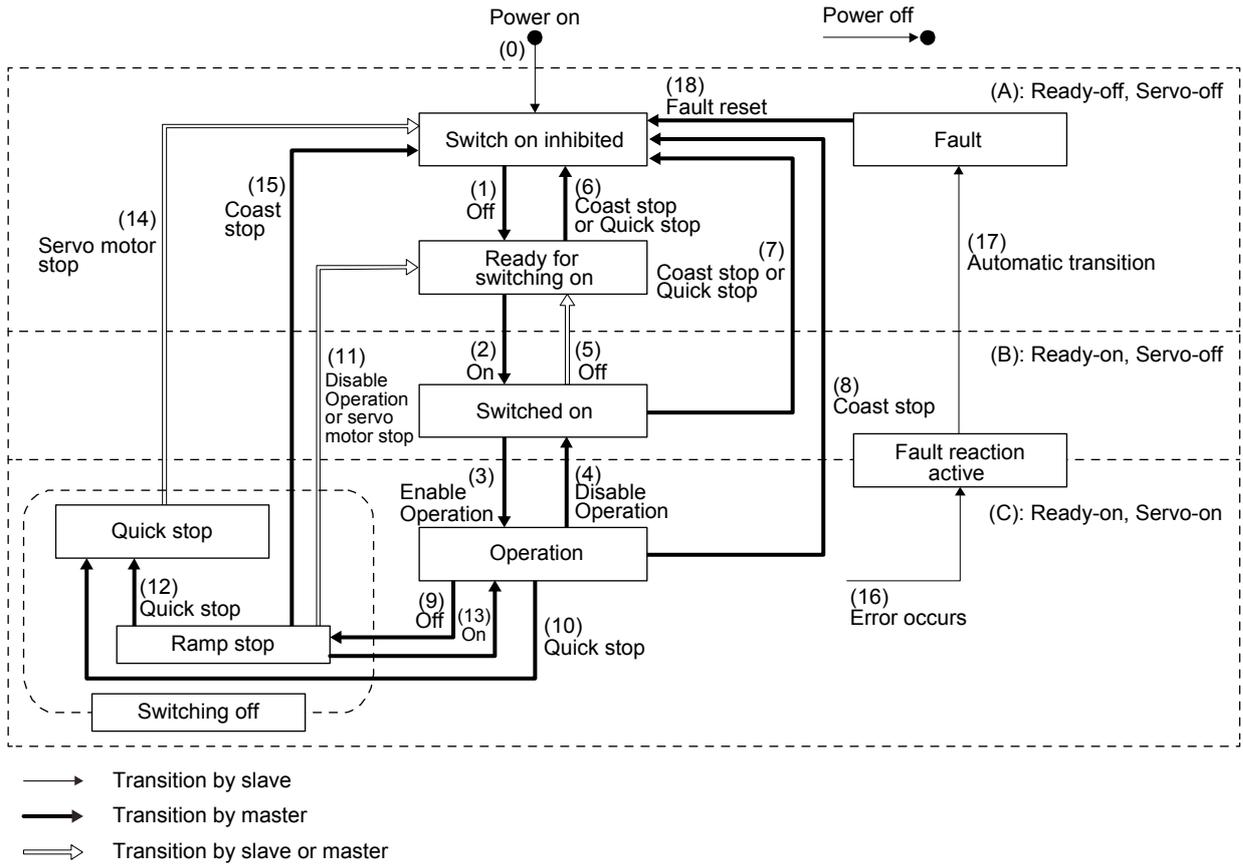


Figure 5.1 Transition between the basic states

## 5. STATE TRANSITION

Table 5.1 State transition

Transition No.	Event	Remark
(0)	The control circuit power supply is turned on.	Initialization
(1)	The state transitions with the Off command from the master.	None
(2)	The state transitions with the On command from the master.	RA turns on.
(3)	The state transitions with the Enable operation command from the master.	The operation becomes ready after servo-on.
(4)	The state transitions with the Disable operation command from the master.	The operation is disabled after servo-off.
(5)	The state transitions with the Off command from the master.	RA turns off.
(6)	<ul style="list-style-type: none"> <li>▪ The state transitions with the Coast stop command from the master.</li> <li>▪ Quick stop command from the master</li> </ul>	None
(7)	<ul style="list-style-type: none"> <li>▪ The state transitions with the Coast stop command from the master.</li> <li>▪ The state transitions with the Quick stop command from the master.</li> </ul>	RA turns off.
(8)	The state transitions with the Coast stop command from the master.	Operation is disabled after servo-off or RA-off.
(9)	The state transitions with the Off command from the master.	Ramp stop (temporary stop) starts.
(10)	The state transitions with the Quick stop command from the master.	Quick Stop starts.
(11)	<ul style="list-style-type: none"> <li>▪ The state transitions after the servo motor stops.</li> <li>▪ The state transitions with the Disable operation command from the master.</li> </ul>	Operation is disabled after servo-off or RA-off.
(12)	The state transitions with the Quick stop command from the master.	Quick Stop starts.
(13)	The state transitions with the On command from the master.	Ramp stop (temporary stop) is canceled.
(14)	<ul style="list-style-type: none"> <li>▪ The state transitions after the servo motor stops.</li> </ul>	Operation is disabled after servo-off or RA-off.
(15)	The state transitions with the Coast stop command from the master.	Operation is disabled after servo-off or RA-off.
(16)	Alarm occurrence	Processing against the alarm is executed.
(17)	Automatic transition	After processing against the alarm has been completed, servo-off or RA-off is performed and the operation is disabled.
(18)	The state transitions with the Fault reset command from the master.	Alarms are reset. Resettable alarms are cleared.
-	Main circuit power supply off	Operation is disabled after servo-off or RA-off.

## 5. STATE TRANSITION

Correspondence relation between command bit setting and state transition.

PROFIENT Command	Command bit setting of Control word 1 (STW1, P24640) (Note)					Transition No.	CiA 402 Drive Profile command (reference)
	Bit 7	Bit 3	Bit 2	Bit 1	Bit 0		
Off	0	○	1	1	0	(1), (5), (9)	Shutdown
On	0	0	1	1	1	(2), (13)	Switch on
Coast stop	0	○	○	0	○	(6), (7), (8), (15)	Disable voltage
Quick stop	0	○	0	1	○	(6), (7), (10), (12)	Quick stop
Disable operation	0	0	1	1	1	(4), (11)	Disable operation
Enable operation	0	1	1	1	1	(3)	Enable operation
Fault reset	0 to 1	○	○	○	○	(18)	Fault reset

Note. 0: OFF 1: ON ○: ON/OFF

In faulty communication, hold the state of Bit 7 = 1 for as follows for the Fault Reset command to prevent the command from failing to be recognized.

10 ms ≥ twice the communication cycle: Hold the state for 10 ms.

10 ms < twice the communication cycle: Hold the state for the time determined by doubling the communication cycle.

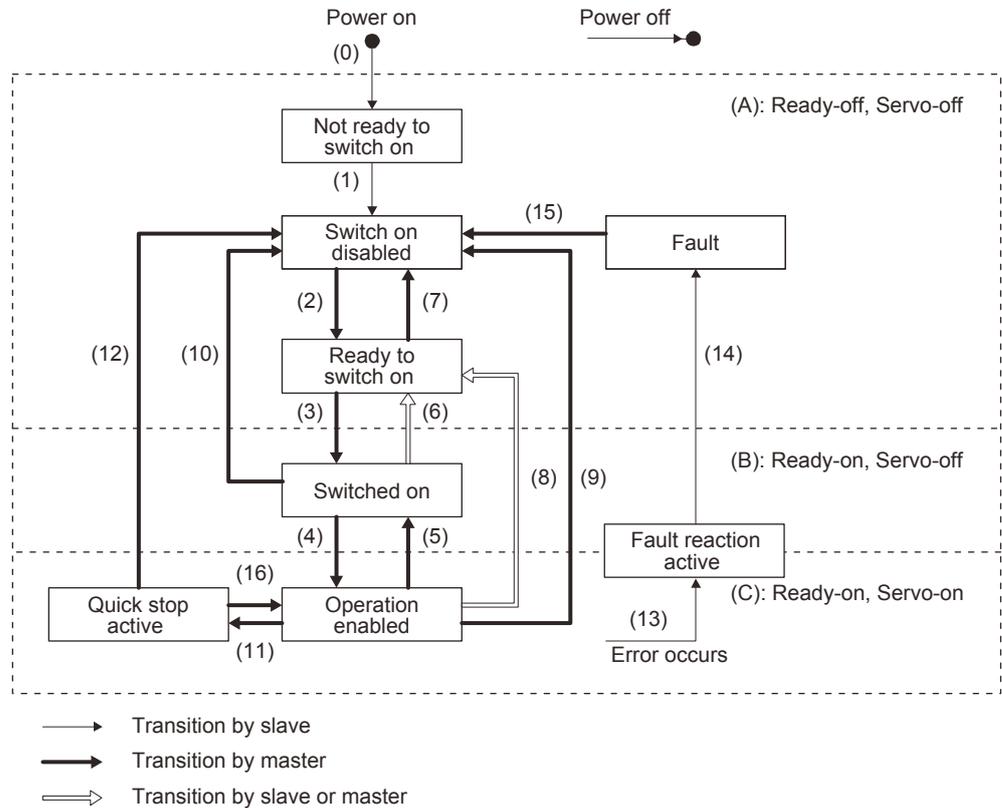
Figure 5.1 and Table 5.1 show the transition conditions. The transition from the Switch on Inhibited state to the Operation state requires Off, On, and Enable operation to be issued in this order. However, with the MR-J4-TM servo amplifier, transition to the target state skipping the states in between is possible.

Current status	Command	Status after transition
Switch on inhibited	On	Switched on
	Enable operation	Operation
Ready for switching on	Enable operation	Operation

# 5. STATE TRANSITION

## 5.2 FSA state

Telegram 100 or more internal status of the MR-J4-\_TM\_ servo amplifier are controlled with STA state. Figure 5.2 and Table 5.2 show the transition conditions between the FSA states. The states are switched when the master sends a command following table 5.2 (sets Controlword) after the I/O communication was established. When the state has transitioned from Not ready to switch on, which is right after the power on, to Operation enabled with the predetermined procedure, the servo motor becomes ready to operate.



When the communication state is "IDLE", the state will always be Switch on disabled.

Figure 5.2 Transition between the FSA states

## 5. STATE TRANSITION

Table 5.2 State transition

Transition No.	Event	Remark
(0)	The control circuit power supply is turned on.	Initialization
(1)	The state automatically transitions when the control circuit power supply is turned on.	Communication setting
(2)	The state transitions with the Shutdown command from the master.	None
(3)	The state transitions with the Switch on command from the master.	RA turns on.
(4)	The state transitions with the Enable operation command from the master.	The operation becomes ready after servo-on.
(5)	The state transitions with the Disable operation command from the master.	The operation is disabled after servo-off.
(6)	The state transitions with the Shutdown command from the master.	RA turns off.
(7)	The state transitions with the Disable Voltage command or Quick Stop command from the master.	None
(8)	(a) The state transitions with the Shutdown command from the master. (b) The state transitions when the main circuit power supply is turned off.	Operation is disabled after servo-off or RA-off.
(9)	The state transitions with the Disable Voltage command from the master.	Operation is disabled after servo-off or RA-off.
(10)	The state transitions with the Disable Voltage command or Quick Stop command from the master.	RA turns off.
(11)	The state transitions with the Quick Stop command from the master.	Quick Stop starts.
(12)	(a) The state automatically transitions after Quick Stop is completed. (If the Quick Stop option code is 1, 2, 3, or 4) (b) The state transitions with the Disable Voltage command from the master.	Operation is disabled after servo-off or RA-off.
(13)	Alarm occurrence	Processing against the alarm is executed.
(14)	Automatic transition	After processing against the alarm has been completed, servo-off or RA-off is performed and the operation is disabled.
(15)	The state transitions with the Fault Reset command from the master.	Alarms are reset. Resettable alarms are cleared.
(16)	The state transitions with the Enable Operation command from the master. (If the Quick Stop option code is 5, 6, 7, or 8)	The operation becomes ready. (Not supported)

### Correspondence relation between command bit setting and FSA state transition

Command	Command bit setting of Controlword (Note)					Transition No.
	Bit 7 Fault Reset	Bit 3 Enable Operation	Bit 2 Quick Stop	Bit 1 Enable Voltage	Bit 0 Switch On	
Shutdown	0	○	1	1	0	(2), (6), (8)
Switch On	0	0	1	1	1	(3)
Disable Voltage	0	○	○	0	○	(7), (9), (10), (12)
Quick Stop	0	○	0	1	○	(7), (10), (11)
Disable Operation	0	0	1	1	1	(5)
Enable Operation	0	1	1	1	1	(4), (16)
Fault Reset	0 to 1	○	○	○	○	(15)

Note. 0: OFF 1: ON ○: ON/OFF

In faulty communication, hold the state of Bit 7 = 1 for as follows for the Fault Reset command to prevent the command from failing to be recognized.

10 ms ≥ twice the communication cycle: Hold the state for 10 ms.

10 ms < twice the communication cycle: Hold the state for the time determined by doubling the communication cycle.

## 5. STATE TRANSITION

Figure 5.1 and Table 5.1 show the FSA state transition conditions. The transition from the Switch on disabled state to the Operation enabled state requires Shutdown, Switch on, and Enable operation to be issued in this order. However, with the MR-J4-\_TM\_ servo amplifier, transition to the target state skipping the states in between is possible.

Current status	Command	Status after transition
Switch on disabled	Switch on	Switched on
Switch on disabled	Enable operation	Operation
Ready to switch on	Enable operation	Operation

### 5.3 Controlword/Statusword

The format of Controlword/Statusword used for the ProcessData communication is different depending on Telegrams you use.

Refer to the following table.

Telegram	ProcessData communication	
	Controlword	Statusword
Standard Telegram 1	Control word 1 (compliant with PROFIdrive)	Status word 1 (compliant with PROFIdrive)
Telegram 100, 102	Controlword (compliant with CiA 402)	Statusword (compliant with CiA 402)

#### 5.3.1 Controlword

The drive state can be switched and control commands for the functions of the drive can be issued by rewriting Controlword from the master controller. Refer to the followings for functions assigned to each bit.

##### (1) Control word 1 (compliant with PROFIdrive) bit definition

Control word 1 cannot be accessed from the Acyclic communication.

Bit	Name	Description	Controlword (P24640)	
			Bit	Name
0	ON	Refer to section 5.1. (Note 1)	0	Switch On
1	Coast Stop	Refer to section 5.1. (Note 1)	1	Enable Voltage
2	Quick Stop	Refer to section 5.1. (Note 1)	2	Quick Stop
3	Enable Operation	Refer to section 5.1. (Note 1)	3	Enable Operation
4	Depends on the control mode (Refer to each control mode.)			
5				
6				
7	Fault Acknowledge	When 1 is set from 0, alarms are reset. (Note 1)	7	Fault Reset
8	JOG1 (not supported)	Not supported (Note 2)		
9	JOG2 (not supported)	Not supported (Note 2)		
10	Control By PLC	0: Not following PLC command (holding previous value) 1: Drive following PLC command		
11	Depends on the control mode (Refer to each control mode.)			
12		(Note 2)		
13				
14				
15				

Note 1. Bit 0 to 3 and 7 are used for switching drive state. Refer to chapter 5.

Note 2. The values in bit 8, 9, and 12 to 15 at reading are undefined. Set "0" when writing.

## 5. STATE TRANSITION

Controlword (compliant with CiA 402) bit definition

Bit	Symbol	Description
0	SO	Switch on (Note 1)
1	EV	Enable voltage (Note 1)
2	QS	Quick stop (Note 1)
3	EO	Enable operation
4	OMS	Differs depending on Modes of operation (P24672). (Refer to each control mode.)
5		
6		
7	FR	Fault reset (Note 1)
8	HALT	0: Operation ready 1: Temporary stop
9	OMS	Differs depending on Modes of operation (P24672). (Refer to each control mode.)
10		(Note 2)
11		
12		
13		
14		
15		

- Note 1. Bit 0 to 3 and 7 are used for switching drive state.  
 2. The values in bit 10 to 15 at reading are undefined. Set "0" when writing.

(2) Bit definition of control DI1

Bit	Symbol	Description
0		(Note)
1		
2		
3		
4	C_CDP	Gain switching Turn on C_CDP to use the values of [Pr. PB29] to [Pr. PB36] and [Pr. PB56] to [Pr. PB60] as the load to motor inertia ratio and gain values.
5		(Note)
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Note. The values in bit 0 to 3 and 5 to 15 at reading are undefined. Set "0" when writing.

## 5. STATE TRANSITION

### (3) Bit definition of control DI2

Bit	Symbol	Description
0		(Note)
1		
2		
3		
4		
5		
6		
7		
8	C_PC	Proportional control Turn C_PC on to switch the speed amplifier from the proportional integral type to the proportional type. If the servo motor at a stop is rotated even one pulse due to any external factor, it generates torque to compensate for a position shift. 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 shift. When the shaft is to be locked for a long time, use the C_PC and torque limit at the same time to make the torque less than the rated torque.
9		(Note)
10		
11		
12		
13		
14		
15	C_ORST	Operation alarm reset Turn on C_ORST from off to reset [AL. F4 Positioning warning].

Note. The values in bit 0 to 7 and 9 to 14 at reading are undefined. Set "0" when writing.

### (4) Bit definition of control DI3

Bit	Symbol	Description
0		(Note)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Note. The values in bit 0 to 15 at reading are undefined. Set "0" when writing.

## 5. STATE TRANSITION

### 5.3.2 Statusword

Statusword notifies the master controller of the drive state of the MR-J4-\_TM\_ servo amplifier and other drive status. Refer to the followings for functions assigned to each bit.

#### (1) Status word 1 (compliant with PROFIdrive) bit definition

Bit	Name	Description	Statusword (P24641)	
			Bit	Name
0	Ready To Switch On	Refer to the following table for the definition.	0	Ready To Switch On
1	Ready To Operate	Refer to the following table for the definition.	1	Switched On
2	Operation Enabled	Refer to the following table for the definition.	2	Operation Enabled
3	Fault Present	0: No alarm 1: At alarm occurrence	3	Fault
4	Coast Stop Not Activated	0: During a coasting 1: Other than coasting	4	Voltage Enabled
5	Quick Stop Not Activated	0: During a quick stop 1: other than quick stop (including during the test mode)	5	Quick Stop
6	Switching On Inhibited	Refer to the following table for the definition.	6	Switch On Disabled
7	Warning Present	0: No warning has been occurred. 1: A warning is occurring.	7	Warning
8	Differs depending on Telegrams. (Refer to each control mode.)			
9	Control Requested	0: Not controlled by controller 1: Controlled by controller	9	Remote
10	Differs depending on Telegrams. (Refer to each control mode.)			
11				
12				
13				
14				
15				

Bit 0 to 2 and 6 are switched depending on the internal state of MR-J4-\_TM\_ servo amplifier. The following table shows the details.

Status word 1 (bin)	PROFIdrive state
xxxx xxxx x1xx x000	Switching on inhibited
xxxx xxxx x0xx x001	Ready for switching on
xxxx xxxx x0xx x011	Switched on
xxxx xxxx x0xx x111	Operation
xxxx xxxx x0xx x011	Switching off (Ramp stop, Quick stop)

## 5. STATE TRANSITION

### (2) Statusword (compliant with CiA 402) bit definition

Bit	Symbol	Description
0	RTSO	Ready-to-switch-on
1	SO	Switch-on
2	OE	Operation-enabled
3	F	Fault
4	VE	Voltage-enabled 0: The bus voltage is lower than the certain (RA) level. 1: The bus voltage is equal to or higher than the certain level.
5	QS	Quick stop 0: During a quick stop 1: No during a quick stop (including during the test mode)
6	SOD	Switch on disabled
7	W	Warning 0: No warning has been occurred. 1: A warning is occurring.
8		(Note)
9	RM	Remote 0: Not following the Controlword command 1: In operation following the Controlword command
10	TR	Target reached Differs depending on Modes of operation (P24672). (Refer to chapter 6.)
11	ILA	Internal limit active 0: The forward rotation stroke end, reverse rotation stroke end, and software position limit have not been reached 1: The forward rotation stroke end, reverse rotation stroke end, or software position limit has been reached. (Enabled in the pp, pv, or hm mode)
12	OMS	Differs depending on Modes of operation (P24672). (Refer to chapter 6.)
13		
14		
15		(Note)

Note. The values in bit 8, 14, and 15 at reading are undefined.

Bit 0 to Bit 3, Bit 5, and Bit 6 are switched depending on the internal state of the MR-J4-<sub>TM</sub> servo amplifier. Refer to the following table for details.

Statusword (bin)	CiA 402 Drive Profile state
x0xx xxx0 x0xx 0000	Not ready to switch on (Note)
x0xx xxx0 x1xx 0000	Switch on disabled
x0xx xxx0 x01x 0001	Ready to switch on
x0xx xxx0 x01x 0011	Switched on
x0xx xxx0 x01x 0111	Operation enabled
x0xx xxx0 x00x 0111	Quick stop active
x0xx xxx0 x0xx 1111	Fault reaction active
x0xx xxx0 x0xx 1000	Fault

Note. Statusword is not sent in the Not ready to switch on state.

## 5. STATE TRANSITION

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

Bit	Symbol	Description
0		(Note)
1		
2	S_SA	Speed reached SA will turn off during servo-off. When the servo motor speed reaches the following range, S_SA turns on. Set speed $\pm ((\text{Set speed} \times 0.05) + 20)$ r/min When the preset speed is 20 r/min or less, SA always turns on.
3	S_MBR	Electromagnetic brake interlock 0: Servo-off or at alarm occurrence
4	S_CDPS	Variable gain selection 1: ON during gain switching
5	S_CLD	During fully closed loop control switching S_CLD turns on during fully closed loop control.
6		(Note)
7		
8		
9		
10		
11		
12	S_INP	In-position When the number of droop pulses is in the in-position range, S_INP will turn on. The in-position range can be changed with [Pr. PA10]. When the in-position range is increased, INP may be always on during low-speed rotation. The Status DO cannot be used in the velocity mode or torque mode.
13	S_TLC	Limiting torque When the torque reaches the torque limit value during torque generation, S_TLC will turn on. This will be turned off at servo-off. The Status DO cannot be used in the torque mode.
14	S_ABSV	Absolute position undetermined 1: Absolute position is erased
15	S_BWNG	Battery warning When [AL. 92 battery cable disconnection warning] or [AL. 9F Battery warning] has occurred, S_BWNG turns on. When the battery warning is not occurring, turning on the power will turn off S_BWNG after 2.5 s to 3.5 s.

Note. The values in bit 0, 1, and 5 to 11 at reading are undefined.

## 5. STATE TRANSITION

### (4) Bit definition of Status DO 2

Bit	Symbol	Description
0	S_ZPAS	Z-phase already passed 0: Z-phase unpassed after start-up 1: Z-phase passed once or more after start-up
1		(Note)
2		
3	S_ZSP	Zero speed state S_ZSP turns on when the servo motor speed is at zero speed or less. Zero speed can be changed with [Pr. PC07].
4	S_VLC	Limiting speed When the speed reaches the speed limit value in the torque mode, S_VLC will turn on. When the servo is off, TLC will be turned off. The Status DO cannot be used in the position mode or velocity mode.
5		(Note)
6		
6	S_IPF	During IPF S_IPF turns on during an instantaneous power failure.
7		(Note)
8		
8	S_PC	Under proportional control S_PC turns on under proportional control.
9		(Note)
10		
10	S_DB	External dynamic brake output When the dynamic brake needs to operate, S_DB turns off.
11		(Note)
12		
13		
14		
15	S_ZP2	Home position return completion 2 S_ZP turns off at servo-off. S_ZP2 is always on unless the home position is erased. When a home position return completes normally, S_ZP2 turns on. S_ZP2 is always on unless the home position is erased. In the incremental system, it turns off with one of the following conditions. 1) [AL. 69 Command error] occurs. 2) Home position return is not being executed. 3) Home position return is in progress.  If a home position return completes once in the absolute position detection system, S_ZP2 is always on. However, it will be off with one of the conditions 1) to 3) or the following. 4) The home position return is not performed after [AL. 25 Absolute position erased] or [AL. E3 Absolute position counter warning] occurred. 5) The home position return is not performed after the electronic gear ([Pr. PA06] or [Pr. PA07]) was changed. 6) The home position return is not performed after the setting of [Pr. PA03 Absolute position detection system selection] was changed from "Disabled" to "Enabled". 7) [Pr. PA14 Rotation direction selection/travel direction selection] was changed. 8) [Pr. PA01 Operation mode] was changed.

Note. The values in bit 1, 2, 5, 7, 9, and 11 to 14 at reading are undefined.

## 5. STATE TRANSITION

### (5) Bit definition of Status DO 3

Bit	Symbol	Description
0	/	(Note)
1		
2		
3		
4		
5	S_STO	During STO S_STO turns on during STO.
6	/	(Note)
7		
8		
9		
10		
11	S_MTTR	Transition to tough drive mode in process When a tough drive is "Enabled" in [Pr. PA20], activating the instantaneous power failure tough drive will turn on S_MTTR.
12	/	(Note)
13		
14		
15		

Note. The values in bit 0 to 4, 6 to 10, and 12 to 15 at reading are undefined.

### (6) Bit definition of Status DO 5

Bit	Symbol	Description
0	/	(Note)
1		
2		
3		
4		
5		
6	S_MEND	Travel completion
7	/	(Note)
8		
9		
10		
11		
12		
13		
14		
15		

Note. The values in bit 0 to 5 and 7 to 15 at reading are undefined.



## 6. CONTROL MODE

### 6. CONTROL MODE

#### 6.1 Selection of control mode

Specify a control mode with the combinations of the following conditions.

- [Pr. PA01] (P8193)
- Telegram setting from controller
- Modes of operation area in Telegram (only Telegram 102)

When the Telegram setting is other than the following combinations, [AL. 37] will occur.

Pr. PA01	Telegram Setting	Modes of operation	Control mode	Remark
___0 ___2	1		Profile velocity mode (pv)	
___0 ___2	100		Profile torque mode (tq)	
___0 ___2	102	0	No mode change/No mode assigned (Note)	
		1	Profile position mode (pp)	
		3	Profile velocity mode (pv)	
		4	Profile torque mode (tq)	
		6	Homing mode (hm)	
___1				Not supported ([AL. 37] occurs.)

Note. The control mode at power on will be Profile position mode.

The following table shows the objects related to control modes.

PNU	Sub	Access	Name	Data Type	Default	Description
24672	0	R/W	Modes of operation	Integer8	Differs depending on [Pr. PA01].	Refer to section 9.3.6.
24673	0	R	Modes of operation display	Integer8	Differs depending on [Pr. PA01].	Refer to section 9.3.6.
25858	0	R	Supported drive mode	Unsigned32	0000002Dh	Refer to section 9.3.6.

## 6. CONTROL MODE

### 6.2 Control switching

When telegram 102 is used

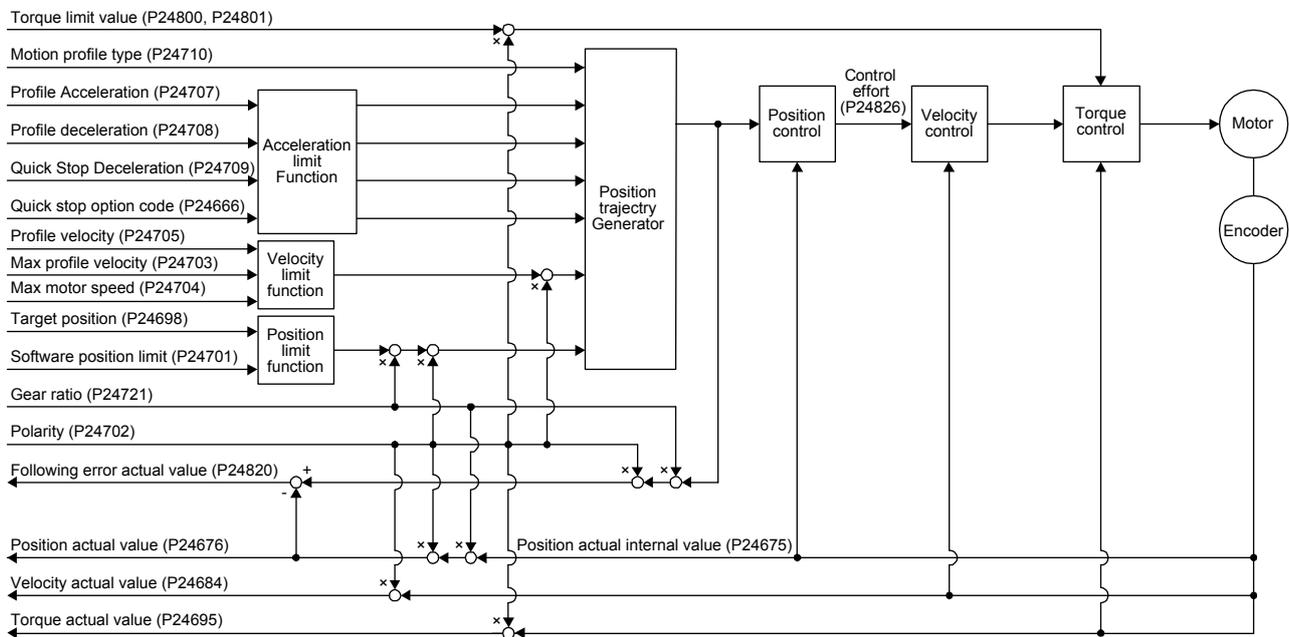
Because control switching has a delay, the controller must keep sending command values corresponding to the control mode before and after the switching. After the completion of control switching has been checked with Modes of operation display, update of the command value before the switching can be stopped.

Before switching the mode from or to Profile position mode (pp), check that the servo motor speed is zero speed. Zero speed state can be obtained with Bit 3 (S\_ZSP) of Status DO 2 (P11538). If the motor is not zero speed state, the control will not be switched and Modes of operation display will not change.

Changes to the OMS bit of Controlword are not accepted until control switching is completed. Before inputting commands, check that the control mode has been switched referring to Modes of operation display.

### 6.3 Profile position mode (pp)

The following shows the functions and related PROFIdrive parameters of the profile position mode (pp).



## 6. CONTROL MODE

### (1) Related object

PNU	Sub	Access	Name	Type	Default value	Description
24698	0	R/W	Target position	Integer32		Command position (Pos unit)
24701	0	R/W	Min position limit	Array [2]	0	Minimum position address (Pos unit)
	1	R/W	Max position limit	Integer32	0	Maximum position address (Pos unit)
24703	0	R/W	Max profile velocity	Unsigned32	2000000	maximum speed Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear))
24704	0	R/W	Max motor speed	Unsigned32		Servo motor maximum speed Unit: r/min
24705	0	R/W	Profile velocity	Unsigned32	10000	Speed after acceleration completed Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear))
24707	0	R/W	Profile Acceleration	Unsigned32	0	Acceleration at start of movement to target position Unit: ms
24708	0	R/W	Profile deceleration	Unsigned32	0	Deceleration at arrival at target position Unit: ms
24709	0	R/W	Quick stop deceleration	Unsigned32	100	Deceleration at deceleration to a stop by Quick stop Unit: ms
24710	0	R/W	Motion profile type	Integer16	-1	Acceleration/deceleration type selection -1: S-pattern 0: Linear ramp (not compatible) (Note) 1: Sin <sup>2</sup> ramp (not compatible) (Note) 2: Jerk-free ramp (not compatible) (Note) 3: Jerk-limited ramp (not compatible) (Note)
24666	0	R/W	Quick stop option code	Integer16	2	Operation setting for Quick stop Refer to section 8.10.
24675	0	R	Position actual internal value	Integer32		Current position (Enc inc)
24676	0	R	Position actual value	Integer32		Current position (Pos units)
24684	0	R	Velocity actual value	Integer32		Current speed Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear))
24695	0	R	Torque actual value	Integer16		Current torque Unit: 0.1% (rated torque of 100%)
24722	0	R/W	Feed	Array [2] Unsigned32		Travel distance per revolution of an output shaft Encoder resolution of the connected servo motor at initial value
	1	R/W	Shaft revolutions		1	Number of servo motor shaft revolutions
24820	0	R	Following error actual value	Integer32		Droop pulses (Pos unit)
24826	0	R	Control effort	Integer32		Position control loop output (speed command) Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear))
24800	0	R/W	Positive torque limit value	UInteger16	10000	Torque limit value (forward) Unit: 0.1% (rated torque of 100%)
24801	0	R/W	Negative torque limit value	UInteger16	10000	Torque limit value (reverse) Unit: 0.1% (rated torque of 100%)
24721	0	R/W	Motor revolutions	Array [2] Unsigned32	1	Gear ratio: Number of revolutions of the servo motor axis (numerator)
	1		Shaft revolutions		1	Gear ratio: Number of revolutions of the drive axis (denominator)

## 6. CONTROL MODE

PNU	Sub	Access	Name	Type	Default value	Description
24702	0	R/W	Polarity	USInteger16	0	Polarity selection Bit 7: Position POL Bit 6: Velocity POL Bit 5: Torque POL The values other than bit 5, 6, and 7 at reading are undefined. Set "0" when writing. Refer to section 8.5.
24744	0	R/W	SI unit position	Unsigned32	0	SI unit position The value will be set automatically depending on the value of [Pr. PT01] (_ x _ _) and [Pr. PT03] (_ _ _ x). Refer to section 9.3.12 (5) for details.
24745	0	R/W	SI unit velocity	Unsigned32	0	SI unit velocity 0.01 mm/s or 0.01 r/min FB010300h (0.01 mm/s) FEB44700h (0.01 r/min)

Note. This is not supported by the MR-J4-\_TM\_ servo amplifier.

### (2) Details on the OMS bit of Controlword (pp mode)

Bit	Symbol	Description
4	New set-point	New positioning parameters are obtained when this bit turns on.
5	Change set immediately	0: Set of set-points 1: Single set-point
6	abs/rel	0: Absolute position command 1: Relative position command (Note)
8	HALT	0: Positioning is executed. 1: The servo motor stops according to Halt option code (P24669).
9	Change on set-point	Enabled only for Set of set-points (Bit 5 = 0). 0: The next positioning starts after the current positioning is completed (stopped) (black line). 1: The next positioning starts after positioning is executed with Profile velocity held up to the current set-point (gray line).

Note. When the unit is set to degree, relative position commands are disabled. When the relative position command is specified and positioning is started, [AL. F4.8] occurs and positioning cannot be started.

### (3) Details on the OMS bit of Statusword (pp mode)

Bit	Symbol	Description
10	Target reached	0 (Halt (Bit 8) = 0): Target position not reached. 0 (Halt (Bit 8) = 1): Axis decelerates 1 (Halt (Bit 8) = 0): Target position reached. 1 (Halt (Bit 8) = 1): Velocity of axis is 0  Judgment condition for Target position reached If the error between Actual position and Target position has stayed within Position window for Position window time or more, Target position reached is stored.
12	Set-point acknowledge	0: Positioning completed (wait for next command) 1: Positioning being executed (The set-point can be overwritten.)
13	Following error	0: No following error 1: Following error

## 6. CONTROL MODE

### (4) Feed constant (P24722)

The following shows setting values of P24722.0 Feed and P24722.1 Shaft revolutions.

[Pr. PT01] setting	Feed	Shaft revolutions
_ 2 _ _ : degree	360000	1
_ 3 _ _ : pulse	Encoder resolution of the servo motor	1

No value can be written to Feed because it is set automatically. Writing a value will be Error No. 02h (Low or high limit exceeded).

When the command unit is degree and pulse, the value of Shaft revolutions will be set automatically as the above table shows. Writing a value will be Error No. 02h (Low or high limit exceeded).

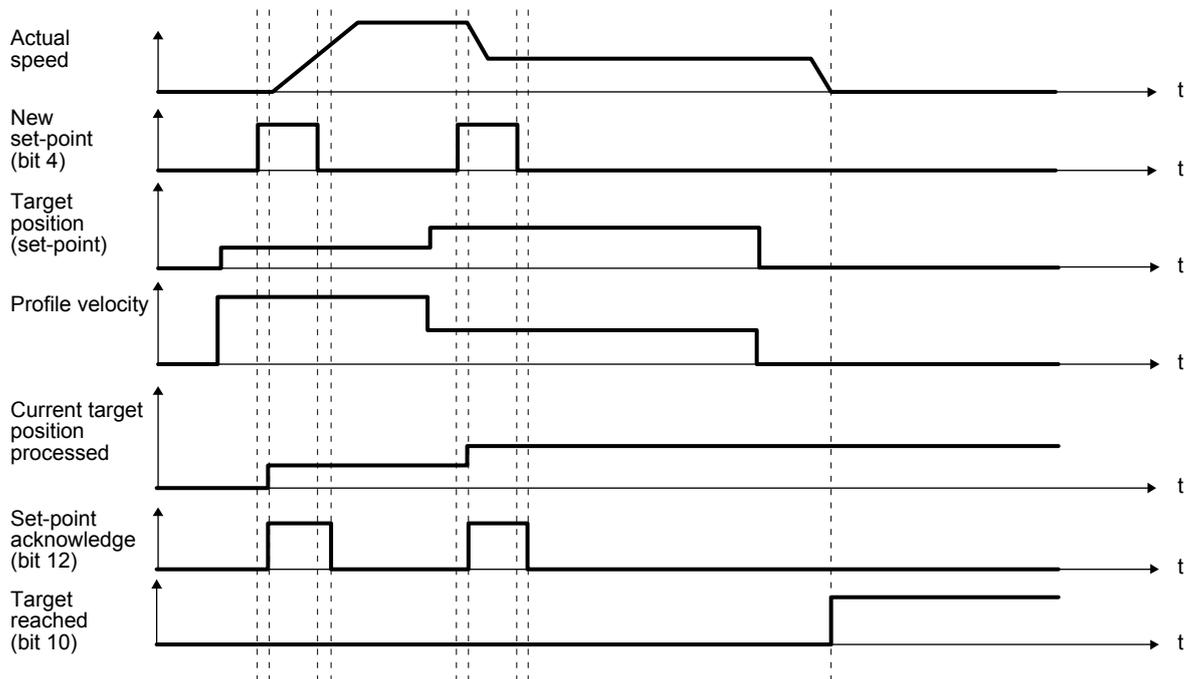
Additionally, Position actual value (P24676) is calculated from Gear ratio (P24721) and Feed constant (P24722) as follows.

$$\text{Position actual value (P24676)} = \frac{\text{Position actual internal value (P24675)} \times \text{Feed constant (P24722)}}{\text{Position encoder resolution (P24719)} \times \text{Gear ratio (P24721)}}$$

When the unit is degree, the operation result will be limited within 0 to 359999.

### (5) Single Set-point

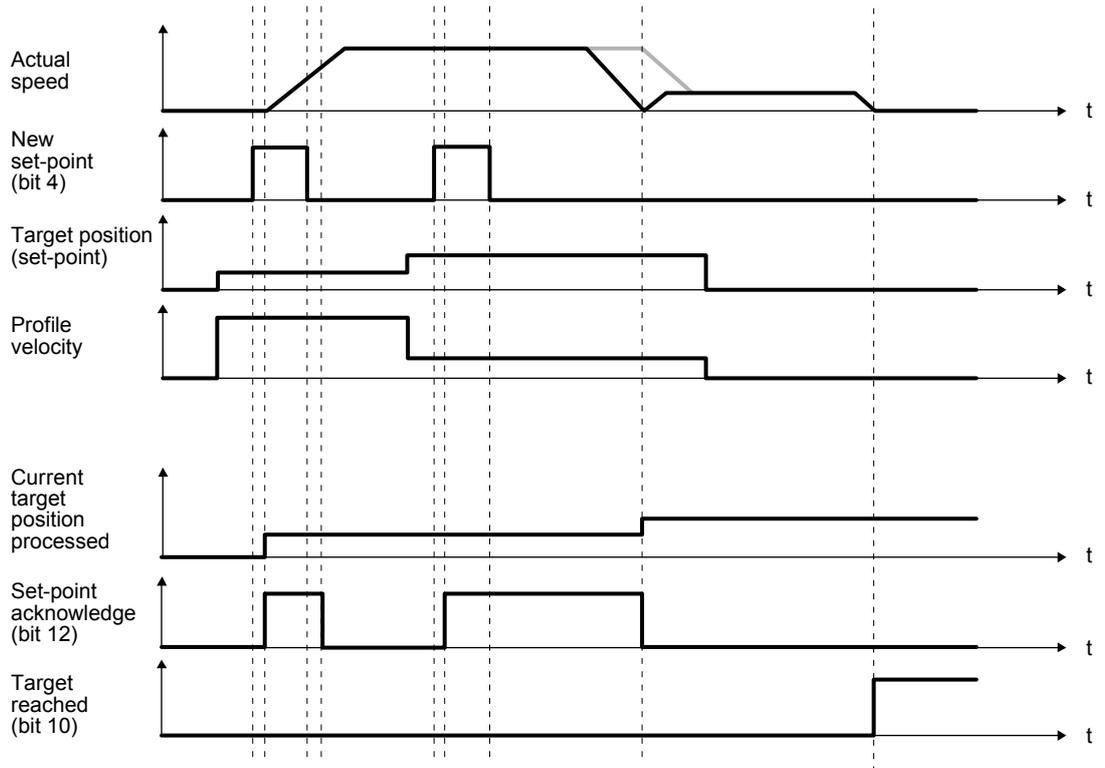
Update of positioning parameters during a positioning operation is immediately accepted. (The next positioning starts after the current positioning is canceled.)



## 6. CONTROL MODE

### (6) Set of set-points

After the current positioning operation is completed, the next positioning is started. Whether positioning is stopped at the first positioning point when at an update of the positioning parameter before completion of the positioning can be switched. To switch the setting, use Change on set-point (Bit 9 of Control word).

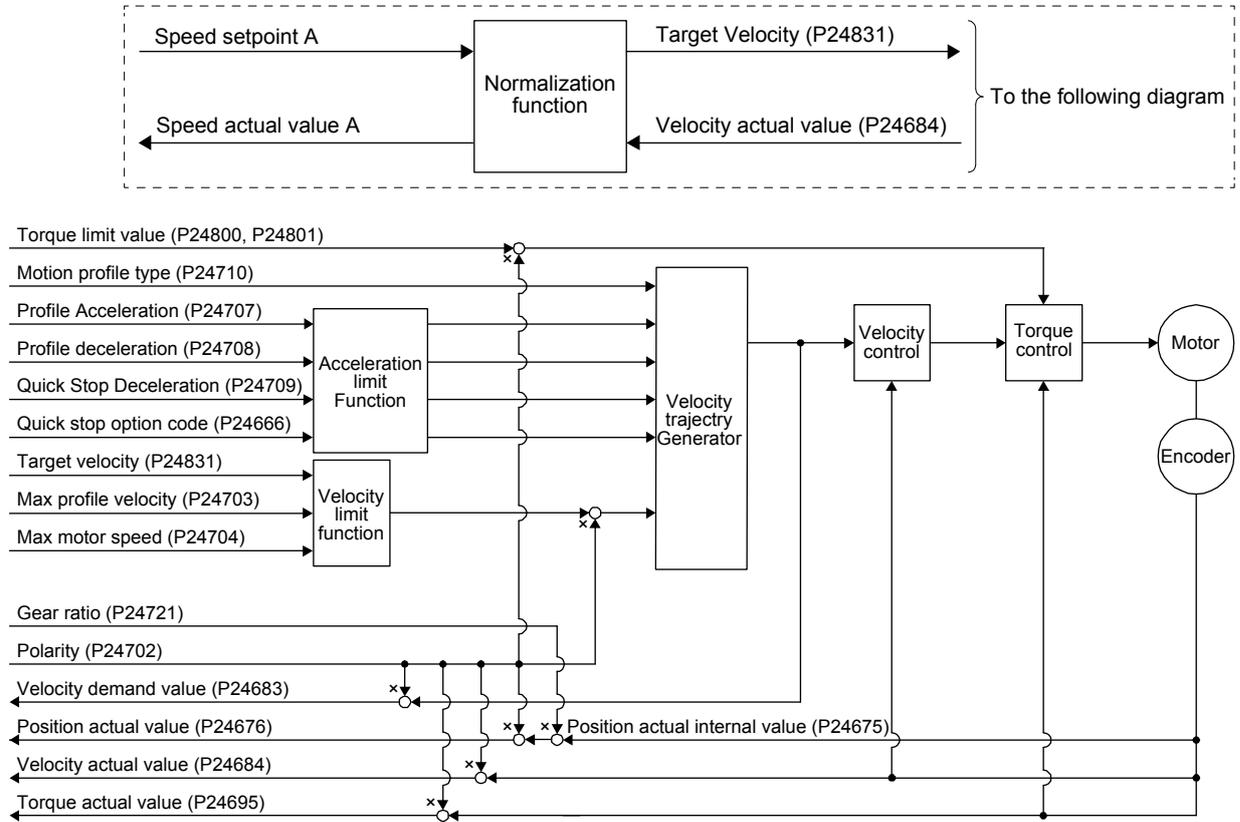


## 6. CONTROL MODE

### 6.4 Profile velocity mode (pv)

The following shows the functions and related PROFIdrive parameters of the profile velocity mode (pv).

The dotted line area in the following diagram is used only for Standard Telegram 1.



#### (1) Related object

PNU	Sub	Access	Name	Type	Default value	Description
24831	0	R/W	Target velocity	Integer32		Command speed (Vel unit)
24703	0	R/W	Max profile velocity	Unsigned32	2000000	maximum speed Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear))
24704	0	R/W	Max motor speed	Unsigned32		Servo motor maximum speed Unit: r/min
24707	0	R/W	Profile Acceleration	Unsigned32	0	Acceleration at start of movement to target position Unit: ms
24708	0	R/W	Profile deceleration	Unsigned32	0	Deceleration at arrival at target position Unit: ms
24709	0	R/W	Quick stop deceleration	Unsigned32	100	Deceleration at deceleration to a stop by Quick stop Unit: ms
24710	0	R/W	Motion profile type	Integer16	-1	Acceleration/deceleration type selection -1: S-pattern 0: Linear ramp (Not compatible) (Note) 1: Sin <sup>2</sup> ramp (Not compatible) (Note) 2: Jerk-free ramp (not compatible) (Note) 3: Jerk-limited ramp (not compatible) (Note)
24666	0	R/W	Quick stop option code	Integer16	2	Operation setting for Quick stop Refer to section 8.10.

## 6. CONTROL MODE

PNU	Sub	Access	Name	Type	Default value	Description
24675	0	R	Position actual internal value	Integer32		Current position (Enc inc)
24676	0	R	Position actual value	Integer32		Current position (Pos unit)
24683	0	R	Velocity demand value	Integer32		Speed command (after trajectory generation)
24684	0	R	Velocity actual value	Integer32		Current speed Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear))
24695	0	R	Torque actual value	Integer16		Current torque Unit: 0.1% (rated torque of 100%)
24800	0	R/W	Positive torque limit value	Unsigned16	10000	Torque limit value (forward) Unit: 0.1% (rated torque of 100%)
24801	0	R/W	Negative torque limit value	Unsigned16	10000	Torque limit value (reverse) Unit: 0.1% (rated torque of 100%)
24721	0	R/W	Motor revolutions	Array [2] Unsigned32	1	Gear ratio: Number of revolutions of the servo motor axis (numerator)
	1		1		Gear ratio: Number of revolutions of the drive axis (denominator)	
24722	0	R/W	Feed	Array [2] Unsigned32		Travel distance per revolution of an output shaft Encoder resolution of the servo motor at initial value
	1	R/W	Shaft revolutions		1	Number of servo motor shaft revolutions
24702	0	R/W	Polarity	Unsigned8	0	Polarity selection Bit 7: Position POL Bit 6: Velocity POL Bit 5: Torque POL The values other than bit 5, 6, and 7 at reading are undefined. Set "0" when writing. Refer to section 8.5.
24685	0	R/W	Velocity window	Unsigned16	2000	Speed error threshold for judging Target reached Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear))
24686	0	R/W	Velocity window time	Unsigned16	10	Target reached judgment time Unit: ms
24687	0	R/W	Velocity threshold	Unsigned16	5000	Zero speed threshold for judging Speed Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear))
24688	0	R/W	Velocity threshold time	Unsigned16	10	Speed judgment time Unit: ms
24744	0	R/W	SI unit position	Unsigned32	0	SI unit position The value will be set automatically depending on the value of [Pr. PT01] (_ x _) and [Pr. PT03] (_ _ _ x). Refer to section 9.3.12 (5) for details.
24745	0	R/W	SI unit velocity	Unsigned32	0	SI unit velocity 0.01 mm/s or 0.01 r/min FB010300h (0.01 mm/s) FEB44700h (0.01 r/min)

Note. This is not supported by the MR-J4-\_TM\_ servo amplifier.

## 6. CONTROL MODE

(2) Details on the Control word 1 (compliant with PROFIdrive) bit (pv mode) (only when using Standard telegram 1)

Bit	Name	Description	Controlword (P24640)	
			Bit	Name
4	Enable Ramp Generator	Refer to the following table for the definition.	8	Halt
5	Unfreeze Ramp Generator			
6	Enable Setpoint			
11	/	(Note)	/	/
12				
13				
14				
15				

Note. The values in bit 11 to 15 at reading are undefined. Set "0" when writing.

### Details of bit 4, 5, and 6

Bit 4	Bit 5	Bit 6	Description
0	/	/	The servo motor stops according to Halt option code (P24669).
1			0
1	1	0	Command speed is set to 0.
1	1	1	Command speed is updated.

(3) Details on the OMS bit of Controlword (pv mode)

Bit	Symbol	Description
4	(reserved)	(Note)
5	(reserved)	
6	(reserved)	
8	HALT	0: The servo motor is driven. 1: The servo motor stops according to Halt option code (P24669).
9	(reserved)	(Note)

Note. The values in bit 4 to 6, and 9 at reading are undefined. Set "0" when writing.

## 6. CONTROL MODE

(4) Details on the Status word 1 (compliant with PROFIdrive) bit (pv mode) (only when using Standard telegram 1)

Bit	Name	Description	Statusword (P24641)	
			Bit	Name
8	Speed Error (Not supported)			
10	Speed Reached	Refer to the following table for the definition.	10	Target velocity reached
11	Internal limit active	Internal limit active 0: The forward rotation stroke end, reverse rotation stroke end, and software position limit have not been reached 1: The forward rotation stroke end, reverse rotation stroke end, or software position limit has been reached.	11	Internal limit active
12	Speed	0: Speed is not equal 0 1: Speed is equal 0  Judgment condition for Speed is not equal 0 If the absolute value of Actual velocity has exceeded Velocity threshold for Velocity threshold time or more, Speed is not equal 0 is stored.	12	Speed
13		(Note)		
14				
15				

Note. The values in bit 8 and 13 to 15 at reading are undefined.

### Speed Reached

Status word 1 bit 10	Control word 1 bit 4	Description
Speed Reached (Note)	Enable Ramp Generator	
0	0	Target velocity not reached.
	1	Axis decelerates
1	0	Target velocity reached.
	1	Velocity of axis is 0

Note. Judgment condition for Speed Reached: If the error between Actual velocity and Target velocity has stayed within Velocity window for Velocity window time or more, Speed Reached is stored.

(5) Details on the OMS bit of Statusword (pv mode)

Bit	Symbol	Description
10	Target reached	0 (Halt (Bit 8) = 0): Target velocity not reached. 0 (Halt (Bit 8) = 1): Axis decelerates 1 (Halt (Bit 8) = 0): Target velocity reached. 1 (Halt (Bit 8) = 1): Velocity of axis is 0 Judgment condition for Target velocity reached If the error between Actual velocity and Target velocity has stayed within Velocity window for Velocity window time or more, Target velocity reached is stored.
12	Speed	0: Speed is not equal 0 1: Speed is equal 0 Judgment condition for Speed is not equal 0 If the absolute value of Actual velocity has exceeded Velocity threshold for Velocity threshold time or more, Speed is not equal 0 is stored.
13	Max slippage error	0: Maximum slippage not reached 1: Maximum slippage reached (not supported) (Note) Max slippage is a maximum slippage of the asynchronous servo motor.

Note. This is not supported by the MR-J4- \_TM\_ servo amplifier.

## 6. CONTROL MODE

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- (6) Speed setpoint A (only when using Standard telegram 1)

Speed setpoint A is a target speed.

The MR-J4-\_TM\_ servo amplifier receives Speed setpoint A from the controller, converts it to a target speed, and set it to Target Velocity (P24831).

$$\text{Speed setpoint A} = \frac{\text{Target Velocity (P24831)}}{100}$$

- (7) Speed actual value A (only when using Standard telegram 1)

Speed actual value A is a current speed.

The MR-J4-\_TM\_ servo amplifier converts Velocity actual value (P24684) to Speed actual value A and transmits it to the controller.

$$\text{Speed actual value A} = \frac{\text{Velocity actual value (P24684)}}{100}$$

- (8) Feed constant (P24722)

The following shows setting values of P24722.0 Feed and P24722.1 Shaft revolutions.

[Pr. PT01] setting	Feed	Shaft revolutions
_ 2 _ _ : degree	360000	1
_ 3 _ _ : pulse	Encoder resolution of the servo motor	1

No value can be written to Feed because it is set automatically. Writing a value will be Error No. 02h (Low or high limit exceeded).

When the command unit is degree and pulse, the value of Shaft revolutions will be set automatically as the table shows. Writing a value will trigger Error No. 02h (Low or high limit exceeded).

Additionally, Position actual value (P24676) is calculated from Gear ratio (P24721) and Feed constant (P24722) as follows.

$$\text{Position actual value (P24676)} = \frac{\text{Position actual internal value (P24675)} \times \text{Feed constant (P24722)}}{\text{Position encoder resolution (P24719)} \times \text{Gear ratio (P24721)}}$$

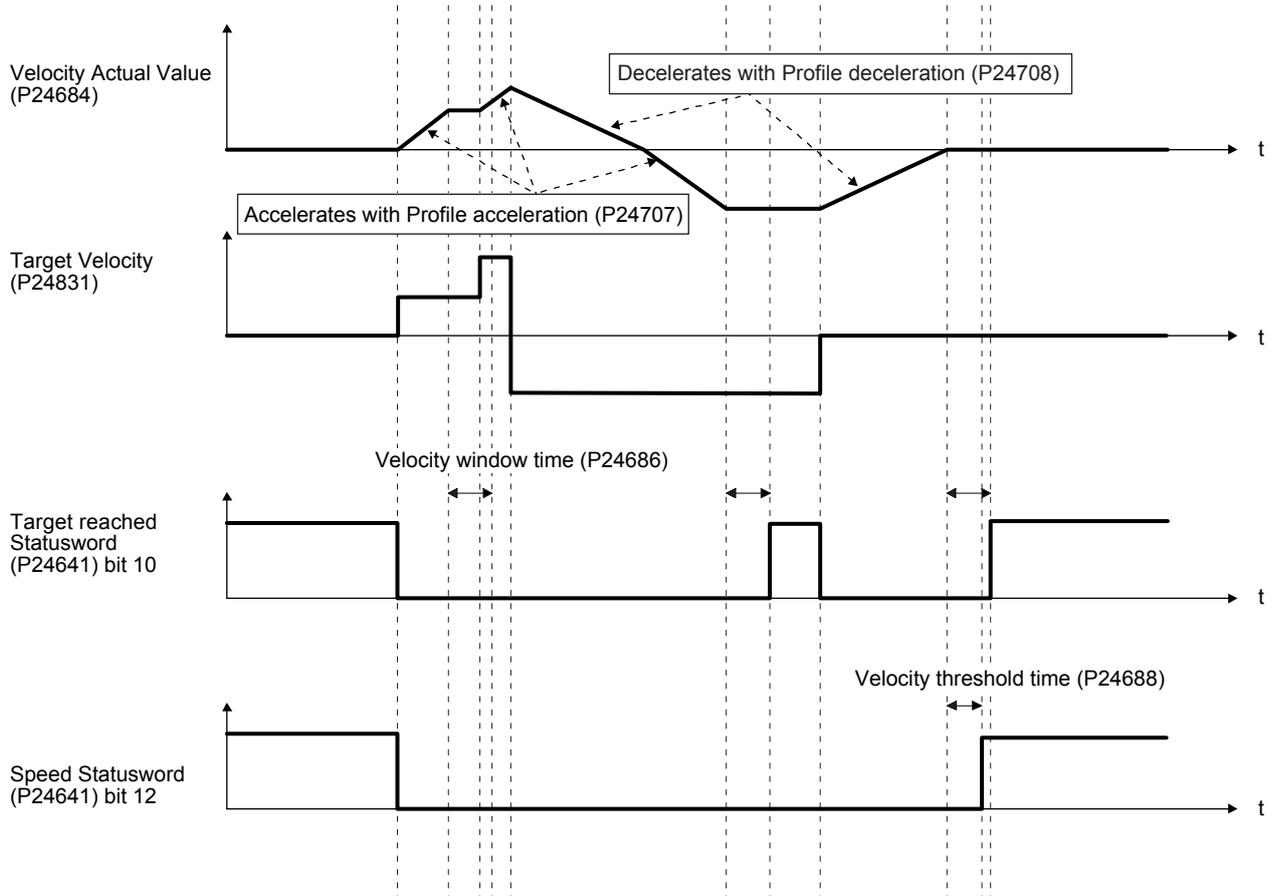
When the unit is degree, the operation result will be limited within 0 to 359999.

## 6. CONTROL MODE

### (9) The pv mode operation sequence

When using Standard telegram 1, replace the following left signals to the right signals.

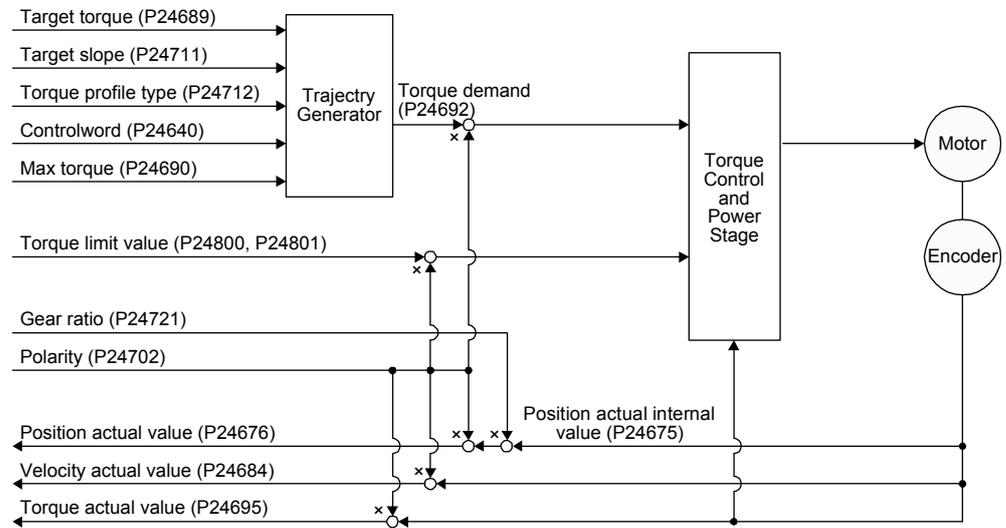
Signal name	When using Standard telegram 1
Velocity Actual Value	Speed actual value A
Target Velocity	Speed Setpoint A
Target reached (Statusword bit 10)	Speed reached (Status word 1 bit 10)
Speed (Statusword bit 12)	Speed (Status word 1 bit 12)



## 6. CONTROL MODE

### 6.5 Profile torque mode (tq)

The following shows the functions and related PROFIdrive parameters of the Profile torque mode (tq).



#### (1) Related object

PNU	Sub	Access	Name	Type	Default value	Description
24689	0	R/W	Target torque	Integer16		Command torque Unit: 0.1% (rated torque of 100%)
24692	0	R	Torque demand	Integer16		Command torque (after limit) Unit: 0.1% (rated torque of 100%)
24711	0	R/W	Torque slope	Unsigned32	0	Torque variation Unit: 0.1%/s (rated torque of 100%)
24712	0	R/W	Torque profile type	Unsigned32	0	Torque variation pattern 0000h: Linear ramp 0001h: Sin <sup>2</sup> ramp (not supported) (Note) 0002h to 7FFFh: reserved 8000h to FFFFh: Manufacturer specific
24675	0	R	Position actual internal value	Integer32		Current position (Enc inc)
24676	0	R	Position actual value	Integer32		Current position (Pos unit)
24684	0	R	Velocity actual value	Integer32		Current speed Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear))
24695	0	R	Torque actual value	Integer16		Current torque Unit: 0.1% (rated torque of 100%)
24800	0	R/W	Positive torque limit value	Unsigned16	10000	Torque limit value (forward) Unit: 0.1% (rated torque of 100%)
24801	0	R/W	Negative torque limit value	Unsigned16	10000	Torque limit value (reverse) Unit: 0.1% (rated torque of 100%)
24721	0	R/W	Motor revolutions	Array [2] Unsigned32	1	Gear ratio: Number of revolutions of the servo motor axis (numerator)
	1	R/W	Shaft revolutions		1	Gear ratio: Number of revolutions of the drive axis (denominator)
24722	0	R/W	Feed	Array [2] Unsigned32		Travel distance per revolution of an output shaft Encoder resolution of the servo motor at initial value
	1	R/W	Shaft revolutions		1	Number of servo motor shaft revolutions

## 6. CONTROL MODE

PNU	Sub	Access	Name	Type	Default value	Description
24702	0	R/W	Polarity	Unsigned8	0	Polarity selection Bit 7: Position POL Bit 6: Velocity POL Bit 5: Torque POL The values other than bit 5, 6, and 7 at reading are undefined. Set "0" when writing. Refer to section 8.5.
11552	0	R/W	Velocity limit value	Integer32	50000	Speed limit value Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear))
24744	0	R/W	SI unit position	Unsigned32	0	SI unit position The value will be set automatically depending on the value of [Pr. PT01] (_ x _ _) and [Pr. PT03] (_ _ _ x). Refer to section 9.3.12 (5) for details.
24745	0	R/W	SI unit velocity	Unsigned32	0	SI unit velocity 0.01 mm/s or 0.01 r/min FB010300h (0.01 mm/s) FEB44700h (0.01 r/min)

Note. This is not supported by the MR-J4-\_TM\_ servo amplifier.

### (2) Details on the OMS bit of Controlword (tq mode)

Bit	Symbol	Description
4	(reserved)	(Note)
5	(reserved)	
6	(reserved)	
8	HALT	0: The servo motor is driven. 1: The servo motor stops according to Halt option code (P24669).
9	(reserved)	(Note)

Note. The values in bit 4 to 6, and 9 at reading are undefined. Set "0" when writing.

### (3) Details on the OMS bit of Statusword (tq mode)

Bit	Symbol	Description
10	Target reached (not compatible) (Note 1)	0 (Halt (Bit 8) = 0): Target torque not reached. 0 (Halt (Bit 8) = 1): Axis decelerates 1 (Halt (Bit 8) = 0): Target torque reached. 1 (Halt (Bit 8) = 1): Velocity of axis is 0 Judgment condition for Target torque reached If the error between Actual torque and Target torque has stayed within Torque window for Torque window time or more, Target torque reached is stored. (Note 2)
12	(reserved)	(Note 2)
13	(reserved)	(Note 2)

Note 1. This is not supported by the MR-J4-\_TM\_ servo amplifier.  
2. The value at reading is undefined.

## 6. CONTROL MODE

### (4) Feed constant (P24722)

The following shows setting values of P24722.0 Feed and P24722.1 Shaft revolutions.

[Pr. PT01] setting	Feed	Shaft revolutions
_ 2 _ _ : degree	360000	1
_ 3 _ _ : pulse	Encoder resolution of the servo motor	1

No value can be written to Feed because it is set automatically. Writing a value will be Error No. 02h (Low or high limit exceeded).

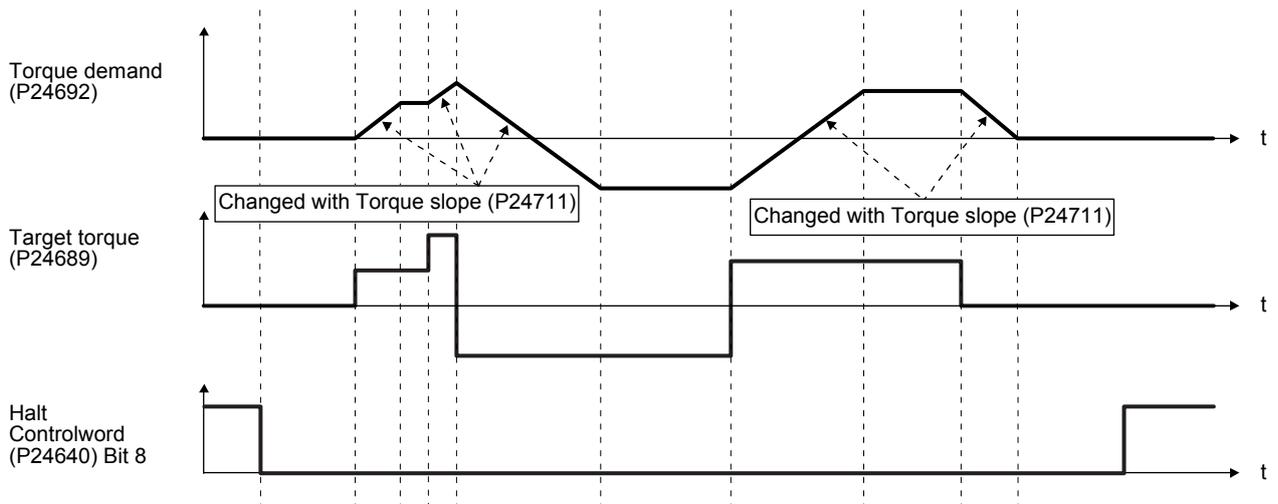
When the command unit is degree and pulse, the value of Shaft revolutions will be set automatically as the above table shows. Writing a value will be Error No. 02h (Low or high limit exceeded).

Additionally, Position actual value (P24676) is calculated from Gear ratio (P24721) and Feed constant (P24722) as follows.

$$\text{Position actual value (P24676)} = \frac{\text{Position actual internal value (P24675)} \times \text{Feed constant (P24722)}}{\text{Position encoder resolution (P24719)} \times \text{Gear ratio (P24721)}}$$

When the unit is degree, the operation result will be limited within 0 to 359999.

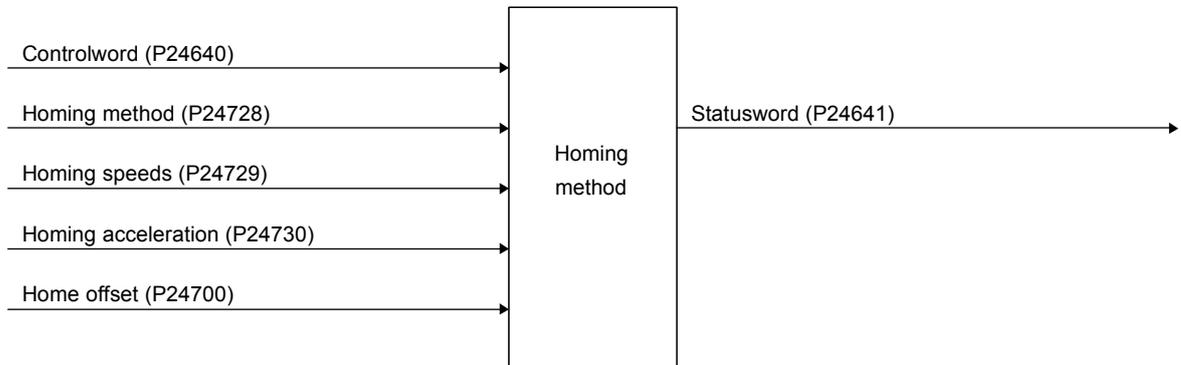
### (5) The tq mode operation sequence



## 6. CONTROL MODE

### 6.6 Homing mode (hm)

The following shows the functions and related PROFIdrive parameters of the homing mode (hm).



#### (1) Related object

In the homing mode (hm), the servo motor is not brought to a slow stop according to the deceleration time constant when the stroke end is detected. The motor is brought to a quick stop. Set the home position return speed carefully.

PNU	Sub	Access	Name	Type	Default value	Description
24700	0	R	Home offset	Integer32		The home position saved in EEPROM is stored at power-on. If a home position return is executed in the homing mode (hm), the home position will be updated. If [Pr. PA03 Absolute position detection system] is disabled, 0 is always stored.
24728	0	R/W	Homing Method	Integer8	-1	Specify a home position return type. Refer to (4) in this section for supported home position return types.
24729	0	R/W	Speed during search for switch	Array [2] Unsigned32	10000	Specify the travel speed until dog detection. Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear)) Range: 0 to servo motor maximum speed
	1	R/W	Speed during search for zero		1000	Specify the travel speed up to the home position after dog detection. Unit: Vel unit (0.01 r/min or 0.01 mm/s (linear)) Range: 0 to servo motor maximum speed
24730	0	R/W	Homing acceleration	Unsigned32	0	Acceleration/deceleration time constant at home position return Unit: ms
24803	0	R	1 <sup>st</sup> supported homing method	Array [39] Integer8	37	The home position return type that uses the current position as a home position is supported.
	to 38	R	39 <sup>th</sup> supported homing method		-43	The dogless Z-phase reference home position return type (reverse rotation) is supported.

## 6. CONTROL MODE

### (2) Details on the OMS bit of Controlword (hm mode)

Bit	Symbol	Description
4	HOS	Homing operation start (Note 1) 0: Do not start homing procedure 1: Start or continue homing procedure
5		(Reserved) (Note 2)
6		(Reserved) (Note 2)
8	HALT	Halt (Note 1) 0: Bit 4 enable 1: Stop axis according to halt option code (P24669)

- Note 1. Bit 4 and 8 are enabled only in the homing mode (hm).  
2. The values in bit 5 and 6 at reading are undefined. Set "0" when writing.

### (3) Details on the OMS bit of Statusword (hm mode)

Bit	Symbol	Description
10	Target reached	Refer to the following table for the definition.
12	Homing attained	Refer to the following table for the definition.
13	Homing error	Refer to the following table for the definition.

Statusword Bit 10, 12, and 13 in the hm mode.

Bit 13	Bit 12	Bit 10	Definition
0	0	0	Homing procedure is in progress.
0	0	1	Homing procedure is interrupted or not started.
0	1	0	Homing is attained, but target is not reached.
0	1	1	Homing procedure is completed successfully.
1	0	0	Homing error occurred, velocity is not 0.
1	0	1	Homing error occurred, velocity is 0.
1	1		reserved

## 6. CONTROL MODE

### (4) List of Homing method

POINT
<ul style="list-style-type: none"> <li>● In the following cases, make sure that the Z-phase has been passed through once before the home position return.               <ul style="list-style-type: none"> <li>▪ When using an incremental linear encoder in the linear servo motor control mode</li> <li>▪ When using an incremental external encoder in the fully closed loop control mode</li> <li>▪ For the use in the DD motor control mode</li> </ul>               Z-phase unpassed will trigger [AL. 90.5 Z-phase unpassed].             </li> <li>● To execute a home position return securely, start a home position return after moving the servo motor to the opposite stroke end with csv or pv from the controller and others. Whether the servo motor has reached the stroke end can be checked with Digital inputs (P24829).</li> <li>● When changing the mode after the home position return completion, set 0 to the Target position (P24698) and change the control mode.</li> </ul>

To specify the home position return type in the homing mode (hm), use Homing Method (P24728). The MR-J4-\_TM\_ servo amplifier supports Homing method in the following table.

Method No.	Home position return type	Rotation direction	Description
-1	Dog type (Rear end detection, Z-phase reference)	Forward rotation	Deceleration starts at the front end of the proximity dog. After the rear end is passed, the position specified by the first Z-phase signal, or the position of the first Z-phase signal shifted by the specified home position shift distance is used as the home position.
-33		Reverse rotation	
-3	Data set type home position return		The current position is set as the home position.
-4	Stopper type (Stopper position reference)	Forward rotation	A workpiece is pressed against a mechanical stopper, and the position where it is stopped is set as the home position.
-36		Reverse rotation	
-2	Count type (Front end detection, Z-phase reference)	Forward rotation	At the front end of the proximity dog, deceleration starts. After the front end is passed, the position specified by the first Z-phase signal after the set distance or the position of the Z-phase signal shifted by the set home position shift distance is set as a home position.
-34		Reverse rotation	
-6	Dog type (Rear end detection, rear end reference)	Forward rotation	Deceleration starts from the front end of the proximity dog. After the rear end is passed, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position.
-38		Reverse rotation	
-7	Count type (Front end detection, front end reference)	Forward rotation	Deceleration starts from the front end of the proximity dog. The position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position.
-39		Reverse rotation	
-8	Dog cradle type	Forward rotation	A position, which is specified by the first Z-phase signal after the front end of the proximity dog is detected, is set as the home position.
-40		Reverse rotation	
-9	Dog type last Z-phase reference	Forward rotation	After the front end of the proximity dog is detected, the position is shifted away from the proximity dog in the reverse direction. Then, the position specified by the first Z-phase signal or the position of the first Z-phase signal shifted by the home position shift distance is used as the home position.
-41		Reverse rotation	
-10	Dog type front end reference	Forward rotation	Starting from the front end of the proximity dog, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position.
-42		Reverse rotation	
-11	Dogless Z-phase reference	Forward rotation	The position specified by the first Z-phase signal, or the position of the first Z-phase signal shifted by the home position shift distance is used as the home position.
-43		Reverse rotation	

## 6. CONTROL MODE

Method No.	Home position return type	Rotation direction	Description
3	Homing on positive home switch and index pulse	Forward rotation	Same as the dog type last Z-phase reference home position return. Note that if the stroke end is detected during home position return, [AL. 90 Home position return incomplete warning] occurs.
4	Homing on positive home switch and index pulse	Forward rotation	Same as the dog cradle type home position return. Note that if the stroke end is detected during home position return, [AL. 90 Home position return incomplete warning] occurs.
5	Homing on negative home switch and index pulse	Reverse rotation	Same as the dog type last Z-phase reference home position return. Note that if the stroke end is detected during home position return, [AL. 90 Home position return incomplete warning] occurs.
6	Homing on negative home switch and index pulse	Reverse rotation	Same as the dog cradle type home position return. Note that if the stroke end is detected during home position return, [AL. 90 Home position return incomplete warning] occurs.
7	Homing on home switch and index pulse	Forward rotation	Same as the dog type last Z-phase reference home position return.
8	Homing on home switch and index pulse	Forward rotation	Same as the dog cradle type home position return.
11	Homing on home switch and index pulse	Reverse rotation	Same as the dog type last Z-phase reference home position return.
12	Homing on home switch and index pulse	Reverse rotation	Same as the dog cradle type home position return.
19	Homing without index pulse	Forward rotation	Same as the dog type front end reference home position return. Note that if the stroke end is detected during home position return, [AL. 90 Home position return incomplete warning] occurs.
20	Homing without index pulse	Forward rotation	Although this type is the same as the dog cradle type home position return, the stop position is not on the Z-phase. Starting from the front end of the dog, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position. If the stroke end is detected during home position return, [AL. 90 Home position return incomplete warning] occurs.
21	Homing without index pulse	Reverse rotation	Same as the dog type front end reference home position return. Note that if the stroke end is detected during home position return, [AL. 90 Home position return incomplete warning] occurs.
22	Homing without index pulse	Reverse rotation	Although this type is the same as the dog cradle type home position return, the stop position is not on the Z-phase. Starting from the front end of the dog, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position. If the stroke end is detected during home position return, [AL. 90 Home position return incomplete warning] occurs.
23	Homing without index pulse	Forward rotation	Same as the dog type front end reference home position return.
24	Homing without index pulse	Forward rotation	Although this type is the same as the dog cradle type home position return, the stop position is not on the Z-phase. Starting from the front end of the dog, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position.
27	Homing without index pulse	Reverse rotation	Same as the dog type front end reference home position return.
28	Homing without index pulse	Reverse rotation	Although this type is the same as the dog cradle type home position return, the stop position is not on the Z-phase. Starting from the front end of the dog, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position.
33	Homing on index pulse	Reverse rotation	Although this type is the same as the dogless Z-phase reference home position return, the creep speed is applied as the movement start speed.
34	Homing on index pulse	Forward rotation	Although this type is the same as the dogless Z-phase reference home position return, the creep speed is applied as the movement start speed.
35	Homing on current position		The current position is set as the home position. This type can be executed not in the Operation Enabled (servo-on) state.
37	Homing on current position		The current position is set as the home position. This type can be executed not in the Operation Enabled (servo-on) state.

## 6. CONTROL MODE

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### (5) CiA 402-type homing method

#### (a) Home position return type in CiA 402 type

The following shows the CiA 402-type home position return.

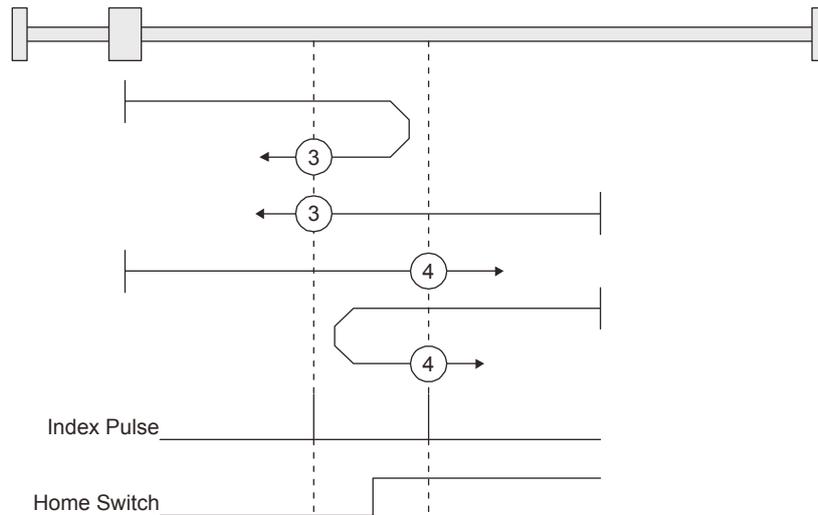
##### 1) Method 3 and 4: Homing on positive home switch and index pulse

These home position return types use the front end of the proximity dog as reference and set the Z-phase right before and right after the dog as a home position.

Method 3 has the operation of the dog type last Z-phase reference home position return, and

Method 4 has the operation of the dog cradle type home position return at a forward rotation start.

However, if the stroke end is detected during home position return, [AL. 90] occurs.



##### 2) Method 5 and 6: Homing on negative home switch and index pulse

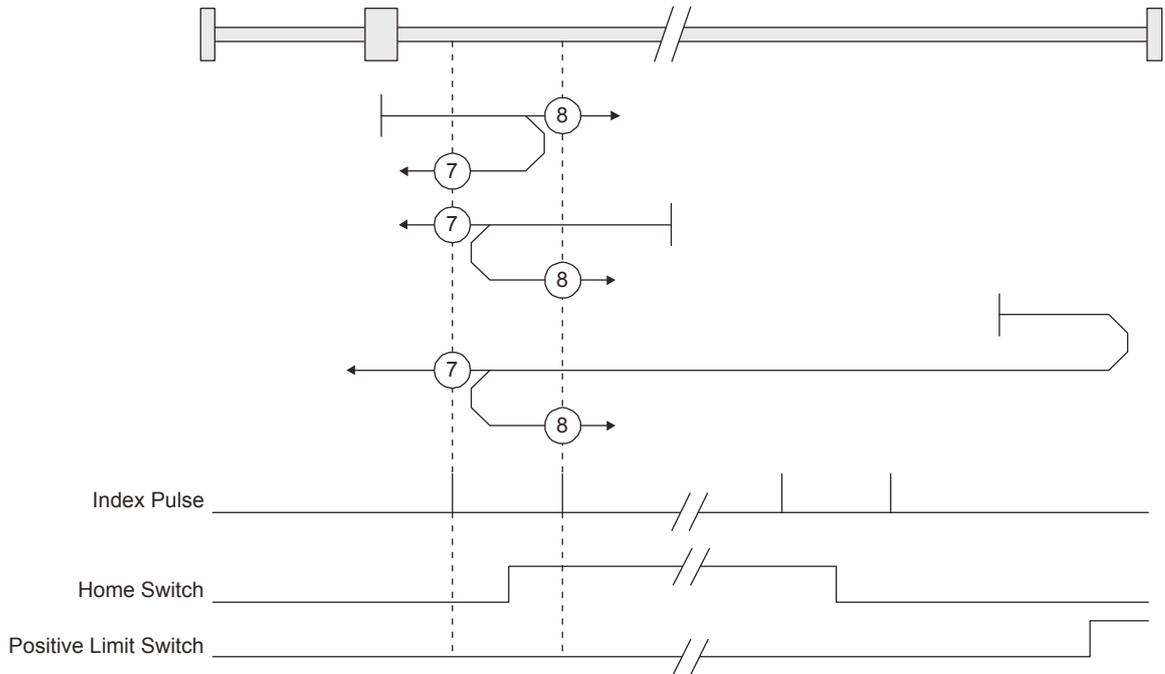
These home position return types use the front end of the proximity dog as reference and set the Z-phase right before and right after the dog as a home position. Method 5 and 6 differ from

Method 3 and Method 4 in the starting direction: the starting direction of Method 5 and 6 is the reversed direction.

## 6. CONTROL MODE

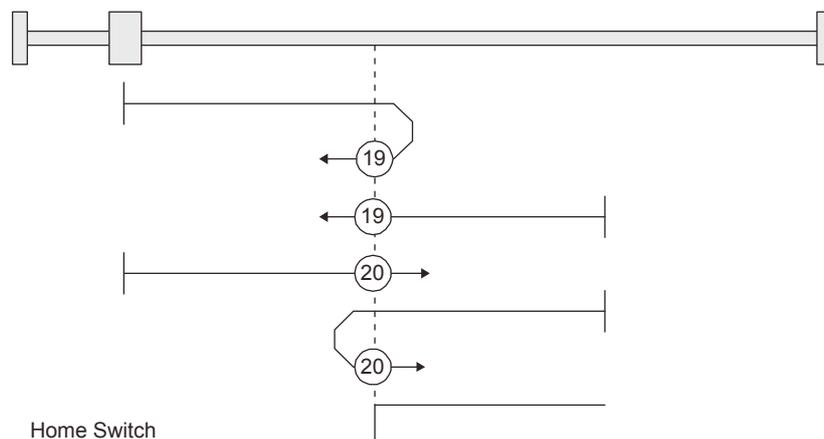
### 3) Method 7, 8, 11, 12: Homing on home switch and index pulse

These types include the operation at stroke end detection in addition to the operation of Method 3 to Method 6. Thus, the home position is the same as that of Method 3 to Method 6. Method 7 has the operation of the dog type last Z-phase reference home position return. Method 8 has the operation of the dog cradle type home position return at a forward rotation start. Method 11 and 12 differ from Method 7 and Method 8 only in the starting direction: the starting direction of Method 11 and 12 is the reversed direction.



### 4) Method 17 to 30: Homing without index pulse

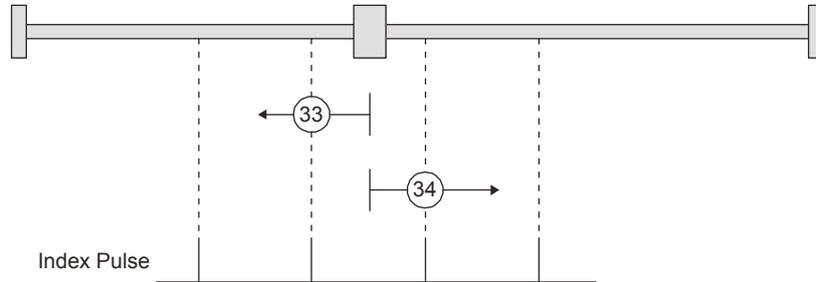
Method 17 to 30 have the operation of Method 1 to Method 14; however, these types set the home position not on the Z-phase but on the dog. Method 17 to 30 have the operation of Method 1 to Method 14; however, these types set the home position not on the Z-phase but on the dog. The following figure shows the operation of the home position return type of Method 19 and Method 20. Method 19 and Method 20 have the operation of Method 3 and Method 4; however, these types set the home position not on the Z-phase but on the dog. Method 19 has the operation of the dog type front end reference home position return. Method 20 has the operation of the dog cradle type home position return; however, the stop position is not on the Z-phase but on the dog.



## 6. CONTROL MODE

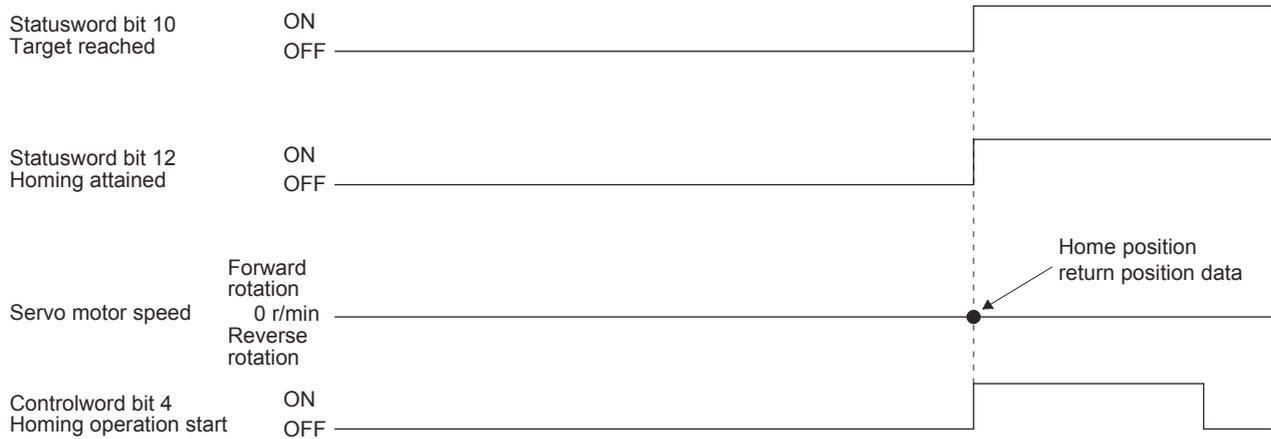
### 5) Method 33 and 34: Homing on index pulse

These home position return types set the Z-phase detected first as a home position. The operation is the same as that of the dogless Z-phase reference home position return except that the creep speed is applied at the start.



### 6) Method 35 and 37: Homing on current position

These home position return types set the current position as a home position. The operation is the same as that of the data set type home position return; however, these types can be executed even during servo-off.



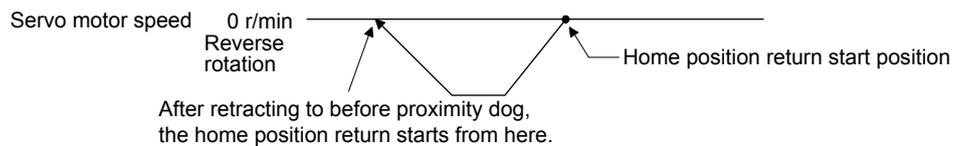
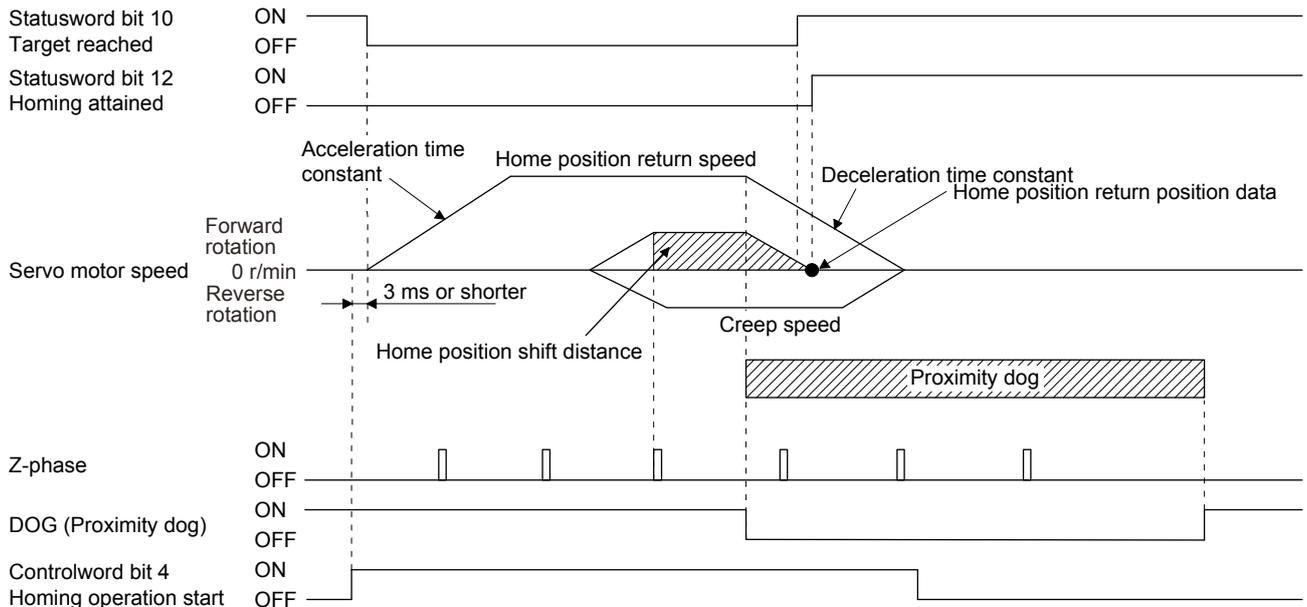
## 6. CONTROL MODE

### (b) Operation example of the CiA 402-type Homing method

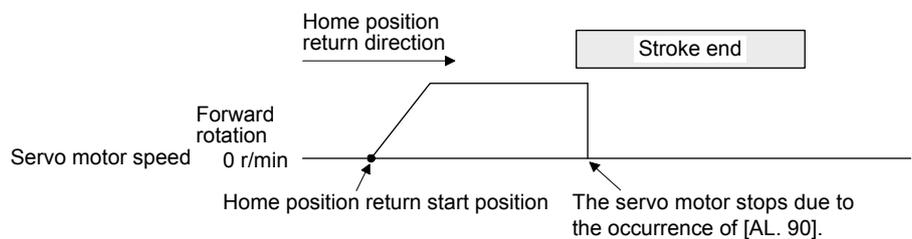
The following shows an operation example of the home position return in the CiA 402-type Homing method.

#### 1) Method 3 (Homing on positive home switch and index pulse) and Method 5 (Homing on negative home switch and index pulse)

The following figure shows the operation of Homing method 3. The operation direction of Homing method 5 is opposite to that of Homing method 3.



When a home position return is started from the proximity dog

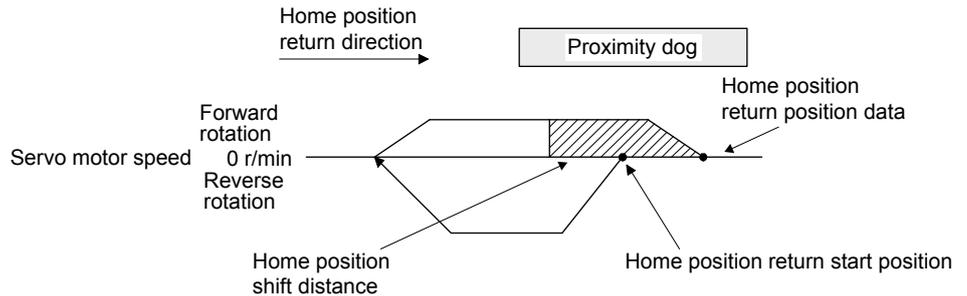
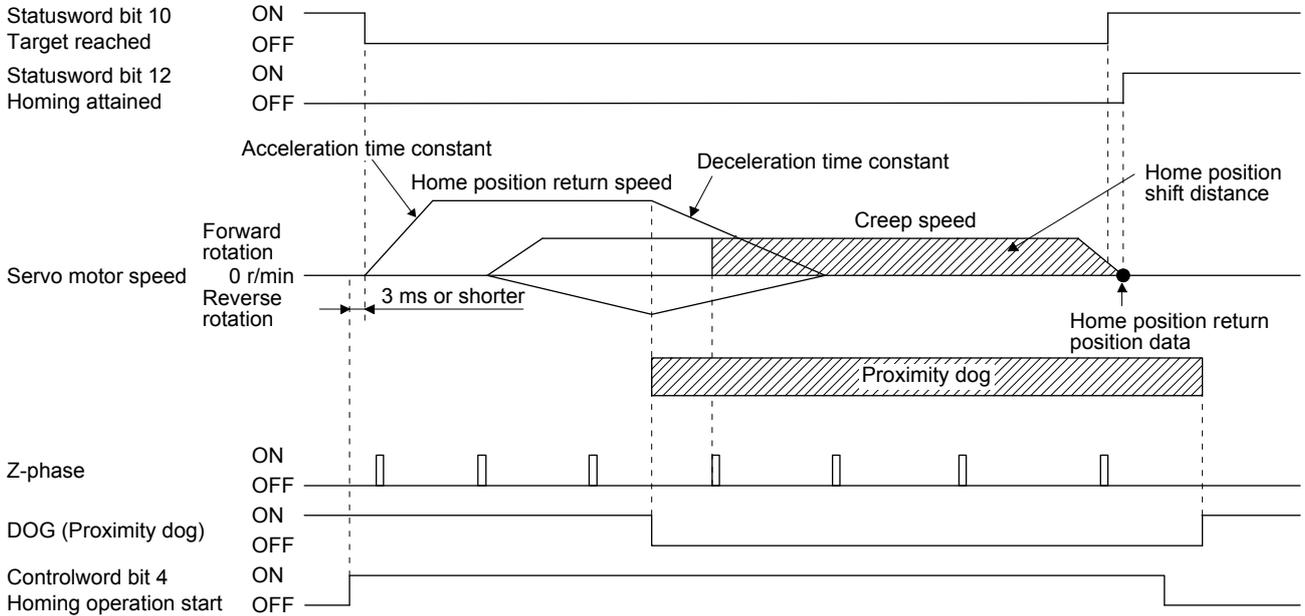


When the stroke end is detected

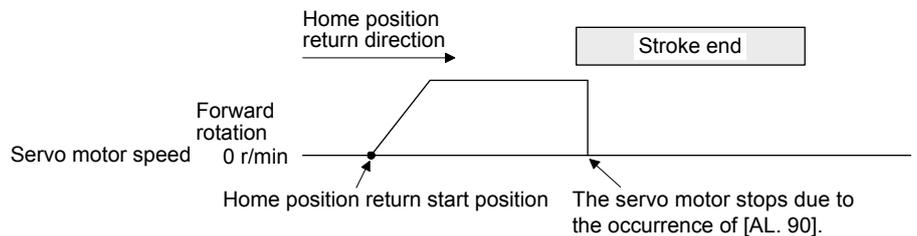
## 6. CONTROL MODE

- 2) Method 4 (Homing on positive home switch and index pulse) and Method 6 (Homing on negative home switch and index pulse)

The following figure shows the operation of Homing method 4. The operation direction of Homing method 6 is opposite to that of Homing method 4.



When a home position return is started from the proximity dog

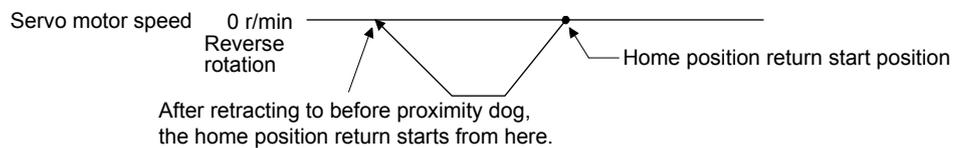
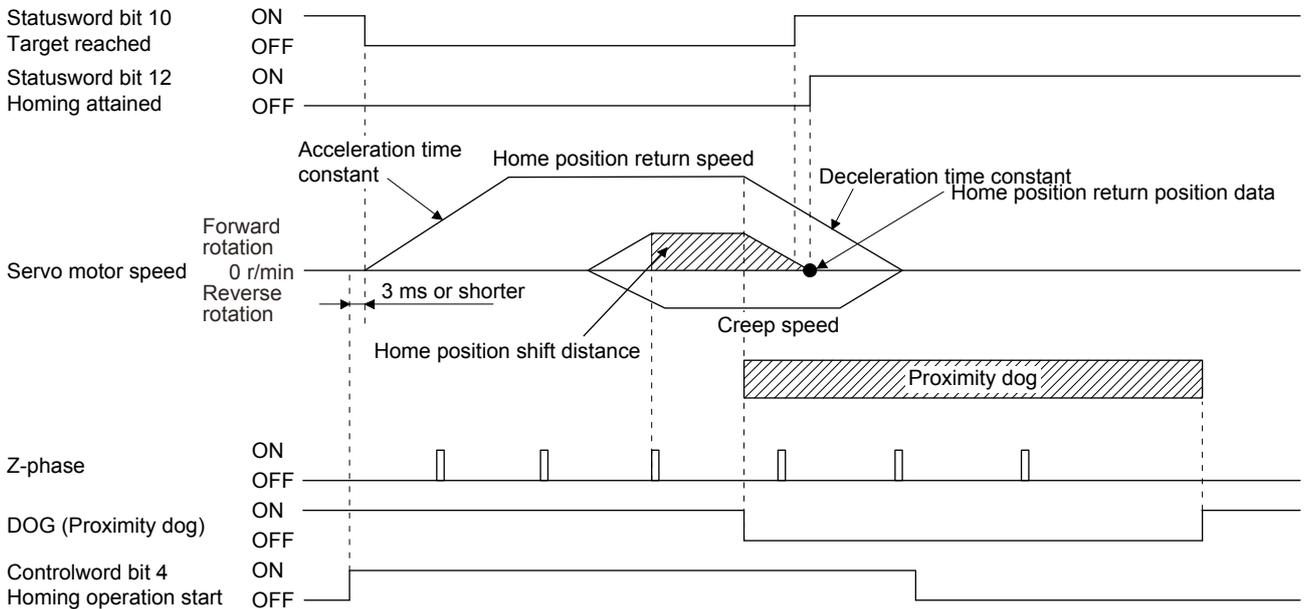


When the stroke end is detected

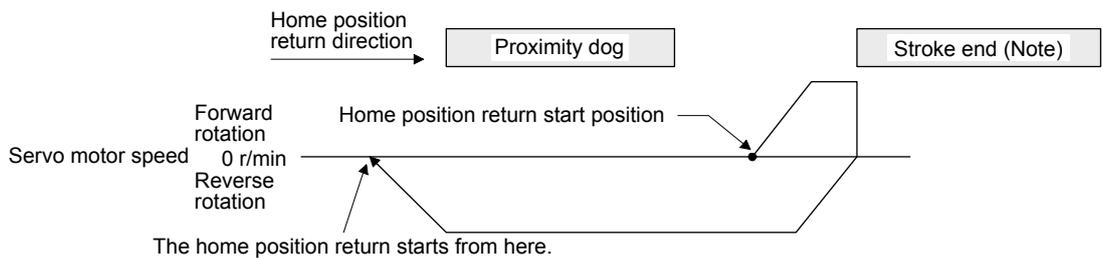
## 6. CONTROL MODE

### 3) Method 7 and Method 11 (Homing on home switch and index pulse)

The following figure shows the operation of Homing method 7. The operation direction of Homing method 11 is opposite to that of Homing method 7.



When a home position return is started from the proximity dog



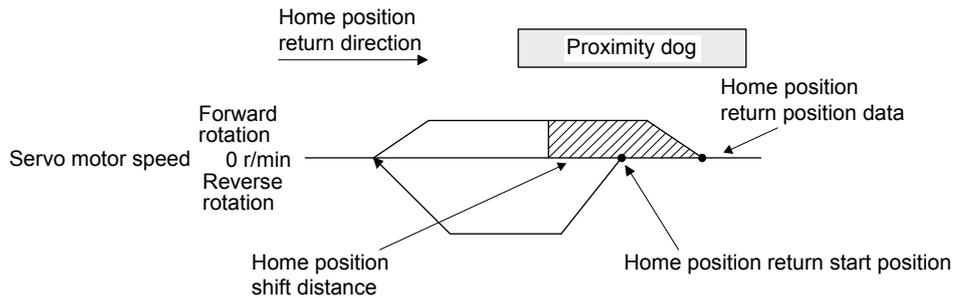
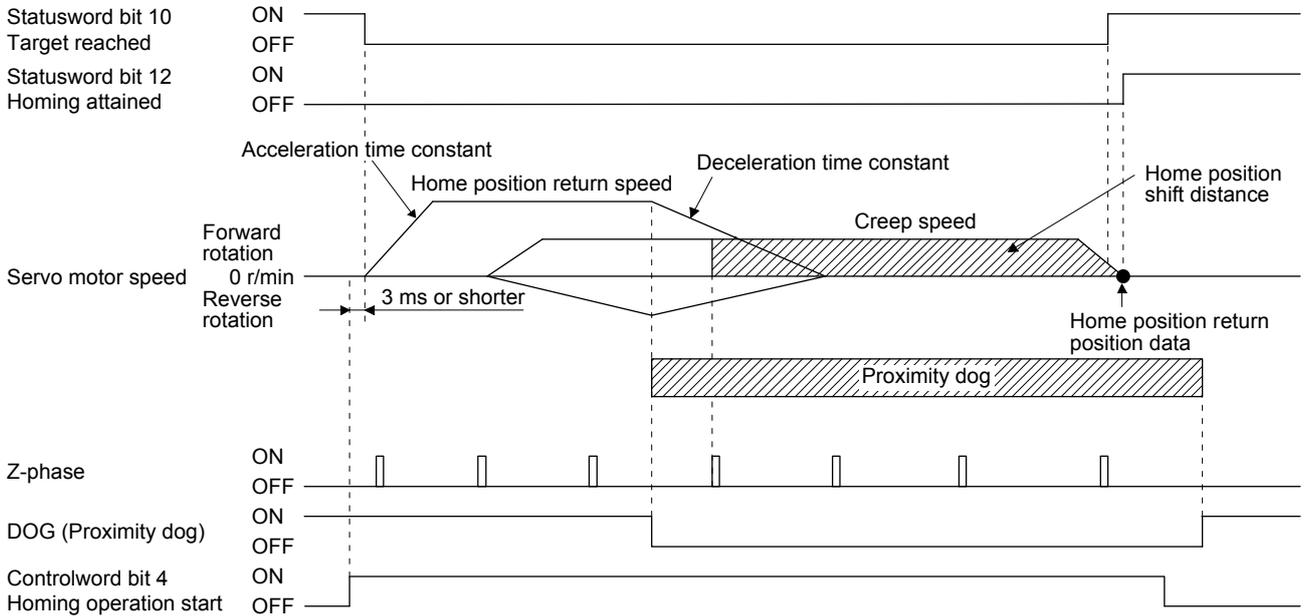
Note. The software limit cannot be used with these functions.

When the movement is returned at the stroke end

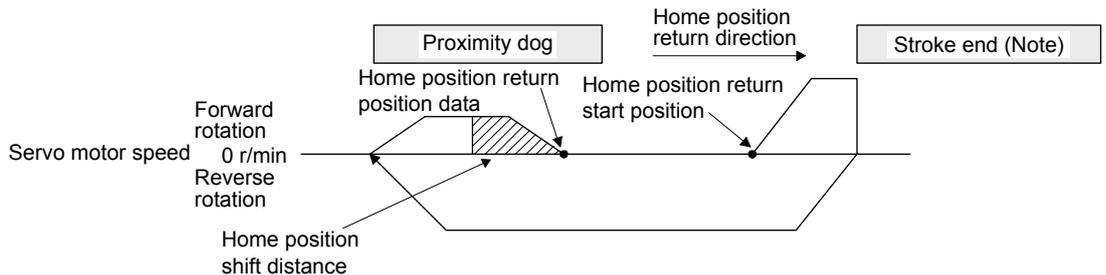
# 6. CONTROL MODE

## 4) Method 8 and Method 12 (Homing on home switch and index pulse)

The following figure shows the operation of Homing method 8. The operation direction of Homing method 12 is opposite to that of Homing method 8.



When a home position return is started from the proximity dog



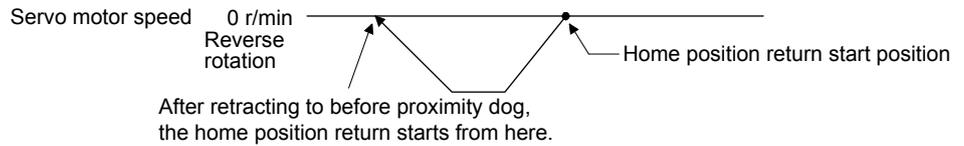
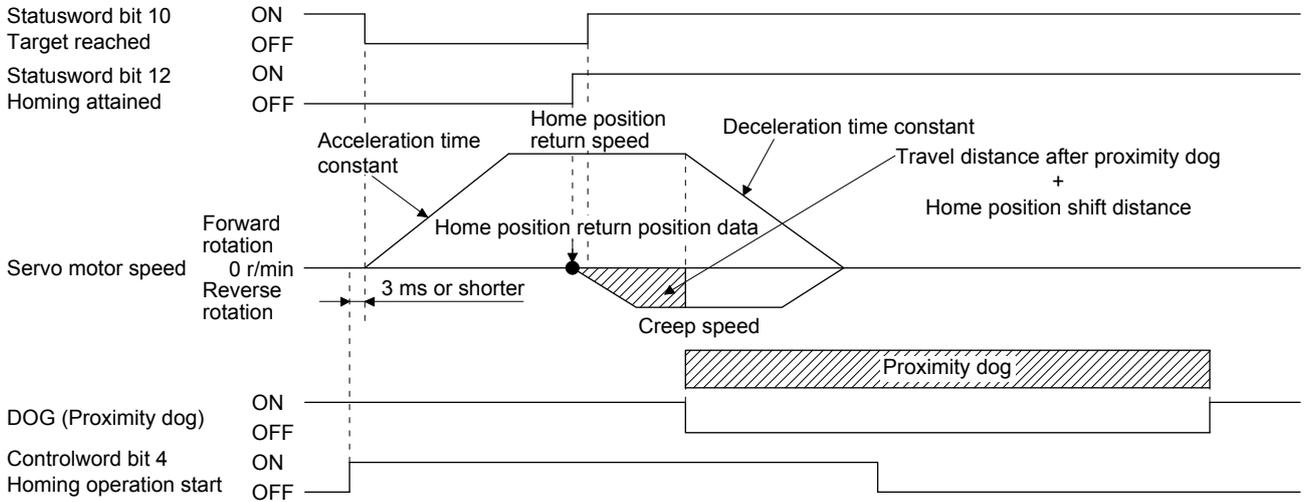
Note. The software limit cannot be used with these functions.

When the movement is returned at the stroke end

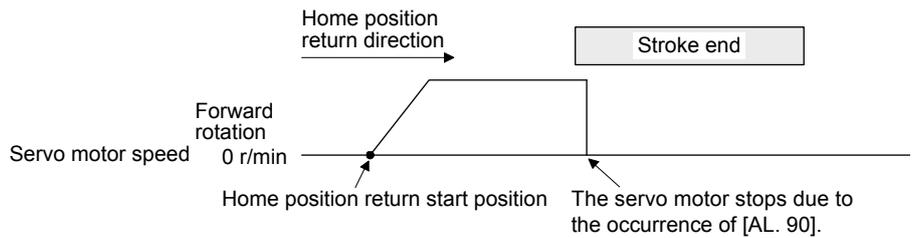
# 6. CONTROL MODE

## 5) Method 19 and Method 21 (Homing without index pulse)

The following figure shows the operation of Homing method 19. The operation direction of Homing method 21 is opposite to that of Homing method 19.



When a home position return is started from the proximity dog

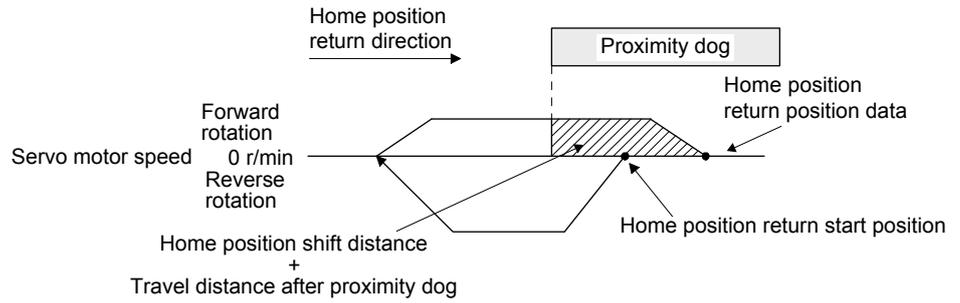
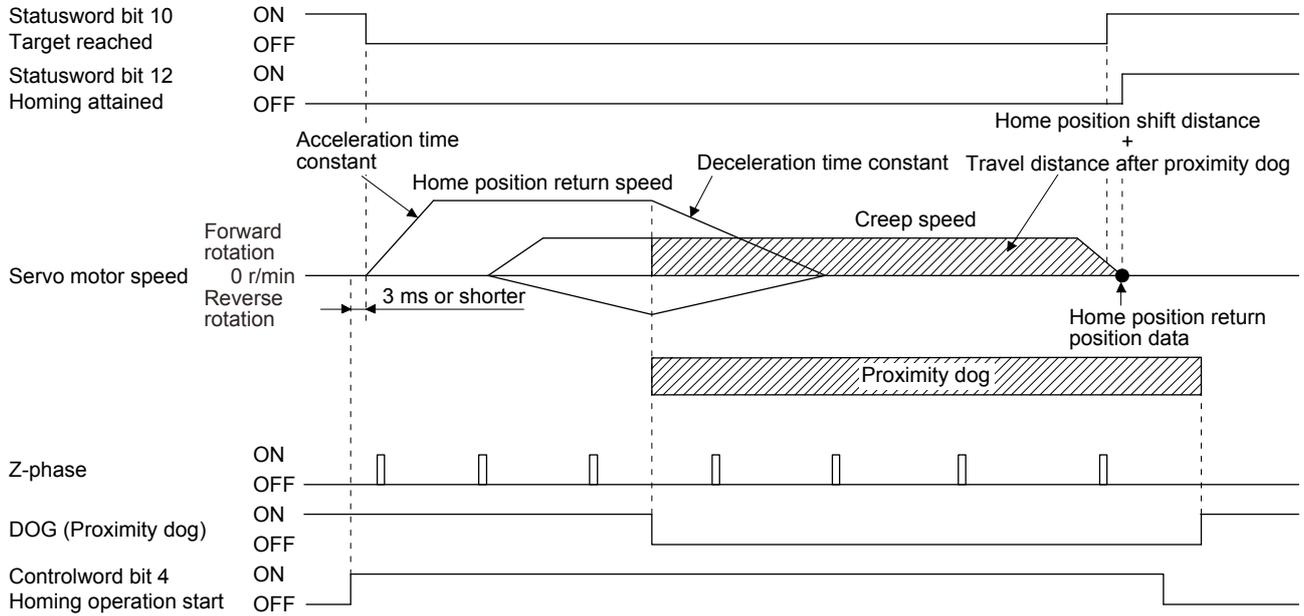


When the stroke end is detected

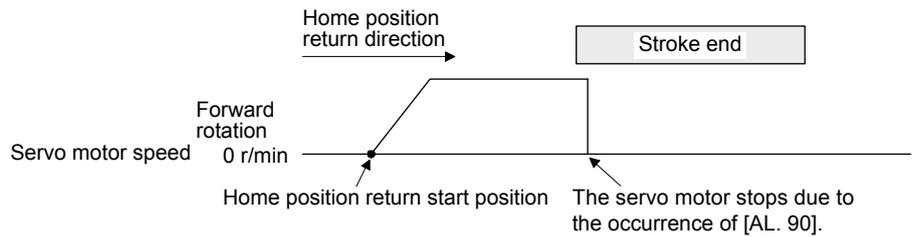
# 6. CONTROL MODE

## 6) Method 20 and Method 22 (Homing without index pulse)

The following figure shows the operation of Homing method 20. The operation direction of Homing method 22 is opposite to that of Homing method 20.



When a home position return is started from the proximity dog

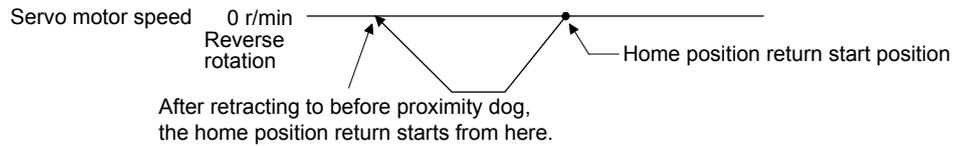
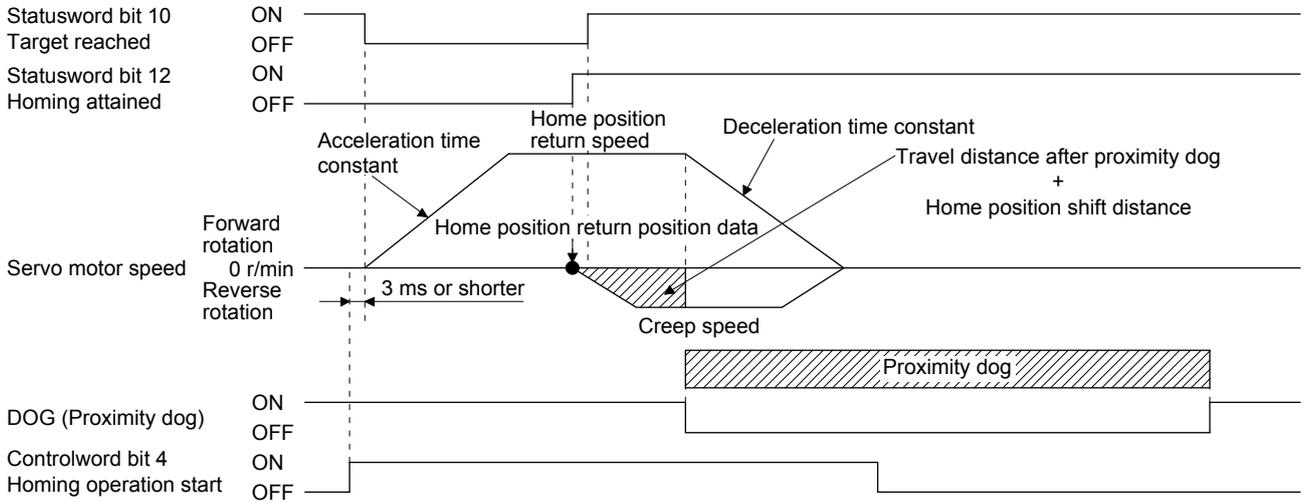


When the stroke end is detected

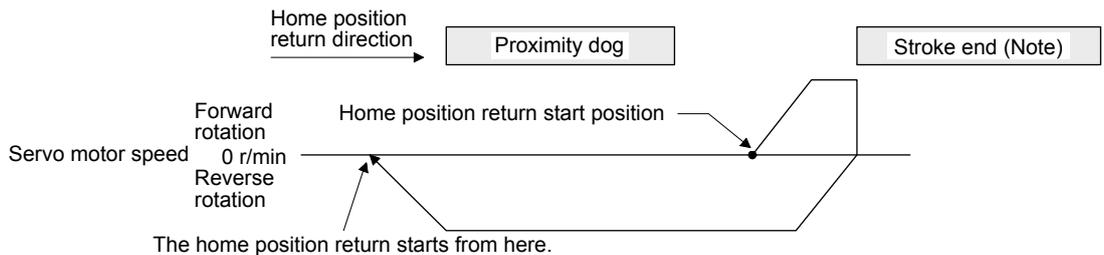
## 6. CONTROL MODE

### 7) Method 23 and Method 27 (Homing without index pulse)

The following figure shows the operation of Homing method 23. The operation direction of Homing method 27 is opposite to that of Homing method 23.



When a home position return is started from the proximity dog



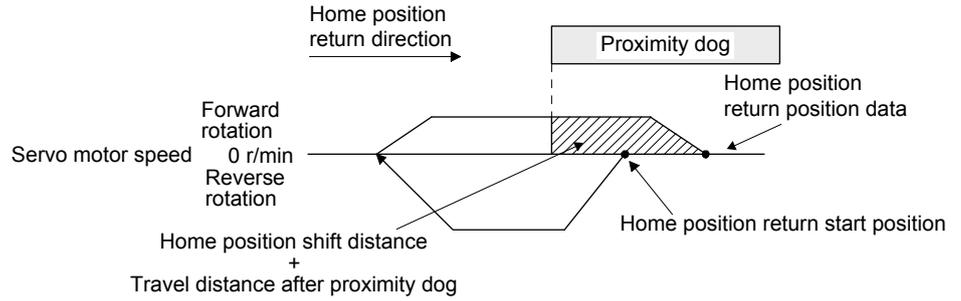
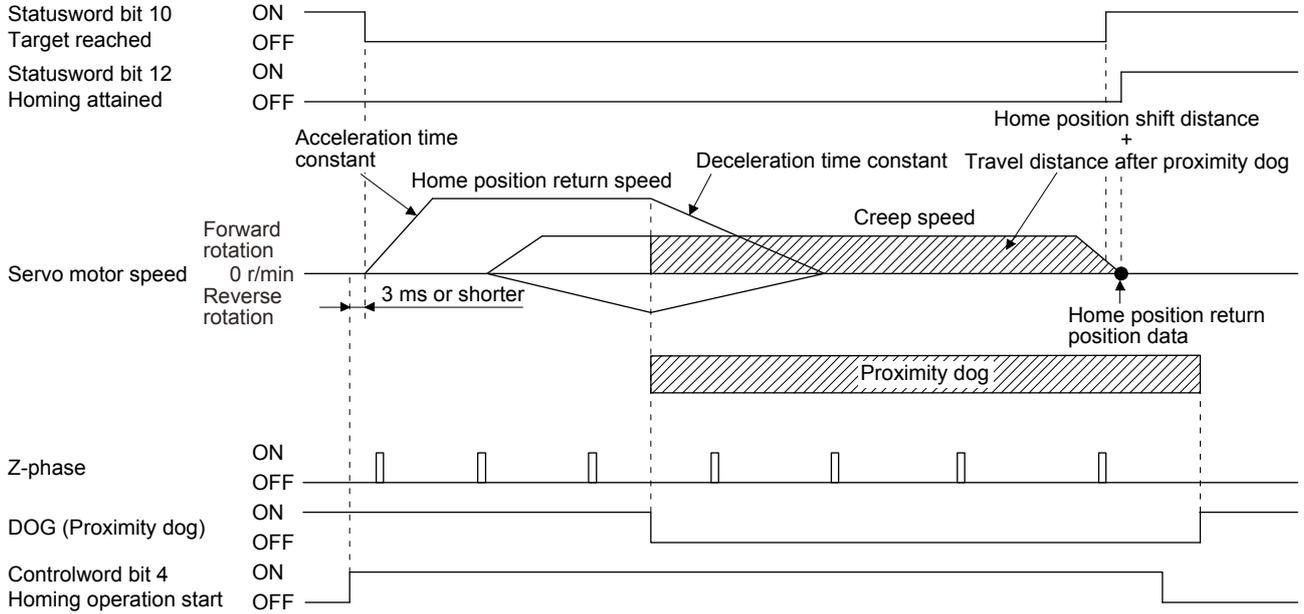
Note. The software limit cannot be used with these functions.

When the movement is returned at the stroke end

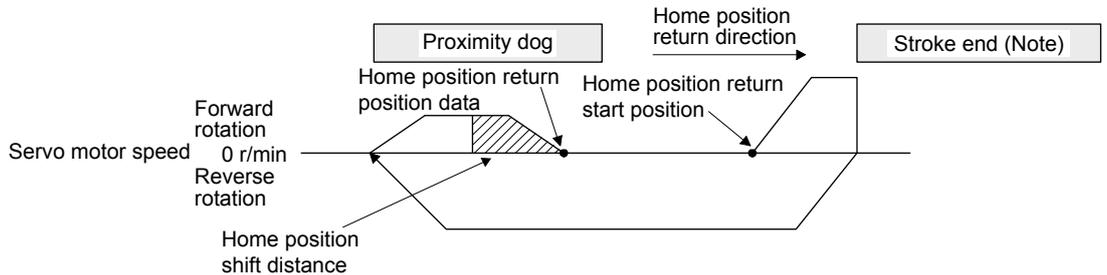
# 6. CONTROL MODE

## 8) Method 24 and Method 28 (Homing without index pulse)

The following figure shows the operation of Homing method 24. The operation direction of Homing method 28 is opposite to that of Homing method 24.



When a home position return is started from the proximity dog



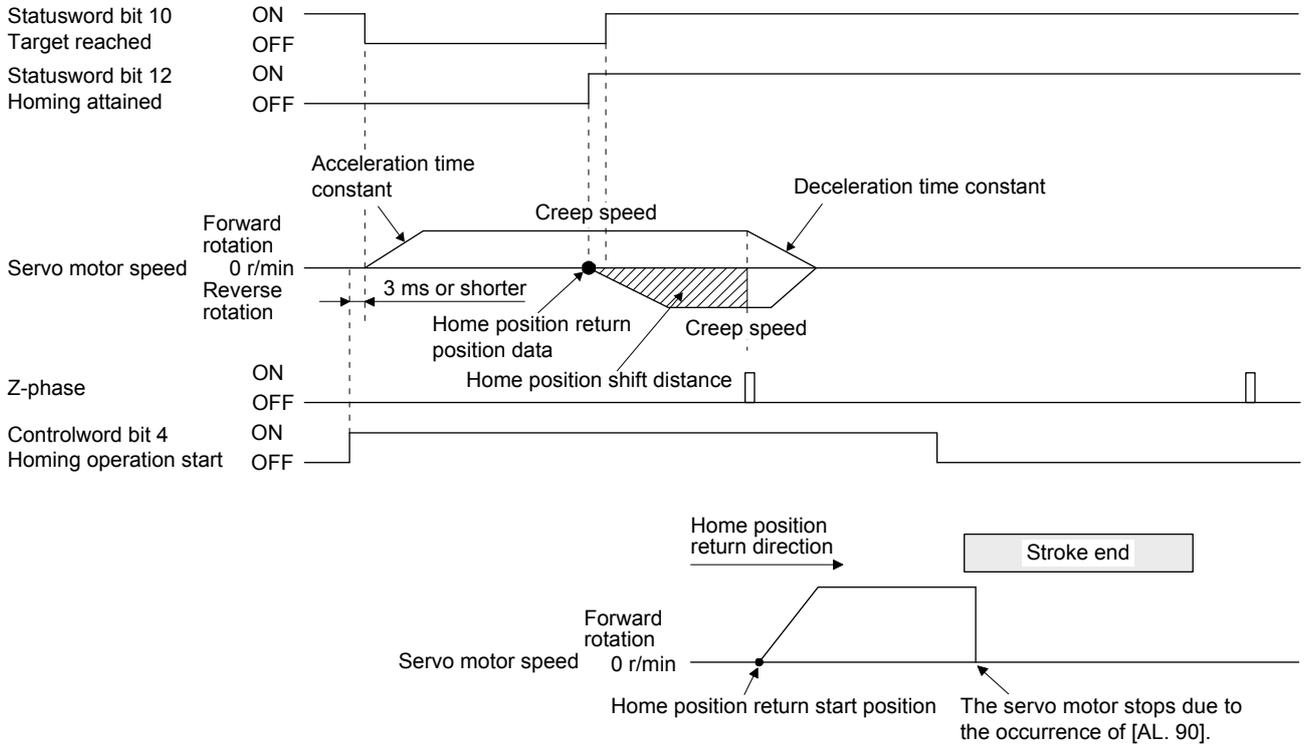
Note. The software limit cannot be used with these functions.

When the movement is returned at the stroke end

## 6. CONTROL MODE

### 9) Method 33 and Method 34 (Homing on index pulse)

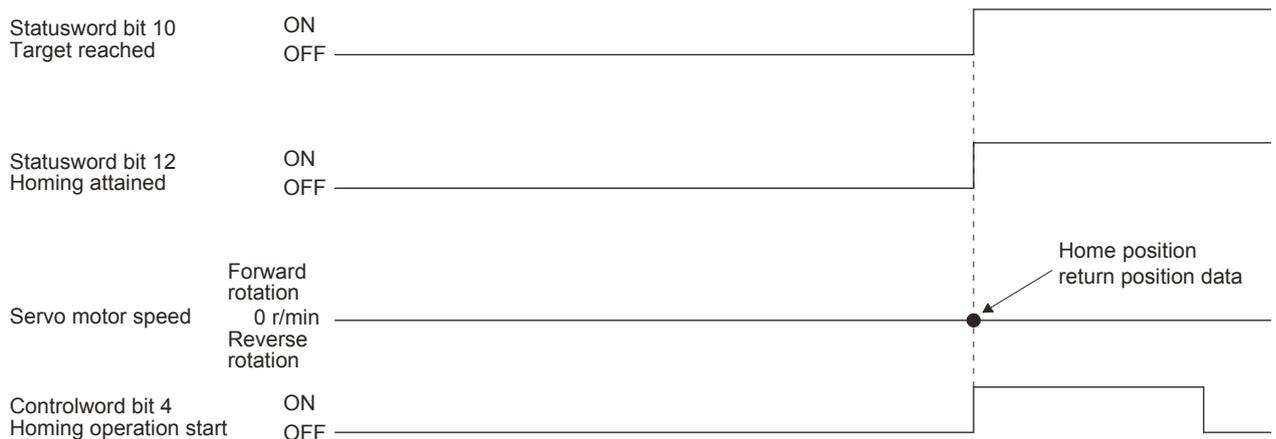
The following figure shows the operation of Homing method 34. The operation direction of Homing method 33 is opposite to that of Homing method 34.



When the stroke end is detected

### 10) Method 35 and Method 37 (Homing on current position)

The following figure shows the operation of Homing method 35 and Homing method 37. These methods can be performed in the servo-off status.



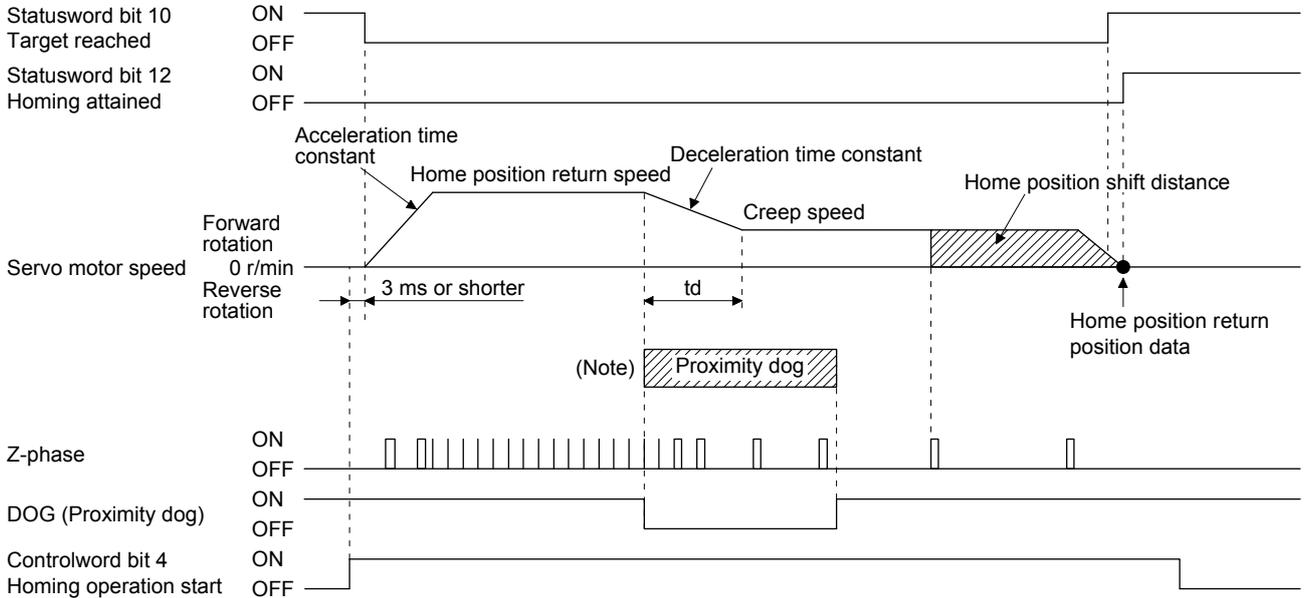
# 6. CONTROL MODE

## (6) Operation example of Manufacturer-specific Homing method

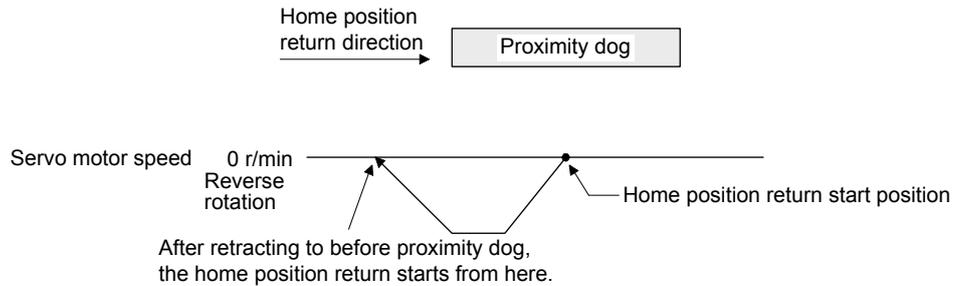
The following shows an operation example of the Manufacturer-specific home return.

### (a) Method -1 and -33 (Dog type home position return)

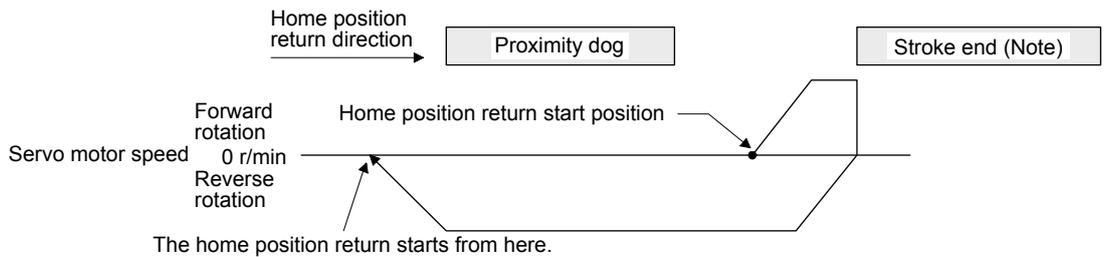
The following figure shows the operation of Homing method -1. The operation direction of Homing method -33 is opposite to that of Homing method -1.



Note. After the front end of the proximity dog is detected, if the distance after proximity dog is traveled without reaching the creep speed, [AL. 90] occurs. Set the travel distance after proximity dog enough for deceleration from the home position return speed to the creep speed.



When a home position return is started from the proximity dog



Note. The software limit cannot be used with these functions.

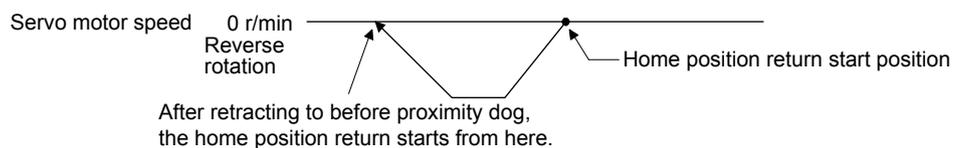
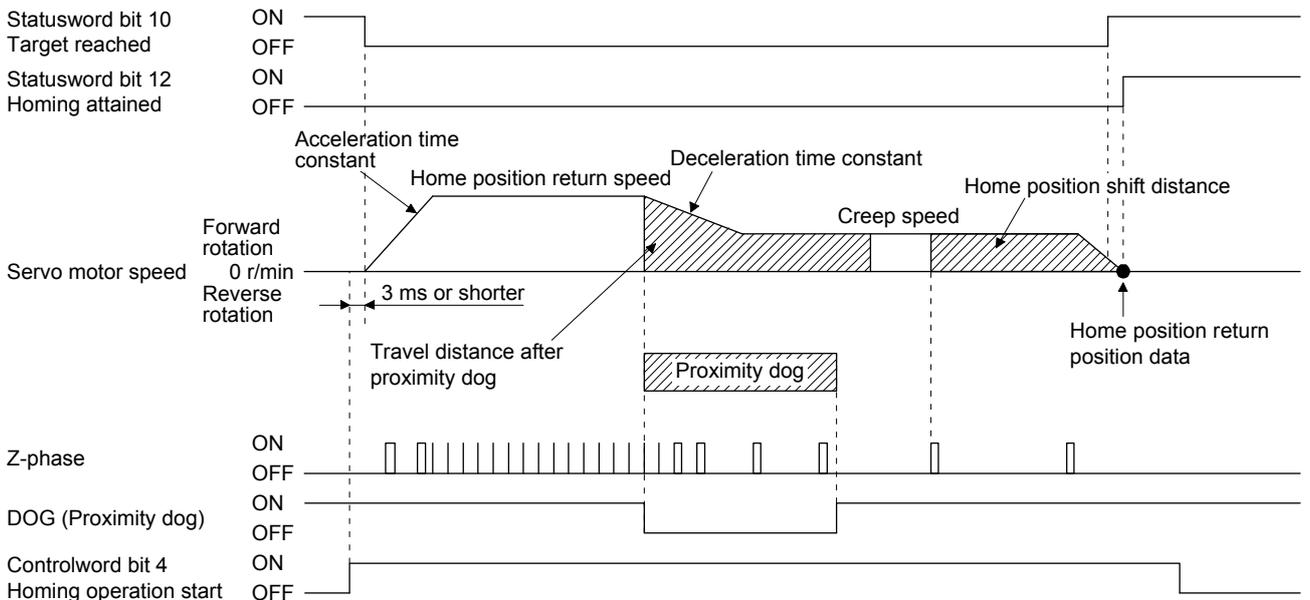
When the movement is returned at the stroke end

## 6. CONTROL MODE

(b) Method -2 and -34 (Count type home position return)

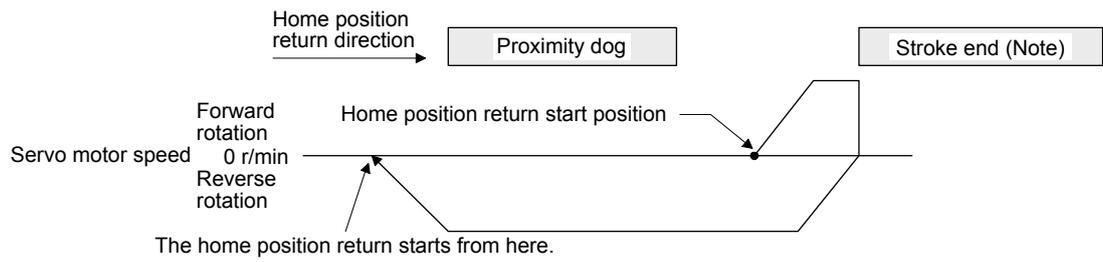
POINT
<p>● For the count type home position return, after the front end of the proximity dog is detected, the position is shifted by the distance set in the travel distance after proximity dog. Then, the first Z-phase is set as the home position. Therefore, when the on-time of the proximity dog is 10 ms or more, the length of the proximity dog has no restrictions. Use this home position return type when the dog type home position return cannot be used because the length of the proximity dog cannot be reserved or other cases.</p>

The following figure shows the operation of Homing method -2. The operation direction of Homing method -34 is opposite to that of Homing method -2. After the front end of the proximity dog is detected, if the distance after proximity dog is traveled without reaching the creep speed, [AL. 90] occurs. Set the travel distance after proximity dog enough for deceleration from the home position return speed to the creep speed.



When a home position return is started from the proximity dog

## 6. CONTROL MODE

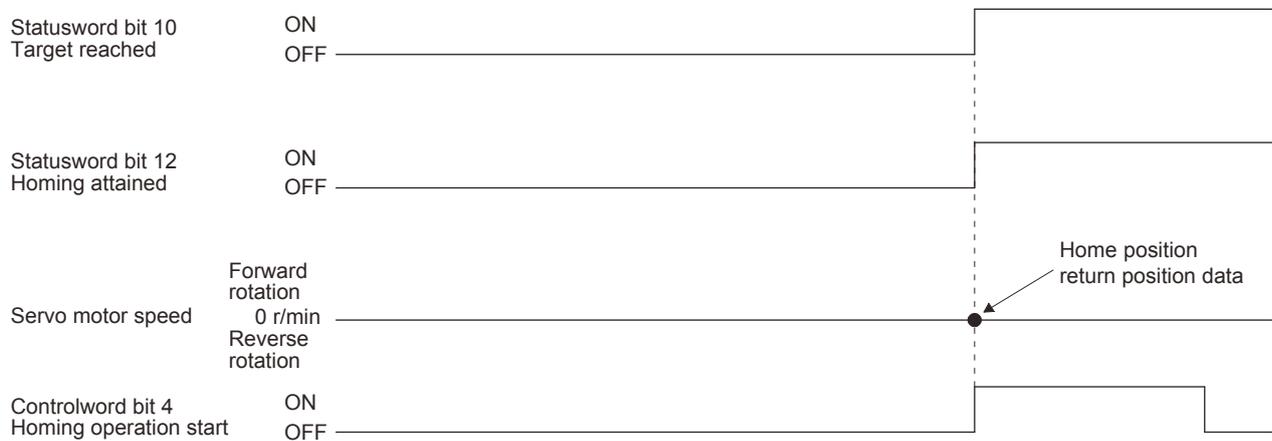


Note. The software limit cannot be used with these functions.

When the movement is returned at the stroke end

### (c) Method -3 (Data set type home position return)

The following figure shows the operation of Homing method -3. This type cannot be executed during servo-off.

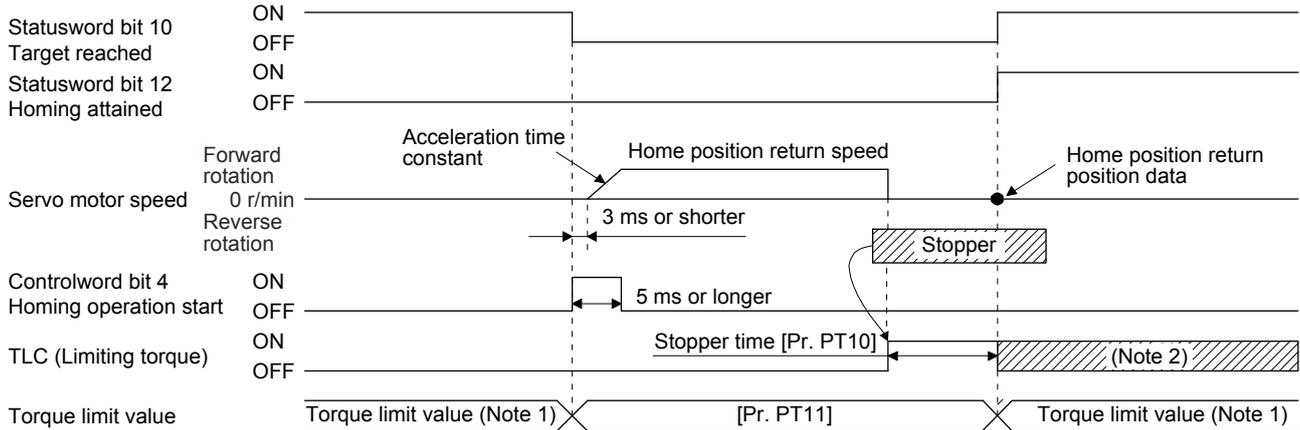


## 6. CONTROL MODE

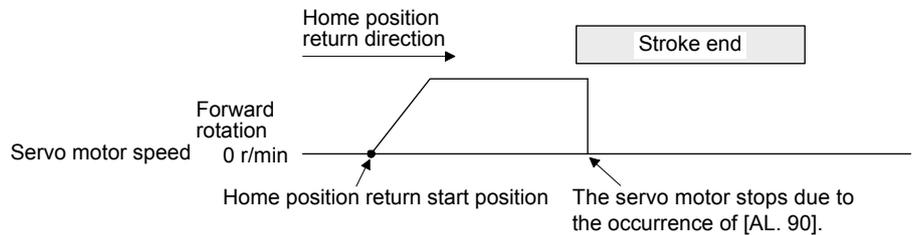
(d) Method -4 and -36 (stopper type home position return)

POINT
<p>● Since the workpiece collides with the mechanical stopper, the home position return speed must be low enough.</p>

The following figure shows the operation of Homing method -4. The operation direction of Homing method -36 is opposite to that of Homing method -4.



- Note 1. When Method -4 is set, the torque limit value of Positive torque limit value (P24800) is applied. When Method -36 is set, the torque limit value of Negative torque limit value (P24801) is applied.
- Note 2. If the torque limit value is reached, TLC remains on after the home position return is completed.



When the stroke end is detected

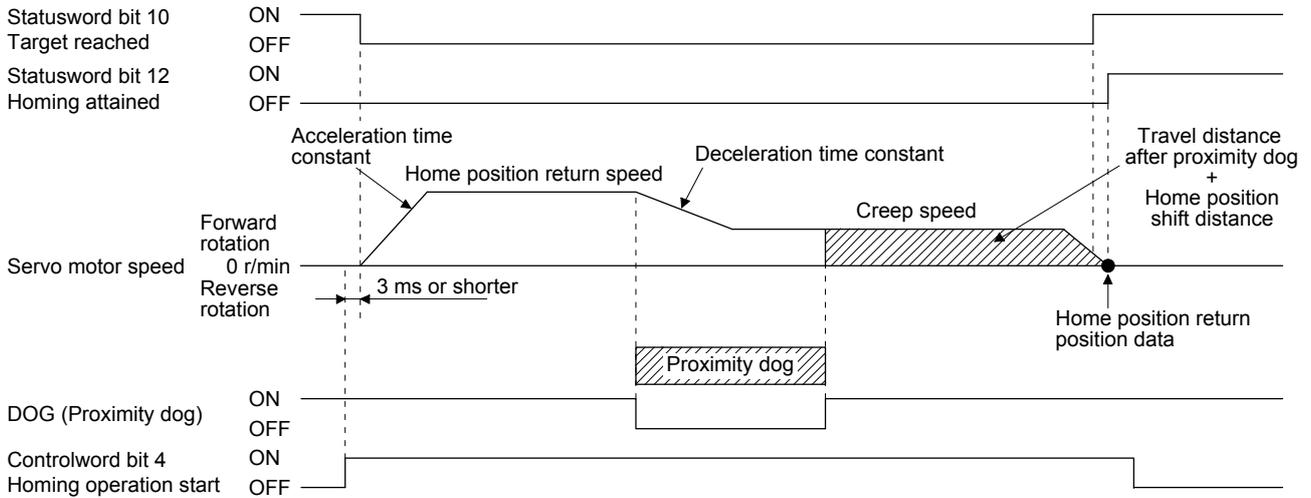
# 6. CONTROL MODE

(e) Method -6 and -38 (dog type rear end reference home position return)

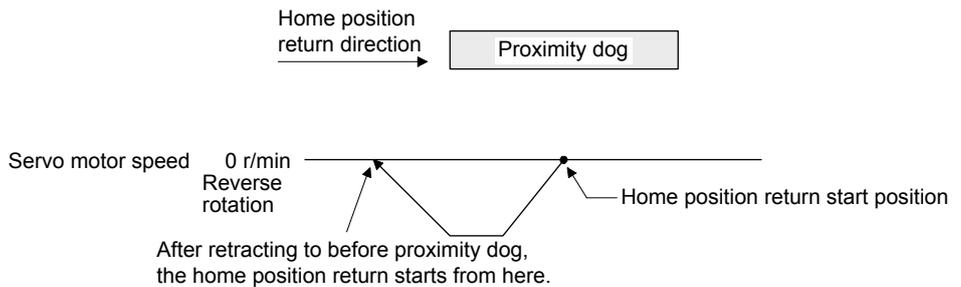
**POINT**

● This home position return type depends on the timing of reading DOG (Proximity dog) that has detected the rear end of the proximity dog. Therefore, when the creep speed is set to 100 r/min and a home position return is performed, the home position has an error of  $\pm (\text{Encoder resolution}) \times 100/65536$  [pulse]. The higher the creep speed, the greater the error of the home position.

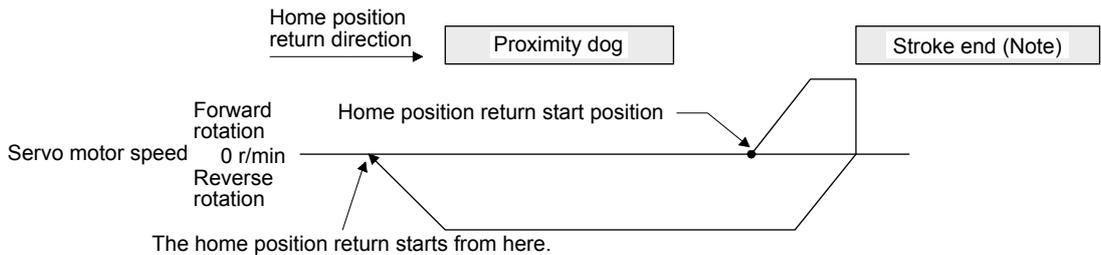
The following figure shows the operation of Homing method -6. The operation direction of Homing method -38 is opposite to that of Homing method -6.



Note. After the front end of the proximity dog is detected, if the rear end of the proximity dog is detected without reaching the creep speed, [AL. 90] occurs. Check the length of the proximity dog or check the home position return speed and creep speed.



When a home position return is started from the proximity dog



Note. The software limit cannot be used with these functions.

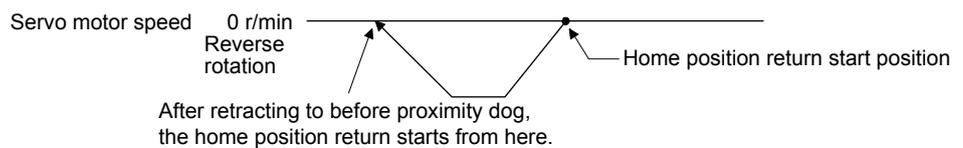
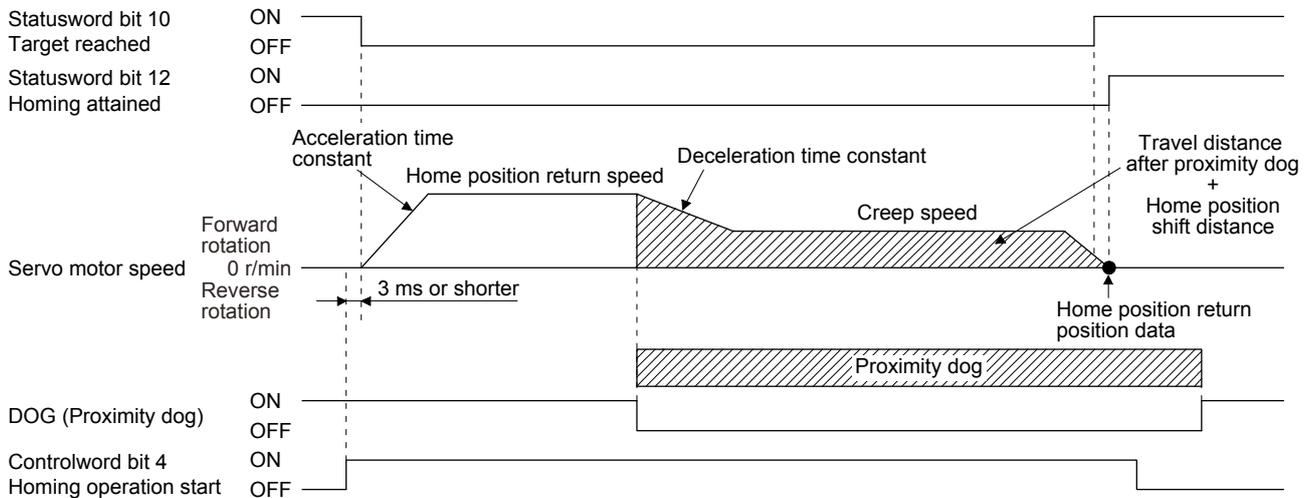
When the movement is returned at the stroke end

## 6. CONTROL MODE

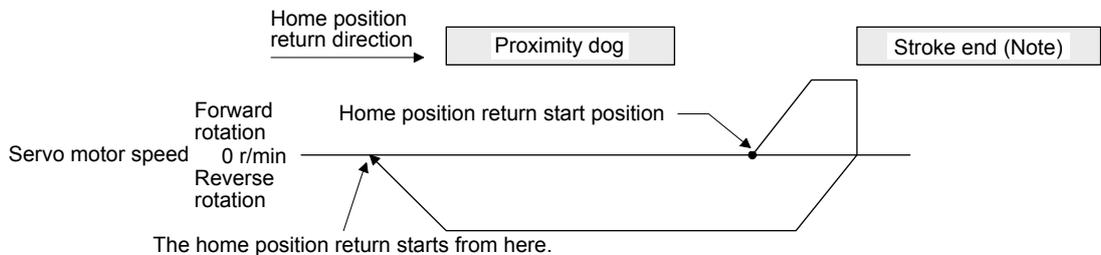
(f) Method -7 and -39 (count type front end reference home position return)

POINT
<p>● This home position return type depends on the timing of reading DOG (Proximity dog) that has detected the front end of the proximity dog. Therefore, when the creep speed is set to 100 r/min and a home position return is performed, the home position has an error of <math>\pm (\text{Encoder resolution}) \times 100/65536</math> [pulse]. The faster home position return speed sets a larger error in the home position.</p>

The following figure shows the operation of Homing method -7. The operation direction of Homing method -39 is opposite to that of Homing method -7.



When a home position return is started from the proximity dog



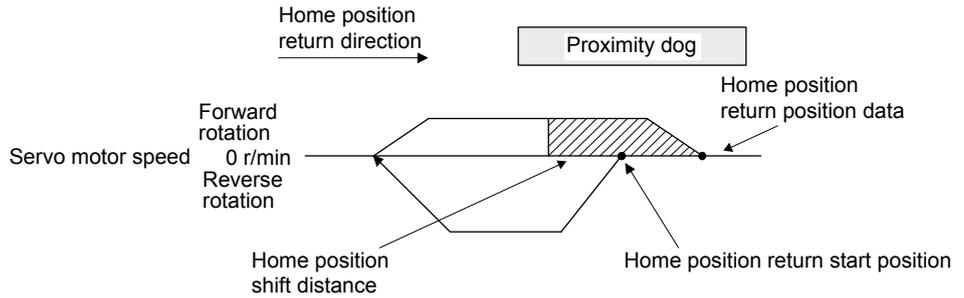
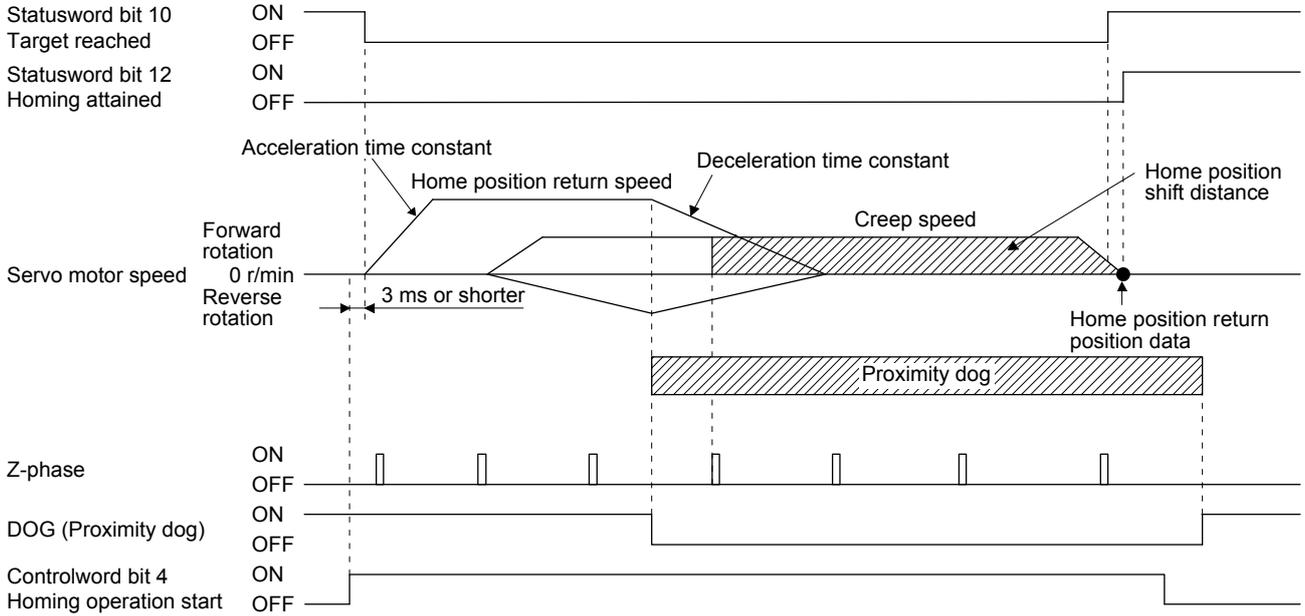
Note. The software limit cannot be used with these functions.

When the movement is returned at the stroke end

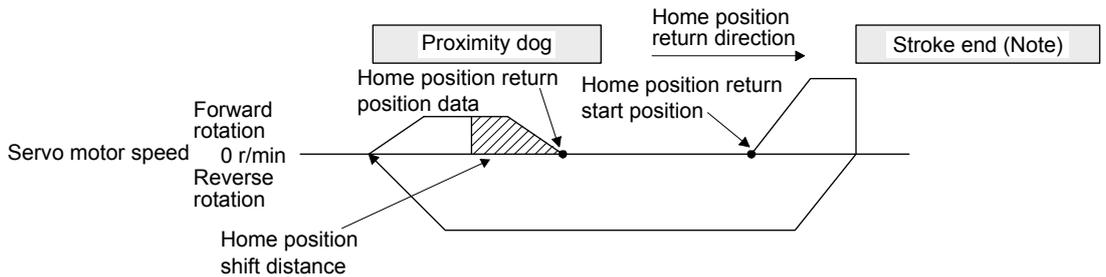
# 6. CONTROL MODE

## (g) Method -8 and -40 (dog cradle type home position return)

The following figure shows the operation of Homing method -8. The operation direction of Homing method -40 is opposite to that of Homing method -8.



When a home position return is started from the proximity dog



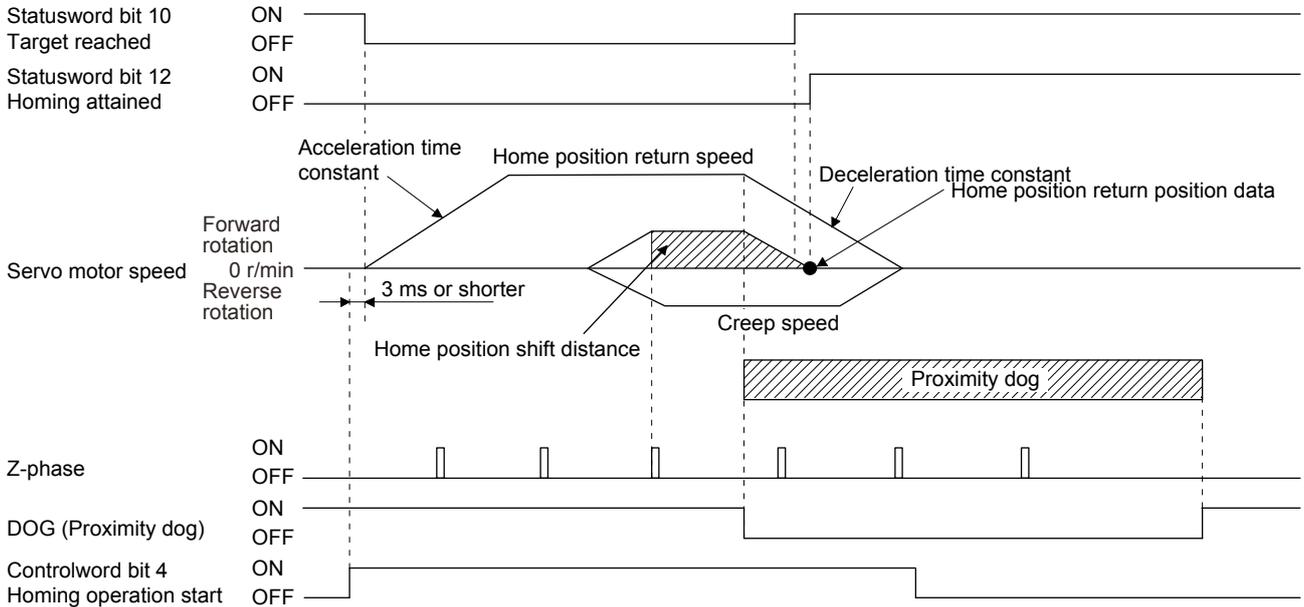
Note. The software limit cannot be used with these functions.

When the movement is returned at the stroke end

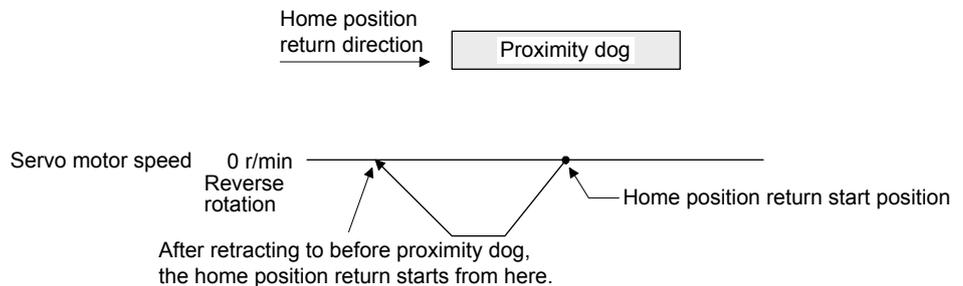
## 6. CONTROL MODE

(h) Method -9 and -41 (dog type last Z-phase reference home position return)

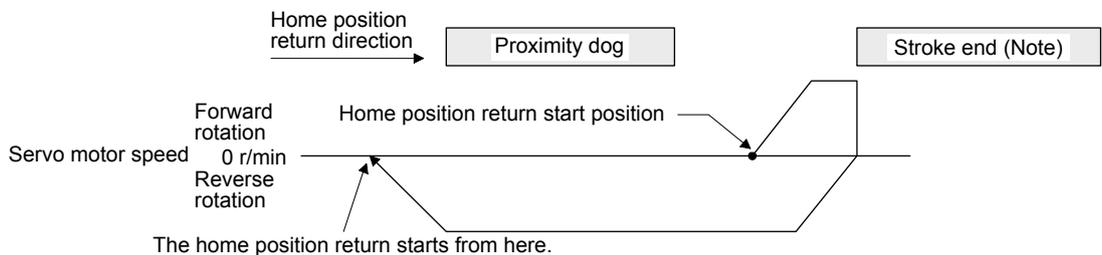
The following figure shows the operation of Homing method -9. The operation direction of Homing method -41 is opposite to that of Homing method -9.



Note. After the front end of the proximity dog is detected, if the rear end of the proximity dog is detected without stop, [AL. 90] occurs. Check the length of the proximity dog or check the home position return speed and creep speed.



When a home position return is started from the proximity dog



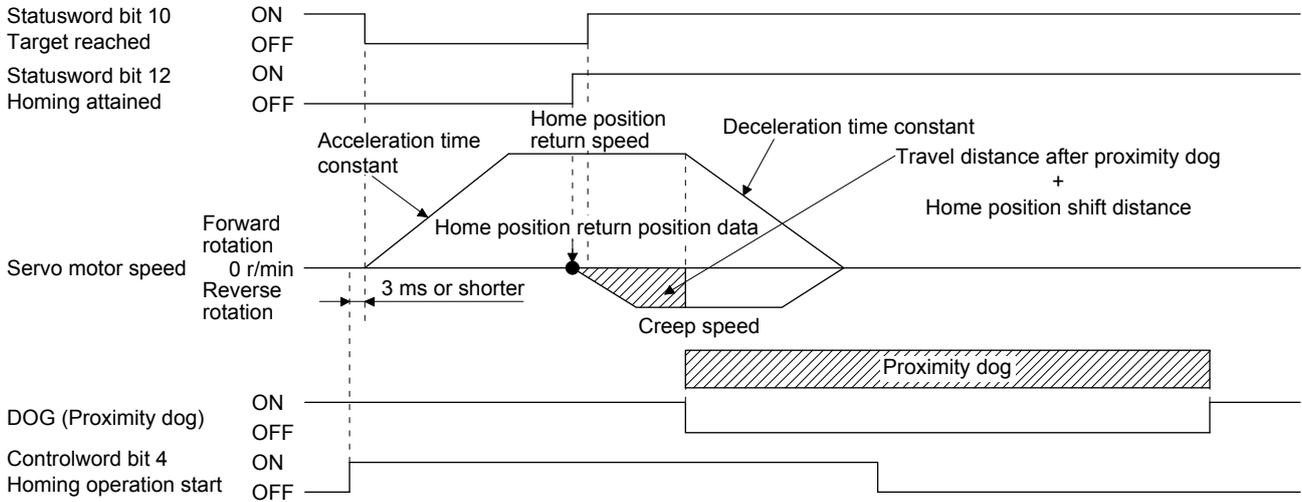
Note. The software limit cannot be used with these functions.

When the movement is returned at the stroke end

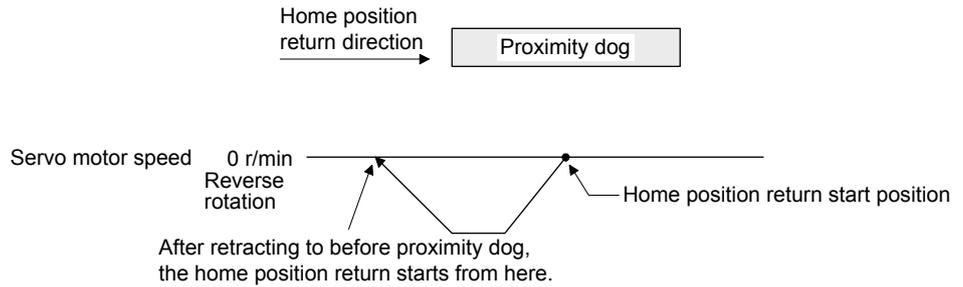
## 6. CONTROL MODE

### (i) Method -10 and -42 (dog type front end reference home position return)

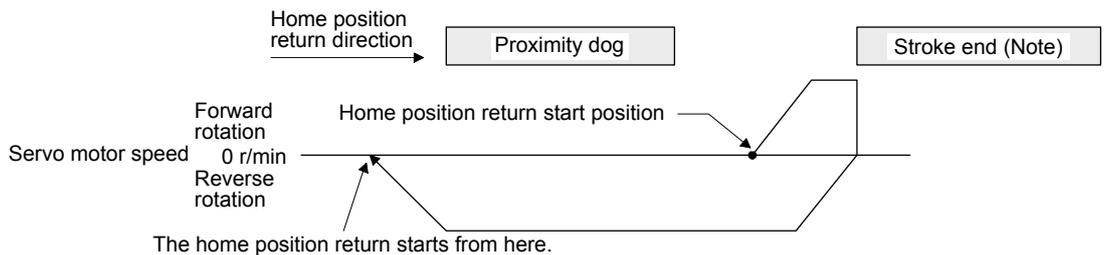
The following figure shows the operation of Homing method -10. The operation direction of Homing method -42 is opposite to that of Homing method -10.



Note. After the front end of the proximity dog is detected, if the rear end of the proximity dog is detected without reaching the creep speed, [AL. 90] occurs. Check the length of the proximity dog or check the home position return speed and creep speed.



### When a home position return is started from the proximity dog



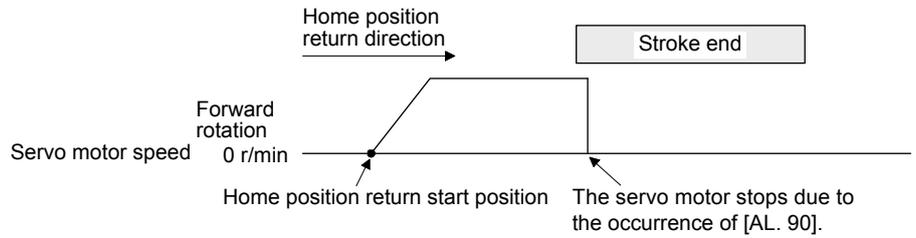
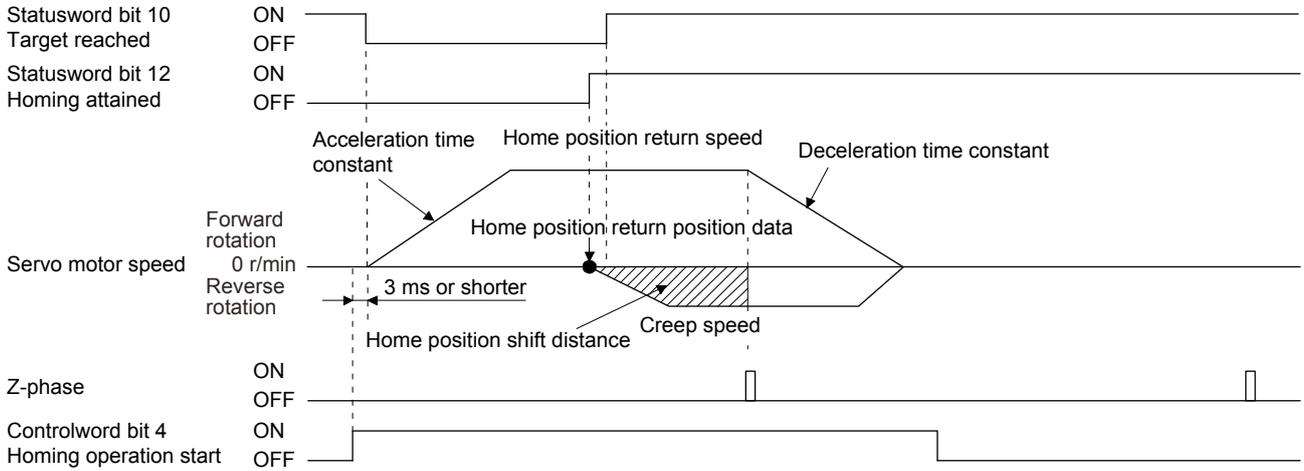
Note. The software limit cannot be used with these functions.

### When the movement is returned at the stroke end

## 6. CONTROL MODE

(j) Method -11 and -43 (dogless Z-phase reference home position return)

The following figure shows the operation of Homing method -11. The operation direction of Homing method -43 is opposite to that of Homing method -11.



When the stroke end is detected



## 7. WEB SERVER

### 7. WEB SERVER

You can configure various settings and monitor the servo amplifier in a web browser with the web server function of MR-J4-\_TM\_ (PROFINET).

When you access the PROFINET network module with web browser, the following will be displayed. (The example shows Module parameter and Network configuration.)

To save each setting set from the Module parameter page to EEPROM, Store Parameters are required. (Refer to section 9.1.)

Input the parameter setting values in hexadecimal.

MODULE	Page 1 of 79			← 1 →	Refresh
<b>Overview</b>	#	Name	Value		
<b>Parameters</b>	4112	Store parameters	0: 1	<input type="text"/>	<input type="button" value="Set"/>
<b>NETWORK</b>			1: 1	<input type="text"/>	<input type="button" value="Set"/>
<b>Status</b>			2: 1	<input type="text"/>	<input type="button" value="Set"/>
<b>Configuration</b>	8193	PA01	4096	<input type="text"/>	<input type="button" value="Set"/>
<b>SERVICES</b>	8194	PA02	0	<input type="text"/>	<input type="button" value="Set"/>
<b>SMTP</b>	8195	PA03	0	<input type="text"/>	<input type="button" value="Set"/>
	8196	PA04	8448	<input type="text"/>	<input type="button" value="Set"/>
	8197	PA05	10000	<input type="text"/>	<input type="button" value="Set"/>
	8198	PA06	1	<input type="text"/>	<input type="button" value="Set"/>
	8199	PA07	1	<input type="text"/>	<input type="button" value="Set"/>
	8200	PA08	1	<input type="text"/>	<input type="button" value="Set"/>
	8201	PA09	16	<input type="text"/>	<input type="button" value="Set"/>

MODULE	IP Configuration	
<b>Overview</b>	DHCP	Disabled <input type="button" value="v"/>
<b>Parameters</b>	IP Address	<input type="text" value="0.0.0.0"/>
<b>NETWORK</b>	Subnet Mask	<input type="text" value="0.0.0.0"/>
<b>Status</b>	Gateway Address	<input type="text" value="0.0.0.0"/>
<b>Configuration</b>	Host Name	<input type="text"/>
<b>SERVICES</b>	Domain name	<input type="text"/>
<b>SMTP</b>	DNS Server #1	<input type="text" value="0.0.0.0"/>
	DNS Server #2	<input type="text" value="0.0.0.0"/>
	<input type="button" value="Save settings"/>	



## 8. MANUFACTURER FUNCTIONS

### 8. MANUFACTURER FUNCTIONS

#### 8.1 PROFIdrive parameters for status monitor

PNU	Sub	Access	Name	Type	Default value	Description
11009	0	R/W	Monitor 1 Cumulative feedback pulses	Integer32		Cumulative feedback pulses (Unit: pulse) Cleared by writing "0000 1EA5h".
11010	0	R	Monitor 2 Servo motor speed	Integer32		Servo motor speed (Unit: r/min)
11011	0	R	Monitor 3 Droop pulse	Integer32		Droop pulses (Unit: pulse)
11012	0	R	Monitor 4 Cumulative command pulses	Integer32		Cumulative command pulses (Unit: pulse)
11013	0	R	Monitor 5 Command pulse frequency	Integer32		Command pulse frequency (Unit: kpulse/s)
11016	0	R	Monitor 8 Regenerative load ratio	Unsigned16		Regenerative load ratio (Unit: %)
11017	0	R	Monitor 9 Effective load ratio	Unsigned16		Effective load ratio (Unit: %)
11018	0	R	Monitor 10 Peak load ratio	Unsigned16		Peak load ratio (Unit: %)
11019	0	R	Monitor 11 Instantaneous torque	Integer16		Instantaneous torque (Unit: %)
11020	0	R	Monitor 12 Within one-revolution position	Integer32		Position within one-revolution (Unit: pulse)
11021	0	R	Monitor 13 ABS counter	Integer32		ABS counter (Unit: rev)
11022	0	R	Monitor 14 Load to motor inertia ratio	Unsigned16		Load to motor inertia ratio (Unit: 0.01 times)
11023	0	R	Monitor 15 Bus voltage	Unsigned16		Bus voltage (Unit: V)
11024	0	R	Monitor 16 Load side encoder cumulative feedback pulses	Integer32		Load-side cumulative feedback pulses (Unit: pulse)
11025	0	R	Monitor 17 Load side encoder droop pulses	Integer32		Load-side encoder droop pulses (Unit: pulse)
11026	0	R	Monitor 18 Load side encoder information 1	Integer32		Load-side encoder information 1 (Unit: pulse)
11027	0	R	Monitor 19 Load side encoder information 2	Integer32		Load-side encoder information 2 (Unit: rev)
11031	0	R	Monitor 23 Temperature of motor thermistor	Integer16		Servo motor thermistor temperature (Unit: °C)
11032	0	R	Monitor 24 Motor side cumulative F/B pulses (BeforeGear)	Integer32		Servo motor-side cumulative feedback pulses (before gear) (Unit: pulse)
11033	0	R	Monitor 25 Electrical angle	Integer32		Electrical angle (Unit: pulse)
11043	0	R	Monitor 35 Motor/load side position deviation	Integer32		Servo motor-side/load-side position deviation (Unit: pulse)

## 8. MANUFACTURER FUNCTIONS

PNU	Sub	Access	Name	Type	Default value	Description
11044	0	R	Monitor 36 Motor/load side speed deviation	Integer32		Servo motor-side/load-side speed deviation (Unit: r/min)
11045	0	R	Monitor 37 Internal temperature of encoder	Integer16		Internal temperature of encoder (Unit: °C)
11046	0	R	Monitor 38 Settling time	Integer16		Settling time (Unit: ms)
11047	0	R	Monitor 39 Oscillation detection frequency	Integer16		Oscillation detection frequency (Unit: Hz)
11048	0	R	Monitor 40 Number of tough drive operations	Unsigned32		Number of tough drive operations (Unit: time)
11053	0	R	Monitor 45 Unit power consumption	Integer16		Unit power consumption (Unit: W)
11054	0	R	Monitor 46 Unit total power consumption	Integer32		Unit total power consumption (Unit: Wh)

### 8.2 Stroke end

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

Operation status		Remark
During rotation at constant speed	During deceleration to a stop	
<p>— No S-pattern acceleration/ deceleration - - - With S-pattern acceleration/ deceleration</p> <p>Servo motor speed</p> <p>0 r/min (0 mm/s)</p> <p>LSP or LSN ON OFF</p>	<p>— No S-pattern acceleration/ deceleration - - - With S-pattern acceleration/ deceleration</p> <p>Servo motor speed</p> <p>0 r/min (0 mm/s)</p> <p>LSP or LSN ON OFF</p>	<p>Travels for the droop pulse portion and stops the servo motor.</p> <p>A difference will be generated between the command position and the current position.</p> <p>Perform a home position return again.</p>

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

Mode	Return method
Profile position mode (pp)	Input the position command of the direction opposite to the limit to Target position (P24698).
Profile velocity mode (pv)	Input the speed command of the direction opposite to the limit to Target velocity (P24831). When Standard telegram1 is selected, input it to Speed setpoint A.

## 8. MANUFACTURER FUNCTIONS

### 8.3 Software limit

Specify the upper and lower limits of the command position and current position. If a command position exceeding the limit position is specified, the command position is clamped at the limit position. Specify a relative position from the machine home point (position address = 0) as the limit position.

This function is enabled when the home position is not erased in the profile position mode (pp). While the clamp processing is being performed with the command position exceeding the limit value, [AL. 98 Software limit warning] occurs and not cleared. When the position command of the direction opposite to reached Software position limit is given, the operation can be restarted.

Table 8.3 Definition of Software position limit

PNU	Sub	Access	Name	Type	Default value	Description
24701	0	R/W	Min position limit (Note)	Array [2] Integer32	0	Specify a relative position from the machine home point (position address = 0) as the minimum value of the command position and current position. When the value falls below the minimum value, it is clamped and processed as the minimum value.
	1	R/W	Max position limit (Note)		0	Specify a relative position from the machine home point (position address = 0) as the maximum value of the command position and current position. When the value exceeds the maximum value, it is clamped and processed as the maximum value.

Note. When the set value of Min position limit is equal to or greater than the set value of Max position limit, the function of Software position limit is disabled.

Software position limit (P24701) can be saved in EEPROM. The data saved in EEPROM is reflected to Software position limit (P24701) at power-on.

## 8. MANUFACTURER FUNCTIONS

### 8.4 Torque limit

Generated torque can be limited with the values of Positive torque limit value (P24800) and Negative torque limit value (P24801). When "0" is set, torque (thrust) is not generated.

The polarity of the torque limit value varies depending on the setting of bit 5 Torque polarity of Polarity (P24702).

Table 8.4 Definition of Positive/Negative torque limit value

PNU	Sub	Access	Name	Type	Default value	Description
24800	0	R/W	Positive torque limit value	Unsigned16	10000	[Pr. PA11 Forward rotation torque limit/positive direction thrust limit] Torque limit value in CCW power running/CW regeneration Unit: 0.1% (rated torque of 100%) Range: 0 to 10000 Changing polarity of the torque limit value will change the reading/writing parameter from [Pr. PA11] to [Pr. PA12]. When the parameter is changed, the torque limit value will be at CCW direction regeneration/CW direction power running.
24801	0	R/W	Negative torque limit value	Unsigned16	10000	[Pr. PA12 Reverse rotation torque limit/negative direction thrust limit] Torque limit value in CW power running/CCW regeneration Unit: 0.1% (rated torque of 100%) Range: 0 to 10000 Changing polarity of the torque limit value will change the reading/writing parameter from [Pr. PA12] to [Pr. PA11]. When the parameter is changed, the torque limit value will be at CCW direction power running/CW direction regeneration.

## 8. MANUFACTURER FUNCTIONS

### 8.5 Polarity

The rotation direction of a servo motor to position commands, speed commands, and torque commands can be set with Polarity (P24702). For the Polarity setting to position commands and speed commands, use [Pr. PA14]. For the Polarity setting to torque commands, use [Pr. PA14] and [Pr. PC29] (x \_ \_ \_).

A change in the setting of Polarity is not applied immediately. Refer to section 8.14.1 for the procedure of enabling parameters.

#### (1) Bit definition

7	6	5	4	3	2	1	0
Position POL	Speed POL	Torque POL	Reserve				

The polarity is reversed when this bit is turned on.

#### (2) Target parameter

The following shows objects whose polarity is reversed according to the setting of Polarity.

No.	Object	Remark
1	Target position (P24698)	
2	Target velocity (P24831)	
3	Target torque (P24689)	
5	Position actual value (P24676)	
6	Velocity demand value (P24683)	Whether to reverse the polarity using Polarity can be switched with [Pr. PC76] (_ x _ _). [Pr. PC76] = _ 0 _ _ (Automatic setting): Automatically set depending on the type of the network in use. [Pr. PC76] = _ 1 _ _ (POL setting enabled): The polarity is reversed using Polarity. [Pr. PC76] = _ 2 _ _ (POL setting disabled): The polarity is not reversed using Polarity.
7	Velocity actual value (P24684)	
8	Torque demand (P24692)	
9	Torque actual value (P24695)	
10	Positive torque limit value (P24800)	The corresponding parameters are changed according to the settings of [Pr. PA14] and [Pr. PC29] (x _ _ _). [Pr. PA14] = 0, [Pr. PC29] = 1 _ _ _ : Written to [Pr. PA11] (TLP). [Pr. PA14] = 1, [Pr. PC29] = 1 _ _ _ : Written to [Pr. PA11] (TLP). [Pr. PA14] = 0, [Pr. PC29] = 0 _ _ _ : Written to [Pr. PA11] (TLP). [Pr. PA14] = 1, [Pr. PC29] = 0 _ _ _ : Written to [Pr. PA12] (TLN).
11	Negative torque limit value (P24801)	The corresponding parameters are changed according to the settings of [Pr. PA14] and [Pr. PC29] (x _ _ _). [Pr. PA14] = 0, [Pr. PC29] = 1 _ _ _ : Written to [Pr. PA12] (TLN). [Pr. PA14] = 1, [Pr. PC29] = 1 _ _ _ : Written to [Pr. PA12] (TLN). [Pr. PA14] = 0, [Pr. PC29] = 0 _ _ _ : Written to [Pr. PA12] (TLN). [Pr. PA14] = 1, [Pr. PC29] = 0 _ _ _ : Written to [Pr. PA11] (TLP).
12	Digital inputs (P24829)	The corresponding status is changed according to the setting of [Pr. PA14] as follows. [Pr. PA14] = 0: The status of LSN (Reverse rotation stroke end) is applied to Negative limit switch (bit 0). The status of LSP (Forward rotation stroke end) is applied to Positive limit switch (bit 1). [Pr. PA14] = 1: The status of LSP (Reverse rotation stroke end) is applied to Negative limit switch (bit 0). The status of LSN (reverse rotation stroke end) is applied to Positive limit switch (bit 1).
13	Speed setpoint A	
14	Speed actual value A	

## 8. MANUFACTURER FUNCTIONS

### 8.6 Touch probe

The touch probe function that executes current position latch by sensor input can be used.

Based on the conditions specified to Touch probe function (P24760), the function latches position feedback of rising/falling edges of touch probe signals (TPR1/TPR2) and stores the feedback in each parameter from P24762 to P24765. This function is the same as the mark detection.

The following shows the touch probe detection resolution. Enabling the high precision touch probe will disable the encoder output pulses.

		Touch probe1	Touch probe2
Input terminal		TPR1	TPR2
Encoder resolution	[Pr. PD37] = ___ 0 (Selection of high-precision touch probe is disabled)	55 μs	55 μs
	[Pr. PD37] = ___ 1 (Selection of high-precision touch probe is enabled)	55 μs	Rising: 2 μs Falling: 55 μs

#### (1) Related PROFIdrive parameters

PNU	Sub	Access	Name	Type	Default value	Description
24760	0	R/W	Touch probe function	Unsigned16		Settings such as enabling/disabling of the touch probe function and trigger conditions
24761	0	R	Touch probe status	Unsigned16	0	Status information of the touch probe function
24762	0	R	Touch probe pos1 pos value	Integer32	0	Shows the rising edge position of Touch probe 1. (Pos units)
24763	0	R	Touch probe pos1 neg value	Integer32	0	Shows the falling edge position of Touch probe 1. (Pos units)
24764	0	R	Touch probe pos2 pos value	Integer32	0	Shows the rising edge position of Touch probe 2. (Pos units)
24765	0	R	Touch probe pos2 neg value	Integer32	0	Shows the falling edge position of Touch probe 2. (Pos units)

## 8. MANUFACTURER FUNCTIONS

### (2) Details of Touch probe function (P24760)

Bit	Definition
0	0: Touch probe 1 disabled 1: Touch probe 1 enabled
1	0: Single trigger mode 1: Continuous trigger mode
2	0: Set input of touch probe 1 as a trigger 1: Set 0 point of the encoder as a trigger (not compatible) (Note)
3	(Reserved)
4	0: Stop sampling at the rising edge of touch probe 1 1: Start sampling at the rising edge of touch probe 1
5	0: Stop sampling at the falling edge of touch probe 1 1: Start sampling at the falling edge of touch probe 1
6	(Reserved)
7	(Reserved)
8	0: Touch probe 2 disabled 1: Touch probe 2 enabled
9	0: Single trigger mode 1: Continuous trigger mode
10	0: Set input of touch probe 2 as a trigger 1: Set 0 point of the encoder as a trigger (not compatible) (Note)
11	(Reserved)
12	0: Stop sampling at the rising edge of touch probe 2 1: Start sampling at the rising edge of touch probe 2
13	0: Stop sampling at the falling edge of touch probe 2 1: Start sampling at the falling edge of touch probe 2
14	(Reserved)
15	(Reserved)

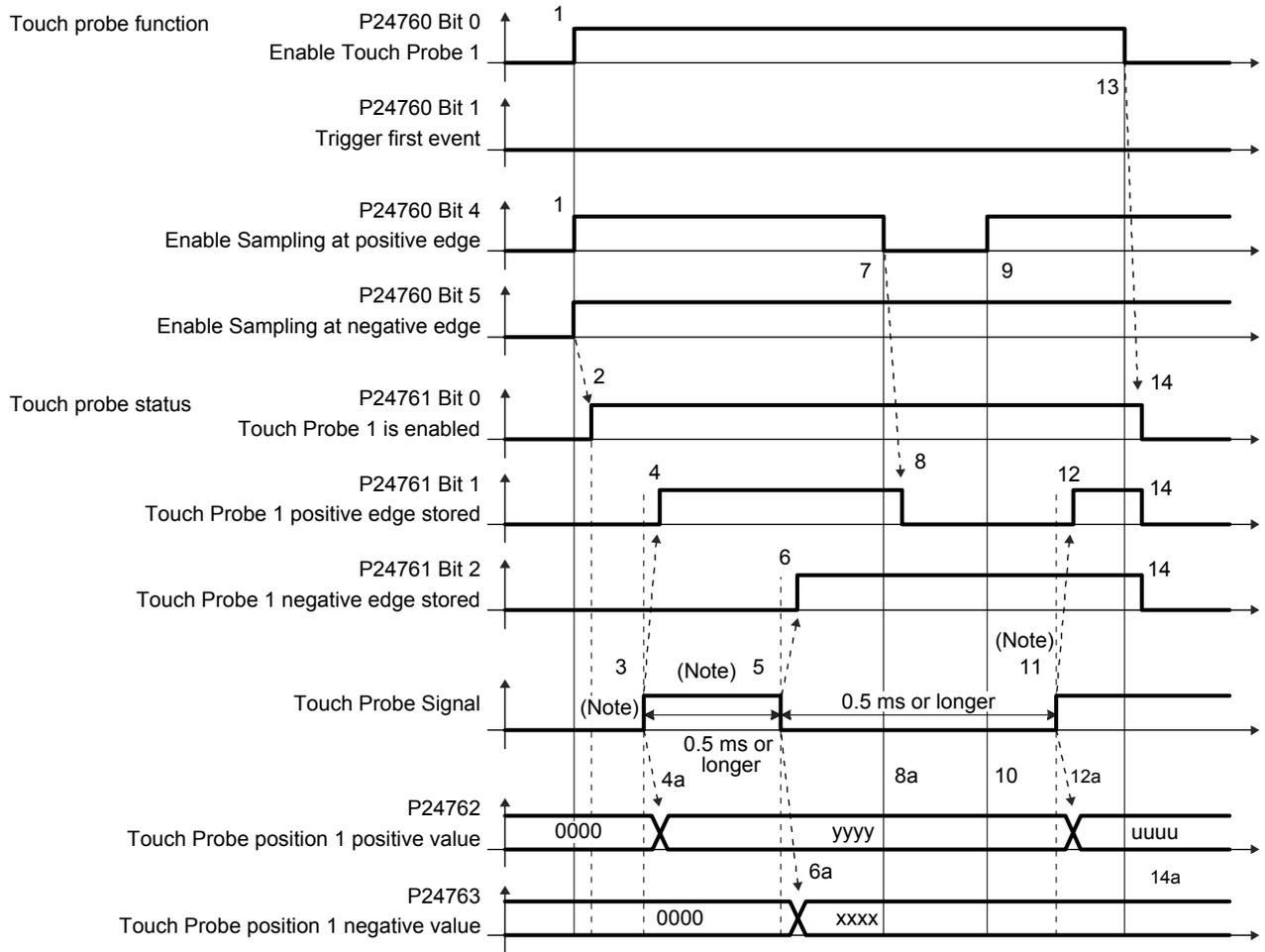
Note. This is not supported by the MR-J4-\_TM\_ servo amplifier.

### (3) Details of Touch probe status (P24761)

Bit	Definition
0	0: Touch probe 1 disabled 1: Touch probe 1 enabled
1	0: The rising edge position of touch probe 1 has not been stored. 1: The rising edge position of touch probe 1 has been stored.
2	0: The falling edge position of touch probe 1 has not been stored. 1: The falling edge position of touch probe 1 has been stored.
3-7	(Reserved)
8	0: Touch probe 2 disabled 1: Touch probe 2 enabled
9	0: The rising edge position of touch probe 2 has not been stored. 1: The rising edge position of touch probe 2 has been stored.
10	0: The falling edge position of touch probe 2 has not been stored. 1: The falling edge position of touch probe 2 has been stored.
11-15	(Reserved)

# 8. MANUFACTURER FUNCTIONS

## (4) Timing chart



Note. Turn on and off Touch Probe Signal so that both the on time and off time are 0.5 ms or longer.

## 8. MANUFACTURER FUNCTIONS

Transition No.	Object	Description
1	P24760 bit 0, 4, 5 = 1	Enables Touch Probe1. The rising edge and falling edge are enabled.
2	→ P24761 bit 0 = 1	Turns on the Touch Probe1 enable status.
3		Turns on Touch Probe Signal (TPR1).
4	→ P24761 bit 1 = 1	Turns on the Touch Probe1 positive edge stored status.
4a	→ P24762	Sets the latched position feedback for Touch probe position1 positive value.
5		Turns off Touch Probe Signal (TPR1).
6	→ P24761 bit 2 = 1	Turns on the Touch Probe1 negative edge stored status.
6a	→ P24763	Sets the latched position feedback for Touch probe position1 negative value.
7	P24760 bit 4 = 0	Turns off Sample positive edge. Rising edge detection is disabled.
8	→ P24761 bit 1 = 0	Turns off Touch Probe1 positive edge stored status.
8a	→ P24762	Touch probe position1 positive value does not change.
9	P24760 bit 4 = 1	Turns on Sample positive edge. Rising edge detection is enabled.
10	→ P24762	Touch probe position1 positive value does not change.
11		Turns on Touch Probe Signal (TPR1).
12	→ P24761 bit 1 = 1	Turns on the Touch Probe1 negative edge stored status.
12a	→ P24762	Sets the latched position feedback for Touch probe position1 negative value.
13	P24760 bit 0 = 0	Disables Touch Probe1.
14	→ P24761 bit 0, 1, 2 = 0	Clears all the status Bit.
14a	→ P24762, P24763	Touch probe position1 positive/negative value does not change.

### (5) High-precision touch probe

Touch probe 2 supports high-precision touch probe. The normal touch probe has the latch function with precision of 55  $\mu$ s. On the other hand, the high-precision touch probe latches precisely startup of TPR2 (touch probe 2) with precision of 2  $\mu$ s. To use the high-precision touch probe, set [Pr. PD37] to "\_\_\_1". While the high-precision touch probe is being used, the encoder pulse output function cannot be used. The precision of falling edge is 55  $\mu$ s in this case as well.

## 8. MANUFACTURER FUNCTIONS

### 8.7 One-touch tuning

Refer to section 6.2 of "MR-J4-\_TM\_ Servo Amplifier Instruction Manual" for one-touch tuning. Using One-touch tuning mode (P11600) allows one-touch tuning from a controller. The function is the same as previous one-touch tuning except that it can be executed via network and it is not compatible with the amplifier command method.

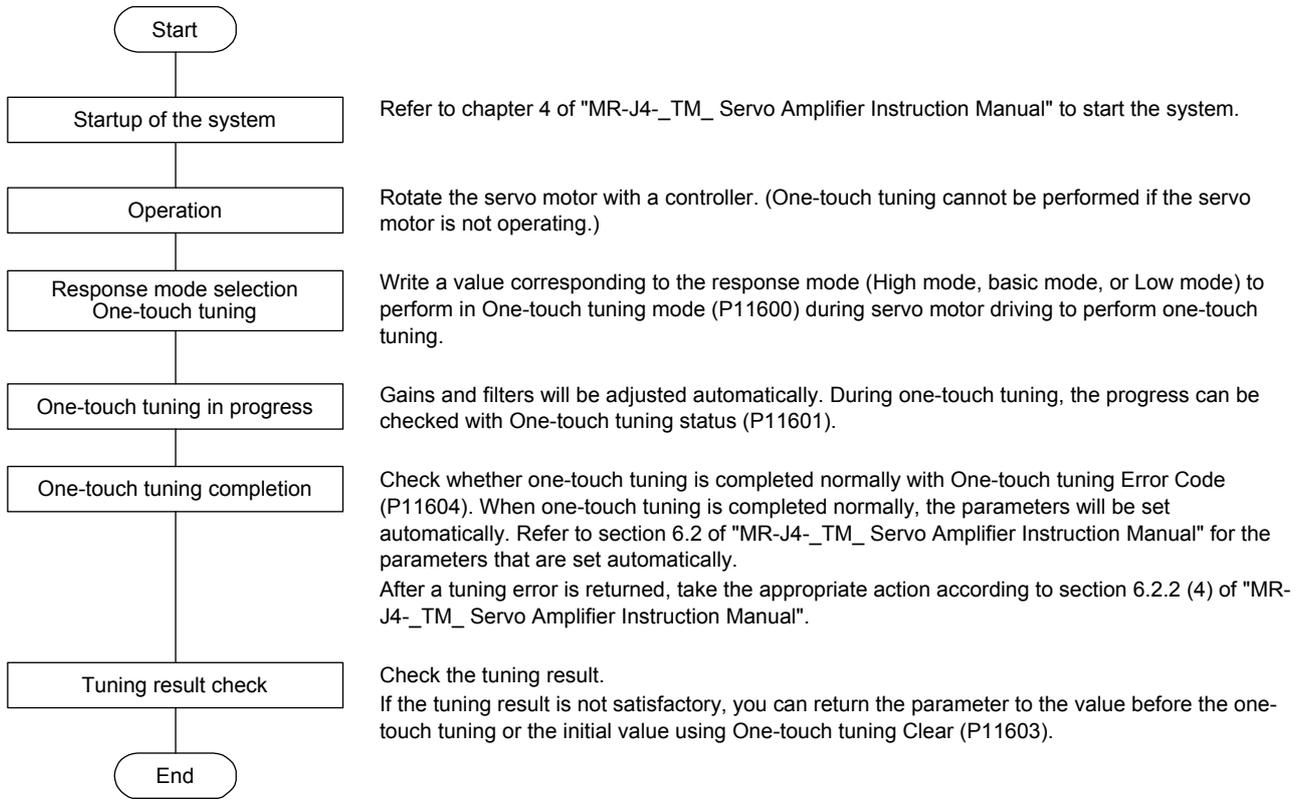
#### (1) Related object

PNU	Sub	Access	Name	Type	Default value	Description
11600	0	R/W	One-touch tuning mode	Unsigned8	0	One-touch tuning command Setting a value of "1" to "3" to this parameter starts one-touch tuning. After one-touch tuning is completed, the setting value automatically changes to "0". 0: During one-touch tuning stop 1: Basic mode 2: High mode 3: Low mode
11601	0	R	One-touch tuning status	Integer8	0	One-touch tuning status Regardless of whether one-touch tuning is properly completed or not, the setting value changes to 100% at the completion. (Unit: %)
11602	0	W	One-touch tuning Stop	Unsigned16	0	One-touch tuning stop command Writing "1EA5h" stops one-touch tuning. Writing a value other than "1EA5h" will trigger Error No. 0x02 (Low or high limit exceeded).
11603	0	W	One-touch tuning Clear	Unsigned16	0	The parameter changed in one-touch tuning can be returned to the value before the change. 0000h: Restores the default value 0001h: Restores the value before one-touch tuning. The setting value of the restored parameter is stored to the EEPROM.
11604	0	R	One-touch tuning Error Code	Unsigned16	0	One-touch tuning error code 0000h: Finished normally C000h: Tuning canceled C001h: Overshoot exceeded C002h: Servo-off during tuning C003h: Control mode error C004h: Time-out C005h: Load to motor inertia ratio misestimated C00Fh: One-touch tuning disabled

## 8. MANUFACTURER FUNCTIONS

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

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



### 8.8 Servo amplifier life diagnosis function

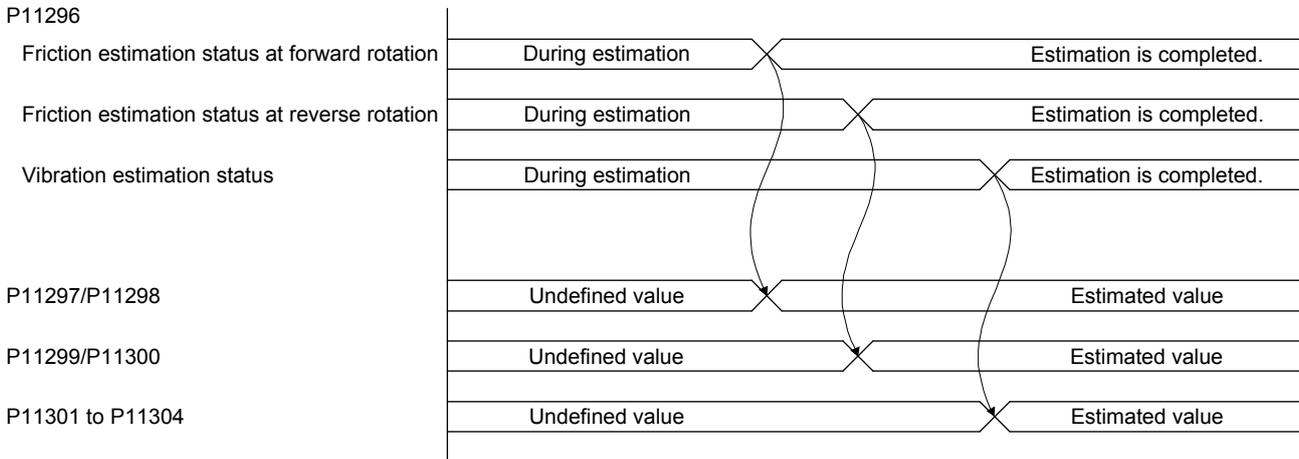
You can check the cumulative energization time and the number of on/off times of the inrush relay based on the data in the servo amplifier. This function gives an indication of the replacement time for parts of the servo amplifier including a capacitor and a relay before they malfunction. The information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

PNU	Sub	Access	Name	Type	Description
11288	0	R	Power ON cumulative time	Unsigned32	The cumulative energization time of the servo amplifier is returned.
11289	0	R	Inrush relay ON/OFF number	Unsigned32	The number of on/off times of the inrush relay of the servo amplifier is returned.

## 8. MANUFACTURER FUNCTIONS

### 8.9 Machine diagnosis

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.



#### (1) Related object

PNU	Sub	Access	Name	Type	Description
11296	0	R	Machine diagnostic status	Unsigned16	Machine diagnostic status Refer to section 9.3.5 (1).
11297	0	R	Coulomb friction torque in positive direction	Integer16	Static friction at forward rotation torque Static friction at forward rotation torque is displayed in increments of 0.1%.
11298	0	R	Friction torque at rated speed in positive direction	Integer16	Kinetic friction at forward rotation torque (at rated speed) Kinetic friction at forward rotation torque at the rated speed is displayed in increments of 0.1%.
11299	0	R	Coulomb friction torque in negative direction	Integer16	Static friction at reverse rotation torque Static friction at reverse rotation torque is displayed in increments of 0.1%.
11300	0	R	Friction torque at rated speed in negative direction	Integer16	Kinetic friction at reverse rotation torque (at rated speed) Kinetic friction at reverse rotation torque is displayed in increments of 0.1%.
11301	0	R	Oscillation frequency during motor stop	Integer16	Vibration frequency at stop/servo-lock Vibration frequency during stop/servo-lock is displayed in increments of 1 Hz.
11302	0	R	Vibration level during motor stop	Integer16	Vibration level at stop/servo-lock Vibration level during stop/servo-lock is displayed in increments of 0.1%.
11303	0	R	Oscillation frequency during motor operating	Integer16	Vibration frequency during operation Vibration frequency during operation is displayed in increments of 1 Hz.
11304	0	R	Vibration level during motor operating	Integer16	Vibration level during operation Vibration level during operation is displayed in increments of 0.1%.

## 8. MANUFACTURER FUNCTIONS

### 8.10 Quick stop

Deceleration to a stop is executed with the Quick stop command of Control word 1 (PROFIdrive standard) and Controlword (CiA 402 standard) (P24640). The servo motor decelerates to a stop according to a time constant of Quick stop deceleration (P24709) and the state shifts to Switch on inhibited (Switch on disabled). The state shifts to Switch on inhibited (Switch on disabled) and the motor stops with the dynamic brake for tq. The following shows related PROFIdrive parameters.

PNU	Sub	Access	Name	Type	Default value	Description
24709	0	R/W	Quick stop deceleration	Unsigned32	100	Deceleration at deceleration to a stop by Quick stop Unit: ms
24666	0	R/W	Quick stop option code	Integer16	2	Refer to table 8.10 for details.

The operation method of deceleration to a stop can be specified with Quick stop option code (P24666). The following table shows the supported methods and the operations. Basic operation is the same as the forced stop function. The difference should be only the deceleration time constant.

Table 8.10 Quick stop option code

Setting value	Description
1	tq: The state shifts immediately to Switch on inhibited and the motor stops with dynamic brake. pp/pv: The servo motor decelerates to a stop with Profile deceleration (P24708) and the state shifts to Switch on inhibited (Switch on disabled). hm: The servo motor decelerates to a stop with Homing acceleration (P24730) and the state shifts to Switch on inhibited (Switch on disabled). (Not compatible) (Note)
2	pp/pv/hm: The servo motor decelerates to a stop with Quick stop deceleration (P24709) and the state shifts to Switch on inhibited (Switch on disabled). tq: The state shifts immediately to the Switch on inhibited and the motor stops with dynamic brake.
3	The current is limited and the motor decelerates. Then, the state shifts to Switch on inhibited (Switch on disabled). (Not compatible) (Note)
4	The voltage is limited and the motor decelerates. Then, the state shifts to Switch on inhibited (Switch on disabled). (Not compatible) (Note)
5	The motor decelerates to a stop. Then, the state does not change from the Quick Stop Active (servo-on). (not compatible) (Note)
6	The motor decelerates to a stop with Quick stop deceleration (P24709). Then, the state does not change from the Quick Stop Active (servo-on). (not compatible) (Note)
7	The current is limited and the motor decelerates. Then, the state does not change from the Quick Stop Active (servo-on). (not compatible) (Note)
8	The voltage is limited and the motor decelerates. Then, the state does not change from the Quick Stop Active (servo-on). (not compatible) (Note)

Note. This is not supported by the MR-J4-\_TM\_ servo amplifier.

## 8. MANUFACTURER FUNCTIONS

### 8.11 Halt

When Halt Bit (Bit 8 of Controlword (CiA 402 standard)) is set to 1, the servo motor decelerates to a stop with the deceleration time constant of Homing acceleration (P24730) or Profile deceleration (P24708) according to the setting of Halt option code (P24669). This is available with the pp/pv/tq/hm modes.

When Halt Bit is set to 0 at deceleration stop operation, the servo motor decelerates to a stop and returns to the operable state. The following table lists the related objects.

PNU	Sub	Access	Name	Type	Default value	Description
24669	0	R/W	Halt option code	Integer16	1	Setting for executing the Halt function Refer to table 8.11 for details.

The following table shows descriptions of Halt option code. However, in the tq mode, Torque demand value (P24692) is set to 0 regardless of Halt option code. The amount of torque change at this time can be set using Torque slope (P24711).

Table 8.11 Halt option code

Setting value	Description
1	The motor decelerates to a stop according to Homing acceleration (P24730) and the state does not change from Operation Enabled (servo-on) at Profile deceleration (P24708) or hm.
2	The servo motor decelerates to a stop with Quick stop deceleration (P24709). The state does not change from Operation Enabled (servo-on). (Not compatible) (Note)
3	The current is limited and the servo motor decelerates to a stop. The state does not change from the Operation Enabled (servo-on). (Not compatible) (Note)
4	The voltage is limited and the servo motor decelerates to a stop. The state does not change from the Operation Enabled (servo-on). (Not compatible) (Note)

Note. This is not supported by the MR-J4-<sub>TM</sub> servo amplifier.

### 8.12 Ramp Stop

This decelerates the motor to a stop with the off command of Control word 1 (PROFIdrive standard) in the Operation state. The deceleration to a stop is according to a deceleration time constant of Profile deceleration (P24708).

PNU	Sub	Access	Name	Data Type	Description	Default
24708	0	R/W	Profile deceleration	Unsigned32	Deceleration time constant	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24708	0	Refer to the text.	ms	Possible	PT50

## 8. MANUFACTURER FUNCTIONS

### 8.13 PROFIdrive parameter definitions related to alarms

Whether an alarm occurs or not in the slave can be detected on the master with bit 3 and bit 7 of Statusword via I/O communication. The alarm history of the latest alarm and 15 alarms that have occurred can be referred to by acquiring the following related object values in Acyclic.

PNU	Sub	Access	Name	Type	Description
10752	0	R	Alarm No.	Unsigned32	Alarm history (last alarm) Alarm No. XXXXVVVVh XXXX: Alarm No. VVVV: Alarm detail
	1	R	Alarm time (Hour)	Unsigned32	Alarm occurrence time Time passed from start-up of the servo amplifier (unit: time)
10753	0	R	Alarm No.	Unsigned32	Alarm history 1 Sub 0 and Sub 1 are omitted. (the same as P10752)
:	:	:	:	:	History 2 to 14 are omitted. (the same as P10752)
10767	0	R	Alarm No.	Unsigned32	Alarm history 15 Sub 0 and Sub 1 are omitted. (the same as P10752)
10816	0	W	Clear alarm history	Unsigned16	Writing "1EA5" clears Alarm history.
10817	0	R	Current alarm	Unsigned32	Occurring alarm XXXXVVVVh XXXX: Alarm No. VVVV: Alarm detail
10820	0	R	Parameter error number	Unsigned16	The number of parameter error numbers (The number of parameter error numbers caused [AL. 37].)
10821	0	R	(No. 1)	Unsigned16	The list of parameter error numbers (The list of parameter error numbers caused [AL. 37].)  Parameter error No. 1 GGNNh GG: Group No. NN: Parameter No. GG 00: Pr. group PA 01: Pr. group PB 02: Pr. group PC 03: Pr. group PD 04: Pr. group PE 05: Pr. group PF 06: Parameter for manufacturer setting 07: Parameter for manufacturer setting 08: Parameter for manufacturer setting 09: Parameter for manufacturer setting 0A: Pr. group PS 0B: Pr. group PL 0C: Pr. group PT 0E: Pr. group PN
	:	:	:	:	
	63	R	(No. 64)	Unsigned16	Parameter error No. 64

## 8. MANUFACTURER FUNCTIONS

### 8.14 Parameter

The parameter of the servo amplifier can be changed on the master in the Acyclic communication. However, once the power supply is shut off, the changed setting is not held at the next startup because the setting value is erased. To hold the changed setting even after the power supply is shut-off, save the parameter setting value to EEPROM using Store Parameters object (P4112).

To change the setting of the parameters where the changes are reflected by cycling the power (parameters whose symbols are preceded by \*), change the value of the corresponding parameter and execute Store Parameters before cycling the power. Refer to chapter 5 of "MR-J4-\_TM\_ Servo Amplifier Instruction Manual" for "\*" of the parameter symbol. The following table lists the related objects.

PNU	Sub	Access	Name	Type	Description
8193	0	R/W	PA01	Integer32	[Pr. PA_ _] group
:	:	:	:	:	
8224	0	R/W	PA32	Integer32	[Pr. PB_ _] group
8321	0	R/W	PB01	Integer32	
:	:	:	:	:	[Pr. PC_ _] group
8384	0	R/W	PB64	Integer32	
8449	0	R/W	PC01	Integer32	[Pr. PD_ _] group
:	:	:	:	:	
8528	0	R/W	PC80	Integer32	[Pr. PE_ _] group
8577	0	R/W	PD01	Integer32	
:	:	:	:	:	[Pr. PF_ _] group
8624	0	R/W	PD48	Integer32	
8705	0	R/W	PE01	Integer32	[Pr. PL_ _] group
:	:	:	:	:	
8768	0	R/W	PE64	Integer32	[Pr. PT_ _] group
8833	0	R/W	PF01	Integer32	
:	:	:	:	:	[Pr. PN_ _] group
8896	0	R/W	PF64	Integer32	
9217	0	R/W	PL01	Integer32	[Pr. PN_ _] group
:	:	:	:	:	
9264	0	R/W	PL48	Integer32	[Pr. PN_ _] group
9345	0	R/W	PT01	Integer32	
:	:	:	:	:	[Pr. PN_ _] group
9424	0	R/W	PT80	Integer32	
9601	0	R/W	PN01	Integer32	[Pr. PN_ _] group
:	:	:	:	:	
9632	0	R/W	PN32	Integer32	

## 8. MANUFACTURER FUNCTIONS

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### 8.14.1 Parameter enabling

The parameters whose symbols are preceded by \* are enabled by the following operations. Refer to chapter 5 of "MR-J4-\_TM\_ Servo Amplifier Instruction Manual" for "\*" of the parameter symbol.

(1) Network disconnection

A parameter is enabled when a network disconnection switches the servo amplifier state to the state in which it waits for the controller to be connected.

(2) State transition

A parameter is enabled when the controller shifts from the ProcessData communication state to another state.

(3) Parameter enabling operation

A parameter is enabled by writing "1EA5h" to User parameter configuration object (P11572). You can operate this when the controller is not using the ProcessData communication. Write it with Web server function for a controller whose Acyclic communication is not enabled without using ProcessData communication.

The parameter enabling processing requires a maximum of about 100 ms. The read values of the User parameter configuration object are as follows. By checking the read value, the completion of the parameter enabling processing can be checked.

Value	Description
0	Parameter enabling processing is being executed.
1	Parameter enabling processing is not being executed. (The processing is completed.)

## 8. MANUFACTURER FUNCTIONS

### 8.15 Degree function

#### (1) Description

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

Item	Description
P24698: Target position	The range will be between -360.000° and 360.000°.
P24676: Position actual value	The range will be between 0° and 359.999°.
P24701: Software position limit	The range will be between 0° and 359.999°. A value outside the range is clamped within the range 0° to 359.999°.
P24699: Position range limit	The range will be between 0° and 359.999°.
P24762: Touch probe pos1 pos value	The range will be between 0° and 359.999°.
P24763: Touch probe pos1 neg value	The range will be between 0° and 359.999°.
P24764: Touch probe pos2 pos value	The range will be between 0° and 359.999°.
P24765: Touch probe pos2 neg value	The range will be between 0° and 359.999°.
P24700: Home offset	The range will be between 0° and 359.999°.

The positioning operation pattern can be changed with Positioning option code (P24818) for the degree setting as follows. Change the setting while the servo motor is stopped (Target reached is on). If the setting is changed while the servo motor is rotating (Target reached is off), the setting value is not applied immediately.

The new value is applied at a positioning start (Bit 4 of Controlword is turned on) after Target reached is once turned on.

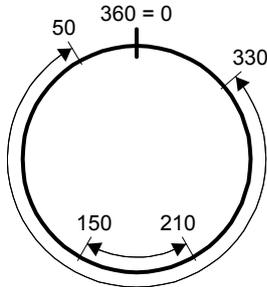
Bit 7	Bit 6	Rotation direction definition for the axis of rotation	[Pr. PT03]
0	0	The servo motor rotates to the target position in a direction specified with a sign of the position data.	_ 0 _ _
0	1	The servo motor rotates in the address decreasing direction regardless of the sign of the position data.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

## 8. MANUFACTURER FUNCTIONS

### (2) Sequences for degree setting

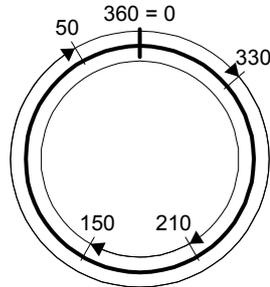
The following shows the operation patterns corresponding to the settings of Positioning option code (P24818).

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



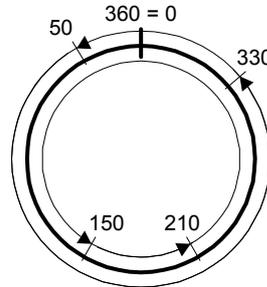
Bit 7: 0  
Bit 6: 0

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



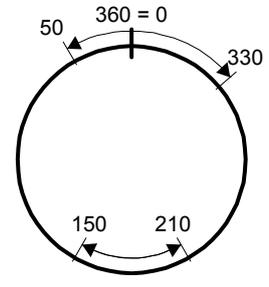
Bit 7: 0  
Bit 6: 1

The servo motor rotates only in the address decreasing direction.



Bit 7: 1  
Bit 6: 0

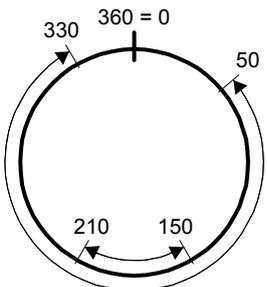
The servo motor rotates only in the address increasing direction.



Bit 7: 1  
Bit 6: 1

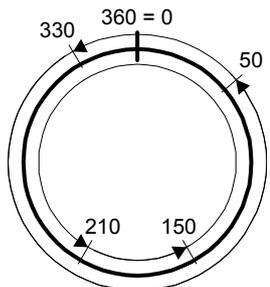
The servo motor rotates in the shorter direction.

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



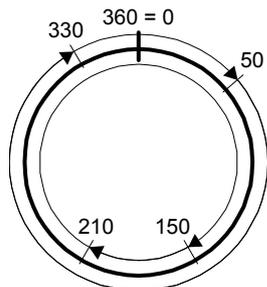
Bit 7: 0  
Bit 6: 0

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



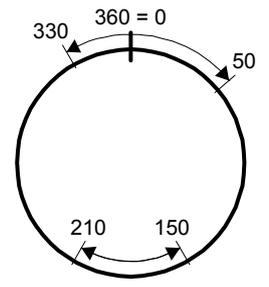
Bit 7: 0  
Bit 6: 1

The servo motor rotates only in the address decreasing direction.



Bit 7: 1  
Bit 6: 0

The servo motor rotates only in the address increasing direction.



Bit 7: 1  
Bit 6: 1

The servo motor rotates in the shorter direction.



## 9. OBJECT DICTIONARY

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### 9. OBJECT DICTIONARY

#### 9.1 Store parameters

Writing "65766173h" (= ASCII code of "save") to Store Parameters (P4112) will save the parameter in the EEPROM of the servo amplifier.

The value saved in the EEPROM is set to the parameter at the next power-on. When setting parameters via PROFINET, use Store Parameters. The setting will not be changed immediately.

Executing Store Parameters takes about a maximum of 10 s because all parameters are written at the same time. Be careful not to shut off the power during writing.

PNU	Sub	Access	Name	Type	Description
4112	0	R/W	Save all parameters	Unsigned32	Saves all parameters. Writing "save" (= 65766173h) saves all the parameters which can be stored in the EEPROM.
	1 (not compatible) (Note)	R/W	Save communication parameters	Unsigned32	Saves communication parameters. Writing "save" (= 65766173h) saves the objects that can be saved in the EEPROM for the communication objects in the EEPROM.
	2 (not compatible) (Note)	R/W	Save application parameters	Unsigned32	Saves application parameters. Writing "save" (= 65766173h) saves the objects that can be saved in the EEPROM except for the communication objects (PROFIdrive parameters in the 900s) in the EEPROM.

Note. This is not supported by the MR-J4-\_TM\_ servo amplifier.

The following values are read from this object. When a parameter is being saved, "0" is read. When no parameter is being saved, "1" is read.

Bit	Description
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.)
1	0: The parameter is not automatically saved.

## 9. OBJECT DICTIONARY

### 9.2 PROFIdrive parameter (Manufacturer-specific) list

Group	Name	PNU
General Objects	Store parameters	4112
Servo Parameter Objects	PA_ _	8193 to 8224
	PB_ _	8321 to 8384
	PC_ _	8449 to 8528
	PD_ _	8577 to 8624
	PE_ _	8705 to 8768
	PF_ _	8833 to 8896
	PL_ _	9217 to 9264
	PT_ _	9345 to 9424
	PN_ _	9601 to 9632
Alarm Objects	Alarm history newest	10752
	Alarm history	10753 to 10767
	Clear alarm history	10816
	Current alarm	10817
	Parameter error number	10820
	Parameter error list	10821
Monitor Objects	Cumulative feedback pulses	11009
	Servo motor speed	11010
	Droop pulses	11011
	Cumulative command pulses	11012
	Command pulse frequency	11013
	Regenerative load ratio	11016
	Effective load ratio	11017
	Peak load ratio	11018
	Instantaneous torque	11019
	Within one-revolution position	11020
	ABS counter	11021
	Load inertia moment ratio	11022
	Bus voltage	11023
	Load-side cumulative feedback pulses	11024
	Load-side droop pulses	11025
	Load-side encoder information 1 Z-phase counter	11026
	Load-side encoder information 2	11027
	Temperature of motor thermistor	11031
	Motor-side cumu. feedback pulses (before gear)	11032
	Electrical angle	11033
	Motor-side/load-side position deviation	11043
	Motor-side/load-side speed deviation	11044
	Internal temperature of encoder	11045
	Settling time	11046
	Oscillation detection frequency	11047
	Number of tough drive operations	11048
	Unit power consumption	11053
	Unit total power consumption	11054
	Alarm Monitor 1 Cumulative feedback pulses	11137
	Alarm Monitor 2 Servo motor speed	11138
	Alarm Monitor 3 Droop pulses	11139
	Alarm Monitor 4 Cumulative command pulses	11140
	Alarm Monitor 5 Command pulse frequency	11141
	Alarm Monitor 8 Regenerative load ratio	11144
	Alarm Monitor 9 Effective load ratio	11145
	Alarm Monitor 10 Peak load ratio	11146
Alarm Monitor 11 Instantaneous torque	11147	
Alarm Monitor 12 Within one-revolution position	11148	

## 9. OBJECT DICTIONARY

Group	Name	PNU
Monitor Objects	Alarm Monitor 13 ABS counter	11149
	Alarm Monitor 14 Load inertia moment ratio	11150
	Alarm Monitor 15 Bus voltage	11151
	Alarm Monitor 16 Load-side cumulative feedback pulses	11152
	Alarm Monitor 17 Load-side droop pulses	11153
	Alarm Monitor 18 Load-side encoder information 1 Z-phase counter	11154
	Alarm Monitor 19 Load-side encoder information 2	11155
	Alarm Monitor 23 Temperature of motor thermistor	11159
	Alarm Monitor 24 Motor-side cumu. feedback pulses (before gear)	11160
	Alarm Monitor 25 Electrical angle	11161
	Alarm Monitor 35 Motor-side/load-side position deviation	11171
	Alarm Monitor 36 Motor-side/load-side speed deviation	11172
	Alarm Monitor 37 Internal temperature of encoder	11173
	Alarm Monitor 38 Settling time	11174
	Alarm Monitor 39 Oscillation detection frequency	11175
	Alarm Monitor 40 Number of tough drive operations	11176
	Alarm Monitor 45 Unit power consumption	11181
Alarm Monitor 46 Unit total power consumption	11182	
Manufacturer Specific Control Objects	Machine diagnostic status	11296
	Coulomb friction torque in positive direction	11297
	Friction torque at rated speed in positive direction	11298
	Coulomb friction torque in negative direction	11299
	Friction torque at rated speed in negative direction	11300
	Oscillation frequency during motor stop	11301
	Vibration level during motor stop	11302
	Oscillation frequency during motor operating	11303
	Vibration level during motor operating	11304
	Control DI 1	11521
	Control DI 2	11522
	Control DI 3	11523
	Status DO 1	11537
	Status DO 2	11538
	Status DO 3	11539
	Status DO 5	11541
	Velocity limit value	11552
	Motor rated speed	11560
	Manufacturer Device Name 2	11568
	Manufacturer Hardware Version 2	11569
	Manufacturer Software Version 2	11570
	Serial Number 2	11571
	User parameter configuration	11572
	Encoder status	11573
	One-touch tuning mode	11600
	One-touch tuning status	11601
	One-touch tuning Stop	11602
	One-touch tuning Clear	11603
	One-touch tuning Error Code	11604
	PDS Control Objects	Error code
Controlword		24640
Statusword		24641
Quick stop option code		24666
Halt option code		24669
Modes of operation		24672
Modes of operation display		24673
Supported drive modes		25858

## 9. OBJECT DICTIONARY

Group	Name	PNU
Position Control Function Objects	Position actual internal value	24675
	Position actual value	24676
	Following error window	24677
	Following error time out	24678
	Position window	24679
	Position window time	24680
	Positioning option code	24818
	Following error actual value	24820
	Control effort	24826
Profile Velocity Mode Objects	Velocity demand value	24683
	Velocity actual value	24684
	Velocity window	24685
	Velocity window time	24686
	Velocity threshold	24687
	Velocity threshold time	24688
	Target velocity	24831
Profile Torque Mode Objects	Target torque	24689
	Max torque	24690
	Torque demand	24692
	Torque actual value	24695
	Torque slope	24711
	Torque profile type	24712
	Positive torque limit value	24800
	Negative torque limit value	24801
Profile Position Mode Objects	Target position	24698
	Position range limit	24699
	Software position limit	24701
	Max profile velocity	24703
	Max motor speed	24704
	Profile velocity	24705
	Profile acceleration	24707
	Profile deceleration	24708
	Quick stop deceleration	24709
	Motion profile type	24710
Homing Mode Objects	Home offset	24700
	Homing method	24728
	Homing speeds	24729
	Homing acceleration	24730
	Supported homing method	24803
Factor Group Objects	Polarity	24702
	Position encoder resolution	24719
	Gear ratio	24721
	Feed constant	24722
	SI uinit position	24744
	SI unit velocity	24745
Optional application FE Objects	Digital inputs	24829
Touch Probe Function Objects	Touch probe function	24760
	Touch probe status	24761
	Touch probe pos1 pos value	24762
	Touch probe pos1 neg value	24763
	Touch probe pos2 pos value	24764
	Touch probe pos2 neg value	24765

## 9. OBJECT DICTIONARY

### 9.3 PROFIdrive parameter (Manufacturer-specific)

This section describes the details of the Manufacturer-specific parameters for each group.

The following is shown in the "Access" column.

"R": Readable

"W": Writable

"R/W": Readable and writable

#### 9.3.1 General Objects

##### (1) Store parameters (P4112)

PNU	Sub	Access	Name	Data Type	Description	Default
4112	0	R/W	Store all parameters	Unsigned32	Saves all parameters. Writing "save" (= 65766173h) saves all the parameters which can be stored in the EEPROM.	0
	1 (not compatible) (Note)	R/W	Store communication parameters	Unsigned32	Saves communication parameters. Writing "save" (= 65766173h) saves the objects that can be saved in the EEPROM for the communication objects in the EEPROM.	1
	2 (not compatible) (Note)	R/W	Store application parameters	Unsigned32	Saves application parameters. Writing "save" (= 65766173h) saves the objects that can be saved in the EEPROM except for the communication objects (PROFIdrive parameters in the 900s) in the EEPROM.	2

PNU	Sub	Range	Units	EEP-ROM	Parameter
4112	0	Refer to the followings.		Impossible	
	1			Impossible	
	2			Impossible	

Note. This is not supported by the MR-J4-<sub>TM</sub> servo amplifier.

Writing "65766173h" (= reverse order of ASCII code of "save") to the corresponding Subindex saves a parameter value in EEPROM.

Whether saving a parameter has been completed can be checked by reading this object. The read values are as follows.

Bit	Description
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.)
1	0: The parameter is not automatically saved.

## 9. OBJECT DICTIONARY

### 9.3.2 ServoParameter Objects

#### (1) ServoParameter Objects PA (P8193 to P8224)

The values of the basic setting parameters ([Pr. PA\_ \_]) can be obtained and set.

PNU	Sub	Access	Name	Data Type	Description	Default
8193	0	R/W	PA01	Integer32	PA01	
.		.	.	.	.	.
.		.	.	.	.	.
8224		R/W	PA32	Integer32	PA32	

PNU	Sub	Range	Units	EEP-ROM	Parameter
8193	0	Refer to "MR-J4-_TM_ Servo Amplifier Instruction Manual".		Possible	PA01
.					.
.					.
8224					PA32

#### (2) ServoParameter Objects PB (P8321 to 8384)

The values of the gain/filter setting parameters ([Pr. PB\_ \_]) can be obtained and set.

PNU	Sub	Access	Name	Data Type	Description	Default
8321	0	R/W	PB01	Integer32	PB01	
.		.	.	.	.	.
.		.	.	.	.	.
8384		R/W	PB64	Integer32	PB64	

PNU	Sub	Range	Units	EEP-ROM	Parameter
8321	0	Refer to "MR-J4-_TM_ Servo Amplifier Instruction Manual".		Possible	PB01
.					.
.					.
8384					PB64

#### (3) ServoParameter Objects PC (P8449 to P8528)

The values of the extension setting parameters ([Pr. PC\_ \_]) can be obtained and set.

PNU	Sub	Access	Name	Data Type	Description	Default
8449	0	R/W	PC01	Integer32	PC01	
.		.	.	.	.	.
.		.	.	.	.	.
8528		R/W	PC80	Integer32	PC80	

PNU	Sub	Range	Units	EEP-ROM	Parameter
8449	0	Refer to "MR-J4-_TM_ Servo Amplifier Instruction Manual".		Possible	PC01
.					.
.					.
8528					PC80

## 9. OBJECT DICTIONARY

### (4) ServoParameter Objects PD (P8577 to P8624)

The values of the I/O setting parameters ([Pr. PD\_ \_]) can be obtained and set.

PNU	Sub	Access	Name	Data Type	Description	Default
8577	0	R/W	PD01	Integer32	PD01	
.		.	.	.	.	.
.		.	.	.	.	.
8624		R/W	PD48	Integer32	PD48	

PNU	Sub	Range	Units	EEP-ROM	Parameter
8577	0	Refer to "MR-J4-_TM_ Servo Amplifier Instruction Manual".		Possible	PD01
.					.
8624					PD48

### (5) ServoParameter Objects PE (P8705 to 8768)

The values of the extension setting 2 parameters ([Pr. PE\_ \_]) can be obtained and set.

PNU	Sub	Access	Name	Data Type	Description	Default
8705	0	R/W	PE01	Integer32	PE01	
.		.	.	.	.	.
.		.	.	.	.	.
8768		R/W	PE64	Integer32	PE64	

PNU	Sub	Range	Units	EEP-ROM	Parameter
8705	0	Refer to "MR-J4-_TM_ Servo Amplifier Instruction Manual".		Possible	PE01
.					.
8768					PE64

### (6) ServoParameter Objects PF (P8833 to 8896)

The values of the extension setting 3 parameters ([Pr. PF\_ \_]) can be obtained and set.

PNU	Sub	Access	Name	Data Type	Description	Default
8833	0	R/W	PF01	Integer32	PF01	
.		.	.	.	.	.
.		.	.	.	.	.
8896		R/W	PF64	Integer32	PF64	

PNU	Sub	Range	Units	EEP-ROM	Parameter
8833	0	Refer to "MR-J4-_TM_ Servo Amplifier Instruction Manual".		Possible	PF01
.					.
8896					PF64

## 9. OBJECT DICTIONARY

### (7) ServoParameter Objects PL (P9217 to 9264)

The values of the linear servo motor/DD motor setting parameters ([Pr. PL\_ \_]) can be obtained and set.

PNU	Sub	Access	Name	Data Type	Description	Default
9217	0	R/W	PL01	Integer32	PL01	
.		.	.	.	.	.
.		.	.	.	.	.
9264		R/W	PL48	Integer32	PL48	

PNU	Sub	Range	Units	EEP-ROM	Parameter
9217	0	Refer to "MR-J4-_TM_ Servo Amplifier Instruction Manual".		Possible	PL01
.					.
9264					PL48

### (8) ServoParameter Objects PT (P9345 to 9424)

The values of the positioning control parameters ([Pr. PT\_ \_]) can be obtained and set.

PNU	Sub	Access	Name	Data Type	Description	Default
9345	0	R/W	PT01	Integer32	PT01	
.		.	.	.	.	.
.		.	.	.	.	.
9424		R/W	PT80	Integer32	PT80	

PNU	Sub	Range	Units	EEP-ROM	Parameter
9345	0	Refer to "MR-J4-_TM_ Servo Amplifier Instruction Manual".		Possible	PT01
.					.
9424					PT80

### (9) ServoParameter Objects PN (P9601 to 9632)

The values of the network setting parameters ([Pr. PN\_ \_]) can be obtained and set.

PNU	Sub	Access	Name	Data Type	Description	Default
9601	0	R/W	PN01	Integer32	PN01	
.		.	.	.	.	.
.		.	.	.	.	.
9632		R/W	PN32	Integer32	PN32	

PNU	Sub	Range	Units	EEP-ROM	Parameter
9601	0	Refer to "MR-J4-_TM_ Servo Amplifier Instruction Manual".		Possible	PN01
.					.
9632					PN32

## 9. OBJECT DICTIONARY

### 9.3.3 Alarm Objects

#### (1) Alarm history newest (P10752)

The latest alarm information of the alarm history is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
10752	0	R	Alarm No.	Array [2] Unsigned32	The number of the alarm that has occurred is returned. The description is as follows. When no history exists, "0" is returned. Bit 0 to Bit 15: Alarm detail number Bit 16 to Bit 31: Alarm number If [AL. 16.3] occurs, "00160003h" is returned.	0
	1		Alarm time (Hour)		Alarm occurrence time is returned. When no history exists, "0" is returned. Unit: [hour]	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
10752	0	00000000h to FFFFFFFFh		Possible	
	1	00000000h to FFFFFFFFh	hour		

#### (2) Alarm history 1 (P10753) to Alarm history 15 (P10767)

The second-latest alarm information of the alarm history is returned. The description of each Sub Index is the same as that of P10753.

PNU	Sub	Access	Name	Data Type	Description	Default
10753 to 10767	0	R	Alarm No.	Array [2] Unsigned32	The number of the alarm that has occurred is returned. The description is as follows. When no history exists, "0" is returned. Bit 0 to Bit 15: Alarm detail number Bit 16 to Bit 31: Alarm number If [AL. 16.3] occurs, "00160003h" is returned.	0
	1		Alarm time (Hour)		Alarm occurrence time is returned. When no history exists, "0" is returned. Unit: [hour]	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
10753 to 10767	0	00000000h to FFFFFFFFh		Possible	
	1	00000000h to FFFFFFFFh	hour		

#### (3) Clear alarm history (P10816)

Writing "1EA5h" to this object clears the alarm history.

PNU	Sub	Access	Name	Data Type	Description	Default
10816	0	W	Clear alarm history	Unsigned16	Alarm history clear	

PNU	Sub	Range	Units	EEP-ROM	Parameter
10816	0	Refer to the text.		Impossible	

## 9. OBJECT DICTIONARY

### (4) Current alarm (P10817)

The number of the current alarm is returned. When no alarm has occurred, "00000000h" is returned.

The description of the values is as follows. If [AL. 16.3] occurs, "00160003h" is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
10817	0	R	Current alarm	Unsigned32	Current alarm Bit 0 to Bit 15: Alarm detail number Bit 16 to Bit 31: Alarm number	

PNU	Sub	Range	Units	EEP-ROM	Parameter
10817	0	00000000h to FFFFFFFFh		Impossible	

### (5) Parameter error number (P10820)

When [AL. 37 Parameter error] has occurred, the number of the parameters which cause the error is returned. Refer to Parameter error list (P10821) for the number of each parameter which causes the error.

PNU	Sub	Access	Name	Data Type	Description	Default
10820	0	R	Parameter error number	Unsigned16	Parameter error No.	

PNU	Sub	Range	Units	EEP-ROM	Parameter
10820	0	0000h to 01F4h		Impossible	

### (6) Parameter error list (P10821)

When [AL. 37 Parameter error] has occurred, the number of the parameter which causes the error is returned. For forms of parameter error Nos., refer to chapter 8.13. If [Pr. PC01] is an error factor, "0201h" is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
10821	0	R	No.1	Array [64] Unsigned16	Parameter error No. 1	
	1		No.2		Parameter error No. 2	
	2		No.3		Parameter error No. 3	
	61		No.62		Parameter error No. 62	
	62		No.63		Parameter error No. 63	
	63		No.64		Parameter error No. 64	

PNU	Sub	Range	Units	EEP-ROM	Parameter
10821	0	0000h to FFFFh		Impossible	
	1				
	2				
	61				
	62				
	63				

## 9. OBJECT DICTIONARY

### 9.3.4 Monitor Objects

#### (1) Cumulative feedback pulses (P11009)

The cumulative feedback pulses are returned. Writing "0000 1EA5h" to this object clears the cumulative feedback pulses.

PNU	Sub	Access	Name	Data Type	Description	Default
11009	0	R/W	Cumulative feedback pulses	Integer32	Cumulative feedback pulses	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11009	0	80000000h to 7FFFFFFFh	pulse	Impossible	

#### (2) Servo motor speed (P11010)

The servo motor speed is returned.

Unit: [r/min] ([mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
11010	0	R	Servo motor speed	Integer32	Servo motor speed	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11010	0	80000000h to 7FFFFFFFh	Refer to the text.	Impossible	

#### (3) Droop pulses (P11011)

The droop pulses (encoder unit) are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11011	0	R	Droop pulses	Integer32	Droop pulses (encoder unit)	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11011	0	80000000h to 7FFFFFFFh	pulse	Impossible	

#### (4) Cumulative command pulses (P11012)

The cumulative command pulses are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11012	0	R	Cumulative command pulses	Integer32	Cumulative command pulses	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11012	0	80000000h to 7FFFFFFFh	pulse	Impossible	

#### (5) Command pulse frequency (P11013)

The command pulse frequency is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11013	0	R	Command pulse frequency	Integer32	Command pulse frequency	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11013	0	80000000h to 7FFFFFFFh	kpulse/s	Impossible	

## 9. OBJECT DICTIONARY

### (6) Regenerative load ratio (P11016)

The regenerative load ratio is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11016	0	R	Regenerative load ratio	Unsigned16	Regenerative load ratio	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11016	0	0000h to FFFFh	%	Impossible	

### (7) Effective load ratio (P11017)

The effective load ratio is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11017	0	R	Effective load ratio	Unsigned16	Effective load ratio	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11017	0	0000h to FFFFh	%	Impossible	

### (8) Peak load ratio (P11018)

The peak load ratio is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11018	0	R	Peak load ratio	Unsigned16	Peak load ratio	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11018	0	0000h to FFFFh	%	Impossible	

### (9) Instantaneous torque (P11019)

The instantaneous torque is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11019	0	R	Instantaneous torque	Integer16	Instantaneous torque	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11019	0	8000h to 7FFFh	%	Impossible	

### (10) Within one-revolution position (P11020)

The position within one-revolution is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11020	0	R	Within one-revolution position	Integer32	Position within one-revolution	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11020	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (11) ABS counter (P11021)

The ABS counter is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11021	0	R	ABS counter	Integer32	ABS counter	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11021	0	80000000h to 7FFFFFFFh	pulse	Impossible	

## 9. OBJECT DICTIONARY

### (12) Load inertia moment ratio (P11022)

The load to motor inertia ratio is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11022	0	R	Load inertia moment ratio	Unsigned16	Load to motor inertia ratio	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11022	0	0000h to FFFFh	0.01 times	Impossible	

### (13) Bus voltage (P11023)

The bus voltage is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11023	0	R	Bus voltage	Unsigned16	Bus voltage	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11023	0	0000h to FFFFh	V	Impossible	

### (14) Load-side cumulative feedback pulses (P11024)

The load-side cumulative feedback pulses (load-side encoder unit) are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11024	0	R	Load-side cumulative feedback pulses	Integer32	Load-side cumulative feedback pulses (load-side encoder unit)	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11024	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (15) Load-side droop pulses (P11025)

The load-side droop pulses are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11025	0	R	Load-side droop pulses	Integer32	Load-side droop pulses	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11025	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (16) Load-side encoder information 1 Z-phase counter (P11026)

The load-side encoder information 1 is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11026	0	R	Load-side encoder information 1 Z-phase counter	Integer32	Load-side encoder information 1	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11026	0	80000000h to 7FFFFFFFh	pulse	Impossible	

## 9. OBJECT DICTIONARY

### (17) Load-side encoder information 2 (P11027)

The load-side encoder information 2 is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11027	0	R	Load-side encoder information 2	Integer32	Load-side encoder information 2	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11027	0	80000000h to 7FFFFFFFh	rev	Impossible	

### (18) Temperature of motor thermistor (P11031)

The temperature of servo motor thermistor is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11031	0	R	Temperature of motor thermistor	Integer16	Servo motor thermistor temperature	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11031	0	8000h to 7FFFh	°C	Impossible	

### (19) Motor-side cumu. feedback pulses (before gear) (P11032)

The cumulative feedback pulses are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11032	0	R	Motor-side cumu. feedback pulses (before gear)	Integer32	Cumulative feedback pulses	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11032	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (20) Electrical angle (P11033)

The electrical angle is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11033	0	R	Electrical angle	Integer32	Electrical angle	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11033	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (21) Motor-side/load-side position deviation (P11043)

The servo motor-side/load-side position deviation is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11043	0	R	Motor-side/load-side position deviation	Integer32	Servo motor-side/load-side position deviation	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11043	0	80000000h to 7FFFFFFFh	pulse	Impossible	

## 9. OBJECT DICTIONARY

### (22) Motor-side/load-side speed deviation (P11044)

The servo motor-side/load-side speed deviation is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11044	0	R	Motor-side/load-side speed deviation	Integer32	Servo motor-side/load-side speed deviation	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11044	0	8000000h to 7FFFFFFh	r/min	Impossible	

### (23) Internal temperature of encoder (P11045)

The internal temperature of encoder is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11045	0	R	Internal temperature of encoder	Integer16	Internal temperature of encoder	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11045	0	8000h to 7FFFh	°C	Impossible	

### (24) Settling time (P11046)

The settling time is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11046	0	R	Settling time	Integer16	Settling time	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11046	0	8000h to 7FFFh	ms	Impossible	

### (25) Oscillation detection frequency (P11047)

The oscillation detection frequency is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11047	0	R	Oscillation detection frequency	Integer16	Oscillation detection frequency	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11047	0	8000h to 7FFFh	Hz	Impossible	

### (26) Number of tough drive operations (P11048)

The number of tough drive operations is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11048	0	R	Number of tough drive operations	Unsigned16	Number of tough drive operations	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11048	0	0000h to FFFFh	number of times	Impossible	

## 9. OBJECT DICTIONARY

### (27) Unit power consumption (P11053)

The unit power consumption is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11053	0	R	Unit power consumption	Integer16	Unit power consumption	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11053	0	8000h to 7FFFh	W	Impossible	

### (28) Unit total power consumption (P11054)

The unit total power consumption is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11054	0	R	Unit total power consumption	Integer32	Unit total power consumption	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11054	0	80000000h to 7FFFFFFFh	Wh	Impossible	

### (29) Alarm Monitor 1 Cumulative feedback pulses (P11137)

The cumulative feedback pulses at alarm occurrence are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11137	0	R	Alarm Monitor 1 Cumulative feedback pulses	Integer32	Cumulative feedback pulses at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11137	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (30) Alarm Monitor 2 Alarm Monitor 2 Servo motor speed (P11138)

The servo motor speed at alarm occurrence is returned.

Unit: [r/min] ([mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
11138	0	R	Alarm Monitor 2 Servo motor speed	Integer32	Servo motor speed at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11138	0	80000000h to 7FFFFFFFh	Refer to the text.	Impossible	

### (31) Alarm Monitor 3 Droop pulses (P11139)

The droop pulses at alarm occurrence are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11139	0	R	Alarm Monitor 3 Droop pulses	Integer32	Droop pulses at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11139	0	80000000h to 7FFFFFFFh	pulse	Impossible	

## 9. OBJECT DICTIONARY

### (32) Alarm Monitor 4 Cumulative command pulses (P11140)

The cumulative command pulses (encoder unit) at alarm occurrence are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11140	0	R	Alarm Monitor 4 Cumulative command pulses	Integer32	Cumulative command pulses (encoder unit) at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11140	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (33) Alarm Monitor 5 Command pulse frequency (P11141)

The command pulse frequency at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11141	0	R	Alarm Monitor 5 Command pulse frequency	Integer32	Command pulse frequency at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11141	0	80000000h to 7FFFFFFFh	kpulse/s	Impossible	

### (34) Alarm Monitor 8 Regenerative load ratio (P11144)

The regenerative load ratio at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11144	0	R	Alarm Monitor 8 Regenerative load ratio	Unsigned16	Regenerative load ratio at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11144	0	0000h to FFFFh	%	Impossible	

### (35) Alarm Monitor 9 Effective load ratio (P11145)

The effective load ratio at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11145	0	R	Alarm Monitor 9 Effective load ratio	Unsigned16	Effective load ratio at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11145	0	0000h to FFFFh	%	Impossible	

### (36) Alarm Monitor 10 Peak load ratio (P11146)

The peak load ratio at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11146	0	R	Alarm Monitor 10 Peak load ratio	Unsigned16	Peak load ratio at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11146	0	0000h to FFFFh	%	Impossible	

## 9. OBJECT DICTIONARY

### (37) Alarm Monitor 11 Instantaneous torque (P11147)

The instantaneous torque at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11147	0	R	Alarm Monitor 11 Instantaneous torque	Integer16	Instantaneous torque at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11147	0	8000h to 7FFFh	%	Impossible	

### (38) Alarm Monitor 12 Within one-revolution position (P11148)

The position within one-revolution at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11148	0	R	Alarm Monitor 12 Within one-revolution position	Integer32	Position within one-revolution at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11148	0	8000000h to 7FFFFFFFh	pulse	Impossible	

### (39) Alarm Monitor 13 ABS counter (P11149)

The ABS counter at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11149	0	R	Alarm Monitor 13 ABS counter	Integer32	ABS counter at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11149	0	8000000h to 7FFFFFFFh	rev	Impossible	

### (40) Alarm Monitor 14 Load inertia moment ratio (P11150)

The load to motor inertia ratio at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11150	0	R	Alarm Monitor 14 Load inertia moment ratio	Unsigned16	Load to motor inertia ratio at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11150	0	0000h to FFFFh	0.1times	Impossible	

### (41) Alarm Monitor 15 Bus voltage (P11151)

The bus voltage at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11151	0	R	Alarm Monitor 15 Bus voltage	Integer32	Bus voltage at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11151	0	8000000h to 7FFFFFFFh	V	Impossible	

## 9. OBJECT DICTIONARY

### (42) Alarm Monitor 16 Load-side cumulative feedback pulses (P11152)

The load-side cumulative feedback pulses at alarm occurrence are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11152	0	R	Alarm Monitor 16 Load-side cumulative feedback pulses	Integer32	Load-side cumulative feedback pulses at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11152	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (43) Alarm Monitor 17 Load-side droop pulses (P11153)

The load-side droop pulses (load-side encoder unit) at alarm occurrence are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11153	0	R	Alarm Monitor 17 Load-side droop pulses	Integer32	Load-side droop pulses (load-side encoder unit) at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11153	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (44) Alarm Monitor 18 Load-side encoder information 1 Z-phase counter (P11153)

The load-side encoder information 1 at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11154	0	R	Alarm Monitor 18 Load-side encoder information 1 Z-phase counter	Integer32	Load-side encoder information 1 at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11154	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (45) Alarm Monitor 19 Load-side encoder information 2 (P11155)

The load-side encoder information 2 at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11155	0	R	Alarm Monitor 19 Load-side encoder information 2	Integer32	Load-side encoder information 2 at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11155	0	80000000h to 7FFFFFFFh	rev	Impossible	

### (46) Alarm Monitor 23 Temperature of motor thermistor (P11159)

The temperature of servo motor thermistor at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11159	0	R	Alarm Monitor 23 Temperature of motor thermistor	Integer32	Temperature of servo motor thermistor at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11159	0	80000000h to 7FFFFFFFh	°C	Impossible	

## 9. OBJECT DICTIONARY

### (47) Alarm Monitor 24 Motor-side cumu. feedback pulses (before gear) (P11160)

The cumulative feedback pulses (servo motor-side unit) at alarm occurrence are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11160	0	R	Alarm Monitor 24 Motor-side cumu. feedback pulses (before gear)	Integer32	Cumulative feedback pulses (servo motor-side unit) at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11160	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (48) Alarm Monitor 25 Electrical angle (P11161)

The electrical angle at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11161	0	R	Alarm Monitor 25 Electrical angle	Integer32	Electrical angle at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11161	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (49) Alarm Monitor 35 Motor-side/load-side position deviation (P11171)

The motor-side/load-side position deviation at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11171	0	R	Alarm Monitor 35 Motor-side/load-side position deviation	Integer32	Motor-side/load-side position deviation at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11171	0	80000000h to 7FFFFFFFh	pulse	Impossible	

### (50) Alarm Monitor 36 Motor-side/load-side speed deviation (P11172)

The servo motor-side/load-side speed deviation at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11172	0	R	Alarm Monitor 36 Motor-side/load-side speed deviation	Integer32	Motor-side/load-side speed deviation at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11172	0	80000000h to 7FFFFFFFh	r/min	Impossible	

### (51) Alarm Monitor 37 Internal temperature of encoder (P11173)

The internal temperature of encoder at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11173	0	R	Alarm Monitor 37 Internal temperature of encoder	Integer32	Internal temperature of encoder at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11173	0	80000000h to 7FFFFFFFh	°C	Impossible	

## 9. OBJECT DICTIONARY

### (52) Alarm Monitor 38 Settling time (P11174)

The settling time at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11174	0	R	Alarm Monitor 38 Settling time	Integer32	Settling time at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11174	0	80000000h to 7FFFFFFFh	ms	Impossible	

### (53) Alarm Monitor 39 Oscillation detection frequency (P11175)

The oscillation detection frequency at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11175	0	R	Alarm Monitor 39 Oscillation detection frequency	Integer32	Oscillation detection frequency at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11175	0	80000000h to 7FFFFFFFh	Hz	Impossible	

### (54) Alarm Monitor 40 Number of tough drive operations (P11176)

The number of tough drive operations at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11176	0	R	Alarm Monitor 40 Number of tough drive operations	Integer32	The number of tough drive operations at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11176	0	80000000h to 7FFFFFFFh	number of times	Impossible	

### (55) Alarm Monitor 45 Unit power consumption (P11181)

The unit power consumption at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11181	0	R	Alarm Monitor 45 Unit power consumption	Integer32	Unit power consumption at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11181	0	80000000h to 7FFFFFFFh	W	Impossible	

### (56) Alarm Monitor 46 Unit total power consumption (P11182)

The unit total power consumption at alarm occurrence is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11182	0	R	Alarm Monitor 46 Unit total power consumption	Integer32	Unit total power consumption at alarm occurrence	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11182	0	80000000h to 7FFFFFFFh	Wh	Impossible	

## 9. OBJECT DICTIONARY

### 9.3.5 Manufacturer Specific Control Objects

#### (1) Machine diagnostic status (P11296)

The current status of machine diagnostic can be obtained. Refer to section 8.9 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11296	0	R	Machine diagnostic status	Unsigned16	Machine diagnostic status	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11296	0	Refer to the text.		Impossible	

The machine diagnostic status is returned. The description is as follows.

Bit	Description
0 to 3	Friction estimation status at forward rotation 0: Friction is being estimated. (normal) 1: Estimation is completed. (normal) 2: The servo motor may rotate in one direction too frequently. (warning) 3: The servo motor speed may too slow for friction estimation. (warning) 4: The change in the servo motor speed may be small for friction estimation. (warning) 5: The acceleration/deceleration time constants may be too short for friction estimation. (warning) 6: The operation time may not be enough. (warning) 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.
4 to 7	Friction estimation status at reverse rotation 0: Friction is being estimated. (normal) 1: Estimation is completed. (normal) 2: The servo motor may rotate in one direction too frequently. (warning) 3: The servo motor speed may too slow for friction estimation. (warning) 4: The change in the servo motor speed may be small for friction estimation. (warning) 5: The acceleration/deceleration time constants may be too short for friction estimation. (warning) 6: The operation time may not be enough. (warning) 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.
8 to 11	Vibration estimation status 0: During estimation 1: Estimation is completed.
12 to 15	(reserved) The value at reading is undefined.

#### (2) Coulomb friction torque in positive direction (P11297)

Static friction at forward rotation torque can be obtained. Refer to section 8.9 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11297	0	R	Coulomb friction torque in positive direction	Integer16	Coulomb friction torque in positive direction	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11297	0	Refer to the text.	0.1%	Impossible	

## 9. OBJECT DICTIONARY

### (3) Friction torque at rated speed in positive direction (P11298)

Kinetic friction at forward rotation torque (at rated speed) can be obtained. Refer to section 8.9 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11298	0	R	Friction torque at rated speed in positive direction	Integer16	Friction torque at rated speed in positive direction	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11298	0	Refer to the text.	0.1%	Impossible	

### (4) Coulomb friction torque in negative direction (P11299)

Static friction at reverse rotation torque can be obtained. Refer to section 8.9 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11299	0	R	Coulomb friction torque in negative direction	Integer16	Coulomb friction torque in negative direction	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11299	0	Refer to the text.	0.1%	Impossible	

### (5) Friction torque at rated speed in negative direction (P11300)

Kinetic friction at reverse rotation torque (at rated speed) can be obtained. Refer to section 8.9 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11300	0	R	Friction torque at rated speed in negative direction	Integer16	Friction torque at rated speed in negative direction	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11300	0	Refer to the text.	0.1%	Impossible	

### (6) Oscillation frequency during motor stop (P11301)

Vibration frequency at stop/servo-lock can be obtained. Refer to section 8.9 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11301	0	R	Oscillation frequency during motor stop	Integer16	Oscillation frequency during motor stop	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11301	0	Refer to the text.	1 Hz	Impossible	

### (7) Vibration level during motor stop (P11302)

Vibration level at stop/servo-lock can be obtained. Refer to section 8.9 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11302	0	R	Vibration level during motor stop	Integer16	Vibration level during motor stop	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11302	0	Refer to the text.	0.1%	Impossible	

## 9. OBJECT DICTIONARY

### (8) Oscillation frequency during motor operating (P11303)

Vibration frequency during operation can be obtained. Refer to section 8.9 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11303	0	R	Oscillation frequency during motor operating	Integer16	Oscillation frequency during motor operating	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11303	0	Refer to the text.	1 Hz	Impossible	

### (9) Vibration level during motor operating (P11304)

Vibration level during operation can be obtained. Refer to section 8.9 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11304	0	R	Vibration level during motor operating	Integer16	Vibration level during motor operating	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11304	0	Refer to the text.	0.1%	Impossible	

### (10) Control DI 1 (P11521)

Set control commands to control the servo amplifier. For details, refer to section 5.3.1 (2).

PNU	Sub	Access	Name	Data Type	Description	Default
11521	0	R/W	Control DI 1	Unsigned16	Control DI 1	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11521	0	Refer to the text.		Impossible	

### (11) Control DI 2 (P11522)

Set control commands to control the servo amplifier. For details, refer to section 5.3.1 (3).

PNU	Sub	Access	Name	Data Type	Description	Default
11522	0	R/W	Control DI 2	Unsigned16	Control DI 2	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11522	0	Refer to the text.		Impossible	

### (12) Control DI 3 (P11523)

Set control commands to control the servo amplifier. For details, refer to section 5.3.1 (4).

PNU	Sub	Access	Name	Data Type	Description	Default
11523	0	R/W	Control DI 3	Unsigned16	Control DI 3	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11523	0	Refer to the text.		Impossible	

## 9. OBJECT DICTIONARY

### (13) Status DO 1 (P11537)

The servo status is returned. Refer to section 5.3.2 (3) for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11537	0	R	Status DO 1	Unsigned16	Status DO 1	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11537	0	Refer to the text.		Impossible	

### (14) Status DO 2 (P11538)

The servo status is returned. Refer to section 5.3.2 (4) for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11538	0	R	Status DO 2	Unsigned16	Status DO 2	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11538	0	Refer to the text.		Impossible	

### (15) Status DO 3 (P11539)

The servo status is returned. Refer to section 5.3.2 (5) for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11539	0	R	Status DO 3	Unsigned16	Status DO 3	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11539	0	Refer to the text.		Impossible	

### (16) Status DO 5 (P11541)

The servo status is returned. Refer to section 5.3.2 (6) for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11541	0	R	Status DO 5	Unsigned16	Status DO 5	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11541	0	Refer to the text.		Impossible	

### (17) Velocity limit value (P11552)

Set the speed limit value for the profile torque mode (tq).

Unit: [0.01 r/min] ([0.01 mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
11552	0	R/W	Velocity limit value	Unsigned32	Speed limit value	50000

PNU	Sub	Range	Units	EEP-ROM	Parameter
11552	0	00000000h to permissible speed	Vel units	Possible	PT67

## 9. OBJECT DICTIONARY

### (18) Motor rated speed (P11560)

The servo motor rated speed is returned.

Unit: [r/min] ([mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
11560	0	R	Motor rated speed	Unsigned32	Servo motor rated speed	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11560	0	00000000h to FFFFFFFFh	r/min	Impossible	

### (19) Manufacturer Device Name 2 (P11568)

The model name of the MR-J4-\_TM\_ servo amplifier is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11568	0	R	Manufacturer Device Name 2	VisibleString	Model name of the MR-J4-_TM_ servo amplifier	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11568	0			Impossible	

### (20) Manufacturer Hardware Version 2 (P11569)

The hardware version of the MR-J4-\_TM\_ servo amplifier is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11569	0	R	Manufacturer Hardware Version 2	VisibleString	Hardware version of the MR-J4-_TM_ servo amplifier	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11569	0			Impossible	

### (21) Manufacturer Software Version 2 (P11570)

The software version of the MR-J4-\_TM\_ servo amplifier is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11570	0	R	Manufacturer Software Version 2	VisibleString	Software version of the MR-J4-_TM_ servo amplifier	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11570	0	—	—	Impossible	—

### (22) Serial Number 2 (P11571)

The serial number of the MR-J4-\_TM\_ servo amplifier is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11571	0	R	Serial Number 2	VisibleString	Serial number of the MR-J4-_TM_ servo amplifier	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11571	0			Impossible	

## 9. OBJECT DICTIONARY

### (23) User parameter configuration (P11572)

The parameters whose symbols are preceded by \* are not automatically enabled. Writing "1EA5" to this parameter enables the parameters. This operation can be executed only when the controller is other than the RUN state. Refer to section 8.14.1 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
11572	0	R/W	User parameter configuration	Unsigned16	Parameter enabling	1

PNU	Sub	Range	Units	EEP-ROM	Parameter
11572	0	Refer to the text.		Impossible	

### (24) Encoder status (P11573)

The encoder status is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11573	0	R	Encoder status1	Array [2]	Encoder status 1	
	1		Encoder status2	Unsigned32	Encoder status 2	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11573	0	00000000h to 00000001h		Impossible	
	1	00000000h to 00000007h			

The following shows status of Sub 0 and 1.

Sub	Description
Encoder status1	This shows load side for the fully closed loop system and shows motor side or operation side for the others. Bit 0: Whether the servo amplifier is used in an absolute position detection system or not is outputted. (Incremental system: Off, Absolute position detection system: On)
Encoder status2	(Not supported)

### (25) One-touch tuning mode (P11600)

Set this for one-touch tuning mode. Setting this starts one-touch tuning.

PNU	Sub	Access	Name	Data Type	Description	Default
11600	0	R/W	One-touch tuning mode	Unsigned8	One-touch tuning mode setting	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11600	0	00h to 03h		Impossible	

The following settings are available.

Setting value	Description
0	During one-touch tuning stop
1	Basic mode
2	High mode
3	Low mode

## 9. OBJECT DICTIONARY

### (26) One-touch tuning status (P11601)

The one-touch tuning status is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11601	0	R	One-touch tuning status	Unsigned8	One-touch tuning status	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11601	0	00h to 64h	%	Impossible	

### (27) One-touch tuning Stop (P11602)

One-touch tuning stop command is issued. Writing "1EA5h" stops one-touch tuning.

PNU	Sub	Access	Name	Data Type	Description	Default
11602	0	W	One-touch tuning Stop	Unsigned16	Stop of one-touch tuning	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11602	0	0000h, 1EA5h		Impossible	

### (28) One-touch tuning Clear (P11603)

The parameter changed in one-touch tuning is returned to the value before the change.

PNU	Sub	Access	Name	Data Type	Description	Default
11603	0	W	One-touch tuning Clear	Unsigned16	The parameter changed in one-touch tuning is returned to the value before the change.	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11603	0	0000h to 001h		Impossible	

The following settings are available.

Setting value	Description
0000	Restores the initial value.
0001	Restores the value before one-touch tuning.

### (29) One-touch tuning Error Code (P11604)

An error code of the one-touch tuning is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
11604	0	R	One-touch tuning Error Code	Unsigned16	One-touch tuning error code	

PNU	Sub	Range	Units	EEP-ROM	Parameter
11604	0	0000h to C0Fh		Impossible	

## 9. OBJECT DICTIONARY

The following error codes are available.

Value	Description
0000	Finished normally
C000	Tuning canceled
C001	Overshoot exceeded
C002	Servo-off during tuning
C003	Control mode error
C004	Time-out
C005	Inertia estimation failed
C00F	One-touch tuning disabled

### 9.3.6 PDS Control Objects

#### (1) Error code (P24639)

The latest error No. that occurred after the power on is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24639	0	R	Error code	Unsigned16	The latest error No. that occurred after the power on	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24639	0	0000h to FFFFh		Impossible	

#### (2) Controlword (P24640)

Set control commands to control the servo amplifier. Refer to section 5.3.1 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
24640	0	R/W	Controlword	Unsigned16	Controlword	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24640	0	Refer to the text.		Impossible	

#### (3) Statusword (P24641)

The servo status is returned. Refer to section 5.3.2 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
24641	0	R	Statusword	Unsigned16	Statusword	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24641	0	Refer to the text.		Impossible	

#### (4) Quick stop option code (P24666)

Set how to decelerate the servo motor to a stop at QuickStop reception. Refer to section 8.10 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
24666	0	R/W	Quick stop option code	Integer16	How to decelerate the servo motor to a stop at QuickStop reception	2

PNU	Sub	Range	Units	EEP-ROM	Parameter
24666	0	0002h to 0002h		possible	PT68

## 9. OBJECT DICTIONARY

### (5) Halt option code (P24669)

Set how to decelerate the servo motor to a stop at Halt reception. Refer to section 8.11 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
24669	0	R/W	Halt option code	Integer16	How to decelerate the servo motor to a stop at Halt reception	1

PNU	Sub	Range	Units	EEP-ROM	Parameter
24669	0	0001h to 0001h		possible	PT68

### (6) Modes of operation (P24672)

PNU	Sub	Access	Name	Data Type	Description	Default
24672	0	R/W	Modes of operation	Integer8	Set the control mode.	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24672	0	Refer to the following table.		Impossible	

Setting value	Description
0	No mode change/No mode assigned
1	Profile position mode (pp)
3	Profile velocity mode (pv)
4	Profile torque mode (tq)
6	Homing mode (hm)

### (7) Modes of operation display (P24673)

PNU	Sub	Access	Name	Data Type	Description	Default
24673	0	R	Modes of operation display	Integer8	The current control mode is returned.	Refer to the text.

PNU	Sub	Range	Units	EEP-ROM	Parameter
24673	0	Refer to the following table.		Impossible	

Setting value	Description
0	No mode assigned
1	Profile position mode (pp)
3	Profile velocity mode (pv)
4	Profile torque mode (tq)
6	Homing mode (hm)

### (8) Supported drive modes (P25858)

PNU	Sub	Access	Name	Data Type	Description	Default
25858	0	R	Supported drive modes	Unsigned32	The supported control mode is returned.	0000002Dh

PNU	Sub	Range	Units	EEP-ROM	Parameter
25858	0	0000002Dh to 0000002Dh		Impossible	

Bit	Description
0	Profile position mode (pp)
2	Profile velocity mode (pv)
3	Profile torque mode (tq)
5	Homing mode (hm)

## 9. OBJECT DICTIONARY

### 9.3.7 Position Control Function Objects

#### (1) Position actual internal value (P24675)

The current position is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24675	0	R	Position actual internal value	Integer32	Current position	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24675	0	80000000h to 7FFFFFFFh	inc	Impossible	

#### (2) Position actual value (P24676)

The current position in the command unit is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24676	0	R	Position actual value	Integer32	Current position in the command unit	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24676	0	80000000h to 7FFFFFFFh	pos units	Impossible	

#### (3) Following error window (P24677)

In the profile position mode (pp), when the time set with Following error time out (P24678) has elapsed with the number of droop pulses exceeding the setting value of this parameter, Bit 13 of Statusword (P24641) is turned on. When "FFFFFFFh" is set, Bit 13 of Statusword (P24641) is always off.

PNU	Sub	Access	Name	Data Type	Description	Default
24677	0	R/W	Following error window	Unsigned32	Position error threshold for judging Following error	00C00000h

PNU	Sub	Range	Units	EEP-ROM	Parameter
24677	0	00000000h to FFFFFFFFh	pos units	possible	PC67/PC68

#### (4) Following error time out (P24678)

Refer to Following error window (P24677).

PNU	Sub	Access	Name	Data Type	Description	Default
24678	0	R/W	Following error time out	Unsigned 16	Following error judging time	10

PNU	Sub	Range	Units	EEP-ROM	Parameter
24678	0	0000h to FFFFh	ms	possible	PC69

## 9. OBJECT DICTIONARY

### (5) Position window (P24679)

In the profile position mode (pp), when the time set with Position window time (P24680) has elapsed with the number of droop pulses equal to or lower than the setting value of this parameter, Bit 10 of Statusword (P24641) is turned on. When "FFFFFFFFh" is set, Bit 10 of Statusword (P24641) is always on.

PNU	Sub	Access	Name	Data Type	Description	Default
24679	0	R/W	Position window	Unsigned32	Position error threshold for judging Target reached	100

PNU	Sub	Range	Units	EEP-ROM	Parameter
24679	0	00000000h to FFFFFFFFh	pos units	possible	PC70

### (6) Position window time (P24680)

Refer to Position window (P24679).

PNU	Sub	Access	Name	Data Type	Description	Default
24680	0	R/W	Position window time	Unsigned16	Target reached judgment time	10

PNU	Sub	Range	Units	EEP-ROM	Parameter
24680	0	0000h to FFFFh	ms	Possible	PC71

### (7) Positioning option code (P24818)

PNU	Sub	Access	Name	Data Type	Description	Default
24818	0	R/W	Positioning option code	Unsigned16	Positioning option code	0000h

PNU	Sub	Range	Units	EEP-ROM	Parameter
24818	0	0000h to 00C0h	-	Possible	PT03

Set the profile position mode. The description of this object is as follows.

Bit	Description	Default
0 to 1	00b: The positioning is performed with the relative position from the internal absolute target position. 01b: The positioning is performed with the relative position from Position demand actual value (P24828). (Not compatible) (Note) 10b: The positioning is performed with the relative position from Position actual value (P24676). (Not compatible) (Note) 11b: reserved	00b
2 to 3	00b: A new value of Target position (P24698), Profile velocity (P24705), and Acceleration are promptly reflected. 01b: The current positioning continues to reach the target position. Then a new setting of Target position (P24698), Profile velocity (P24705), and Acceleration is reflected. (Not compatible) (Note) 10b: reserved 11b: reserved	00b
4 to 5	Reserved	0
6 to 7	00b: The servo motor rotates to the target position in a direction specified with a sign of the position data. 01b: The servo motor rotates in the address decreasing direction regardless of the sign of the position data. 10b: The servo motor rotates in the address increasing direction regardless of the sign of the position data. 11b: The servo motor rotates from the current position to the target position in the shorter direction. If the distances from the current position to the target position are the same for CCW and CW, the servo motor rotates in the CCW direction.	00b
8 to 15	Reserved	0

Note. This is not supported by the MR-J4-\_TM\_ servo amplifier.

## 9. OBJECT DICTIONARY

### (8) Following error actual value (P24820)

The droop pulses are returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24820	0	R	Following error actual value	Integer32	Droop pulses	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24820	0	80000000h to 7FFFFFFFh	pos units	Impossible	

### (9) Control effort (P24826)

The speed command is returned.

Unit: [0.01 r/min] ([0.01 mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
24826	0	R	Control effort	Integer32	Speed command	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24826	0	80000000h to 7FFFFFFFh	vel units	Impossible	

### 9.3.8 Profile Velocity Mode Objects

#### (1) Velocity demand value (P24683)

The speed command is returned.

Unit: [0.01 r/min] ([0.01 mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
24683	0	R	Velocity demand value	Integer32	Speed command	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24683	0	80000000h to 7FFFFFFFh	vel units	Impossible	

#### (2) Velocity actual value (P24684)

The current speed is returned.

Unit: [0.01 r/min] ([0.01 mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
24684	0	R	Velocity actual value	Integer32	Current speed	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24684	0	80000000h to 7FFFFFFFh	vel units	Impossible	

## 9. OBJECT DICTIONARY

### (3) Velocity window (P24685)

In the profile velocity mode (pv), when the time set with Velocity window time (P24686) has elapsed with the current speed equal to or lower than the setting value of this parameter, Bit 10 of Statusword (P24641) is turned on.

Unit: [0.01 r/min] ([0.01 mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
24685	0	R/W	Velocity window	Unsigned16	Speed error threshold for judging Target reached	2000

PNU	Sub	Range	Units	EEP-ROM	Parameter
24685	0	0000h to FFFFh	vel units	Possible	PC72

### (4) Velocity window time (P24686)

Refer to Velocity window (P24685).

PNU	Sub	Access	Name	Data Type	Description	Default
24686	0	R/W	Velocity window time	Unsigned16	Target reached judgment time	10

PNU	Sub	Range	Units	EEP-ROM	Parameter
24686	0	0000h to FFFFh	ms	Possible	PC77

### (5) Velocity threshold (P24687)

In the profile velocity mode (pv), when the time set with Velocity threshold time (P24688) has elapsed with the current speed exceeding the setting value of this PROFIdrive parameter, Bit 12 of Statusword (P24641) is turned off.

Unit: [0.01 r/min] ([0.01 mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
24687	0	R/W	Velocity threshold	Unsigned16	Zero speed threshold for judging Speed	5000

PNU	Sub	Range	Units	EEP-ROM	Parameter
24687	0	0000h to FFFFh	vel units	Possible	PC65

### (6) Velocity threshold time (P24688)

Refer to Velocity threshold (P24687).

PNU	Sub	Access	Name	Data Type	Description	Default
24688	0	R/W	Velocity threshold time	Unsigned16	Speed judgment time	10

PNU	Sub	Range	Units	EEP-ROM	Parameter
24688	0	0000h to FFFFh	ms	Possible	PC66

### (7) Target velocity (P24831)

Set the speed command used in the profile velocity mode (pv).

Unit: [0.01 r/min] ([0.01 mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
24831	0	R/W	Target velocity	Integer32	Speed command	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24831	0	80000000h to 7FFFFFFFh	vel units	Impossible	

## 9. OBJECT DICTIONARY

### 9.3.9 Profile Torque Mode Objects

#### (1) Target torque (P24689)

Set the torque command used in the profile torque mode (tq).

PNU	Sub	Access	Name	Data Type	Description	Default
24689	0	R/W	Target torque	Integer16	Torque command	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24689	0	8000h to 7FFFh	Per thousand of rated torque	Impossible	

#### (2) Max torque (P24690)

The maximum torque of the servo motor is returned. The values notified by this PROFIdrive parameter are the maximum current and feedback value and may not match the maximum torque mentioned in "Servo Motor Instruction Manual (Vol. 3)".

PNU	Sub	Access	Name	Data Type	Description	Default
24690	0	R/W	Max torque	Unsigned16	Maximum torque	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24690	0	0000h to FFFFh	Per thousand of rated torque	Impossible	

#### (3) Torque demand (P24692)

The torque command is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24692	0	R	Torque demand	Integer16	Torque command	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24692	0	8000h to 7FFFh	Per thousand of rated torque	Impossible	

#### (4) Torque actual value (P24695)

The current torque is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24695	0	R	Torque actual value	Integer16	Current torque	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24695	0	8000h to 7FFFh	Per thousand of rated torque	Impossible	

## 9. OBJECT DICTIONARY

### (5) Torque slope (P24711)

Set the variation per second of the torque command used in the profile torque mode. When 0 is set, the setting value is invalid and the torque command is input with step input.

PNU	Sub	Access	Name	Data Type	Description	Default
24711	0	R/W	Torque slope	Unsigned32	Variation of the torque command per second	0000000h

PNU	Sub	Range	Units	EEP-ROM	Parameter
24711	0	0000000h to 00989680h (10000000)	Per thousand of rated torque per second	Possible	PT53

### (6) Torque profile type (P24712)

Set the torque command pattern. Refer to section 6.5 (1) for details.

PNU	Sub	Access	Name	Data Type	Description	Default
24712	0	R/W	Torque profile type	Integer16	Torque command pattern	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24712	0	0000h to 0000h		Impossible	

### (7) Positive torque limit value (P24800)

You can limit the torque or thrust generated by the servo motor. Set the limit value of the torque of the servo motor in the CCW power running or CW regeneration, or the limit value of the thrust of the linear servo motor in the positive direction power running or negative direction regeneration. Set this object to 0 to generate no torque or thrust.

PNU	Sub	Access	Name	Data Type	Description	Default
24800	0	R/W	Positive torque limit value	Unsigned16	Forward rotation torque limit	10000

PNU	Sub	Range	Units	EEP-ROM	Parameter
24800	0	0000h to 2710h	Per thousand of rated torque	Possible	PA11 (POL disabled) PA12 (POL enabled)

### (8) Negative torque limit value (P24801)

You can limit the torque or thrust generated by the servo motor. Set the limit value of the torque of the servo motor in the CW power running or CCW regeneration, or the limit value of the thrust of the linear servo motor in the negative direction power running or positive direction regeneration. Set this object to 0 to generate no torque or thrust.

PNU	Sub	Access	Name	Data Type	Description	Default
24801	0	R/W	Negative torque limit value	Unsigned16	Reverse rotation torque limit	10000

PNU	Sub	Range	Units	EEP-ROM	Parameter
24801	0	0000h to 2710h	Per thousand of rated torque	Possible	PA12 (POL disabled) PA11 (POL enabled)

## 9. OBJECT DICTIONARY

### 9.3.10 Profile Position Mode Objects

#### (1) Target position (P24698)

Set the position command used in the profile position mode (pp). The settable values vary depending on the setting of command unit [Pr. PT01] (\_ x \_).

PNU	Sub	Access	Name	Data Type	Description	Default
24698	0	R/W	Target position	Integer32	Position command	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24698	0	Refer to the text.	pos units	Impossible	

[Pr. PT01] setting	Range
_ 2 _ _ (degree)	FFFA81C0h to 00057E40h (-360000 to 360000)
_ 3 _ _ (pulse)	FFF0BDC1h to 000F423Fh (-999999 to 999999)

#### (2) Position range limit (P24699)

Set the range for limiting the command position. The settable values vary depending on the setting of [Pr. PT01].

PNU	Sub	Access	Name	Data Type	Description	Default
24699	0	R/W	Min position range limit	Array [2]	Minimum value of the position range limit	
	1		Max position range limit	Integer32	Maximum value of the position range limit	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24699	0	Refer to the text.	pos unit	Impossible	
	1				

[Pr. PT01] setting	Range
_ 3 _ _ (pulse)	Min: 80000000h, Max: 7FFFFFFFh (Min: -2147483648, Max: 2147483647)
_ 2 _ _ (degree)	Min: 00000000h, Max: 00057E3Fh (Min: 0, Max: 359999)

#### (3) Software position limit (P24701)

Set the range for limiting the command position. Target position (P24698) is limited within the range between Min position limit (P24701.0) and Max position limit (P24701.1). When the set value of Min position limit (P24701.0) is equal to or greater than the set value of Max position limit (P24701.1), the function of Software position limit (P24701) is disabled.

PNU	Sub	Access	Name	Data Type	Description	Default
24701	0	R/W	Min position limit	Array [2]	Lower software position limit	0
	1	R/W	Max position limit	Integer32	Upper software position limit	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24701	0	80000000h to 7FFFFFFFh	pos units	Possible	PT17/PT18
	1				PT15/PT16

## 9. OBJECT DICTIONARY

### (4) Max profile velocity (P24703)

Set the speed limit value for the profile position mode (pp) and profile velocity mode (pv). When a value exceeding this PROFIdrive parameter is set to Target velocity (P24831) or Profile velocity (P24705), the speed is limited with the value of this PROFIdrive parameter.

PNU	Sub	Access	Name	Data Type	Description	Default
24703	0	R/W	Max profile velocity	Unsigned32	Speed limit value	2000000

PNU	Sub	Range	Units	EEP-ROM	Parameter
24703	0	00000000h to 001E8480h (2000000)	vel units	Possible	PT66

### (5) Max motor speed (P24704)

The maximum speed (value of permissible instantaneous speed) of the servo motor is returned. Operation cannot be performed at a speed exceeding the speed set with this PROFIdrive parameter. Unit: [r/min] ([mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
24704	0	R/W	Max motor speed	Unsigned32	Servo motor maximum speed	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24704	0	00000000h to FFFFFFFFh	Refer to the text.	Impossible	

### (6) Profile velocity (P24705)

Set the command speed in the profile position mode (pp). Set a value within the range between 0 and permissible speed. Unit: [r/min] ([mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
24705	0	R/W	Profile velocity	Unsigned32	Speed command	10000

PNU	Sub	Range	Units	EEP-ROM	Parameter
24705	0	Refer to the text.	vel units	Possible	PT65

### (7) Profile acceleration (P24707)

Set the acceleration time constant in the profile position mode (pp) and the profile velocity mode (pv). Set a time for the servo motor to reach the rated speed. The settable values vary depending on the control mode.

PNU	Sub	Access	Name	Data Type	Description	Default
24707	0	R/W	Profile acceleration	Unsigned32	Acceleration time constant	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24707	0	Refer to the text.	ms	Possible	PT49

Control mode	Range
Profile position mode (pp)	0 to 20000
Profile velocity mode (pv)	0 to 50000

## 9. OBJECT DICTIONARY

### (8) Profile deceleration (P24708)

Set the deceleration time constant in the profile position mode (pp) and the profile velocity mode (pv).  
Set a time for the servo motor to reach the rated speed. The settable values vary depending on the control mode.

PNU	Sub	Access	Name	Data Type	Description	Default
24708	0	R/W	Profile deceleration	Unsigned32	Deceleration time constant	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24708	0	Refer to the text.	ms	Possible	PT50

Control mode	Range
Profile position mode (pp)	0 to 20000
Profile velocity mode (pv)	0 to 50000

### (9) Quick stop deceleration (P24709)

Set a deceleration time constant for the Quick stop function. Set a time for the servo motor to stop from the rated speed. When 0 is set, the operation is performed with 100 ms.

PNU	Sub	Access	Name	Data Type	Description	Default
24709	0	R/W	Quick stop deceleration	Unsigned32	Deceleration time constant	100

PNU	Sub	Range	Units	EEP-ROM	Parameter
24709	0	00000000h to 00004E20h (20000)	ms	Possible	PC24

### (10) Motion profile type (P24710)

Set the acceleration/deceleration pattern in the profile position mode (pp). The description is as follows.

PNU	Sub	Access	Name	Data Type	Description	Default
24710	0	R/W	Motion profile type	Integer16	Acceleration/deceleration pattern generation	-1

PNU	Sub	Range	Units	EEP-ROM	Parameter
24710	0	FFFFh to FFFFh		Impossible	

#### Acceleration/deceleration type selection

Setting value	Description
-1	S-pattern
0	Linear ramp (not compatible) (Note)
1	Sin <sup>2</sup> ramp (not compatible) (Note)
2	Jerk-free ramp (not compatible) (Note)
3	Jerk-limited ramp (not compatible) (Note)

Note. This is not supported by the MR-J4-\_TM\_ servo amplifier.

## 9. OBJECT DICTIONARY

### 9.3.11 Homing Mode Objects

#### (1) Home offset (P24700)

The home position is returned. Only reading the value is available. Do not perform writing because doing so causes an error.

PNU	Sub	Access	Name	Data Type	Description	Default
24700	0	R/W	Home offset	Integer32	Home position	-1

PNU	Sub	Range	Units	EEP-ROM	Parameter
24700	0	80000000h to 7FFFFFFFh	pos units	Possible	

#### (2) Homing method (P24728)

Set a home position return type. Refer to section 6.6 (4) for the settable values.

PNU	Sub	Access	Name	Data Type	Description	Default
24728	0	R/W	Homing method	Integer8	Home position return type	37

PNU	Sub	Range	Units	EEP-ROM	Parameter
24728	0	D5h (-43) to 25h (37)		Possible	PT45

#### (3) Homing speeds (P24729)

Set the servo motor speed at home position return.

Set the servo motor speed at home position return for Speed during search for switch (P24729.0).

Unit: [0.01 r/min] ([0.01 mm/s] when a linear servo motor is used)

Set the creep speed after proximity dog at home position return for Speed during search for zero (P24729.1).

Unit: [0.01 r/min] ([0.01 mm/s] when a linear servo motor is used)

PNU	Sub	Access	Name	Data Type	Description	Default
24729	0	R/W	Speed during search for switch	Array [2] Integer32	Home position return speed	10000
	1		Speed during search for zero		Creep speed	1000

PNU	Sub	Range	Units	EEP-ROM	Parameter
24729	0	00000000h to permissible speed	vel units	Possible	PT05
	1				PT06

#### (4) Homing acceleration (P24730)

Set the acceleration/deceleration time constants at home position return. Set a time for the servo motor to reach the rated speed.

PNU	Sub	Access	Name	Data Type	Description	Default
24730	0	R/W	Homing acceleration	Integer32	Home position return acceleration/deceleration time constant	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24730	0	00000000h to 00004E20h (20000)	ms	Possible	PT56

## 9. OBJECT DICTIONARY

### (5) Supported homing method (P24803)

The supported home position return type is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24803	0	R	1st supported homing method	Array [39] Integer8	1st supported homing method	37
	1	R	2nd supported homing method		2nd supported homing method	35
	2	R	3rd supported homing method		3rd supported homing method	34
	3	R	4th supported homing method		4th supported homing method	33
	4	R	5th supported homing method		5th supported homing method	28
	5	R	6th supported homing method		6th supported homing method	27
	6	R	7th supported homing method		7th supported homing method	24
	7	R	8th supported homing method		8th supported homing method	23
	8	R	9th supported homing method		9th supported homing method	22
	9	R	10th supported homing method		10th supported homing method	21
	10	R	11th supported homing method		11th supported homing method	20
	11	R	12th supported homing method		12th supported homing method	19
	12	R	13th supported homing method		13th supported homing method	12
	13	R	14th supported homing method		14th supported homing method	11
	14	R	15th supported homing method		15th supported homing method	8
	15	R	16th supported homing method		16th supported homing method	7
	16	R	17th supported homing method		17th supported homing method	6
	17	R	18th supported homing method		18th supported homing method	5
	18	R	19th supported homing method		19th supported homing method	4
	19	R	20th supported homing method		20th supported homing method	3
	20	R	21st supported homing method		21st supported homing method	-1
	21	R	22nd supported homing method		22nd supported homing method	-2
	22	R	23rd supported homing method		23rd supported homing method	-3
	23	R	24th supported homing method		24th supported homing method	-4
	24	R	25th supported homing method		25th supported homing method	-6
	25	R	26th supported homing method		26th supported homing method	-7
	26	R	27th supported homing method		27th supported homing method	-8
	27	R	28th supported homing method		28th supported homing method	-9
	28	R	29th supported homing method		29th supported homing method	-10

# 9. OBJECT DICTIONARY

PNU	Sub	Access	Name	Data Type	Description	Default
24803	29	R	30th supported homing method	Array [39] Integer8	30th supported homing method	-11
	30	R	31st supported homing method		31st supported homing method	-33
	31	R	32nd supported homing method		32nd supported homing method	-34
	32	R	33rd supported homing method		33rd supported homing method	-36
	33	R	34th supported homing method		34th supported homing method	-38
	34	R	35th supported homing method		35th supported homing method	-39
	35	R	36th supported homing method		36th supported homing method	-40
	36	R	37th supported homing method		37th supported homing method	-41
	37	R	38th supported homing method		38th supported homing method	-42
	38	R	39th supported homing method		39th supported homing method	-43

PNU	Sub	Range	Units	EEP-ROM	Parameter
24803	0	25h (37)		Impossible	
	1	23h (35)			
	2	22h (34)			
	3	21h (33)			
	4	1Ch (28)			
	5	1Bh (27)			
	6	18h (24)			
	7	17h (23)			
	8	16h (22)			
	9	15h (21)			
	10	14h (20)			
	11	13h (19)			
	12	0Ch (12)			
	13	0Bh (11)			
	14	08h (8)			
	15	07h (7)			
	16	06h (6)			
	17	05h (5)			
	18	04h (4)			
	19	03h (3)			
	20	FFh (-1)			
	21	FEh (-2)			
	22	FDh (-3)			
	23	FCh (-4)			
	24	FAh (-6)			
	25	F9h (-7)			
	26	F8h (-8)			
	27	F7h (-9)			
	28	F6h (-10)			
	29	F5h (-11)			
	30	DFh (-33)			
	31	DEh (-34)			
	32	DCh (-36)			

## 9. OBJECT DICTIONARY

PNU	Sub	Range	Units	EEP-ROM	Parameter
24803	33	DAh (-38)		Impossible	
	34	D9h (-39)			
	35	D8h (-40)			
	36	D7h (-41)			
	37	D6h (-42)			
	38	D5h (-43)			

### 9.3.12 Factor Group Objects

#### (1) Polarity (P24702)

The rotation direction selection can be set. Only 00h, C0h, or E0h can be set. Values other than 00h, C0h, and E0h cannot be set.

Refer to section 8.5 for details.

PNU	Sub	Access	Name	Data Type	Description	Default
24702	0	R/W	Polarity	Unsigned8	Rotation direction	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24702	0	Refer to the text.		Possible	PA14 (bit 6, 7) PC29 (bit 5)

#### (2) Position encoder resolution (P24719)

Encoder resolution is returned with Encoder increments (P24719.0). When the linear servo motor is connected, the virtual resolution per revolution is returned. When the fully closed loop system is used, the number of load-side pulses per servo motor-side revolution is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24719	0	R/W	Encoder increments	Array [2]	Encoder increments	
	1	R/W	Motor revolutions	Unsigned32	Motor revolutions	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24719	0	00000000h to FFFFFFFFh	inc	Impossible	
	1	00000001h to 00000001h	rev		

#### (3) Gear ratio (P24721)

Set the electronic gear. Refer to [Pr. PA06] for the settable values. In the cyclic synchronous mode, always set "1" for Motor revolutions (P24721.0) and Shaft revolutions (P24721.1).

PNU	Sub	Access	Name	Data Type	Description	Default
24721	0	R/W	Motor revolutions	Array [2]	Motor revolutions	1
	1	R/W	Shaft revolutions	Unsigned32	Shaft revolutions	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24721	0	00000001h to 00FFFFFFh (16777215)	rev	Possible	PA06
	1				PA07

## 9. OBJECT DICTIONARY

### (4) Feed constant (P24722)

Travel distance per revolution of output shaft is set. Refer to the section of each control mode for details.

PNU	Sub	Access	Name	Data Type	Description	Default
24722	0	R/W	Feed	Array [2]	Travel distance setting	1
	1	R/W	Shaft revolutions	Unsigned32	Number of servo motor shaft revolutions	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24722	0	Refer to the text.	pos units	Impossible	
	1		rev		

### (5) SI unit position (P24744)

The SI position unit is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24744	0	R/W	SI unit position	Unsigned32	SI position unit	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24744	0	Refer to the following table.	pos units	Impossible	-

[Pr. PT01] setting	Value
_ 2 _ _ (degree)	FD410000 (0.001 degree)
_ 3 _ _ (pulse)	00C10000 (1 pulse)

### (6) SI unit velocity (P24745)

The SI unit velocity is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24745	0	R/W	SI unit velocity	Unsigned32	SI unit velocity	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24745	0	FB010300h (0.01 mm/s), FEB44700h (0.01 r/min)	vel units	Impossible	

## 9. OBJECT DICTIONARY

### 9.3.13 Optional application FE Objects

#### (1) Digital inputs (P24829)

The on/off status of the DI signal is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24829	0	R	Digital inputs	Unsigned32	DI signal status	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24829	0	00000000h to 03300007h		Impossible	

Bit	Description
0	Negative limit switch • [Pr. PA14] = 0 0: LSN (Reverse rotation stroke end) off 1: LSN (Reverse rotation stroke end) on • [Pr. PA14] = 1 0: LSP (Forward rotation stroke end) off 1: LSP (Forward rotation stroke end) on
1	Positive limit switch • [Pr. PA14] = 0 0: LSP (Forward rotation stroke end) off 1: LSP (Forward rotation stroke end) on • [Pr. PA14] = 1 0: LSN (Reverse rotation stroke end) off 1: LSN (Reverse rotation stroke end) on
2	home switch 0: DOG (Proximity dog) off 1: DOG (Proximity dog) on
3 to 19	(reserved) (Note)
20	DI4 0: TPR1 (Touch probe 1) off 1: TPR1 (Touch probe 1) on
21	DI5 0: TPR2 (Touch probe 2) off 1: TPR2 (Touch probe 2) on
22 to 23	(reserved) (Note)
24	Safe torque off 1 0: STO1 off 1: STO1 on
25	Safe torque off 2 0: STO2 off 1: STO2 on
26 to 31	(reserved) (Note)

Note. The values in bit 3 to 19, 22, 23, and 26 to 31 at reading are undefined.

### 9.3.14 Touch Probe Function Objects

#### (1) Details of Touch probe function (P24760)

Set the command for the touch probe function. Refer to section 8.6 (2) for details.

PNU	Sub	Access	Name	Data Type	Description	Default
24760	0	R/W	Touch probe function	Unsigned16	Settings such as enabling/disabling of the touch probe function and trigger conditions	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24760	0	0000h to FFFFh		Impossible	

## 9. OBJECT DICTIONARY

### (2) Touch probe status (P24761)

The status of the touch probe function is returned. Refer to section 8.6 (3) for details.

PNU	Sub	Access	Name	Data Type	Description	Default
24761	0	R	Touch probe status	Unsigned16	Status information of the touch probe function	

PNU	Sub	Range	Units	EEP-ROM	Parameter
24761	0	0000h to FFFFh		Impossible	

### (3) Touch probe pos1 pos value (P24762)

The position latched at the rising edge of touch probe 1 is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24762	0	R	Touch probe pos1 pos value	Integer32	Shows the rising edge position of Touch probe 1. (command unit)	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24762	0	80000000h to 7FFFFFFFh	pos units	Impossible	

### (4) Touch probe pos1 neg value (P24763)

The position latched at the falling edge of touch probe 1 is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24763	0	R	Touch probe pos1 neg value	Integer32	Shows the falling edge position of Touch probe 1. (command unit)	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24763	0	80000000h to 7FFFFFFFh	pos units	Impossible	

### (5) Touch probe pos2 pos value (P24764)

The position latched at the rising edge of touch probe 2 is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24764	0	R	Touch probe pos2 pos value	Lower software position limit	Shows the rising edge position of Touch probe 2. (command unit)	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24764	0	80000000h to 7FFFFFFFh	pos units	Impossible	

### (6) Touch probe pos2 neg value (P24765) (Drive Configuration Object)

The position latched at the falling edge of touch probe 2 is returned.

PNU	Sub	Access	Name	Data Type	Description	Default
24765	0	Get	Touch probe pos2 neg value	Lower software position limit	Shows the falling edge position of Touch probe 2. (command unit)	0

PNU	Sub	Range	Units	EEP-ROM	Parameter
24765	0	80000000h to 7FFFFFFFh	pos units	Impossible	

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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.

MODEL	
MODEL CODE	

# MITSUBISHI ELECTRIC CORPORATION

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